

2444/II or

ELECTRICAL REVIEW

ONE SHILLING

P. 58/50/I

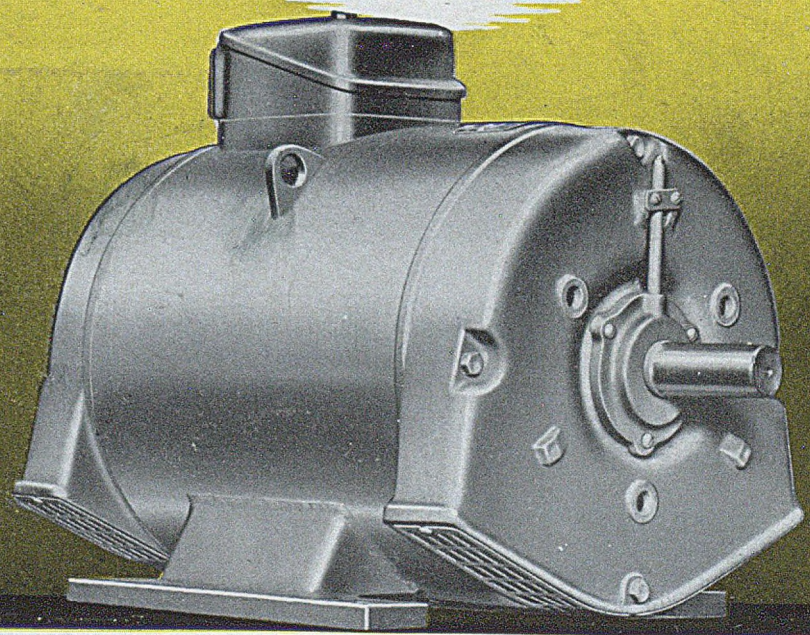
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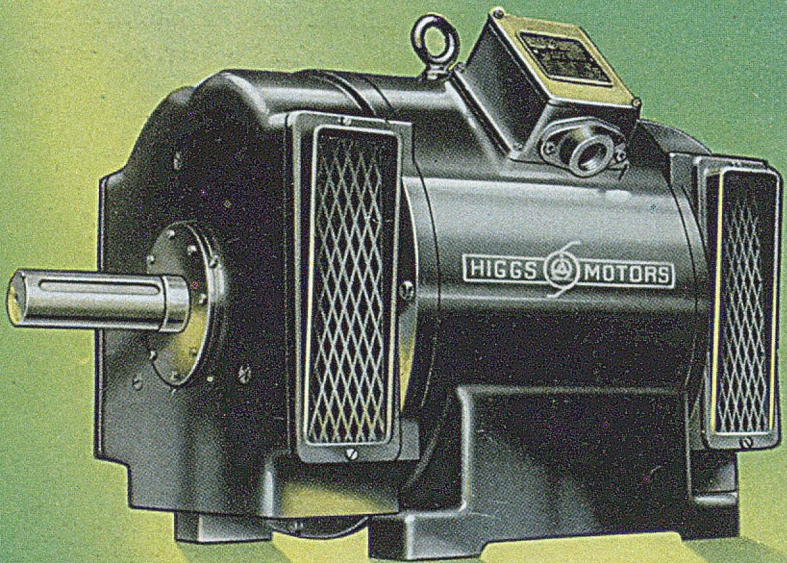
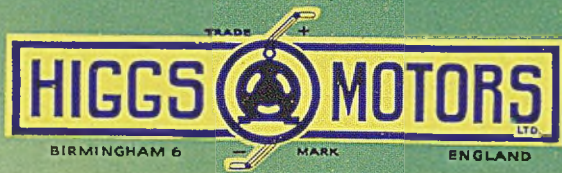
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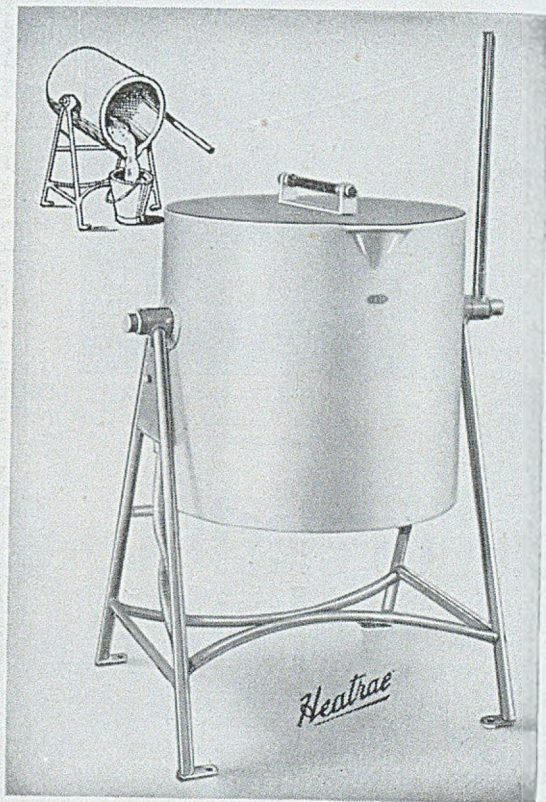
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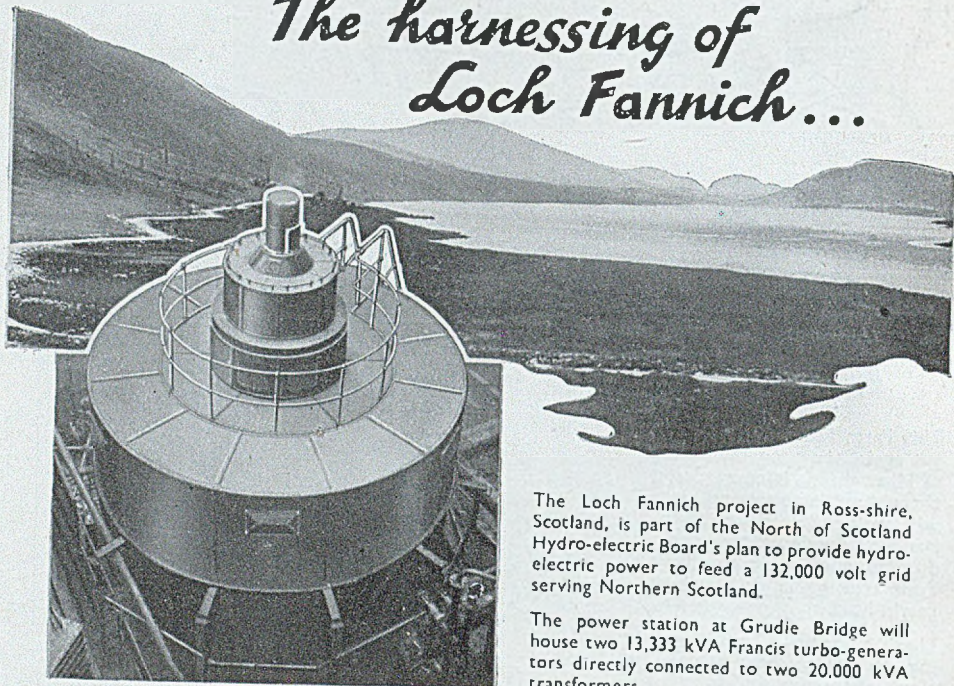


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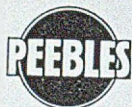
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The harnessing of Loch Fannich...



The Loch Fannich project in Ross-shire, Scotland, is part of the North of Scotland Hydro-electric Board's plan to provide hydro-electric power to feed a 132,000 volt grid serving Northern Scotland.

The power station at Grudie Bridge will house two 13,333 kVA Francis turbo-generators directly connected to two 20,000 kVA transformers.

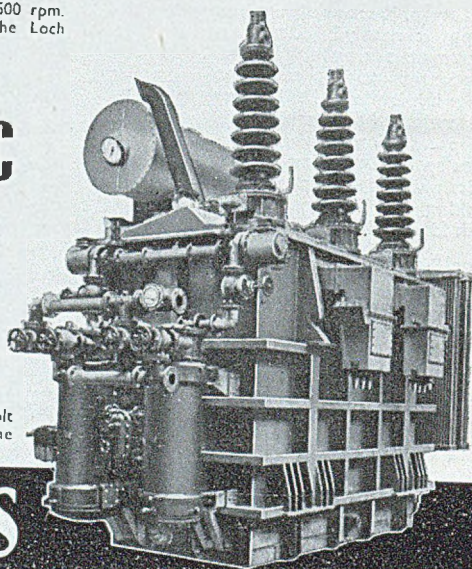


13,333 kVA, 11,000 volt, 500 rpm.
vertical generator for the Loch
Fannich scheme.

hydro-electric plant

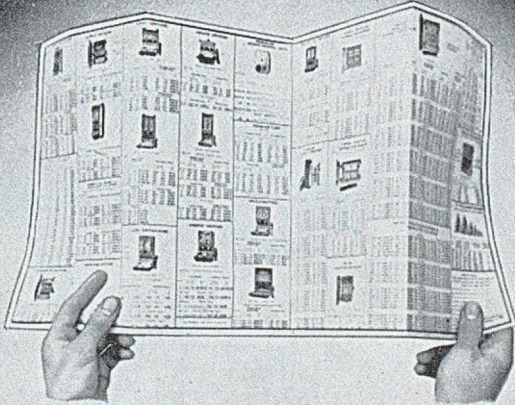
Bruce Peebles build large and small generators for all types of water turbines, and transformers up to the largest sizes for hydro-electric power distribution.

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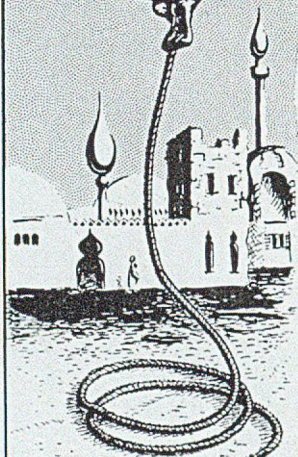
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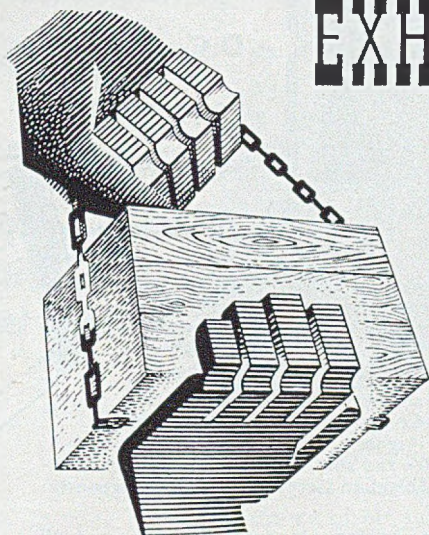


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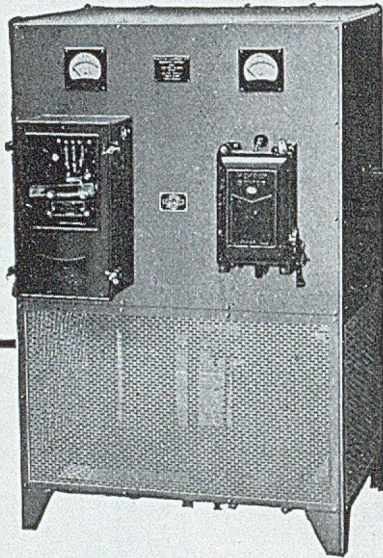
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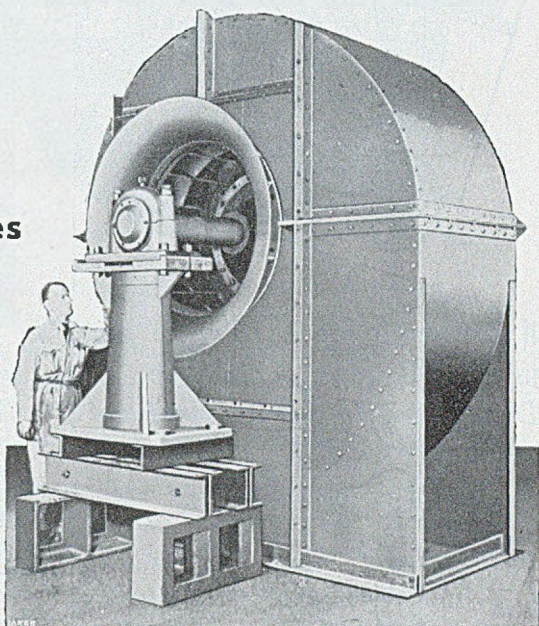
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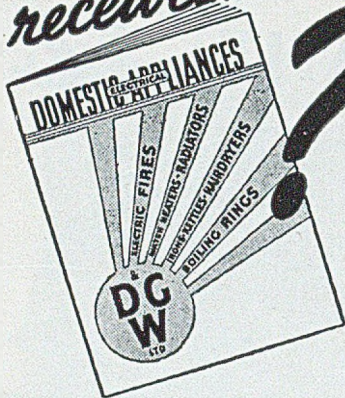
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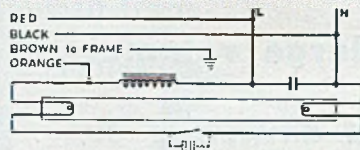
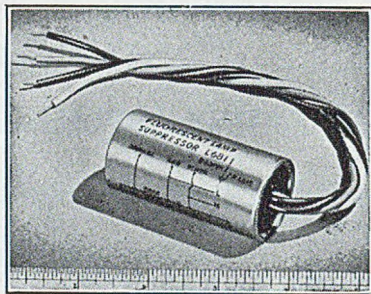
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FLUORESCENT LIGHTING

Interference with Radio and Television reception



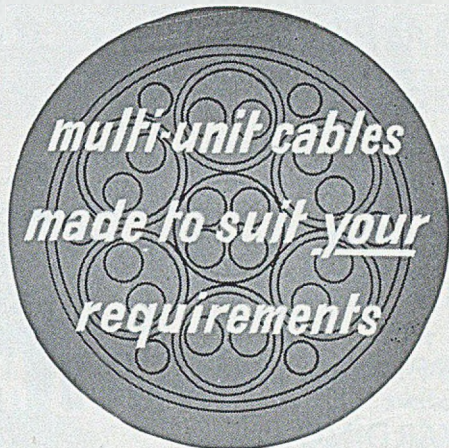
Fluorescent lighting brings with it a new form of interference which does not affect the tube as a source of light and may be severe on the broadcast frequency bands, decreasing fairly quickly above 2 Mc/s.

Television frequency bands are sometimes affected.

While only a relatively small proportion of fluorescent lamps produce interference, it is impossible to predict whether or not any particular tube will cause interference, or at what stage of its life the interference will manifest itself. It is not always present, e.g., it may stop temporarily if the tube is handled.

The "Belling-Lee" filter L.681, intended for use only where the tube and its ancillary equipment are combined in a single unit, has been specially designed to deal with this problem. It may be applied (as above) to the associated circuit of each tube, either by the manufacturer or by an engineer.

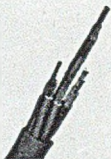
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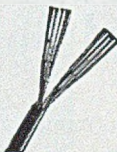
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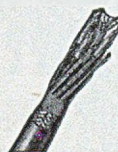
Write to us and let us assist you with your problems.



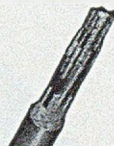
Multicore polythene-insulated and sheathed T/V Camera Cable.



Double-quad polythene-insulated audio-frequency cable.



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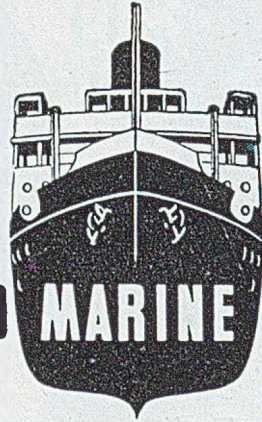
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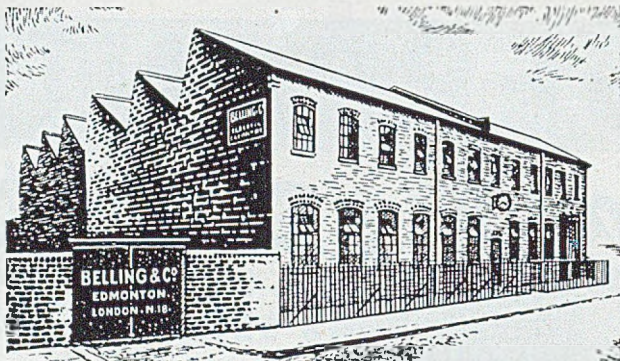
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1912



1950

Works at Derby Road with extension (3 front bays) completed

The Story of BELLING & Company Ltd. No. 6

The last chapter brought us to March 1915 and our Balance Sheet at that date. During the remainder of 1915 we took on much more war work, mainly heating and cooking equipment for submarines, glue pots, metal pots and many similar appliances for factories on war work; also a number of large baking and steaming ovens for Canteens.

By this time we had of course commenced a considerable amount of production work, instead of buying in and assembling. We also installed our own nickel plating plant to save delays. This was the first actual "process" we started.

It was during this year I took out my first patent on combined "griller-boilers." As everyone in the cooker trade knows, these are now used practically universally, and I feel a large amount of credit is due to us for starting the idea.

On looking through our 1915/16 catalogue, I see we illustrated our first heavy current plug and socket. This we were more or less forced into making, as when sending to see to complaints of our fires "not working" we usually found the trouble was that the wall plug and socket were more or less completely burnt out.

In due course we needed more room, and being on war work we were able to get our extension passed and built very quickly. During this time my office was a wooden shed in the yard, and as a result of damp and draughts I was unfortunately knocked out with double pneumonia for about

6 weeks. The Doctor gave most credit for pulling me through this illness to one of our fires, as it kept the room at a steady, constant temperature. In due course I was able to go down to Brighton to convalesce. Whilst there I met the late Mr. Christie, who was Chief Engineer of the Corporation. They helped us along no end in our early days, and as a matter of fact, ever since. Back at work again I found the extension nearly finished, and our war work which went on during 1916/17 going forward rapidly, and this continued also during 1917/18. The war being over I started on a new catalogue for the winter, 1918/19 which contained a large number of fires and in addition, hotplates, breakfast cookers, immersion heaters, water urns, irons, steamers, grillers, bath water heaters, twin-bar kettles and our very well known "No. 7" boilers. Of this latter we have since sold many hundreds of thousands, and as a very practical appliance it holds its own today—almost as it was. Our electric iron was quite modern too—shaped handle, thumb rest and streamlined body.

The next chapter tells how we were soon swamped out with fire orders again and how we changed back to peacetime production.

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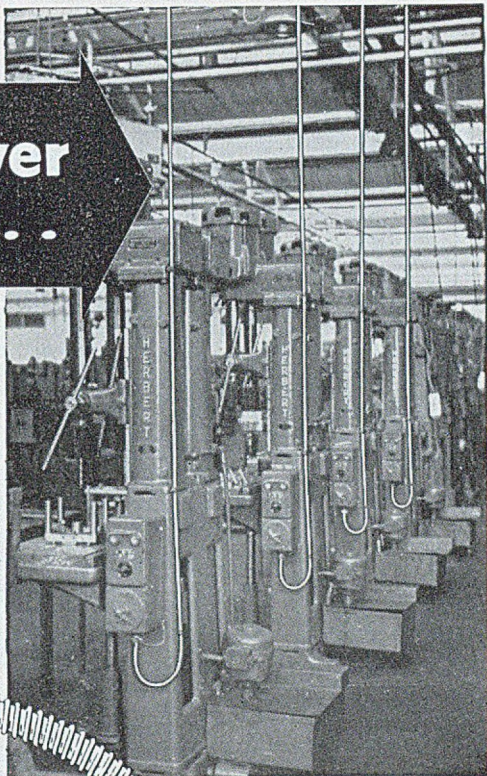
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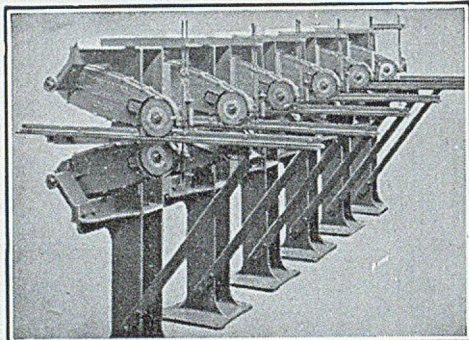
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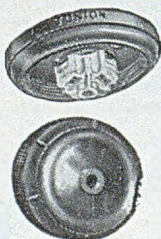
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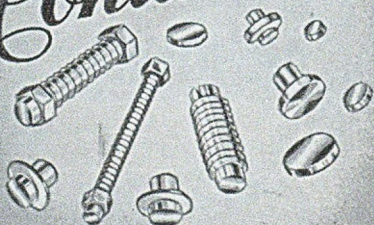
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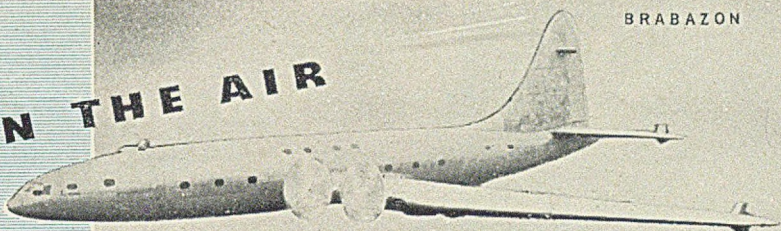
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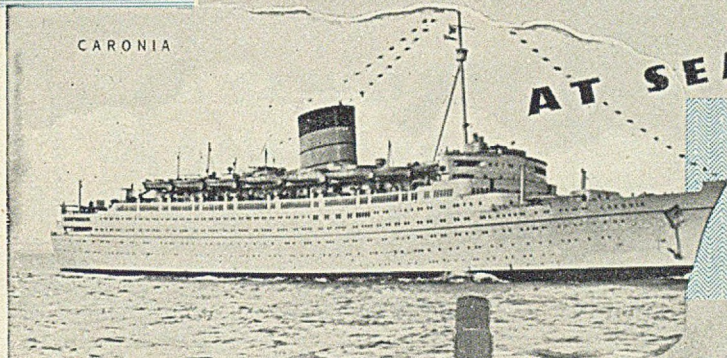
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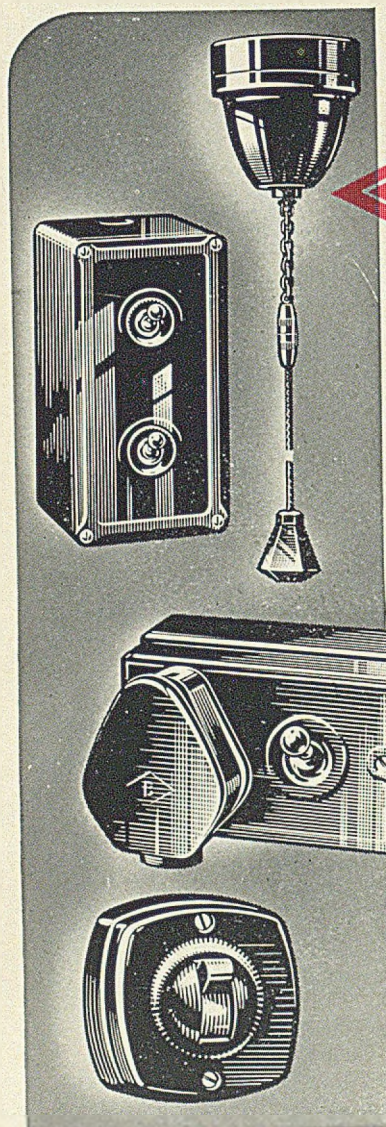
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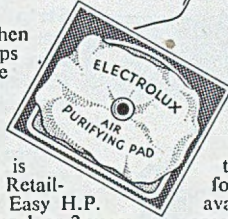
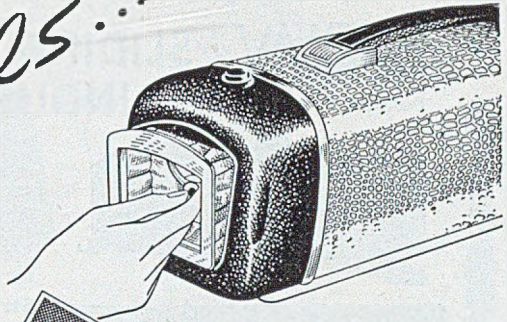
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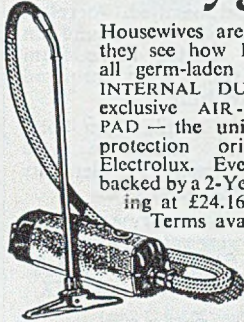
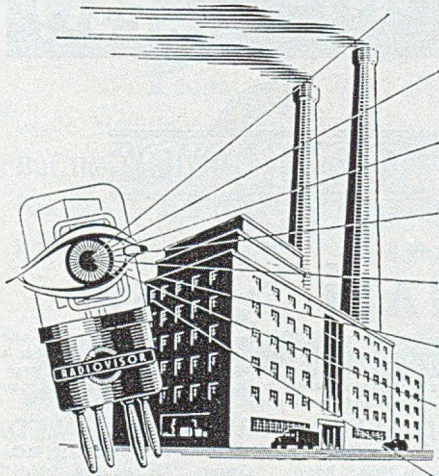


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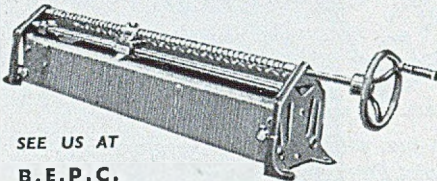
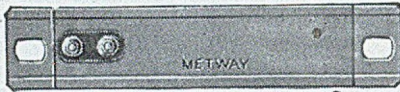
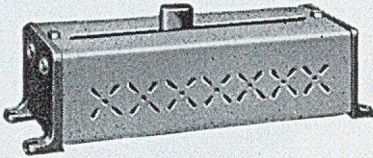
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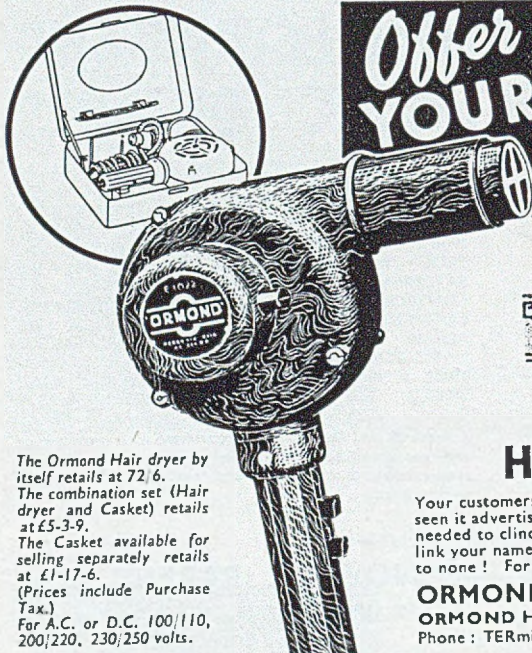
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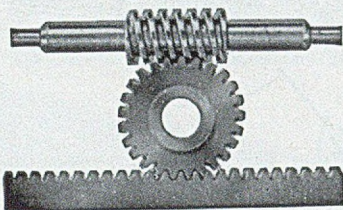


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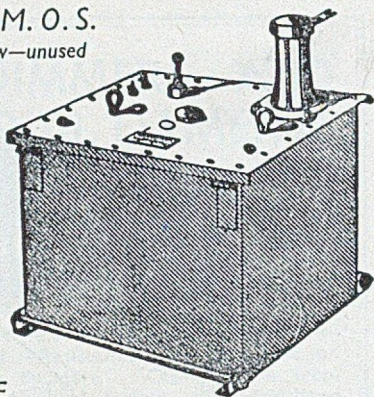
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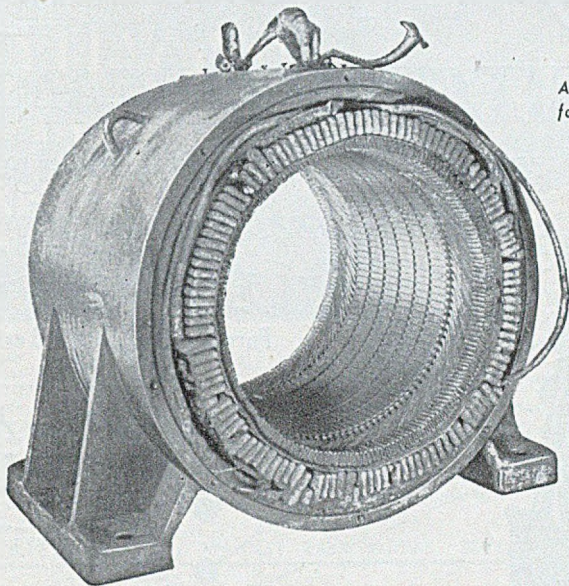
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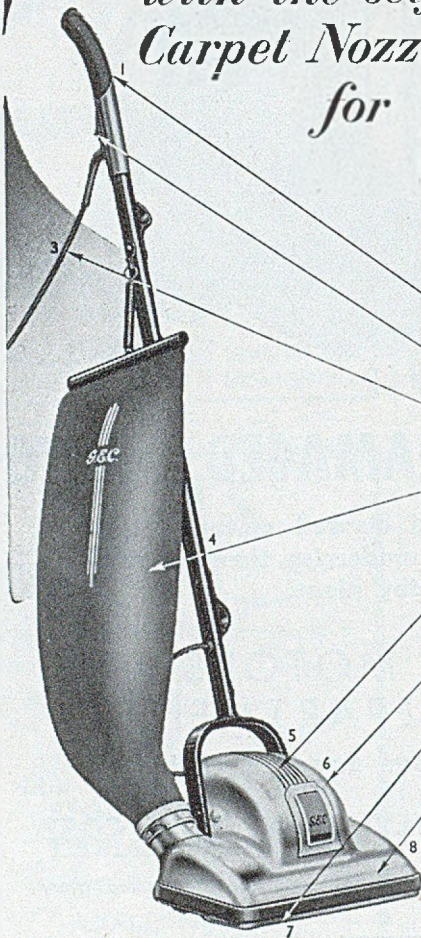
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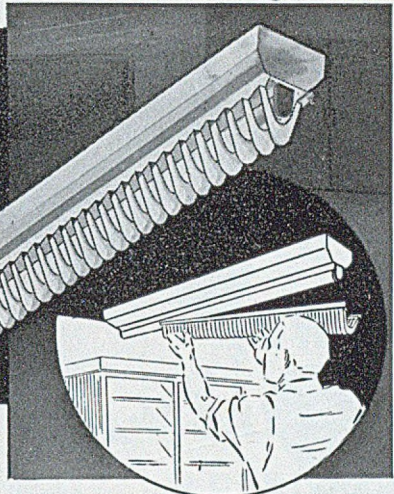
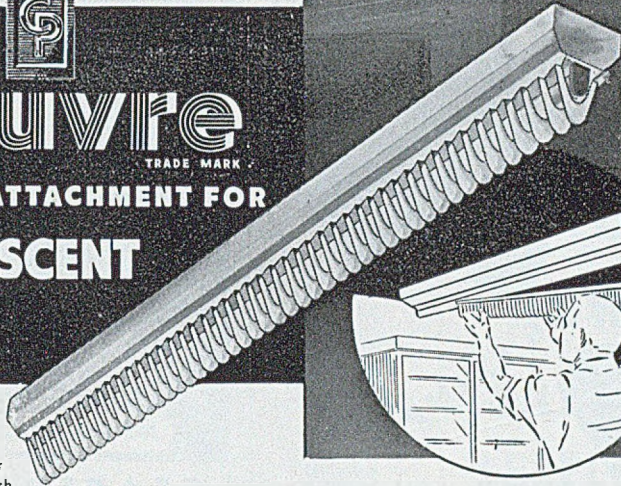
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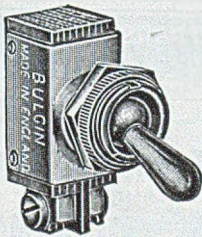
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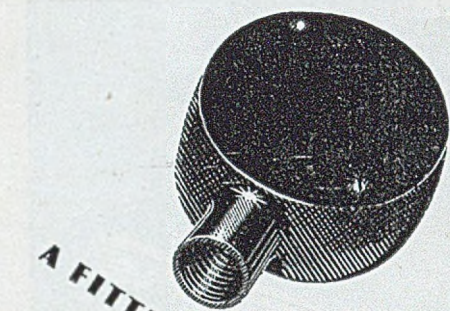
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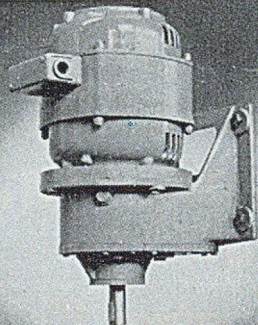
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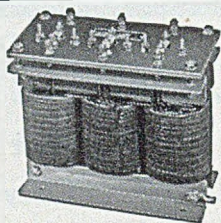
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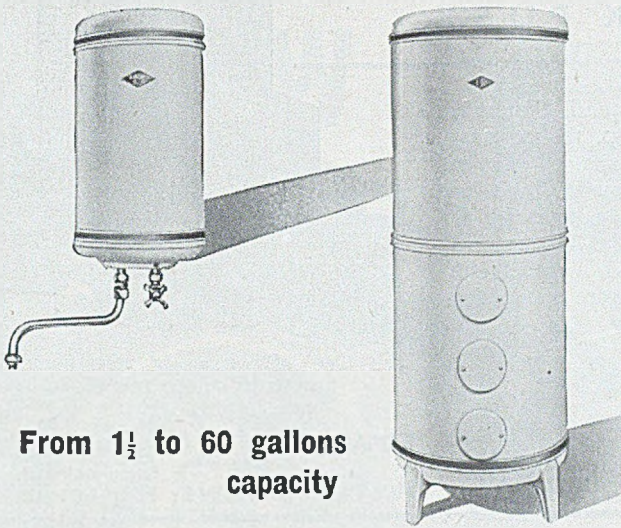


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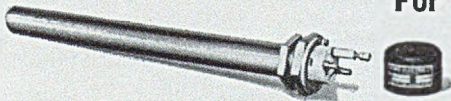
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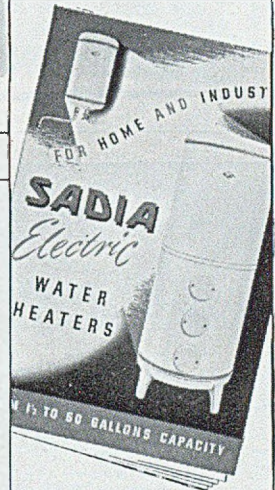
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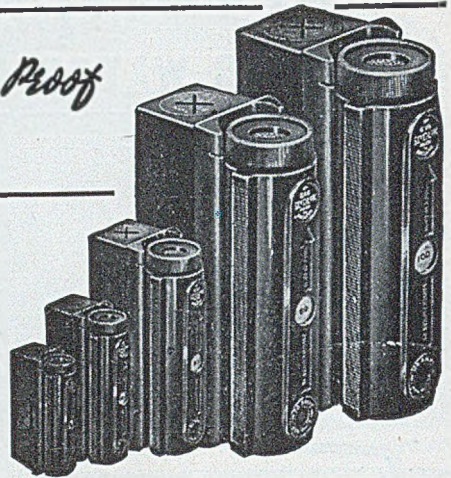
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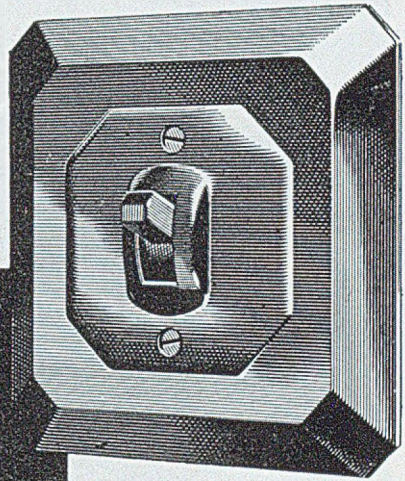
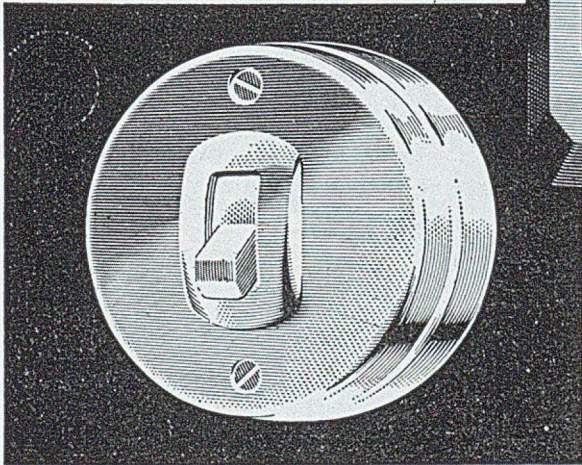
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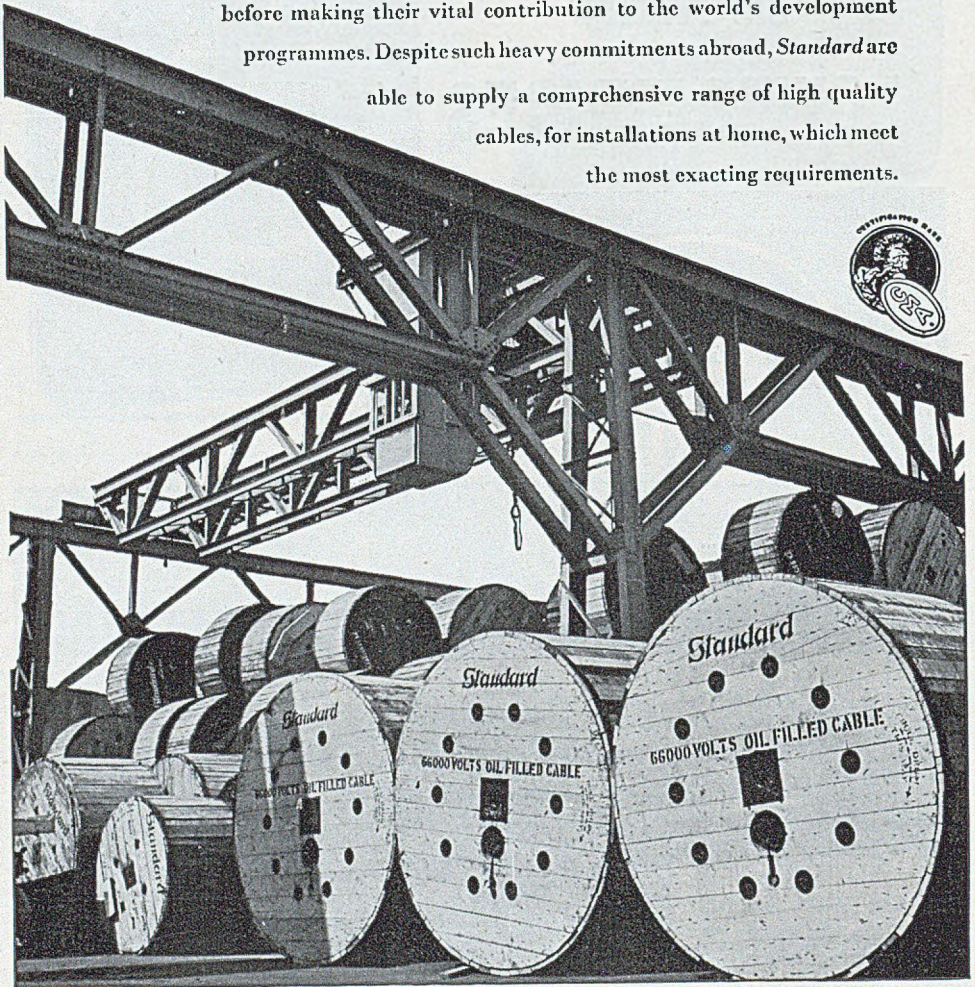


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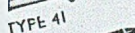
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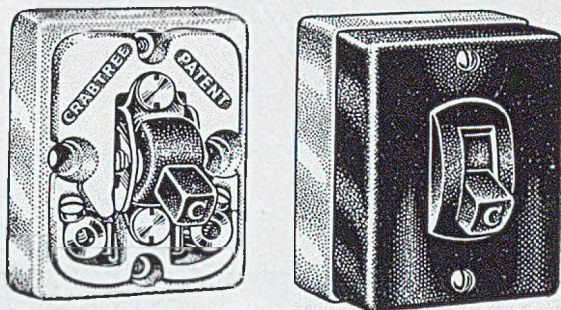
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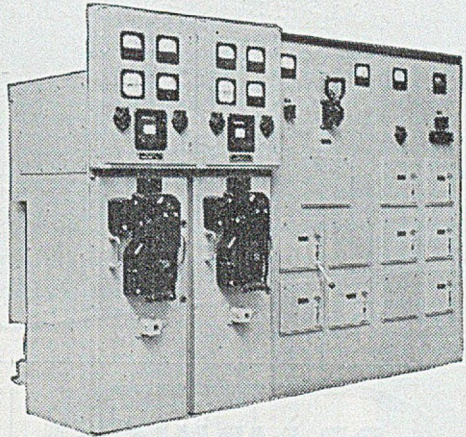
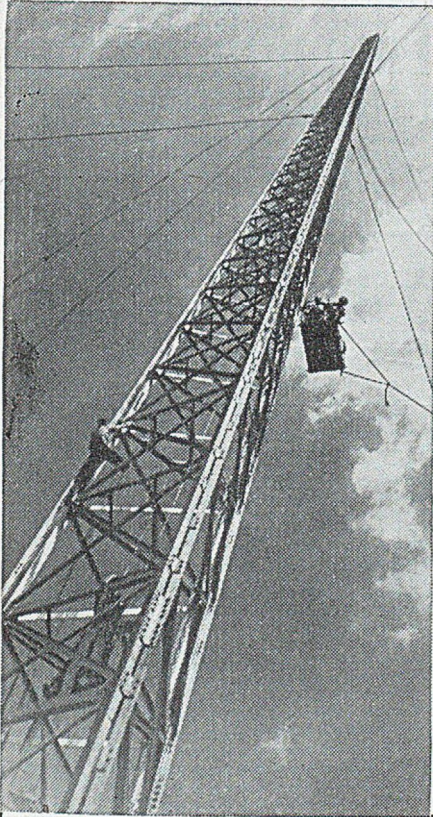
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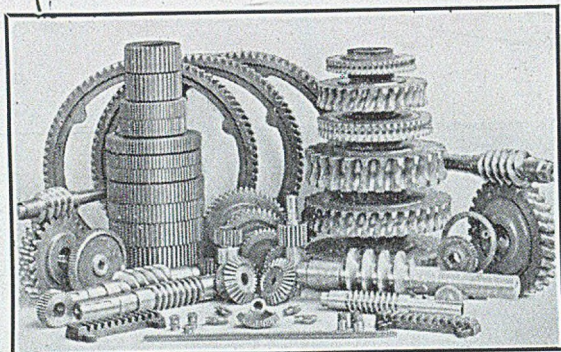
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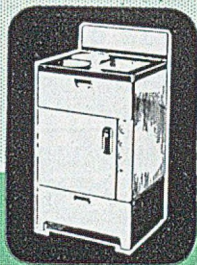
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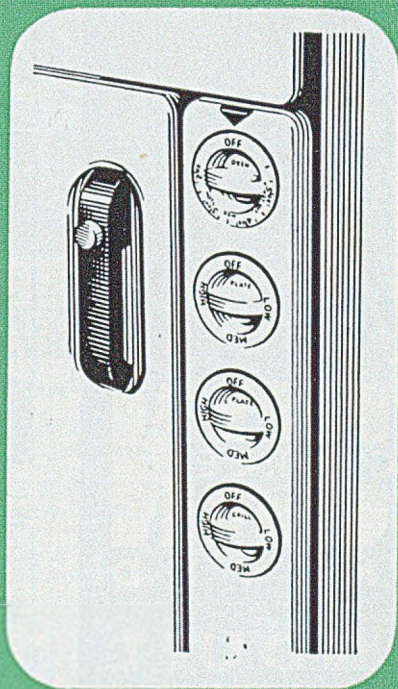
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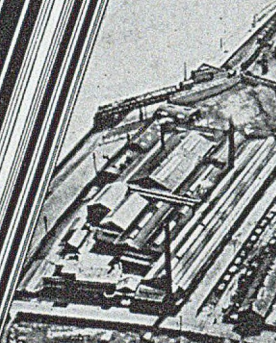
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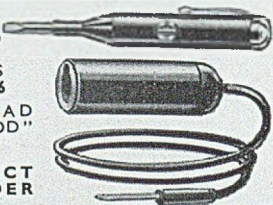
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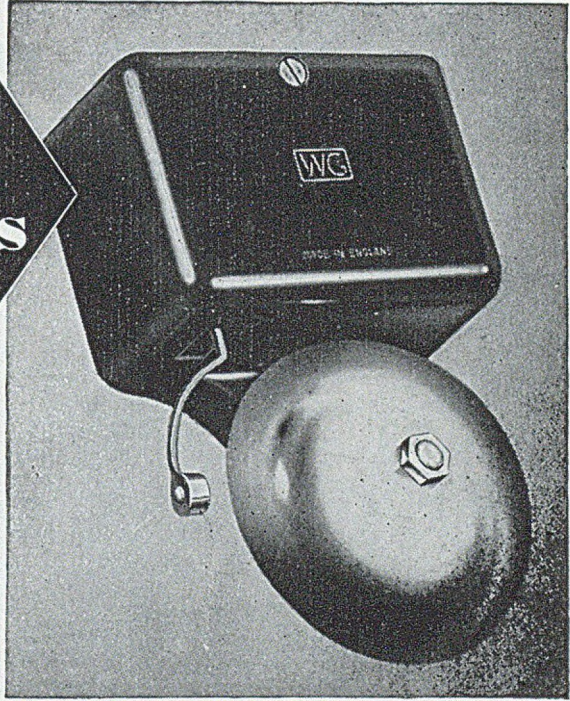
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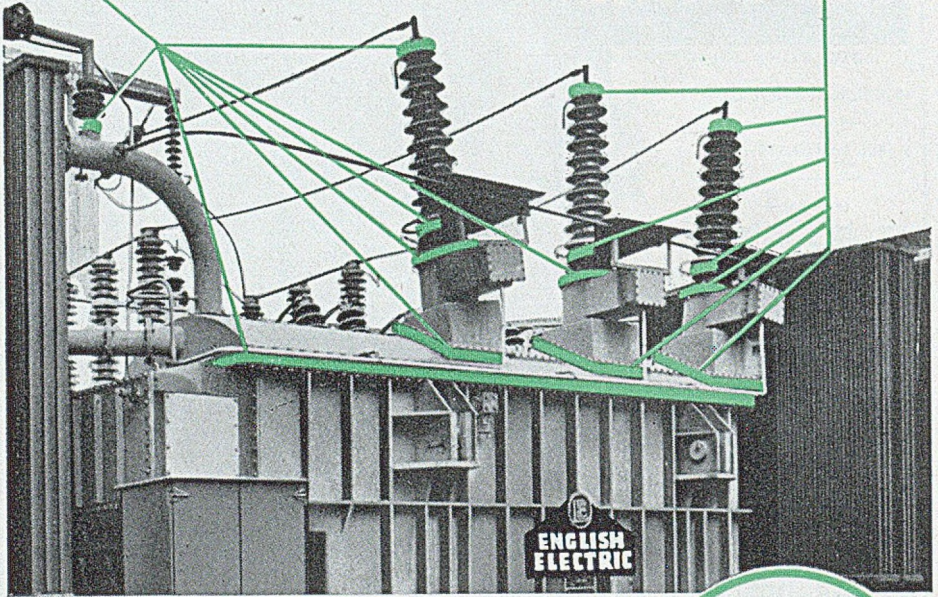
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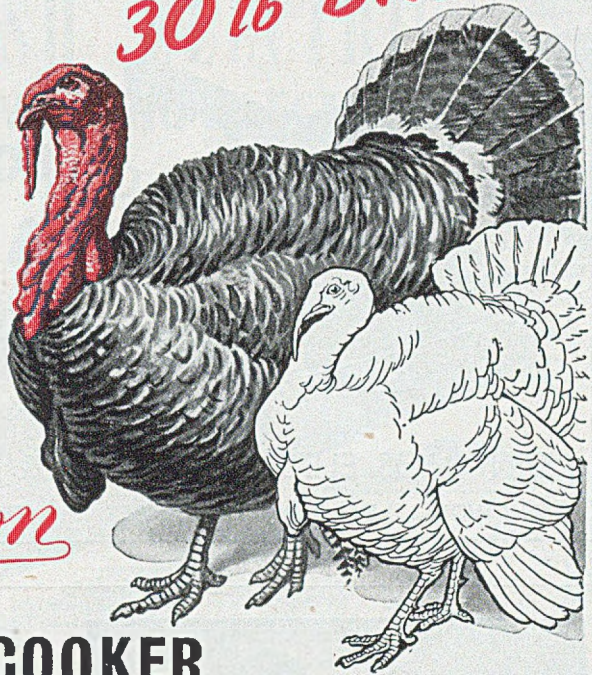
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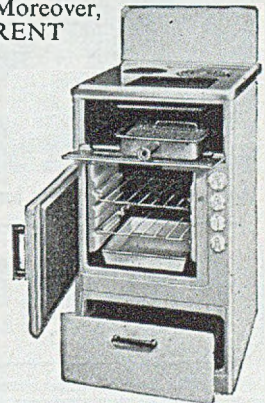
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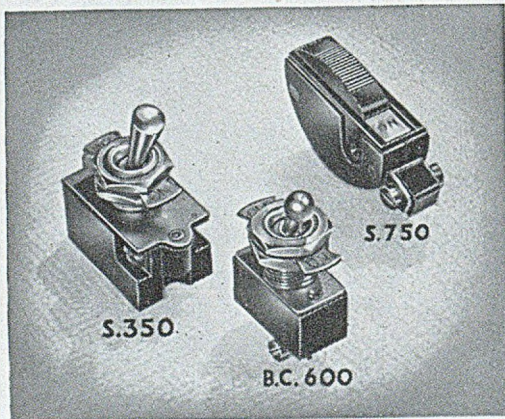
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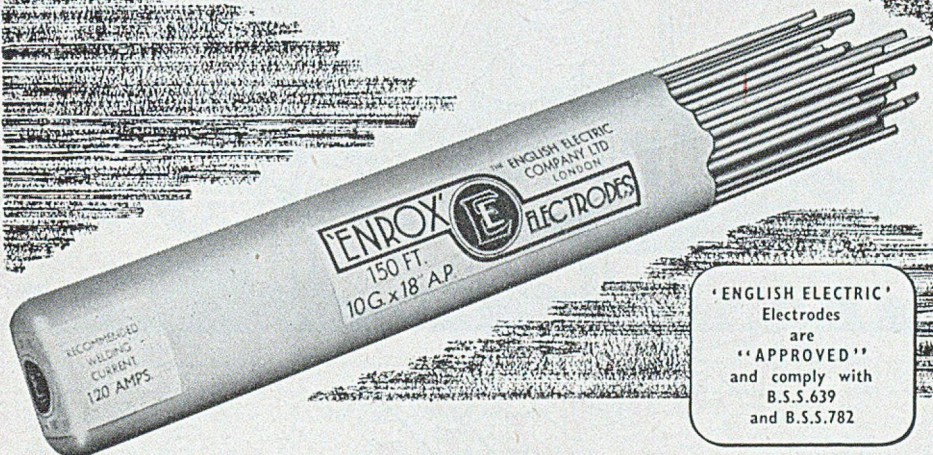
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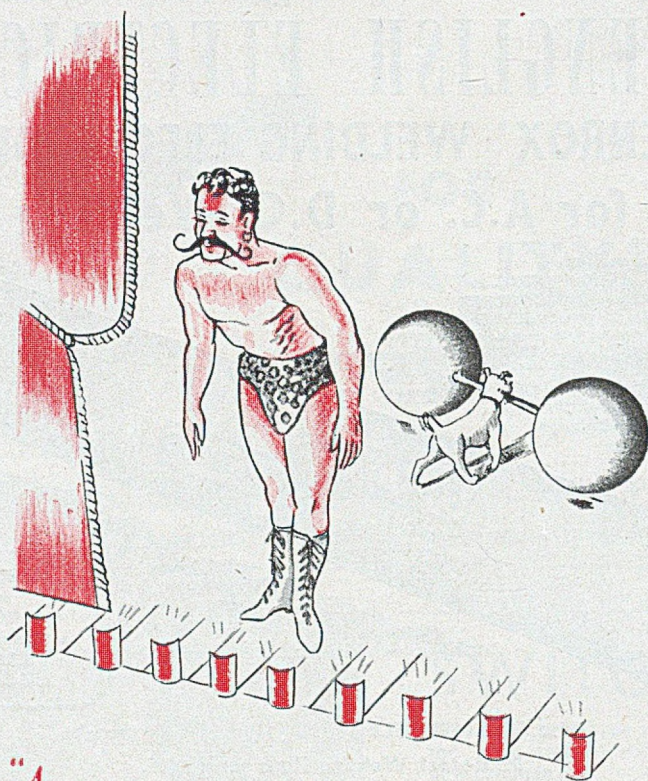
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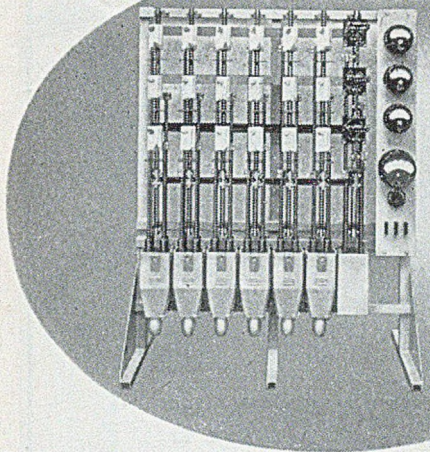
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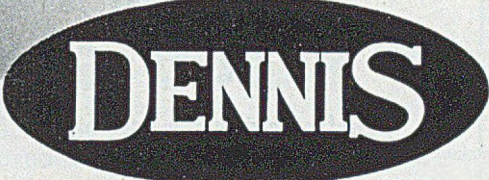
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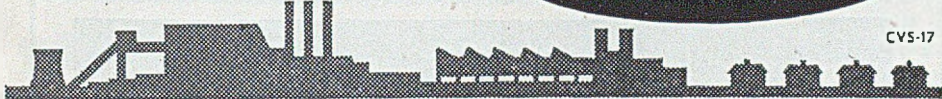
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		Per Coil	Per Spool	Per Coil	Per Spool	Per Coil	Per Spool	Per Coil	Per Spool	Per Coil	Per Spool	Per Coil	Per Spool	Per Coil	Per Spool						
10	1/8	5793	—	—	—	—	—	—	—	—	—	—	—	—	—	—	080	14	034	145	E.C.C. Ove.
14	1/4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	064	16	026	475	—
12	1/4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	060	16	046	164	D.C.C. Ove.
16	3/8	2368	—	—	—	—	—	—	—	—	—	—	—	—	—	—	040	18	046	157	E.C.C. Ove.
18	3/8	2000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	040	18	023	209	—
18	3/8	2319	—	—	—	—	—	—	—	—	—	—	—	—	—	—	036	20	025	106	—
20	3/8	1380	1810	1061	4800	—	—	—	—	—	—	—	—	—	—	—	032	21	020	224	—
21	3/8	5445	—	—	—	—	—	—	—	—	—	—	—	—	—	—	028	22	023	291	—
22	3/8	367	172	354	240	371	—	—	—	—	—	—	—	—	—	—	024	23	034	484	—
24	3/4	6731	3731	793	—	—	—	—	—	—	—	—	—	—	—	—	022	24	—	—	—
25	3/4	3179	389	—	—	—	—	—	—	—	—	—	—	—	—	—	020	25	060	8275	Conymal. H.M.
26	3/4	976	548	326	621	57	—	—	—	—	—	—	—	—	—	—	018	26	052	9239	—
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28	3/4	3500	335	1432	706	319	—	—	—	—	—	—	—	—	—	—	014	28	044	56	—
29	3/4	9336	—	—	—	—	—	—	—	—	—	—	—	—	—	—	012	29	038	1500	—
30	3/4	976	—	—	—	—	—	—	—	—	—	—	—	—	—	—	010	30	034	471	—
31	3/4	3284	—	—	—	—	—	—	—	—	—	—	—	—	—	—	010	31	034	2895	—
32	3/4	2835	—	—	—	—	—	—	—	—	—	—	—	—	—	—	008	32	034	343	—
33	3/4	811	—	—	—	—	—	—	—	—	—	—	—	—	—	—	010	33	030	2488	—
34	3/4	3477	—	—	—	—	—	—	—	—	—	—	—	—	—	—	008	34	028	374	—
35	3/4	829	—	—	—	—	—	—	—	—	—	—	—	—	—	—	006	35	028	200	—
37	3/4	1436	—	—	—	—	—	—	—	—	—	—	—	—	—	—	004	37	026	1179	—
38	3/4	3092	—	—	—	—	—	—	—	—	—	—	—	—	—	—	004	38	026	1022	—
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40	3/4	1381	—	—	—	—	—	—	—	—	—	—	—	—	—	—	004	40	026	1122	—
40	3/4	1686	—	—	—	—	—	—	—	—	—	—	—	—	—	—	004	40	026	972	—
41	3/4	1215	—	—	—	—	—	—	—	—	—	—	—	—	—	—	004	41	026	1179	—
42	3/4	825	—	—	—	—	—	—	—	—	—	—	—	—	—	—	004	42	026	972	—
44	3/4	3111	—	—	—	—	—	—	—	—	—	—	—	—	—	—	004	44	026	1179	—
45	3/4	4548	35	—	—	—	—	—	—	—	—	—	—	—	—	—	004	45	026	1179	—
46	3/4	8913	—	—	—	—	—	—	—	—	—	—	—	—	—	—	004	46	026	1179	—
47	3/4	2416	—	—	—	—	—	—	—	—	—	—	—	—	—	—	004	47	026	1179	—
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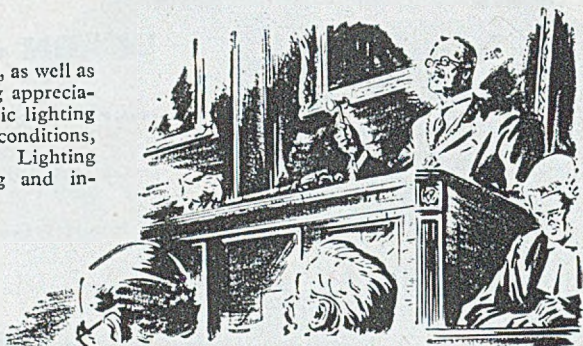
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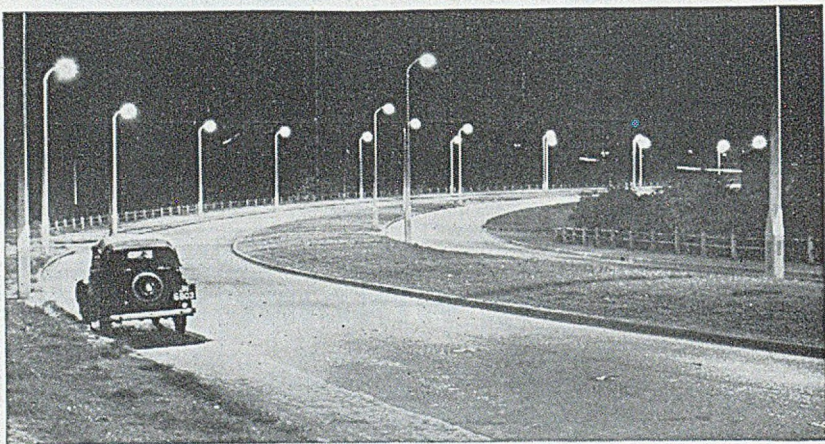
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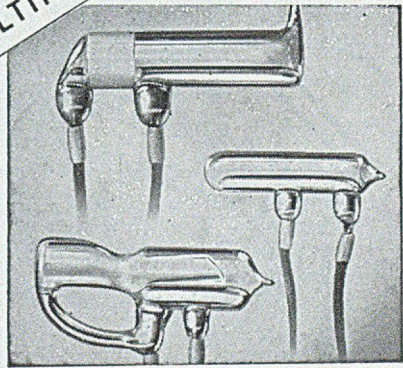
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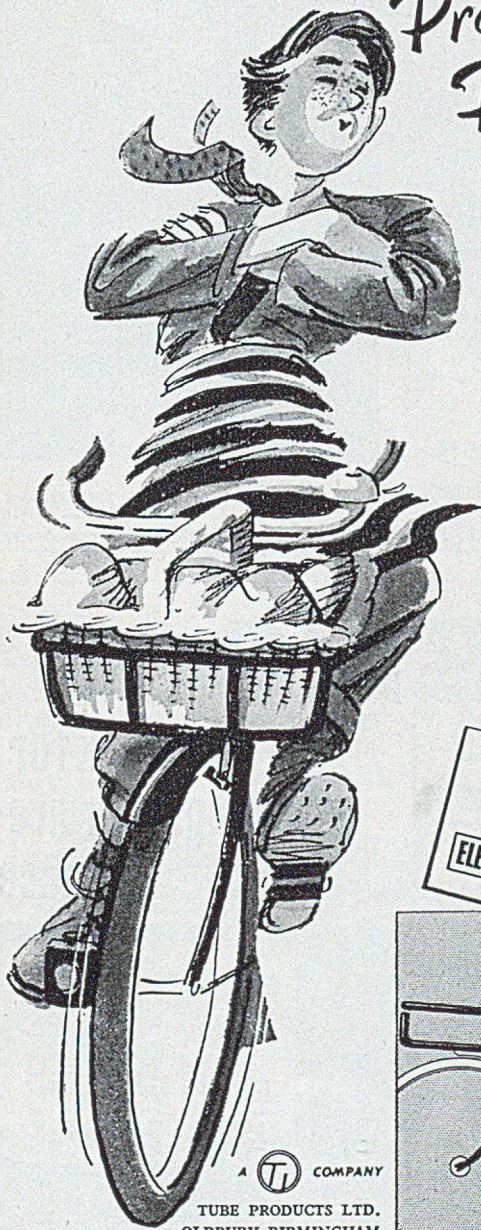
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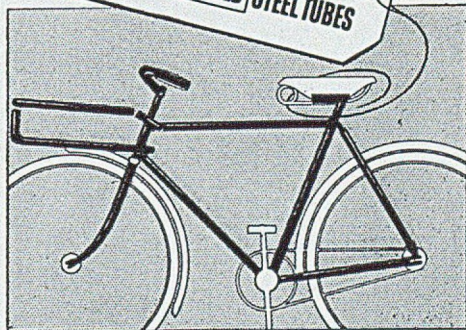
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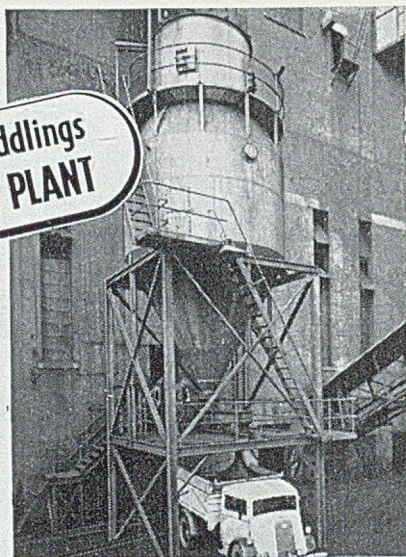
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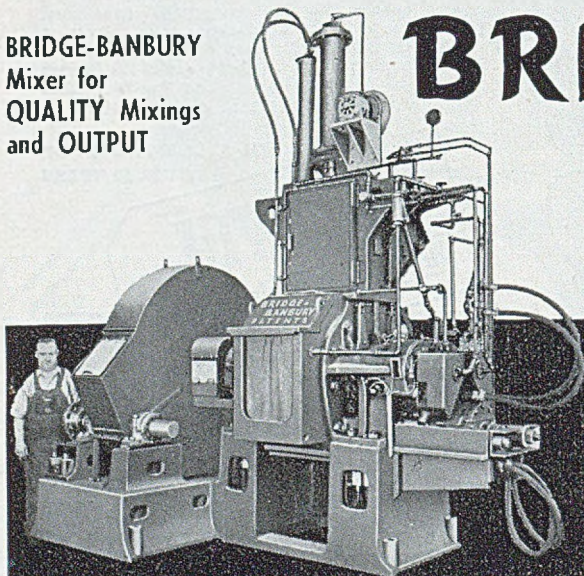
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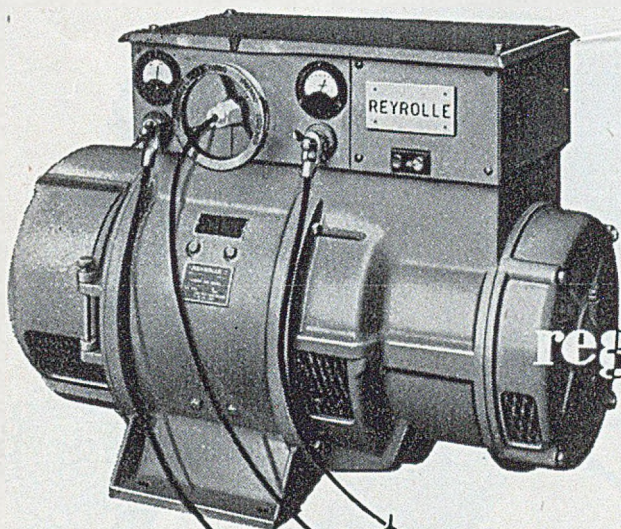


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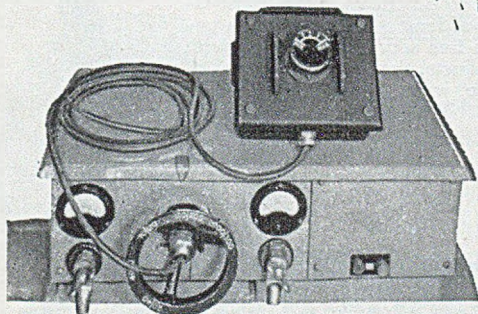
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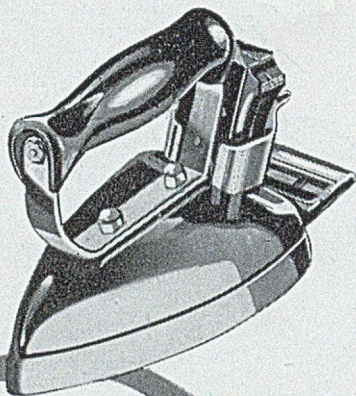
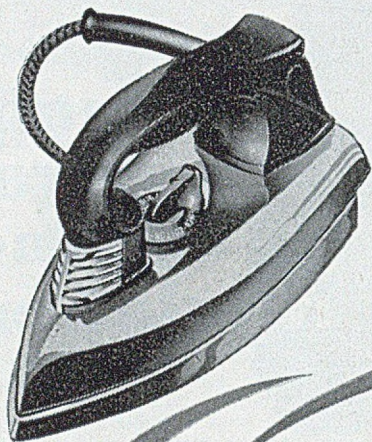
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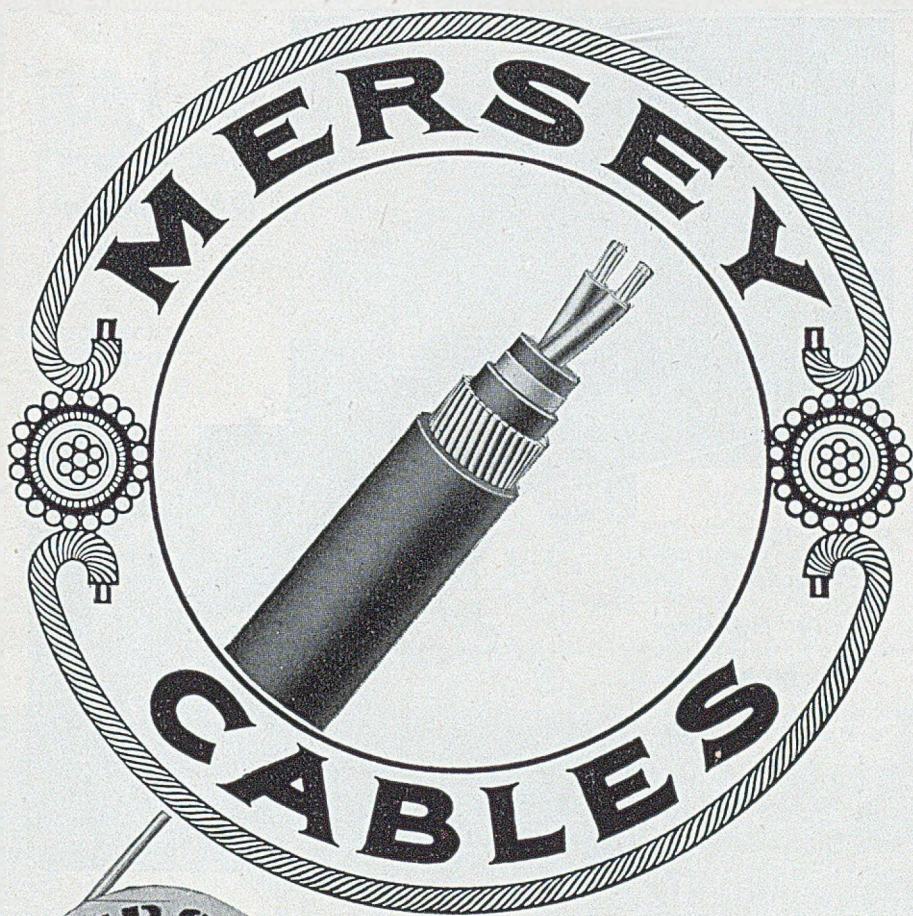
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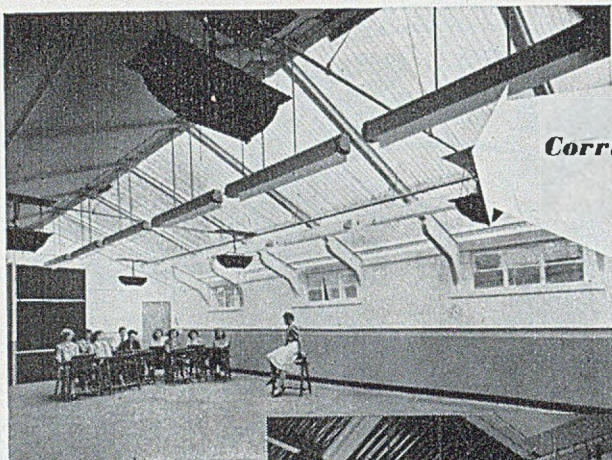
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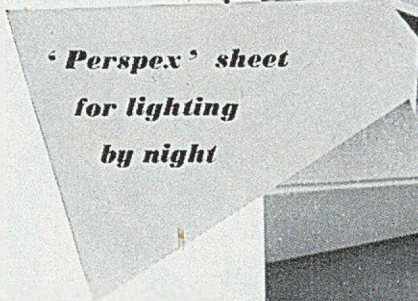
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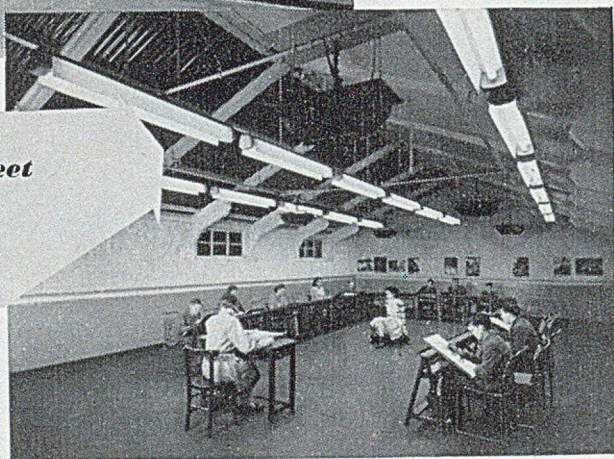
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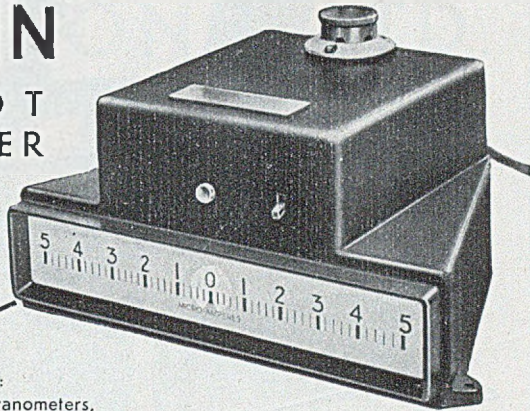
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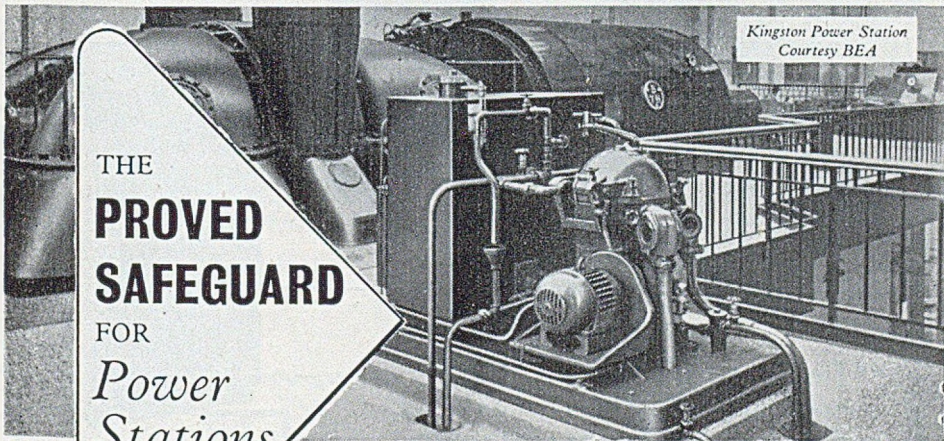
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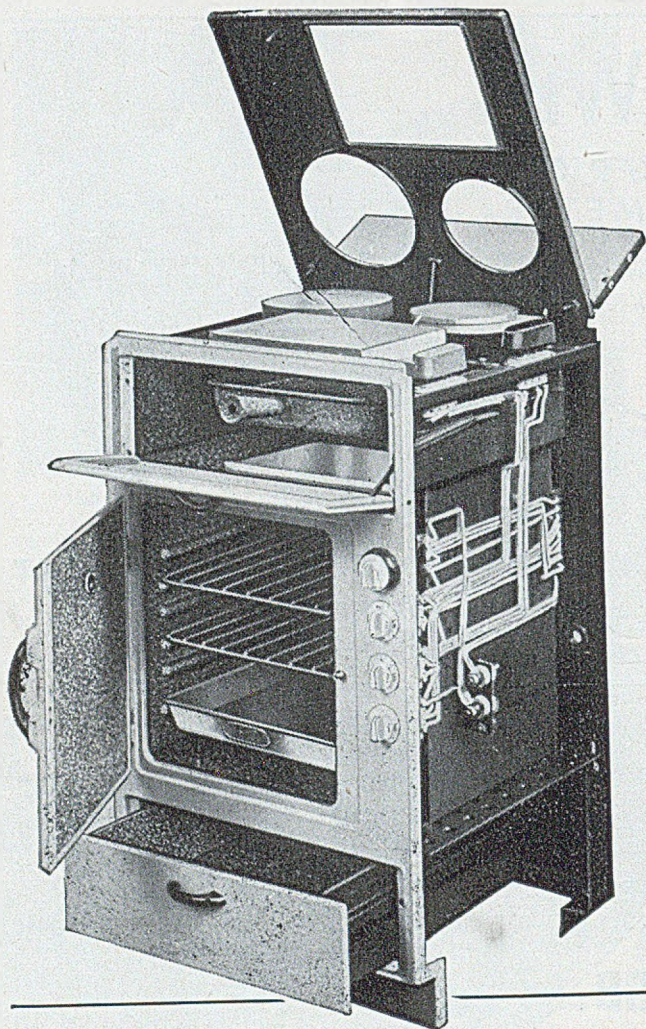
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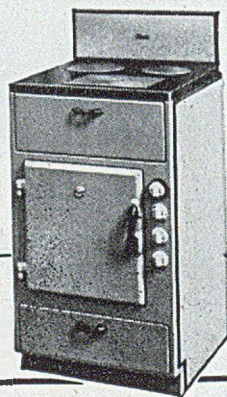
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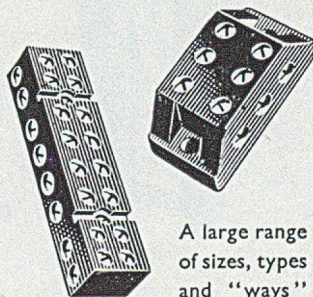
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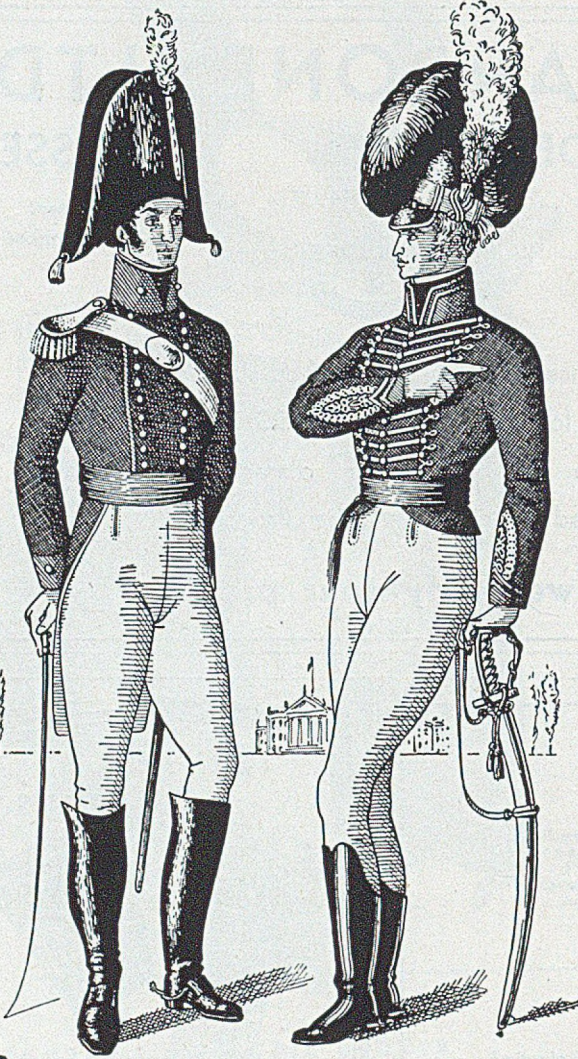


ROYAL REGIMENT OF ARTILLERY

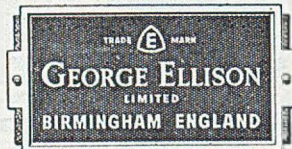
This famous regiment is divided into the Royal Artillery and the Royal Horse Artillery, and its history is the story of Britain at war.

Trains of Artillery—gunners, conductors, artificers and pioneers—served with the Army as early as the reign of Henry VIII, but it was not until 1716 that the two Companies of Artillery were permanently established at Woolwich—the beginning of the present Royal Artillery. The Royal Horse Artillery, the "Galloping Gunners", were formed later in the 18th century. For their speed and gallantry in action they earned, and still hold, the privilege of taking the "Right of the Line" on parade, except when the Sovereign is present.

"Ubique"—Everywhere—is the appropriate motto of the Royal Regiment of Artillery, and the illustration shows the uniforms worn by the gunners in 1812.



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ELECTRICAL REVIEW

Vol. CXLVI

9th JUNE 1950

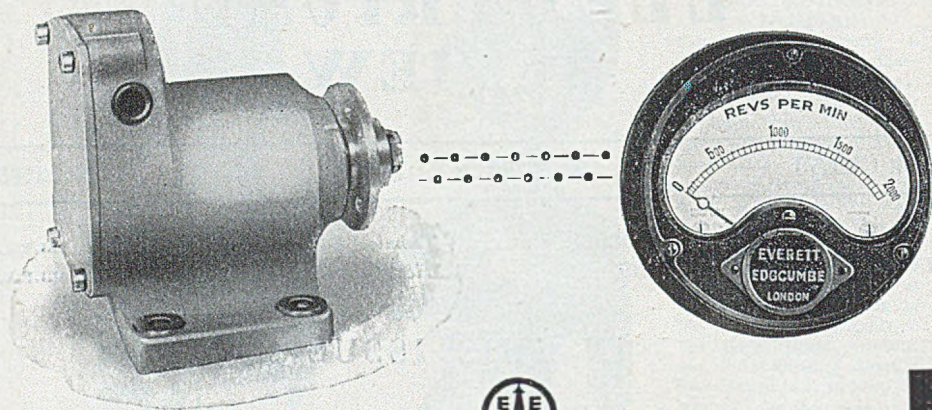
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ELECTRICAL REVIEW



Vol. CXLVI. No. 3785

9TH JUNE, 1950

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872

Mechanical Handling

REFLECTIONS ON LABOUR-AIDING EQUIPMENT

THIS is a big subject; so large that it involves many branches of engineering, as is made very evident by the second Mechanical Handling Exhibition at Olympia this week and next, which is reviewed on subsequent pages. The show occupies twice as much space as the first held two years ago.

Industrial "handling" has numerous phases and even more applications. It commences with the raw materials, proceeds through the commercial processing and manufacturing stages, then helps the collection of finished products and quickens their conveyance to delivery sites, whether for subsequent assembly or wholesale distribution. Thus, apart from technicalities, proper handling embraces the improvement of industry and the reduction of manual labour—not its displacement, for the consequent enlargement of output should cause more rather than less total employment.

Old Methods Uneconomic

Extension of the use of machinery tends to raise the load factor of human effort, so enabling more work to be done at a diminishing cost of production with less physical exertion and mental strain. The time required and cost of doing some things in the old way have so increased as almost to render them commercially uneconomic.

Industry cannot afford to go on much longer spending so much money on wages for work that can be better done and,

in the long run, less expensively—therefore more efficiently—by mechanical handling means. And so this valuable, in some case indispensable, aid to production on the modern scale is at last being seen in its right perspective and is being increasingly given its proper place in the general scheme of things as a requirement of the times to which circumstance industry must, perhaps of necessity rather than from free choice, adjust itself.

Largely Electrical

But why do we talk of the "mechanical" handling of coal at power stations and the "electrical" handling of materials in factories? Neither term is quite true while either is insufficient by itself, for each is very much dependent upon the other. A predominant feature of all up-to-date installations of this kind is that they are very largely an electrical development. Electricity stands alone as the motive power for mechanical aids of this kind and when not readily available it is good engineering practice to generate power locally for the purpose.

Motor driving under adequate electrical sequence control, which incidentally means more engineering than is sometimes supposed, but is not well represented at Olympia, can minimize the effects of inertia in the event of a "jam" of the mechanism. Not only is money lost when time has to be spent on clear-

ing the "pile-up" to free the production line, but transformation of the kinetic energy of moving parts into stresses applied to the transmission system may frequently be far more severe than those the designers intended the equipment normally to withstand.

Nevertheless care needs to be exercised in this, as in all engineering projects, to guard against over-building in respect of structural strength, over-rating in relation to normal usage and over-elaboration of control, lest running costs should mount uneconomically. When planning any sort of mechanical aid it will generally be found that the fewer the complications, the less annoying will the system be to the operator and the more satisfying to the user.

THERMAL EFFICIENCIES

Of the twenty steam power stations officially listed on another page as having operated at the highest overall thermal efficiencies during the calendar year 1949, the Battersea "B" plant is placed first with 28.81 per cent; the figure for the "A" and "B" sections of that station together was 2.09 per cent less. The Littlebrook "B" plant is not included in the first twenty because it did not operate throughout the whole year, although it reached 26.85 per cent; so Fulham is given second place with 26.49 per cent, or 0.27 per cent lower than when it topped the list in 1948. Kearsley, taking the high-pressure section only into account, occupies third place and consequently Hams Hall "B" moves down from second to fourth place in the official list.

BOILER PRODUCTION

Some light was thrown on the boiler makers' difficulties in the statement by Sir John Greenly presented at last week's meeting of Babcock & Wilcox, Ltd. In this it was shown that a large modern steam-generating plant at present required eighteen months to manufacture in the works and about the same time to erect. Thus the manufacture of plant put into commission last year had begun in 1945-46 at a time when there was an acute shortage of raw materials, particularly steel. It was not until early in 1949 that the full steel requirements became obtain-

able and so a further two years must elapse before the results of the increased productive capacity become apparent. There had been a decline in orders during the last three years and the company's expanded facilities would be adequate to deal with future steam requirements if the necessary labour and materials were available.

DELIVERY PROMISES

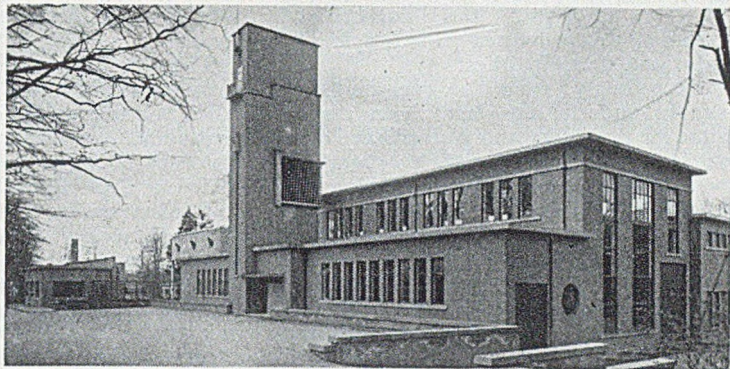
From time to time we receive complaints from overseas customers that certain British manufacturers are not keeping to their stipulated delivery dates, thereby causing the customers loss and inconvenience. Up to fairly recently, of course, manufacturers have been governed by circumstances and promises made in quite good faith have been found impossible of fulfilment. Perhaps materials have not been received as expected or sub-contractors have failed to produce vital components on time. It is to be hoped that with the rather less difficult conditions now prevailing, including the easing of pressure upon supplies, this kind of thing will become very rare. It is vital to the future of British export trade that delivery promises shall not be lightly made and when made should be kept. It is better to lose one order than to incur lasting distrust.

FESTIVAL LIGHTING

Seven months ago attention was drawn to some of the many parts which display lighting should play in the Festival of Britain, 1951. Time is needed for schemes of this kind to mature. Sites have to be surveyed, projects designed and approved, after which almost a year is required to put them into effect. The recent I.E.S. summer meeting at Buxton was a reminder that little time remains in which to prepare for the commencement of the Festival.

The withdrawal of overtime working by a section of the printing industry which necessitated a slight reduction in the number of pages in *Electrical Review* last week still operates and we regret that to-day's issue is similarly affected

Power house with cooling tower for gravity feed oil tanks, showing the test cells and control laboratory in the distance



Short-Circuit Testing

Restoration of the K.E.M.A. Station at Arnhem

MANY engineers in this country will have been familiar before the war with the Naamlooze Vennootschap tot Keuring van Electrotechnische Materialen (K.E.M.A. organization) at Arnhem and particularly with the short-circuit testing station there. It is also generally well known that those laboratories were completely devastated during the later years of the war; only the fabric of the buildings remained. It is pleasing to record that the K.E.M.A. short-circuit testing station is once again in operation and that in the place of the original station a larger and better equipped test plant has been created. The first official tests in the new laboratory were carried out on 11th April and the first equipment to be tested there happened to be 33 kV switchgear of British manufacture, constructed by Cooke & Ferguson, Ltd., of Manchester.

The K.E.M.A. organization comprises a number of laboratories, comparable in scope and

capacity with those in England, which provide comprehensive facilities for the testing of electrical materials and equipment. The 33 kV switchgear tests referred to, which we were privileged personally to witness, were carried out in the presence of representatives of the B.E.A. and of leading consulting engineers.

It may usefully be recalled that the "supply" section of the Dutch electrical industry differs in several respects from its counterparts in many other countries. One important difference is that private concerns do not generate or distribute electricity. These functions, with a single exception, devolve directly, or in-

Test cells at the Arnhem testing station with 30ft head room, each equipped with a 5-ton crane, and outdoor test yard in foreground

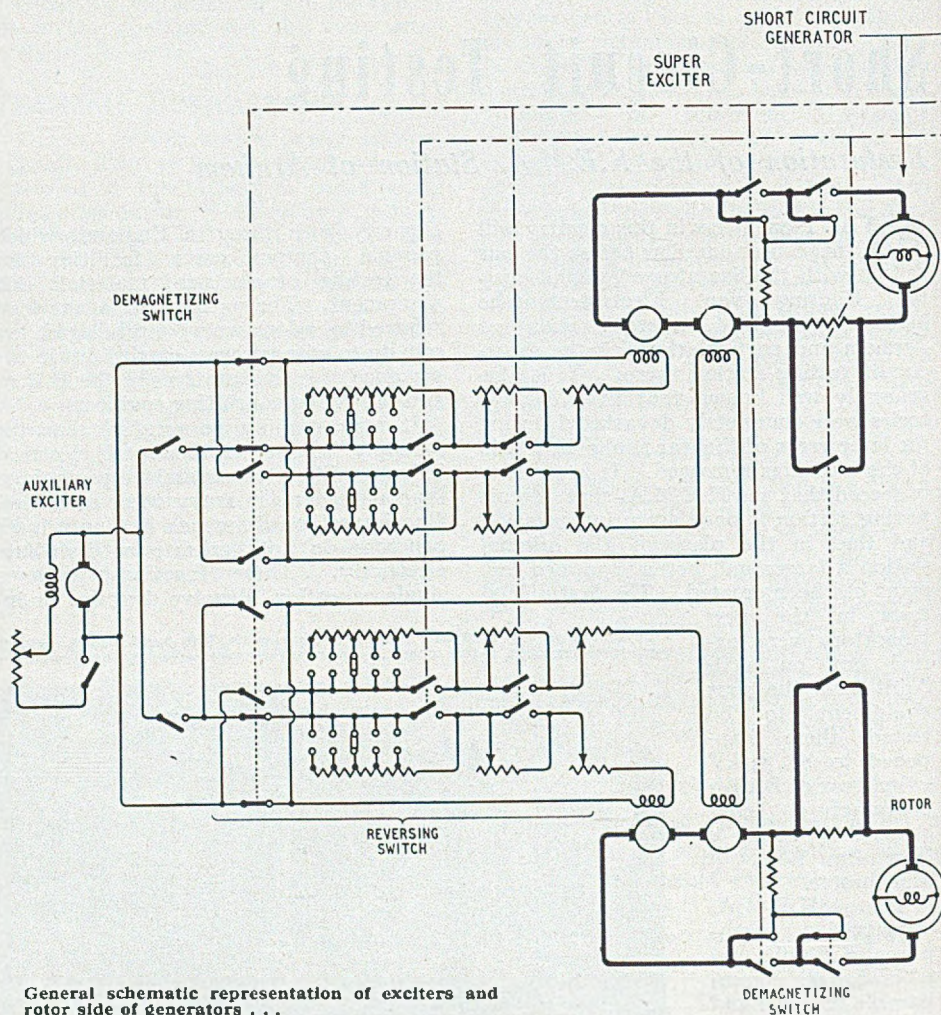


directly, upon the "lower authorities," meaning the provinces (counties in Britain) and municipalities.

Accordingly, from the beginning, the supply undertakings have been responsible for the safety and performance of installations connected to their networks as well as those of apparatus composing such installations. Thus their terms of supply are conditional upon the installations complying with the rules (the first edition appeared some fifty years ago) of the Netherlands Royal Institution of Electrical Engineers. Consequently installations are checked and/or tested as a

whole before connection to the service mains.

This procedure remained generally satisfactory up to the 1914-18 war period when deterioration of the quality of materials, increasing use of electricity, diversity of apparatus marketed and insufficiency of qualified staff made the multiplication of testing stations by individual supply undertakings impracticable. Instead, these functions were entrusted to the central office of the Association of Managers of Supply Undertakings (V.D.E.N.) which drafted the necessary specifications while the testing



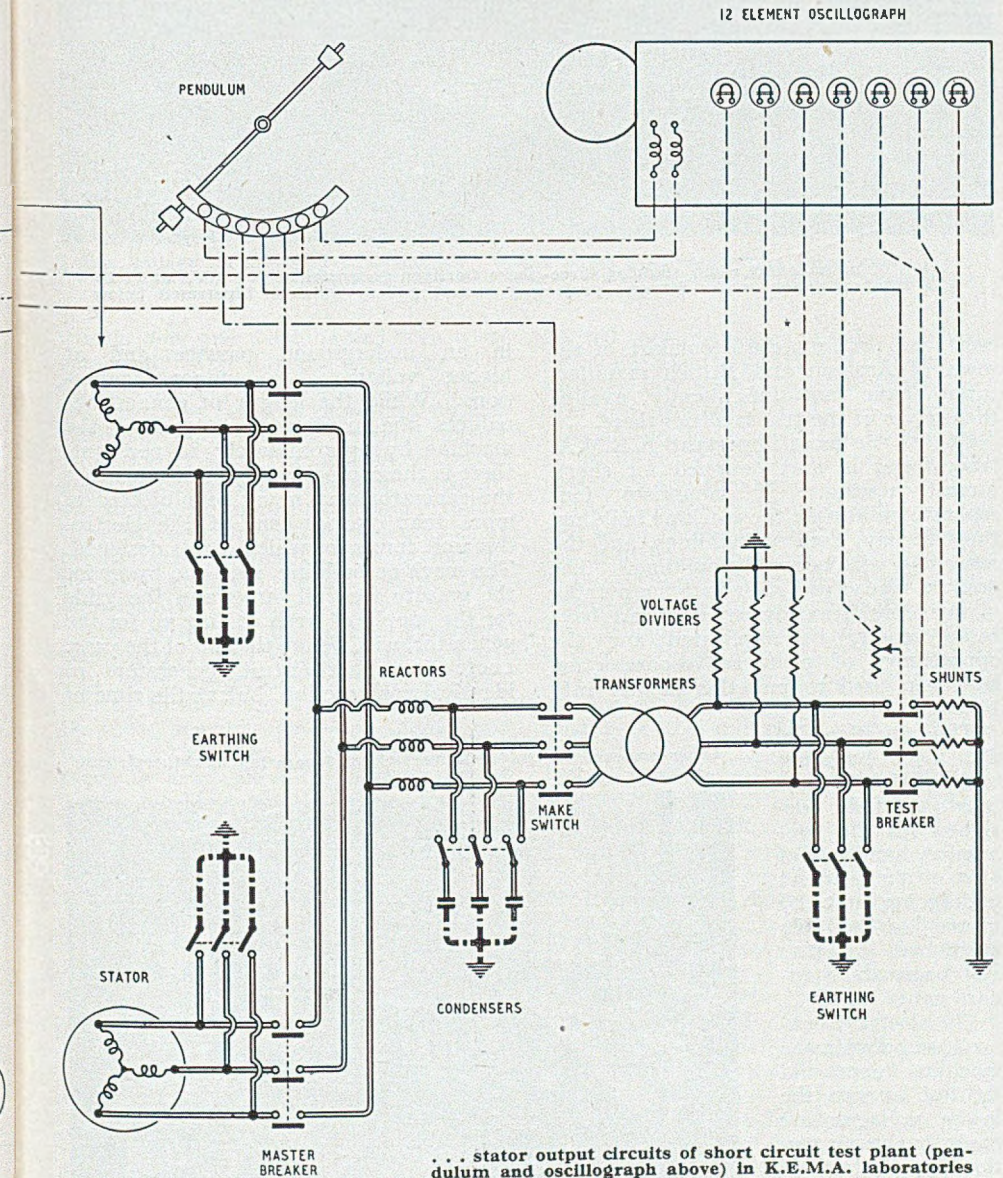
General schematic representation of excitors and rotor side of generators . . .

was done at the University of Delft and by such of the older electricity undertakings as had made provision for it.

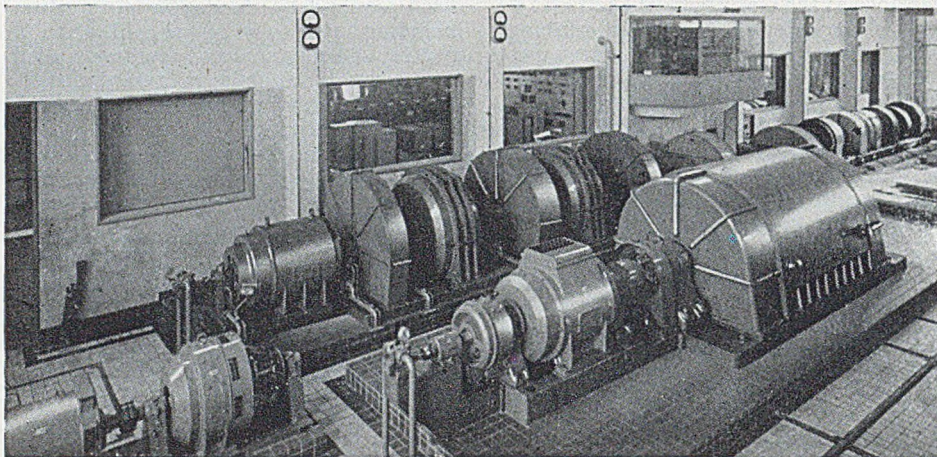
Growth of this work led to the founding in 1927 by the supply undertakings in Holland, together with those in the Netherlands East Indies, of a company (K.E.M.A.) to undertake the investigation for approval of materials and equip-

ment required by the supply authorities, including supervision of the calibration of meters; of appliances and accessories used by consumers; and also of "third party" equipment, either on behalf of the Dutch supply undertakings or otherwise.

The group of laboratories, officially inaugurated in 1938, is situated in beautiful parkland on part of the old "Den Brink"



. . . stator output circuits of short circuit test plant (pendulum and oscillograph above) in K.E.M.A. laboratories



A view of the machine room showing three-phase Oerlikon generator of 700 MVA at 12 kV with flywheel super exciter set and projecting control gallery which is illustrated below

estate on the immediate outskirts of the town of Arnhem and British manufacturers have not infrequently availed themselves of the test facilities there.

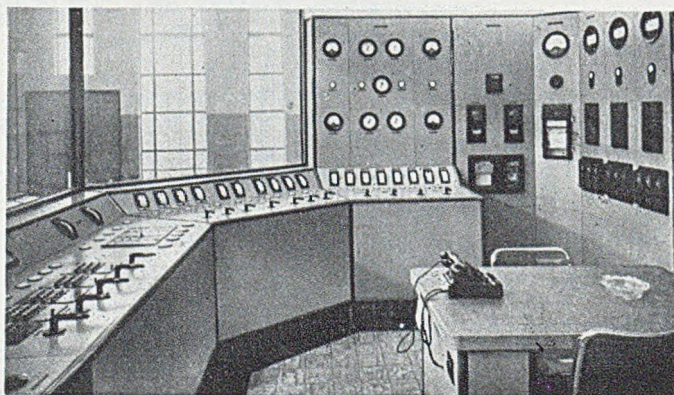
One of the most important K.E.M.A. laboratories is that designed for short-circuit testing. It comprises four separate buildings: the machine building, the test bay, control buildings, and the workshop with assembly building. The original layout was such that the number of machines, transformers and test bays could readily be duplicated and the opportunity of post-war reconstruction has been used to put this facility into practice.

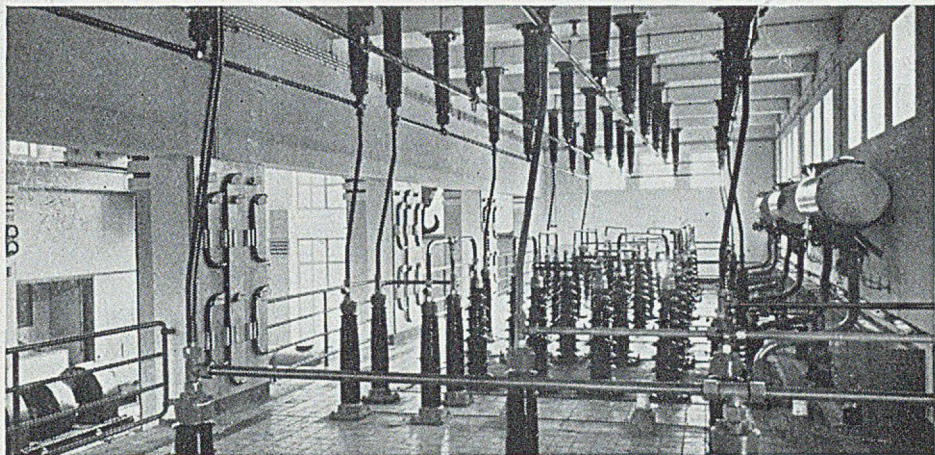
The situations of the main buildings and their layouts were carefully designed for the convenient handling of the equipment undergoing test by means of suitably positioned cranes and bogies on standard gauge rails.

The electrical connections between the machine room and the test bays at the lower voltages are made by heavy section copper busbars

in an underground passage and at higher voltages by outdoor connections. While the length of connections reduces the maximum output of the machine by approximately 10 per cent, there is the compensating advantage that the generator may never be subjected to more than 75 per cent of the electrodynamic forces for which it was designed. The machine building, with the tower for the gravity feed oil tanks and the grids for the supply of fresh cooling air for the generator, will, before the end of the year, house two short-circuit generators of identical construction, but at the time of

□ Glass-enclosed control desk overlooking generating machinery room





High voltage terminals of "Savoisienne" single phase generator output transformers, each with four 12,500 V secondary windings to deliver up to 100 kV three-phase or 200 kV single-phase

writing only one machine has been commissioned. The dimensions of the synchronous three-phase generator (Oerlikon) are about the same as those of a normal three-phase generator of a rated capacity of 65,000 kVA. The maximum three-phase symmetrical breaking capacity which can be obtained from each machine is 700 MVA. The output is, however, at present being limited approximately to 500 MVA until the second machine has been installed.

The generator of 0.11Ω reactance (series-star 11 kV) is driven by a 1,400 h.p. 380 V asynchronous motor coupled directly to the rotor of the main machine, the speed of revolution being about 3,000 r.p.m. Two sets of windings in each phase are available so that the full output of the machine can be delivered at 11, 6.5, 5.5 and 3.2 kV. The stator weighs 70 tons and the rotor 21 tons, or 110 tons with bedplate. In addition, each machine has a super-exciter set, the first set comprising two 800 V d.c. generators, each capable of delivering 8,500 A and driven by a 500 h.p. motor at 1,000 r.p.m. with three flywheels weighing 6-12-6 tons. The second super-exciter set is somewhat larger in capacity.

About 35 minutes is required to run the main set fully up to speed.

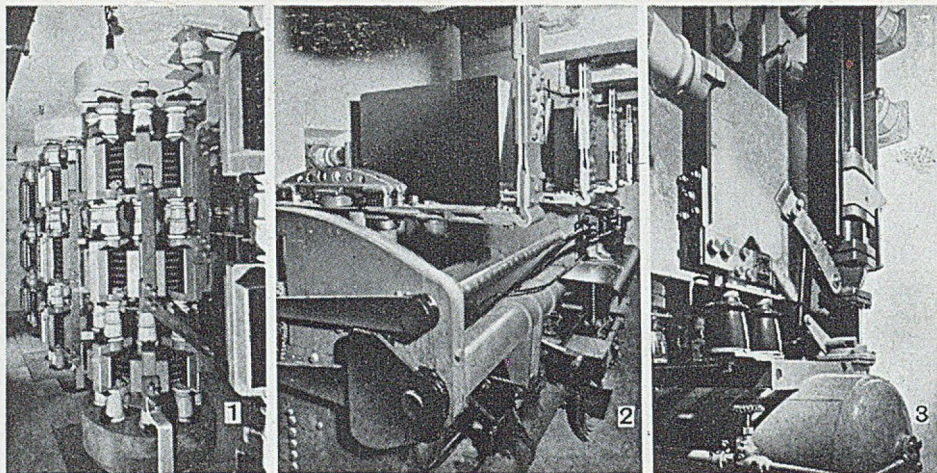
An auxiliary exciter set with an output of 500 A at 100 V is used for direct excitation of the generator when tests of a

limited capacity are required. For tests exceeding about 100 MVA, however, the super-exciter set is used. The latter set can also be used for d.c. short-circuit tests and up to 37,000 A can be obtained at up to 800 V or up to 18,500 A at between 800 and 1,600 V.

The machine building also houses the first set of three single-phase transformers for delivering test voltages exceeding 11 kV. Short-circuit impedance of the transformers is only about 20 per cent of the generator reactance during short-circuit. By an increase of the order of 10 per cent in the generator voltage, tests can be made with the transformers in circuit at the full rated output of the machine.

Each transformer has four secondary sets of windings, each for 12,500 V. These windings can be connected in series, in parallel, or in series-parallel, and the three transformer secondaries can be connected in star and delta. In this way the whole output of the plant can be obtained at various voltages up to about 100 kV for three-phase tests and up to about 200 kV for single-phase tests.

The short-circuit current is controlled to the desired value by means of reactance coils housed in the basement of the machine building. Adjustment to the desired output can be obtained in steps of about 10 per cent between wide limits. The machine building also contains the

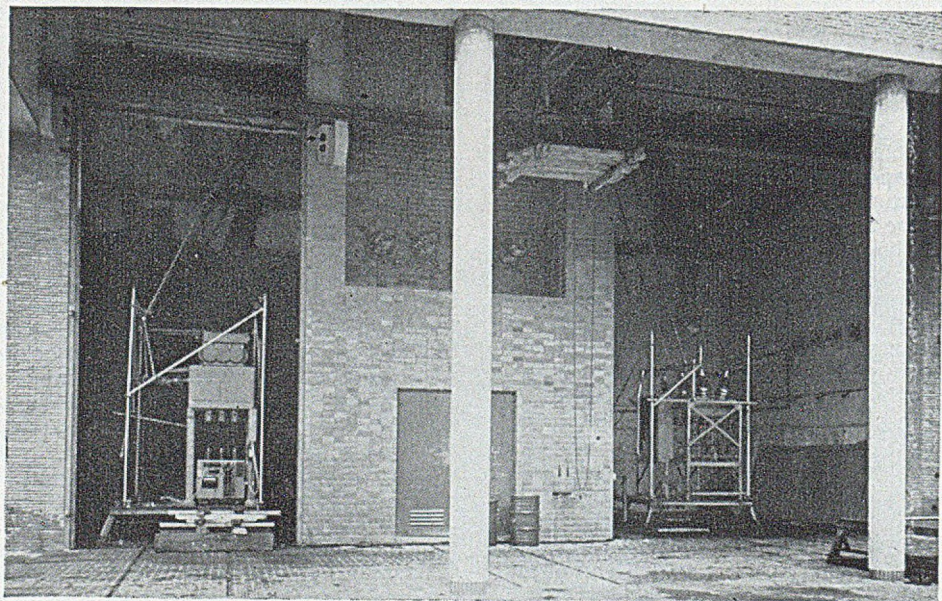


1.—View of reactor coil stacks. 2.—Pneumatically operated four pole "Cog" closing switch of 120 kA (making) capacity, each pole independently operated for phase angle variation. 3.—Master air blast breaker, 800 MVA at 11 kV, main gap resistance switching with series isolator in open position

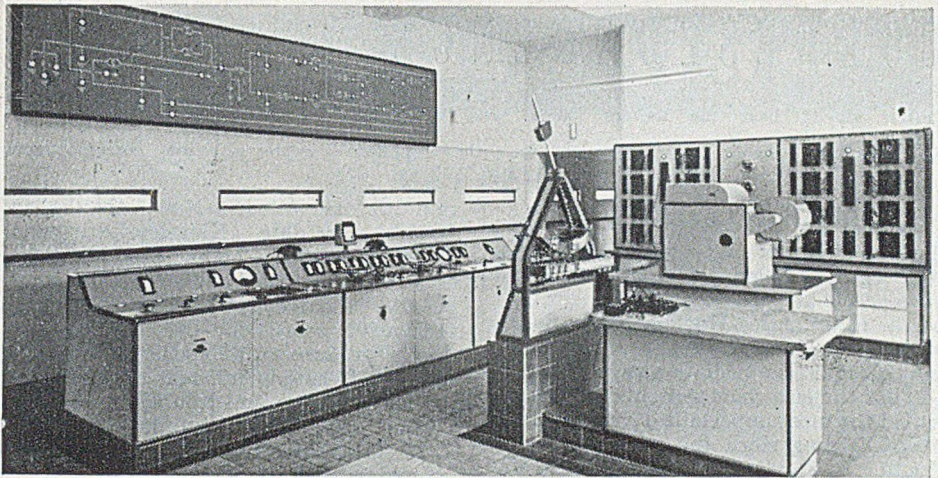
main closing switch and the master breaker. The former is pneumatically operated with a rated making capacity of 120 kA. Each phase is independent in operation to permit phase angle variations of the instant of contact make. The

master breaker is of the air-blast type, having a rated breaking capacity of 800 MVA at 11 kV.

The test bays, which now are two in number, with an additional outside testing area, have a 30 ft clearance height



Cooke & Ferguson 33 kV metalclad breaker (left) and outdoor breaker (right) in test cells



Control desk in test room commands a view of the test area with illuminated mimic-circuit diagram above, showing master pendulum and twelve-element electro-magnetic oscillograph

and each cell and outside area is equipped with adequate crane facilities. Adjoining the test cells there is also a low voltage transformer which can deliver making currents up to 180 kA and breaking currents up to 65 kA at up to 550 V. The auxiliary equipment, including potential dividers, shunts and instrument transformers, is contained in rooms adjacent to the test cells.

The tests are controlled from the main room of the control building, of which the interior main equipment comprises a central control desk, a 12-element electro-magnetic oscillograph incorporating Siemens vibrators, and a master pendulum constructed by K.E.M.A. which gives at various exactly adjusted time intervals the impulses necessary for the initiation of a short-circuit test. Provision is also made for the installation of a cathode-ray oscillograph as soon as the construction is completed. The majority of the control and recording equipment has been made in the K.E.M.A. workshops.

From the main control desk a clear view of the test cells is obtained through slit windows and on the wall above these is mounted an illuminated mimic diagram from which at a glance the test engineer can check the conditions of the test circuit. Facilities are also provided in the control building for the accommodation of visiting engineers.

The K.E.M.A. is an autonomous testing authority and is competent to issue unbiased reports of performance and to ensure that tests are carried out fully in accordance with the national standards applicable to the particular apparatus undergoing test. Where switchgear of British manufacture is concerned, the relevant specification is B.S.116.

We are indebted to Cooke & Ferguson, Ltd., for the opportunity of witnessing the circuit breaker tests, to Prof. Ir. J. C. van Staveren for permission to visit the K.E.M.A. and to Dr. D. Th. J. ter Horst for the very cordial reception accorded our representative at the short-circuit testing laboratories.

Heating Requirements

WE have received from the Institution of Heating and Ventilating Engineers the 1950 edition of "The Computation of Heat Requirements for Buildings," first issued in 1942. In the latest edition of this useful publication of 247 pages, a number of the sections have been revised and the tables of thermal conductivity and resistivity have been extended to include new materials which were omitted from the original book. General information has also been brought up to date and other alterations made as necessary. In particular, attention is drawn to the increased value which is quoted for the conductivity of concrete.

CORRESPONDENCE

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

Stage Lighting Control

IN your report (May 26th) of the discussion following Mr. L. G. Applebee's paper on "Stage Lighting" at the Illuminating Engineering Society's summer meeting I find several points which require immediate answers.

That the electronic switchboard can be called the most important development in stage lighting since the war is in some doubt. The statement by Mr. Christopher Ede which claimed this to be so was based on "providing the right intensity of illumination just when and where it was required." Mr. Ede must be aware that such provision is a combination of types of lantern, the skill with which they are placed and used and, above all, the accurate dimming of circuits from the switchboard. To say, therefore, that an electronic board is necessary for such a degree of control is to make an unnecessarily sweeping statement.

The choke dimming circuit, using d.c. saturated chokes, has recently been proved by this company to offer an opportunity of control more than equal to that of the valve circuit with none of the latter's attendant disadvantages and, most important, at much lower installation and maintenance costs.

The important point about stage lighting control in my opinion is the ease with which the operator can give throughout the performance the lighting called for by the producer at rehearsal. The choke circuit can most certainly be incorporated into a board on which every circuit can be proportionately dimmed by master application of a small d.c. and, in fact, a board has now been developed on which all circuits can be preset and rapidly brought into action by the operation of one small master potentiometer, giving maximum ease and speed of control.

May I remind Mr. Applebee that in the past it has been difficult to produce a d.c. saturated choke which has not been unwieldy and expensive out of propor-

tion to its value. Now, thanks to research by Mr. Kingsley-Lark and others, a new and highly efficient choke has been developed which has made it possible to build not only large and comprehensive boards for big theatres, but also to produce an inexpensive board for small halls having full master control of the most modern and trouble-free type.

ERIC WOLFENSOHN

(Stage Electrical Equipment, Ltd.)

London, S.W.9.

B.E.A./Contractor Co-operation

HAVING read Lord Citrine's speech at the Hastings Conference, and your article on this and contractor co-operation, I nearly thought it was coming true, until I thought again, then I realized that I do the bulk of my work in the area of the Midlands Electricity Board, where I fear the Board is doing its utmost to squeeze out the contractor.

Let me mention the last straw: not content with opening many more palatial showrooms, selling radio, etc., they have now refused to let the contractor have forms for a supply of electricity. During the last few weeks, these application forms have been redesigned, the space for the contractor's name being omitted, and none of these forms is to be given to contractors, I have been told. I must either send my customers to sign the form in the showroom, however awkward this may be for them, or the M.E.B. wants the name and address and will then either send the form or a representative with the form to get it signed. Why the contractor cannot be trusted with this job, I know not, but it does appear that the M.E.B. wants to get to know the customer, and I am wondering why, or do I already know the answer to this?

In any case, bearing this and other pinpricks in mind, co-operation in the Midlands is a thing not desired by the M.E.B.

THIRTY YEARS A CONTRACTOR.

VIEWS on the NEWS

By REFLECTOR

PARLIAMENT is to reassemble next Tuesday and an opportunity will be given during the committee stage of the Finance Bill for members to raise again the question of purchase tax on electrical appliances (particularly water heaters) and on electric vehicles. It is ridiculous that although the electricity supply authorities have said that immersion heaters do not represent an untimely load the tax on them remains at 100 per cent. As regards the electric vehicle, no doubt Government speakers will point out that it escapes the increased petrol tax and thereby has an advantage. Against this may be placed its necessarily heavier cost which will be greatly exaggerated by a proportional purchase tax. And as it consumes only home-produced fuel the case for exemption is still a strong one.

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Among the lantern slides shown by Mr. S. L. M. Barlow when he presented his paper at the recent E.C.A. conference was one illustrating lighting at the Slade School of Art, London University. It comprised vertical fluorescent tubes fitted on the window frames, the idea being to ensure that shadows cast by models were the same by day as night. I thought this quite a good arrangement but, in the discussion, Mr. E. B. Sawyer, manager of the Lighting Service Bureau, said that the use of unscreened vertical tubes in this way was likely to give rise to glare. Probably the directional idea could be retained with suitable treatment of the light sources.

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Portability is a valuable attribute of many electrical appliances but I had not heard of the portable geyser until I read about it in the *Electrical Contractor*. In the June issue Mr. W. A. Gazard says that for one of their customers his firm devised a portable arrangement by which the customer, when he wanted a bath, re-

moved the geyser from the kitchen sink and took it upstairs under his arm. By using a couple of wing nuts, the geyser was automatically disconnected and reconnected—the earth connection as well. Mr. Gazard claims that the arrangement was liked by the electricity supply authority which preferred to have one rather than two 6 or 8 kW geysers operating on its mains.

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Most people want an electricity service but few welcome a generating station in their neighbourhood. Among those who do are the residents of Castle Donington, "a picturesque country town with few industries and a population of about 3,000," to quote the *Leicester Evening Mail*. The proposal to construct a power station there has been described by the chairman of the R.D.C. as "one of the best things that could ever happen to Donington." Local landowners, it is said, do not oppose the scheme, in fact, they will do all they can to encourage it. Further, the Council is collaborating in the work of providing accommodation for the workers—it is forecast that at least 300 extra houses will be needed. This reversal of the usual order of things is almost embarrassing.

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Some stir has been aroused because the North of Scotland Hydro-Electric Board has demolished the Clunie Bridge at Pitlochry. But the Board has erected two bridges in its stead: the aluminium footbridge and, a mile down the River Tummel, a concrete bridge for traffic. In *Gulliver's Travels* the opinion was expressed that "whoever could make two ears of corn, or two blades of grass, to grow upon a spot of ground where only one grew before, would deserve better of mankind . . . than the whole race of politicians put together." How much more deserving then is a body which does this with bridges.

PERSONAL and SOCIAL

News of Men and Women of the Industry

AMONG the names of electrical interest which are included in the King's Birthday Honours List published yesterday are **Sir Cyril Hurcomb**, G.C.B., K.B.E., chairman of the British Transport Commission, upon whom a barony has been conferred. **Mr. C. B. Colston**, C.B.E., M.C., D.C.M., chairman of Hoover, Ltd., receives a knighthood, while the C.B.E. is awarded to **Mr. H. J. Randall**, F.C.I.S., chairman of the London Electricity Board, **Mr. A. G. Ramsey**, O.B.E., M.Inst.C.E., M.I.Mech.E., M.I.E.E., chief mechanical and electrical engineer, Ministry of Works, and **Mr. G. M. Wright**, M.I.E.E., engineer-in-chief, Marconi's Wireless Telegraph Co., Ltd. **Sir Ben Lockspeiser**, LL.D., M.I.Mech.E., F.R.Ac.S., F.R.S., secretary of the Department of Scientific and Industrial Research, becomes a K.C.B. We propose to publish next week a full list of men in the electrical and allied industries whose names appear in the Honours List.

Mr. W. A. Bennett, B.Sc., A.M.I.E.E., has resigned from the British Broadcasting



Mr. W. A. Bennett

Corporation and will take up an appointment on 1st July with Turners Asbestos Cement Co., Ltd., at Trafford Park, Manchester, as manager of the Electrical Sales Department. Mr. Bennett was educated at Mundella School and University College, Nottingham, and served an apprenticeship at the Rugby and Willesden works of the B.T.H. Co., Ltd. In 1928 he entered the Contract and Large Machine Sales Department where he was mainly engaged on railway and industrial electrification schemes. In 1936 Mr. Bennett joined the B.B.C. as an assistant engineer and later became head of the power section in the Corporation's Planning and Installation Department.

Mr. A. F. Harper, shift charge engineer at Clarence Dock power station, has been appointed station superintendent at Wallasey power station in place of **Mr. A. G. R. Bell**, who was appointed station superin-

tendent designate at the new Bromborough station some time ago. The transfer of duties took place on 1st June.

Mr. M. Mackenzie, electrical engineer to the Metropolitan Water Board, has been appointed electrical engineer to the Public Works Department, Hong Kong, and is sailing on 28th July. Mr. Mackenzie is an associate member of the Institutions of Electrical, Civil and Mechanical Engineers.

Mr. J. E. Gamage, A.M.I.E.E., and **Mr. D. L. Campbell**, M.C., have been appointed sales managers of the Electric Furnace Co., Ltd.

Mr. A. R. Baines, C.B.E., member of the Yorkshire Electricity Board, has had the honorary membership of the Wool Textile Delegation conferred upon him.

During his recent visit to Uganda, **Mr. W. K. Brasher**, M.A., M.I.E.E., secretary of the Institution of Electrical Engineers, paid a visit to the Owen Falls hydroelectric scheme in Jinja. In the accompanying picture we show Mr. Brasher, with Mrs. Brasher and **Mr. C. R. Westlake**, chairman



Mrs. Brasher, Mr. W. K. Brasher and Mr. C. R. Westlake, outside the Jinja district office of the Uganda Electricity Board

of the Uganda Electricity Board, outside the Jinja district office of the Board.

The General Electric Co., Ltd., announces the appointment of **Mr. M. R. Neville**, M.C., M.A., A.M.I.E.E., as manager of the Publicity Organization of the company to succeed **Mr. C. Pinkham**, whose retirement on 30th June we reported in our last issue. Mr. Neville was educated at the William Ellis School and entered Peterhouse, Cambridge, as a scholar, where he gained an honours degree in mathematics.



Mr. M. R. Neville

He served in the R.G.A. in the first world war and was awarded the M.C. during the retreat from the Ypres salient in April, 1918. He joined the G.E.C. in 1919 under Lord Hirst's ex-officers' training scheme. In 1924 he joined the Sales Department as assistant to the sales manager (the late Mr. H. W. Roberts), and was appointed assistant sales manager in 1933. He has always taken an active interest in the social affairs of the company, having served as secretary and being now chairman of the social and athletic clubs.

Mr. A. White has been appointed to succeed **Mr. F. Crush** as manager of the Ipswich Branch of the General Electric Co., Ltd., as from 1st July. Mr. White joined the G.E.C. in 1915 and worked in the Despatch Department of the company's head office at that time in Queen Victoria Street. After a break for service during the 1914-18 war, he returned to Despatch Department and in 1919 was



Mr. A. White

appointed assistant to Mr. Crush at the Ipswich sales office. When the sales office was given the status of a branch in 1929 he remained as chief assistant, a position he has held as the branch has grown.

Mr. L. D. Beston, whose firm of L. D. Beston, Sydney, N.S.W., are manufacturers' representatives and merchants for electrical, radio and other products, left Sydney on the R.M.S. *Himalaya* on 2nd June, with Mrs. Beston, for an extended tour of the United Kingdom, the Con-

continent and America. He expects to arrive in London on 6th July, and wishes to get into touch with suppliers and manufacturers of electrical and other equipment. Inquiries should be addressed to the Bank of New South Wales, 47, Berkeley Square, London, W.1.

London Transport announces the appointment of **Mr. H. E. Styles**, B.Sc., A.R.I.C., to the post of superintendent of laboratories.

Mr. F. H. Flood, A.M.I.P.E., has recently been appointed works manager to John Fowler (Leeds), Ltd. Mr. Flood has been production engineer to Crompton Parkinson, Ltd., being responsible for the production reorganization of certain of their works.

The Lancashire and Cheshire Radio Industry Golfing Society held a competition for the president's prize at the Prestbury Golf Club on 25th May. Over forty members of the Society took part, the prize being won by Mr. G. G. Cooper, with Mr. E. G. Freeman second. Following the main competition a ten-hole greensome was played which was won by Messrs. G. Smallman and S. Austin. During dinner, held in the club house afterwards, the president of Society (Mr. J. D. Morrison) said that the committee had decided to make a donation of £50 from the Society's funds to the Electrical Industries Benevolent Association.

A presentation dance was recently held in the works canteen of the Benjamin Electric, Ltd., when prizes were presented by Mr. Guy Campbell, managing director, to the winners and the runners-up of the numerous winter tournaments, including inter-

Mr. Guy Campbell, managing director of the Company, making presentations at the recent dance of the Benjamin Electric, Ltd.



departmental shields. There were championship cups for billiards, snooker, darts, table tennis, cribbage, etc., and these were competed for during the winter months. Our picture shows Mr. Campbell presenting the individual table tennis club cup to the winner Miss G. Toppie.

On 3rd June, 2,300 employees and staff of **Brook Motors, Ltd.**, from the Huddersfield and Barnsley factories, were entertained by the directors on a day's outing to Blackpool. All employees were also given a sum of money in lieu of meals.

OBITUARY

Mr. D. M. Allan.—The death occurred on the 30th May at a London hospital after a short illness of Mr. Donald Allan, London manager of William McGeoch & Co., Ltd. Mr. Allan, who was in his early thirties, was employed until two years ago at the firm's head office in Glasgow.

WILLS

Mr. J. H. Runbaken, founder and managing director of Runbaken Electrical Products, left £32,200 gross (£18,673 net).

Mr. T. Birkett, managing director of the Midland Electrical Manufacturing Co., Ltd., left £52,529 gross (£52,477 net).

National Register

THE formal annual general meeting of the National Register of Electrical Installation Contractors was held on Monday at the Institution of Electrical Engineers, London, Mr. P. V. Hunter presiding. The annual report of the Registration Board, which was presented, stated that fifty-nine new certificates were issued during the year and four names were reinstated: eighty-four names were deleted from the Register for various reasons. At the end of 1949 there were 1,041 names on the Register (against 1,062 at the end of 1948). Inspections had been made of the work of ninety-six applicants for registration, while routine inspections of the work of 381 certificate holders involved the examination of 954 installations.

Arising out of negotiations with the British Electricity Authority the Registration Board was informed that the Authority had come to the conclusion that there was little prospect of compulsory registration being adopted at present, and consequently the aims and objects of the National Register should be maintained and encouraged. With this end in view and after discussions with the E.C.A. and the E.C.A. of Scotland, it had been proposed that the N.R.E.I.C. should be reconstituted under

the title of "National Inspection Council for Electrical Installation Contracting." The Registration Board had been invited to appoint two representatives to serve on the Organizing Committee, and the chairman (Mr. P. V. Hunter), together with the hon. director (Mr. F. W. Purse), had been nominated for this purpose. Financial arrangements had been made with the B.E.A. both for 1949 and 1950.

The National Committee on Compulsory Wiring Regulations and Registration, on which the Register was represented, has terminated its activities.

N.A.L.G.O. Conference

DEMANDS that the Association should abandon its support of the Government's wage restraint policy and table immediately claims for higher pay will be made at the annual conference of the National Association of Local Government Officers, to be held at Eastbourne from 13th to 16th June. The conference will be attended by 1,260 delegates, representing the Association's 190,000 members in the clerical, administrative, professional and technical services of local authorities, the national health service, the electricity, gas, and water industries, road transport, and inland waterways. A year ago, on the motion of its National Executive Council, the Association decided to support the wage restraint policy and not to seek any general increase in salaries for its members. This year, many branches have tabled resolutions seeking to overthrow that policy.

Another major topic before the conference will be a scheme prepared by the National Executive Council designed to enable the Association to give adequate representation to the needs of the five separate service groups now covered by the Association—local government, health, electricity, gas and transport.

Among notices of motion on more general topics is one from Bristol Electricity Branch instructing the N.E.C. to "examine the structure, administration and policy of the British Electricity Authority and Area Boards, with a view to increasing efficiency and considering whether the best interests of consumers and employees are being served under the existing administration." Another, from the West Midlands District Committee, representing 100 branches, and Birmingham, calls for discussions between N.A.L.G.O. and other federations of non-industrial workers, designed to secure the immediate enactment of a "statutory code, similar to that set up for factories, including such matters as proper working space, ventilation, lighting, underground rooms, washing facilities, etc."

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CANADIAN TRADE FAIR

Exhibits by United Kingdom Manufacturers

From Our Own Correspondent

WHEN Canada's International Trade Fair opened on 29th May in Toronto it was clear that most of the electrical exhibits were British. One of the largest of these was on the stand of A.E.C., Ltd., and was a 65 kVA 60 cycle alternator set having a continuous rating of 82 b.h.p. at 1,200 r.p.m. It had a Macfarlane "Magnicon" automatically compensated alternator and a 220/127 V 3-phase, 4-wire "Magnicon" exciter. At the other end of the scale were extremely small exhibits such as light sensitive cell units. However, between these extremes there were many gaps.

Our electrical industry has little Canadian competition in many of its fields—the chief competition is from the United States. However, the Canadian Government's system of preferential tariffs reacts to our benefit. Again, the devaluation of the pound has reduced our prices considerably.

Exhibitors are finding that much interest is being shown in their products, but as this report is being written on the third day of the Fair it is too early to know just what this interest is worth in terms of firm orders.

Cable Exhibits

Canada is developing industrially, and this calls for more electric power. Enfield Cables reported that they had orders for the Toronto Hydro-Electric Commission. B. I. Callender's Cables are associated with Automatic Electric (Canada), Ltd., and are supplying to Canada cables for over 70 kV. Both companies, however, have been in the Canadian market for some little time now, and so their exhibits at the Fair are partially a consolidating of their position and not a breaking of entirely new ground, as is the case with many of the other firms.

The B. I. Callender's exhibits include, in addition to h.v. impregnated pressure cable and accessories and oil-filled cable, a selection of resistance welders, power capacitors, crane collector gear and trolley-bus overhead fittings.

The Telephone Manufacturing Co., Ltd., has an imposing stand, and its director, Mr. W. A. Jackson, told me that he anticipates good results in the sales of private telephone installations for inter-depart-

mental communication, and that this side of the business is easier than the public telephone side. The surprising thing about Canada's telephone system is that, excluding Quebec, there are 1,765 telephone companies operating. When telephonic communication is needed in a new district a local company is formed to run the telephone system and all these independent systems are linked nationally by the Bell Telephone Co. The T.M.C. was also exhibiting multi-carrier equipment.

The Brush Electrical Engineering Co. has a Canadian organization which reported favourable business in Canada, especially in transformers of from 300 to 3,000 kVA. Their diesel and petrol engine-driven generators are also selling quite readily in sizes from 1½ to 10 h.p. petrol engine-driven and 5 to 36 h.p. in the diesel engine models.

Oscillograph Apparatus

Oscillograph recording is another field in which interest is being shown according to Mr. Brooks Smith, of Southern Instruments, Ltd. Oscillograph apparatus is not made in Canada, and the War Department has expressed an interest in this equipment. The company tends to specialize in complete units designed for specific purposes, and a set is installed in the mechanical engineering department of Toronto University for measuring various engine characteristics. Dawes Instruments, Ltd., were also exhibiting oscillograph equipment among other types of instruments.

Electro-thermal heating mantles made by the Electrothermal Engineering, Ltd., also created interest. These are woven glass fabric bags which will fit over laboratory flasks that require to be heated, the bag being of a double-walled construction with an insulating filling of glass wool. The heating elements, which operate at a black heat, are in the lower part of the bag. These mantles enable the contents of a flask to be heated to temperatures up to 750 deg C, external controls permitting the temperature to be varied.

Considerable attention was paid to the Walter cordless electric iron. This was in the area devoted to furnishings, etc.

Everett, Edgcumbe & Co., Ltd., showed the widest range of electrical instruments

in the Fair. Apart from many examples of round and square pattern instruments, the company showed its "Vampire" a.c. test set and the "Hum Metrohm" 500v d.c. insulation tester. Mr. R. E. Everett, managing director, and Mr. W. Bamford, director of sales, were in charge of the stand, and are making a survey of the Canadian market.

The exhibits of Salford Electrical Instruments, Ltd., included examples from the company's wide range of selenium and copper oxide rectifiers, quartz crystal units, photo-electric cells, "Gecalloy"-cored coils

and dust cores, and the S.E.I. precision exposure photometer.

Falk Stadelmann & Co., Ltd., showed switchgear and h.r.c. fuses (30-200A).

The Metals Division of the Telegraph Construction and Maintenance Co., Ltd., had a display of special alloys for electrical and communication purposes, including "Telcon 79," "Radiometal," "H.C.R.," "Hysat," "Pyromic" and "Calomic" nickel-chrome and nickel-chrome-iron resistance alloys, thermostatic bimetals, "Telconbronze," "Invar," stainless steel and nickel-iron alloys.

New Instrument Factory

IN order to provide a better service in Scotland in connection with watt-hour meters, time switches and instruments, Sangamo Weston, Ltd., have established a new factory on the Port Glasgow Estate of Scottish Industrial Estates, Ltd. This is situated on the south bank of the Clyde, about 20 miles from Glasgow, and is 130ft above sea level.

The Sangamo Weston factory covers an area of 22,000 sq ft, and when the building was completed in April, 1949, a small team of experts was sent from the parent factory at Enfield to select and train personnel to establish production and test lines for meters for Scottish electricity supply undertakings. A production line for Sangamo-type H.M.T. credit watt-hour meters is now in operation, staffed by fully trained employees, all of whom are Scottish people, apart from a nucleus of management from Enfield. The employees so far engaged have proved themselves extremely adaptable to the class of work involved in

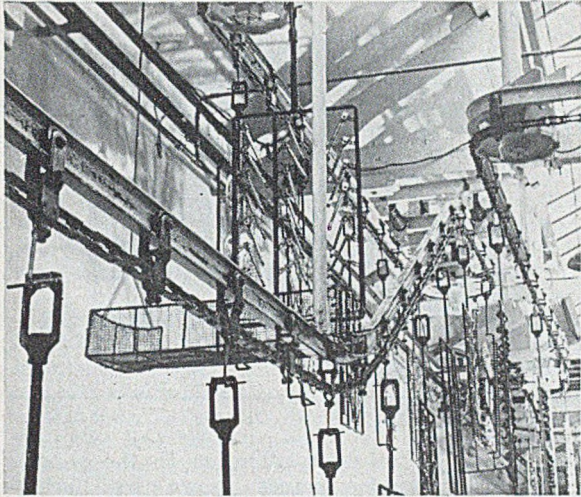
the manufacture of small precision mechanisms.

At present the H.M.T. meter is the only instrument being produced at Port Glasgow. All parts, mouldings, etc., are made at Enfield and conveyed to Scotland where they are assembled, tested, calibrated and packed for despatch. It is hoped that at some time in the future the activities at the Port Glasgow factory will be extended to embrace the manufacture of other instruments for which the Sangamo Weston company is well known.

On Wednesday of last week we had the pleasure of being present when the factory was officially opened. At the inaugural luncheon, which was held in Glasgow, Mr. S. B. Rogers, chairman and managing director of the company, proposed the toast "Our Guests and the Scottish Factory," the reply being made by Baron Bilsland of Kinrara, under whose chairmanship in 1939 Scottish Industrial Estates, Ltd., was formed.



The factory of Sangamo Weston, Ltd., officially opened last week at Port Glasgow



Change-over to materials handling in this factory increased output by 100 per cent; New Conveyor Co.

Materials Handling

Broad Electrical Aspect Revealed at Olympia

FROM the viewpoint of increasing production there is no more important normal industrial development to-day than materials handling. Whether we think in terms of full or semi flow-line production, or in batch production, or of mass or individual production, where there is any degree of precision as to greater output in relation to plant or factory size, the dominating feature of modern materials handling is that it is essentially an electrical development.

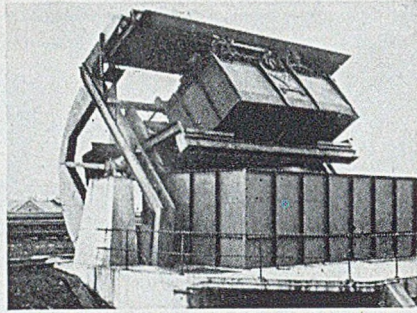
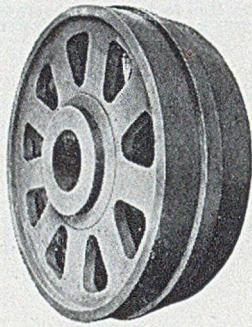
Materials handling as we know it to-day could not have been developed in any other way. All this does not mean, however, that every unit of a handling system must be electrically driven although that is almost the case. A non-power driven idler section of an intricate conveyor system, or a simple hand operated chain hoist, or even a steam shunting engine, may each be a vital link in what is essentially a comprehensive electrical materials handling system.

In reviewing the MECHANICAL HANDLING EXHIBITION at Olympia, London, organized by *Mechanical Handling* we are therefore refraining from keeping our eye too closely on the electric motor or, say, the magnetic brake, and we will not be deterred from making useful references to hand driven, or engine driven equipments which dovetail into the broader principles we have outlined.

It is not so long since the mechanized colliery, the electricity generating station and the steel works could be named as among the very few works or industries which practised materials handling scientifically. Now we can say of a cycle factory in Birmingham, for instance, that because of its change to modern materials handling its output has been increased by 100 per cent; a somewhat startling figure, it is true, but to the dubious we would say—go to Olympia. Whatever scheme of classification of exhibits one adopts, there is bound to be considerable overlapping. In this review it is proposed to adopt classification by processes.

In talking of loading and unloading we have in mind particularly the handling of raw materials and finished products as ready for dispatch, i.e., generally the processes involving heavier duties and greater quantities. We were impressed by what a representative of R. C. Gibbins & Co., Ltd., said with reference to the loading problem. In the initial calculations for the timing of any job, the getting ready and the putting away should be reduced to a minimum.

A somewhat spectacular exhibit of David Brown & Sons (Huddersfield), Ltd., is a winder which weighs $25\frac{1}{2}$ tons and is to go to South Africa. Similarly, a word about the power station wagon tippler in which connection exhibits by Fraser & Chalmers and Strachan &



25½ ton winder wheel; David Brown. Right: Wagon tippler; Strachan & Henshaw

Henshaw, Ltd., are highlights of the exhibition. Lorry loading is another frequent major operation, and in this connection we would refer to the "Hydrum" loader shown by R. H. Corbett & Co., Ltd. It has a hydraulic lift and will raise 7 cwt. to 4ft. 6in.

Generally speaking, however, apart from the siding trucks and engine the crane no doubt takes first place in the factory vicinity. For loading and unloading on the wharf and in the stockyard there are a thousand uses for the 5 ton diesel mobile crane shown by Thomas Smith & Sons (Rodley), Ltd. Power transmission from the engine to all motions is through a hydraulic coupling. A diesel-electric 20-ton mobile crane with a fully slewing superstructure able to turn either way is attracting a good deal of attention in the display by Steels Engineering Products, Ltd. The pneumatic crane shown by Stanhay, Ltd., can readily fulfil the duties of conveying and loading apart from the normal lifting purpose. The portable boom conveyor or elevator marketed by Timson Bros (England), Ltd., has, because of its independent boom adjustment, a particularly wide field covering lifting, travelling and loading services. Three-motor cranes constitute an imposing exhibit by the Crane & Hoist Co., Ltd. In the cranes shown by R. H. Neal & Co., Ltd., the emphasis appears to be on mobility and flexibility. The Metrovick Vaughan gear box, with its electro-hydraulic "Perigrip" brake, makes a special appeal. We should like

also to draw attention to the winding units for cranes shown by Farleigh Hoists. Finally, mention should be made of the travelling crane by George W. King, Ltd., which brings us to the trolley wire problem.

The indoor variations of the shoe pick-up from the bare tramway trolley wire introduce many difficulties by way of protection, and at the same time ingenious solutions. Some of these are to be found in the electric power track developed by Asea Electric, Ltd., in the George King track electrification display, and in the "Vizard" conductor track by Vaughan Crane Co., Ltd. Crane protection is of such importance that the visitor will be interested in the type T indicator shown by Wylie Safe Load Indicators Ltd. It has a collapsible strut assembly with a switch which operates when the safe load is exceeded.

Many hoists are used for major loading purposes, but generally they have a far greater field of operation in process handling. Four hoists shown by Richard C. Gibbins seem to suggest a classification as to hoist operations. There is a fixed suspension hoist which one might associate particularly with the unloading of raw materials at, say, a loading bay, a hoist on a ball bearing runner, a hand chain travel hoist which will carry its load for short distances, and an electric travelling hoist which might well be regarded as horizontal travelling equipment because it seems so suited to longer travel distances.

The "Hoistmaster" of George Cohen

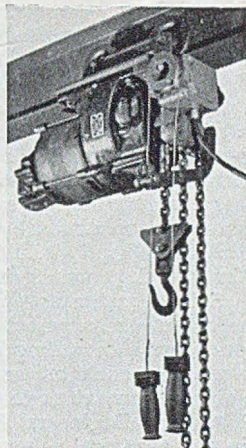
Sons & Co., Ltd., is well worth a special note on account of its automatic limit switch. The chain hoists and lifting units of Farleigh Hoists are also among this extremely useful section of handling plant. Our earlier contention that the hand-operated hoist or pulley block can be an essential link in a comprehensive electrical materials handling installation is supported by the exhibits of Charles Willetts Junr., Ltd. In this connection we may refer also to the Metrovick $\frac{1}{2}$ -ton Wharton pulley block.

Turning to the direct process handling equipment, we have learned from John Barnesley & Sons, Ltd., about some rigid macrast nes designed specially for lifting anodes from plating vats. As distinct from the crane and hoist type of loader there is the general-purpose loader which may be better described as a machine feeder or charger, according to its use, such as the all-purpose loader of T. Baker & Sons (Foundry & Engineers), Ltd.

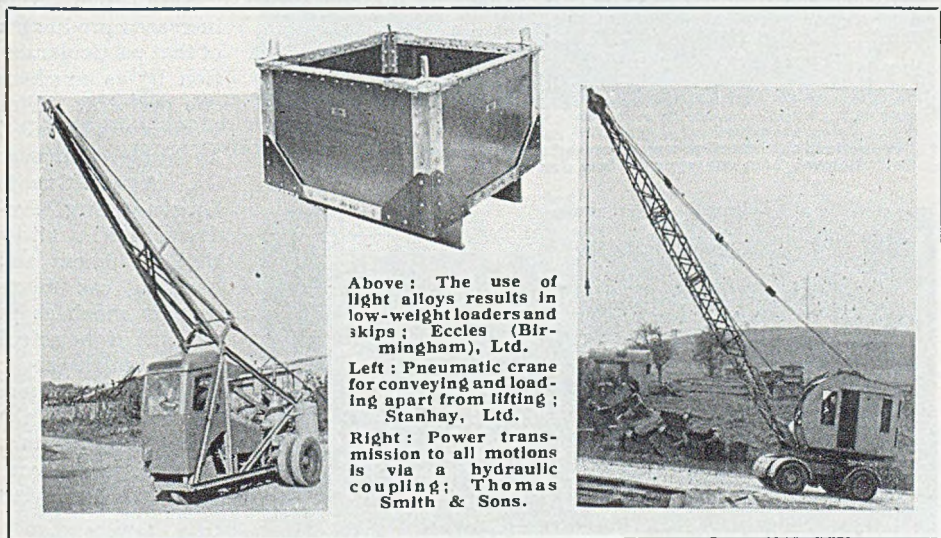
The "Wheelabrater" is of particular interest in this field, in that apart from the actual handling during transit it holds the material in the required position in the cabinet during shot blasting. Eccles (Birmingham), Ltd., showed us some specially designed loaders for use in a new electrical factory where it is particularly desirable to keep the loader weight small in relation to the weight carried.

Equipment for handling up to 5 cwt; Farleigh Hoists.

One loader is 15 ft long, weighs 3 cwt and carries 3 tons. Another loader is 25 ft long and 9 ft wide, has a zin timber platform and weighs 35 cwt. It carries 5 tons. The secret is the use of light alloys which are also non-rusting and clean.



As against holding the work in a machine during processing, there is the handling equipment in which the transmission of the material is wholly or partly the process too. We cannot think of a better example of this than the sausage machine, but such machines as the paddle mixer by the New Conveyor Co., and the George King twin-screw conveyor are very much in our mind in this connection. Then there are the apple sorting, grading, and heat sealing equipments shown by the Didsbury Engineering Co., the heated screen and vibrating machines by Fraser



Above: The use of light alloys results in low-weight loaders and skips; Eccles (Birmingham), Ltd.
 Left: Pneumatic crane for conveying and loading apart from lifting; Stanhay, Ltd.
 Right: Power transmission to all motions is via a hydraulic coupling; Thomas Smith & Sons.

& Chalmers, the screening, drying and vibrating equipment by Lockers (Engineers), Ltd., and the road materials loader, the finishing machine, the ditcher and the one-man trencher by Jack Olding & Co., Ltd. Lifting magnets and particularly magnetic chucks make important contributions to the process handling scheme, and examples of these are shown in operation by the Westinghouse Brake & Signal Co., Ltd., being energised through the company's rectifiers.

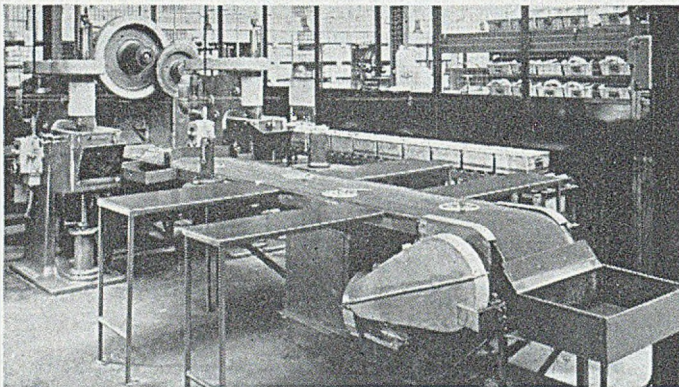
Some materials handling engineers were rather surprised at our interest in pneumatic handling for free flowing materials such as grain and coal, but such equipment as that shown by Simon Handling Engineers, Ltd., is very much in the electrical scheme of things.

The horizontal transit throughout and about factories, whether as part of a process line or for delivering goods from one production centre to another, or

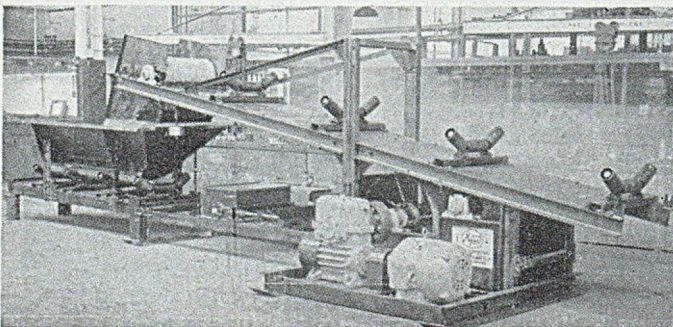
from loading to production, or production to dispatch, represents by far the biggest class of materials handling systems. As Mr. J. F. Knowles, of Willmot Trucks, Ltd., put it, many of the latest factories just could not have been designed without first considering this transit problem and deciding what form of handling should be adopted for it. If the decision is in favour of the conveyor, then the type of conveyor must be decided on before the design is drawn up, and more obviously if trucking is employed consideration of floor space is a vital question.

Concerning this horizontal transit of materials Mr. James, of Richard C. Gibbins & Co., Ltd., spoke strongly of the desirability of moving materials in one direction only, even in cases of non-flow and of batch production, and of how this vitally affected the handling system adopted.

We have already referred to a case where, as the result of conversion to modern materials handling in a cycle factory, the factory output was increased by 100 per cent, and we may add that in the same conveyor materials-handling system a simple belt system of handling certain components increased production of that particular section by as much as 800 per cent. This system was installed by the New Conveyor Co. Again Steels Engineering Products, Ltd., show that movement and handling can represent as much as 75 per cent of the actual production costs. This firm is more interested in the trucking scheme. Let us, however, tackle the conveying section first.



Production in this section was increased to 800 per cent; New Conveyor Co. Below: 24in conveyor surface driving head; Mining Eng. Co.

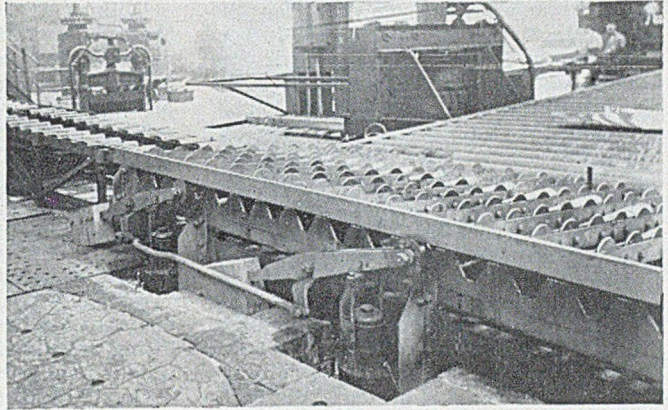


Thruster operating transfer table in steel mill; demonstrated by British Thomson - Houston Co.

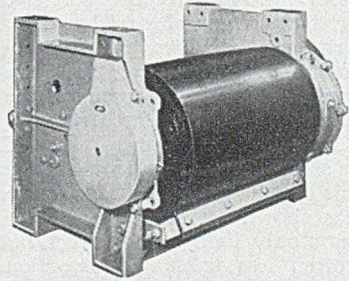
The steel works has already been mentioned as one of the few types of industrial establishments where materials handling has been adopted scientifically for many years. An actual working model of an exceptionally large steel works is shown by the Moxey Conveyor & Transporter Co., Ltd.

From the same angle we draw attention to the exhibit of the British Thomson-Houston Co., Ltd., a thruster operating a transfer table in a steel mill. Similarly, the submerged belt ash conveyor shown by John Thompson, Ltd., supports our contention about the power station and materials handling. Again, the Mining Engineering Co., Ltd., is showing a 15 h.p., 24in conveyor surface driving head.

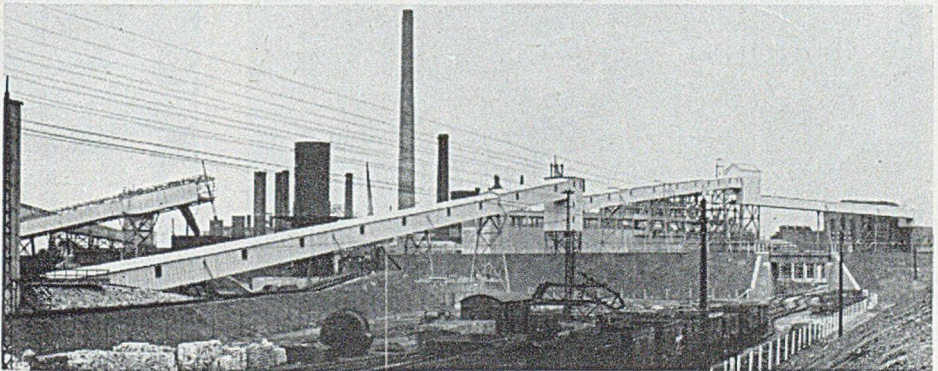
There is often much confusion over idler units and rolls, which perhaps originates in the steel industry where in some cases every roll on a mill feeding table is power driven and where other rolls are not directly power driven. These idlers, however, are actually power driven by virtue of the transmission through the work with or without a conveyor belt, chain or other medium. There are idler systems which fit into all sorts of comprehensive schemes and we have in mind particularly the "Dom-



inion" idler developed by the New Conveyor Co. as a direct reply to the similar American development. Mavor & Coulson, Ltd., seem to have laid themselves out to show that the efficiency of a conveyor system depends on the efficiency of its idlers. As distinct from the



Conveyor drum complete with reducing gear; Mavor & Coulson. Below: The steel works was early in the field of materials handling; Moxey Conveyor & Transporter Co.



idlers, however, this company has one of its most interesting exhibits in the form of the conveyor end or driving drum, complete with reducing gear and a ratchet and pawl "hold back."

Among the exhibitors is Hoover, Ltd., which has a very comprehensive materials handling system installed at its works which in large measure deals with the production of motors that are themselves largely used for small conveyor drives. Referring to an overhead conveyor system which they have installed for handling in the production of vacuum cleaners Teleflex Products, Ltd., stressed the storage value of the overhead system. Similarly the overhead chain conveyor shown by George W. King, Ltd., also depicts the floor saving possibilities. The specialized chain equipment developed by the Renold & Coventry Chain Co., Ltd., is suitable for both normal conveying and elevating and for incorporation in machines, but the emphasis is placed on the braking loads which range up to 85,000 lb.

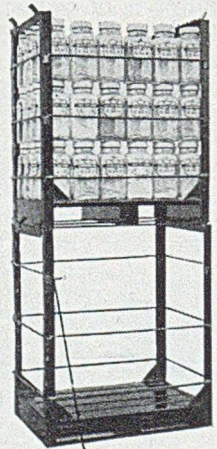
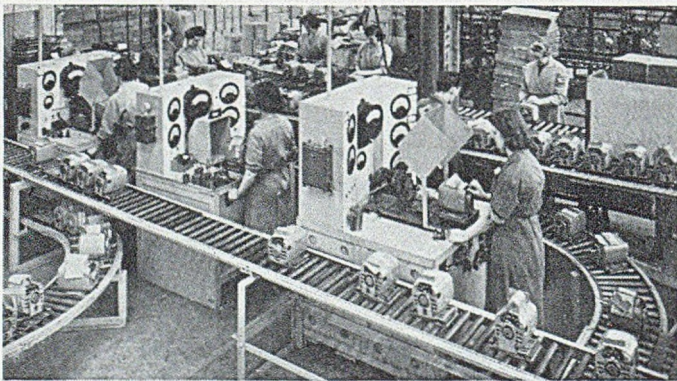
Many processes require belt materials other than the popular rubber one and in referring to the woven wire belt of British Wedge Wire Co., Ltd., we have in mind particularly some of the heat treatment processes which require internal furnace conveyors. The George King slat conveyor may well be included in this category. Core plates for foundry use as shown by J. Stone & Co., Ltd., are not only lighter than steel, but they are often less liable to distortion.

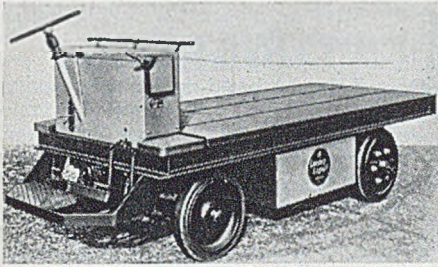
Willmot Trucks made it very clear that it was vitally necessary for the truck manufacturer to know the precise uses to which a truck is to be put. For example, the truck which will receive plastic rubber from the mixing machine is a very different affair from the truck which, with its inverted "V" superstructure, is intended to carry leather, the hides being thrown over the apex, one on the other. Throughout a wide range of trucks, however, the Willmot "Tuglift" system is a common feature, the special point being the simple ball and socket lifting arrangement which distributes the weight evenly over the truck body.

Good examples of general-purpose loading trucks are those shown by A. Hirst & Sons, Ltd., Alfred Allen & Sons, Ltd., and Angel Truck Co. Ltd. An exceptionally large battery truck is a 3 ton Lansing Bagnall model. It has a platform 7ft 10in long and 3ft 9in wide, and has four speeds forward and in reverse up to 6 m.p.h. To take the other extreme there is the electric "Eel" industrial truck of Steels Engineering Products, while the Eccles turntable trucks are also particularly useful in stores and confined places and in train formation.

After what we have said about the necessity of designing trucks specially for their work it sounds strange to talk separately about specialized trucking, but the two things are quite compatible, and serve to indicate the advance that has been made when we line up all the more or less general-purpose trucks

Below : Conveyor motor production ; Hoover. Right : "Palletization" has become a gigantic development : M.G.K. Engineering Co., Ltd.





Above : This exceptionally large battery truck has four speeds ; Lansing Bagnall. Right : Palletization and the fork truck are parallel developments ; Ransomes, Sims & Jefferies (photo courtesy W. T. Glover & Co.)



already mentioned with what we have said about special designing. Now for some "specialized" trucking with regard to both truck operation and processing. The "Hydratruck" of Power Jacks, Ltd., can be put into any position to serve many purposes from lorry loading to machine tool operation table use. The collapsible trolley by Eccles, often with a grid on the top, is particularly useful for heat treatment in the electric furnace. It can be folded up when the furnace is required for other work. The important feature of the dual-purpose truck shown by Wessex Industries (Poole), Ltd., is its interchangeable bodies—a pressed steel tippler and a boarded platform. The "Pul-Lift" truck by the Yale & Towne Manufacturing Co., with its sloping platform and ratchet and chain "Pul-Lift" at the front, is designed specially for the movement of heavy machine tools. The operation of railway trucks on sidings is of special interest to the electricity supply industry, and we recommend a look at the railway handling truck by B.S.A. Cycles, Ltd.

The simple works stillage has evolved many truck developments; for instance, the elevating platform truck shown by Tomlinson (Electric Vehicles), Ltd. Attention may also be drawn to the "Leverstart" B.T.H. one-ton stacker. J. Stone are featuring aluminium-alloy stillages, and a tubular steel type is shown by Tubewrights, Ltd.

"Palletization" (as demonstrated by the M.G.K. Engineering Co.) was introduced here on a large scale during the war. It consists of packing a definite number of articles of the same shape and size into a tray or container and stacking up to a

certain number of containers one on the other for temporary storage, permanent storage, normal machine-side stacking, works transit, and for transportation to the lorry, the goods-yard or the wharf, and often all the way to the customer. It sounds simple, but for every article of a different size or shape there is a specially designed container, so that the development is obviously a gigantic one.

A parallel development with palletization is the fork truck which is designed specially to both lift and carry palletized goods. In connection with their fork-lift trucks Ransomes, Sims & Jefferies, Ltd., stress the importance of train formation conveying. An excellent example of the fork truck is one by Stacatruc, which has a capacity of one ton at 24in centres and a lift of 9ft. The pallet leader truck shown by Wingrove & Rogers, Ltd., is a new low-lift unit designed for loads up to 2 tons to supplement the work of all high-lift trucks. The introduction of giant pneumatic tyres extends the use of the "Pneustac" fork truck by H. & L. Matthew, Ltd., to outdoor use with road speeds up to 15 m.p.h.

Conveyor-storage racking as shown by Rack Engineering, Ltd. can have tray containers, pegs for wheels and brackets for rods, or any adaptation to load up any types of components ready for use as a machine-tool feed table, for truck conveying or for storage.

Battery truck users will find much of interest in the exhibits of Britannia Batteries, Ltd., the Tudor Accumulator Co., Ltd., and the D.P. Battery Co., Ltd., while Partridge Wilson & Co., Ltd., and the Westinghouse Brake & Signal Co., Ltd., have equipment of considerable

interest relating to battery charging.

Some exhibits are driving units independently of what they serve. If crane users can be brought to realize the special care that is put into the crane motor to enable it to withstand its particularly arduous duties we think the Metrovick exhibit will have been justified.

Materials handling schemes, call for unusually large-ratio speed reductions, and there is an outstanding example by Follisain-Wycliffe Foundries, Ltd., in the form of a working unit with an overall reduction from 1,440 r.p.m. to $\frac{1}{2}$ r.p.m. It is not surprising to see in this field the interest displayed in the geared motors and "Radicon" reducing gears shown by David Brown & Sons (Huddersfield), Ltd. Other valuable contributions to the speed reduction field are made by John Holroyd & Co., Ltd., Opperman Gears, Ltd., and by Electropower Gears, Ltd.

As we have already indicated, it is by virtue of electrical control of both the driving unit and material that materials handling can be termed electrical handling. Speed variation of material is called for in some materials handling plants, especially in paper-making and

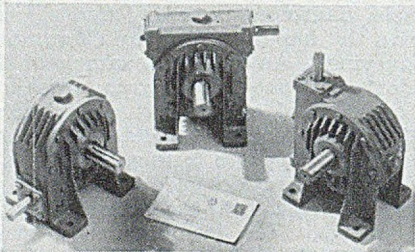
textile drying, where the speed has to be regulated in accordance with the moisture content of the material and adjusted to the build-up on the winding drums, and from this aspect variable-speed motors make a most important contribution to the exhibition. From this angle alone we would well recommend a visit to the stand of the Fuller Electrical Co., Ltd. The speed variation problem is often answered by the a.c. commutator motor, and here Laurence, Scott & Electromotors, Ltd., have much of interest.

There is probably no other field where the push button motor starter has a greater use than in materials handling. A fine display of effective stopping and starting equipment is made by Newman Industries, Ltd. The special arrangements for inching and creeping in the pulley blocks by Asea Electric, Ltd., is an excellent example of the fine control of the electric drive. The B.T.H. "Stacreep" hoist control should be seen by all those interested in cranes.

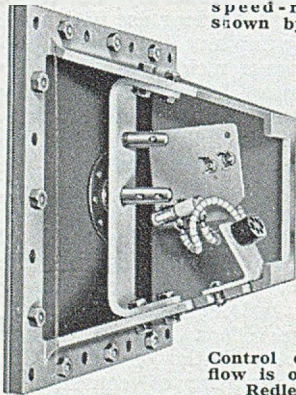
When we have spoken of materials handling as being an essentially electrical development we have had very much in mind the over-riding problem of materials handling, namely, sequence control, which, by the way, appears to be poorly represented at the exhibition. We cannot, however, think of a more promising field for electronic control of which there is an interesting display by Metropolitan Vickers. Electronic control is also shown by the Vaughan Crane Co., Ltd., in conjunction with a 5 ton crane crab with magnetic couplings on the hoisting, lowering and cross traversing motions.

The control of the material flow, as distinct from the drive, is often of major importance and attention may be drawn to the "Tidal" bin level control produced by Redler Conveyors, Ltd., for use with powdered or granular materials. The principle is the operation of a mercury switch under the influence of a loaded flexible diaphragm. The B.T.H. photoelectric relays employed for counting bottles on a travelling conveyor is definitely a materials control unit.

To prove that materials handling plant is better when electrically driven, Associated British Oil Engines, Ltd., display engine-driven electricity generating sets for use in quarries and places where there is no electricity supply.



Some examples of small speed-reducing gears shown by John Holroyd



Control of the material flow is often important; Redler Conveyors

Commerce and Industry

Electrical Fair Trading Appointments in Australia



A NEW edition (the fourth) of the Electrical Fair Trading Policy has been issued. There are a considerable number of clarifications, alterations and additions as compared with the third edition which appeared in October, 1945. There are now schedules for water-heating appliances and for ceiling and table fans. Copies of the Policy have been circulated to those concerned, but extra copies may be obtained at 2s each from the Electrical Fair Trading Council, Sardinia House, Sardinia Street, Kingsway, London, W.C.2.

Paterson Award Appeal

The South West Scotland Electricity Board is appealing against the £52,408 award made to Mr. James Paterson, former general manager and director of the Clyde Valley Electrical Power Co., Glasgow. The appeal will be heard in the Court of Session on 29th June and is expected to last two days.

Australian Technical Appointments

In this issue the Snowy Mountains Hydro-Electric Authority, Australia, is inviting applications for permanent technical appointments in connection with the project for which the Authority was constituted. The positions include a chief electrical and a chief mechanical engineer (salaries £1,855/£2,042) and executive engineers, grades I-III (salaries £1,050/£1,230, £1,230/£1,480 and £1,542/£1,855, respectively). Applications are also invited for electrical and mechanical engineers, grades I-IV (salaries ranging from £607/

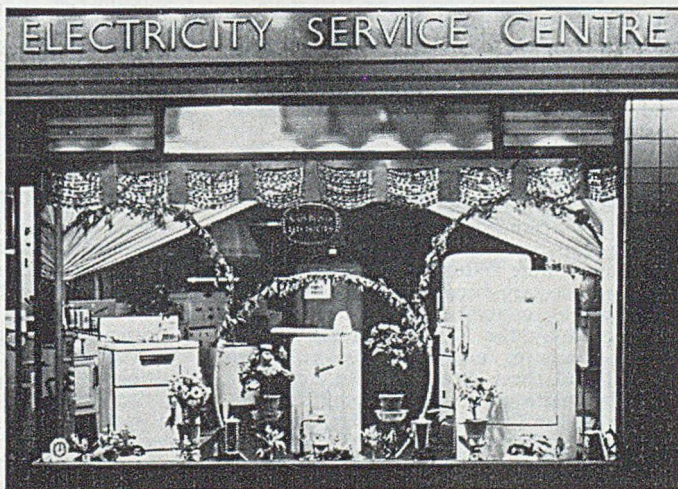
£742 to £960/£1,050). All salaries are in Australian currency and are subject to variation by cost of living adjustments. The Authority will meet the cost of first-class boat fares to Australia for the engineers appointed and their dependants and accommodation on arrival is guaranteed.

Battery Trucks for Sweden

Mr. R. T. Hartman, managing director of I.T.D., Ltd., has recently returned from Scandinavia, where he signed a contract with Salen & Wicander A.B., of Stockholm, for the supply of 100 "Stacatrucks," electric battery trucks and ancillary equipment to the value of £125,000. These trucks will be manufactured at Birmingham by the associated company, Austin Crompton Parkinson Electric Vehicles, Ltd.

Helston Floral Dance Celebrations

As part of the Floral Dance celebrations in the "quaint old Cornish town" of Helston, local traders this year held a window display competition. The accompanying picture shows the entry by the South Western Electricity Board's Helston Service Centre which was awarded the first prize. Flowers are naturally the keynote of the



The S.W.E.B. Helston Service Centre's display at the Floral Dance celebrations

festivities and this display was enlivened with cinerarias, lilies-of-the-valley and blue-bells, whose colours effectively set off the white electrical appliances.

Moffats Blackburn Works

Negotiations have reached the final stages for Platers & Stampers, Ltd., hardware manufacturers, of Burnley, to take over the buildings, plant and machinery of Moffats, Ltd., manufacturers of electric cookers, of India Mill, Skew Bridge, Blackburn. Moffats is a subsidiary company of Moffats, Ltd., Weston, Ontario, and its output was chiefly for export. The decision to sell is the result of import restrictions imposed by several countries in the sterling area during the past few years. To overcome the difficulty, the parent company has arranged for the manufacture of cookers in these countries. The firm will continue to use a portion of the factory until the end of the year for the manufacture of spares and replacements. Afterwards it hopes to secure smaller premises and restart manufacture on a smaller scale. The contract for the sale is awaiting completion.

Batti-Wallahs' Society

Last week's luncheon of the Batti-Wallahs' Society saw the induction of Mr. H. Nimmo as president of the society for the ensuing session, when Mr. Forbes Jackson, the retiring president, handed over the chain of office.

The chief guest was to have been Mr. C. Havers, K.C., but business calls in the North of England prevented him from attending, and Col. H. J. Wellingham, a past-president of the society, stepped into the breach at short notice. Col. Wellingham, who is a member of the Veteran Car Club, and since 1935 (apart from the war years) has taken part in all the annual runs of veteran cars from London to Brighton, gave a lively account of some of those runs and of the "veterans" which have taken part.

Recording Steel Distribution

Under an Order signed by the Minister of Supply arrangements are made for collecting statistics of deliveries of steel to the main consuming industries and for export. This is necessary because of the ending of distribution control for general steel, announced by the Minister on 22nd May. Small purchases not exceeding 5 lb per month, and sheet steel, tinplate, ternplate and blackplate are excluded from the conditions of the Order. The Order, the Iron and Steel Utilization (Records) Order, 1950 (S.I. 1950, No. 873), came into operation on 4th June, and copies are available from

H.M. Stationery Office. In future, anyone requiring steel should merely include in his written order the words "Iron and Steel Utilization Record," followed by the code letters showing the purpose for which he is acquiring the steel. The code letters are listed in the pamphlet, "Note to Consumers—May, 1950," which explains the system, and is being distributed by Government Departments to steel consumers.

C.I.E. Diesel-Electric Locomotives

Two 915 h.p. diesel-electric mixed-traffic locomotives with full engine, transmission and control apparatus supplied by Sulzer Bros. (London), Ltd., have been put into service by the C.I.E. (Irish National Transport Co.). Each has a six-cylinder oil engine running at 750 r.p.m., and the electrical equipment, supplied by the Metropolitan-Vickers Electrical Co., Ltd., to Sulzer specifications, comprises main and auxiliary generators on the same shaft, four force-ventilated traction motors and Sulzer's servo-field regulator system of engine-generator control. The main generator has two ratings of 1,100 A at 475 V and 700 r.p.m., or 720 A at 750 V, 700 r.p.m. The one-hour rating of each traction motor is 350 A at 360 V, 255 r.p.m. The road wheels are of 4.1 in diameter and the gear ratio 16:65.

The cooling fan motor and the blower motors are connected in series at engine starting, so that all three motors run at low speed. As the controller handle is advanced the connection changes automatically to parallel, so that fan and motor-blower groups run at full speed. The servo-field regulator control provides an idling notch and ten other notches, each with a specific torque-speed combination.

Tractive efforts are 46,000 lb at starting and 26,000 lb at 8½ m.p.h. at the one-hour rating. Top speed in service is limited to 55 m.p.h. Speeds of 17 to 18 m.p.h. have been maintained up to 8.4 grades and 48 m.p.h. up to 1 in 1,150 with 360 tons trailing, and 55 m.p.h. up to 1 in 1,150 grades with 130-ton passenger trains.

Rectifier Locomotives

The Pennsylvania Railroad is building two 6,000 h.p. single-phase rectifier locomotives for main-line freight service, in collaboration with the Westinghouse organization. This order follows the encouraging performance of a rectifier equipment in an experimental motor-coach running in a multiple-unit train on the Pennsylvania's standard 25 c/s 11 kV single-phase electrified system. The locomotives are each to have 12 series-type d.c. traction motors fed by 24 ignitron tubes and are to be geared for a top speed of 62 m.p.h. The con-

tinuous rating of 6,000 h.p. is an increase of 30 per cent over that of the present well-known GG-1 class of main-line locomotive with single-phase commutator motors, though the peak capacity will not greatly exceed the 9,000 h.p. of the latter. On the other hand, the estimated weight is 295 tons, or 40 per cent more than that of the GG-1 locomotives.

Canadian Import Relaxations

In the *Electrical Review* of 14th April details were given of some relaxations to be made to the Canadian Emergency Exchange Conservation Act. Confirmation has just been received from Canada regarding the relaxation of the "starred" item shown under Schedule II—"Electric mixers, ironers and dishwashers, etc." The note "*Awaiting confirmation of telegraphic advice from Canada*" should accordingly be deleted. To bring these schedules up to date the undernoted amendments need to be made to Schedule II: Insert: Ex 445—Battery operated electric hand lamps, effective 1st April, 1950. Delete the words "*excluding batteries*" from the item: Ex 445a—Electric flashlights (excluding batteries).

It is understood that flashlights, complete with bulbs and batteries, may now be imported under this item, though the prohibition still remains on "Dry cell batteries n.o.p." shown in Schedule I.

Contract for Television Masts

Following the construction of the 750ft television mast at Sutton Coldfield, British Insulated Callender's Construction Co., Ltd., has now been entrusted with the design, supply and erection of two similar masts for the B.B.C.'s projected television stations at Holme Moss, near Huddersfield, and Kirk o'Shotts, near Glasgow. The construction of foundations at Holme Moss will begin within the next few weeks, and it is expected that erection of the mast will be completed by the early autumn. Erection of the Kirk o'Shotts mast will be commenced in 1951. The design of the new masts will be on the same lines as that of the Sutton Coldfield structure.

Fire at Moulding Works

We are informed that a fire which occurred in the moulding shop of Resinoid & Mica Products, Ltd., on 20th May did not do the extensive damage which has been reported in some quarters, and it has been possible to proceed with production in the Mica Department, the Tube Department and the Fabrication Department, with virtually no interruption. Within three days

of the occurrence more than a third of the normal moulding capacity was again available.

Automatic Telephones for Chester

A new 6,100-line automatic telephone exchange at Chester, and an 800-line automatic exchange at Christleton, installed by Standard Telephones and Cables, Ltd., were put into service on 20th May by Mr. C. R. Hobson, M.P., Assistant Postmaster-General. Councillor B. Reynolds, O.B.E., Mayor of Chester, spoke on behalf of the City of Chester and connected the new system with a formal telephone call to the Lord Mayor of Liverpool. Col. H. Carter, C.B.E., T.D., Regional Director of the Welsh and Border Counties Region, and Mr. W. G. Luxton, M.I.E.E., telephone manager, Chester, paid tribute to the work carried out by Standard Telephones. The installation of Chester exchange was delayed by the war.

Japanese Plant for India

A contract for power plant for India has been awarded to a Japanese concern which quoted about half the price put in by C. A. Parsons & Co. (£150,000). In announcing this on Monday Sir Claude Gibb, chairman of Parsons, said that the Indians sought plant at low capital cost even though it was much more expensive in fuel consumption.

Rubber Cable Specification

The Technical Panel of the Engineering Standards Co-ordinating Committee concerned with cables and wires (Secretary: Ministry of Supply, I.E.M.E. "Aquila," Golf Road, nr. Chislehurst Station, Bromley Kent), has recently issued a 1950 edition of GDES.25—Natural Rubber and Polychloroprene Sheathings from Electric Cables and Flexible Cords. The main difference from the 1948 issue is in the introduction of a tear resistance test and increase of the tensile strength requirements of general-purpose natural rubber and polychloroprene compounds. There are a number of other changes. Copies can be obtained from H.M. Stationery Office, price 3d.

Radio Equipment for B.E.A. Ships

"Transarctic" transmitter/receivers, which provide both radiotelephony and telegraphy facilities, have been ordered from the Marconi International Marine Communication Co., Ltd., for six new vessels building at William Pickersgill and Sons' yard at Sunderland. These six ships, which are for the British Electricity Authority, will be managed for the B.E.A. by Stephenson Clarke, Ltd. Marconi "Oceanic" sound-

reproducing installations, each having six loudspeakers, are also to be fitted on these ships. The *Dame Caroline Haslett* and the *Harry Richardson*, two other vessels managed by the same owners for the B.E.A., are equipped with Marconi "Transarctic" communication equipment, while their "Oceanic" sound-reproducing installations each include four loudspeakers. These two ships are also equipped with Marconi "Seagraph" recording echometers as aids to navigation.

Another collier for the B.E.A., the *Brent Knoll* (1,700 tons), built by S. P. Austin and Sons, was launched last week, the naming ceremony being performed by Mrs. J. Eccles, wife of the chairman of the Merseyside and North Wales Electricity Board. The *Lord Citrine* (4,600 tons), built by William Pickersgill and Sons, is also to be launched shortly.

"Iron and Steel Directory"

Appearing again for the first time since 1939, the *Iron and Steel Directory and Handbook* (Louis Cassier Co., Ltd., Dorset House, Stamford Street, S.E.1, price 25s, postage 8d), provides in some 300 pages a wealth of up-to-date information for iron and steel users and makers. The directory sections include lists of British pig iron manufacturers, some 2,500 ironfounders, steel works, steel founders and makers, and British iron and steel groups. Trade associations and scientific and technical bodies are also listed. The handbook section contains a large amount of technical data for engineers, metallurgists and iron and steel makers and users, and there is also a classified list of manufacturers engaged in the iron, steel and allied trades.

W. N. Froy Centenary

In 1850 Mr. W. N. Froy set up a warehouse and works in King Street, Hammersmith, to supply London builders with materials and equipment. On Monday last, to commemorate the centenary of the business of W. N. Froy & Sons, Ltd., an exhibition was opened at the company's works showing some of its products and those for which the company are factors. The business has throughout the years remained largely a family concern and to-day the grandsons of the founder carry on the family tradition. Mr. Alan Froy is managing director and his brother is a co-director. In the last month Mr. Nigel Froy, son of the managing director, has joined the company.

The concern became a limited company in 1909, and it has been continuously expanding into new fields, developing the manufacturing and production side. To-day 400

people are employed and stock valued at £200,000 is carried. The business now includes a large electrical section.

The exhibition opened on Monday last has been skilfully designed to represent miniature show window displays, each window containing a representative display of the various sections of the company's business. The opening ceremony was performed by the Mayor of Hammersmith, who was introduced by Mr. A. Froy (managing director), and Sir Alan Herbert also spoke in his own inimitable style.

Metal Price Increases

The Ministry of Supply has announced that from 4th June the price of good ordinary brand zinc is increased by £12 per ton to £123 10s per ton delivered. Prices of other grades are varied accordingly.

The Ministry of Supply announced on Tuesday last an immediate increase of £16 in the price of electrolytic copper, from £170 to £186 per ton delivered.

Trade Announcements

British Moulded Plastics, Ltd., have taken over the sale of the battery lids and plugs of Xenit Products, Ltd., Trading Estate, Slough, as from the 1st June, and have become sole selling agents. Manufacture and invoicing will continue unchanged.

Rapid Magnetic Machines, Ltd., have appointed John S. Young & Co., Ltd., 257-261, Eglinton Street, Glasgow, C.5, as their Scottish agents for their permanent and electro-magnet separating equipment and lifting machines.

Change of Name

The name of Machine Tool Electrics, Ltd., has been changed to M.T.E. Control Gear, Ltd.

Victor H. Iddon, Ltd., have changed their name to Nettle Accessories, Ltd.

INFORMATION DEPARTMENT

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

"Wickman T9" food conveyor.

"Suco" 2-pole scraping earth plugs.

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

ELECTRICAL CONTRACTING: Organization and Routine

By H. R. TAUNTON, A.M.I.E.E.

7—Dealing with Inquiries (Continued)

THE form of tender (*F*) may be bound with the specification, or it may be separate. In its simplest form it calls for a single lump sum, with perhaps one or two schedule rates to cover addition or deduction of points; but many consultants prefer to subdivide the total tender, sometimes to provide for the possible omission of certain parts of the scheme, but more often as a check upon extras.

It has to be admitted that this practice of sub-division is reasonable from the consultant's standpoint, serving both his own convenience and the interests of his client. Carried to excess, however, as it sometimes is, it entails a lot of needless estimating work; nor is it always the check on charges for extras its designer fondly imagines. There is usually no difficulty in adjusting the prices quoted so that those against the variable quantities, which may be taken later as the basis for charges for extras, are the more remunerative, while the total tender remains keenly competitive.

Charges for Extras

Although it is commonly assumed by customers, it is not reasonable to expect extra points to be installed at the same rate as those in the original schedule. For one reason and another—e.g., the dislocation of the pre-arranged layout—extra points invariably cost the contractor more than the original points. The fairest way of dealing with them is on a day-work basis, or if the consultant fears that may be abused, then by a fair schedule rate. Moreover, to be quite just, that should be different—less for deductions than for additions. A dozen points, for example, might be left out of the original scheme for a large hall, by adopting larger units at wider intervals, and yet leave the amount of tubing and

wiring required practically unaltered.

Speaking of variations, the contractor should protect himself against excessive deductions from the original contract. For the matter of that, it is possible to imagine cases where excessive additions might be equally prejudicial. The point is fairly met by the I.E.E. General Conditions, which stipulate that variations which increase or decrease the total tender by more than 10 per cent shall not be made without the consent of the contractor.

Too Many Tenders

A grievance of the trade which has already been mentioned is the excessive number of firms who are allowed by public bodies and some consultants to quote to their inquiries. This represents a wanton waste of money, time and energy for the contractors and manufacturers involved. Nor does the purchaser gain by this broadcasting of inquiries. He may secure a price which is falsely low, but he cannot expect with it the quality he wants. His professional adviser may by unremitting vigilance force some approach to it, but it will only be by the ruin of the "successful" contractor. The purchaser may shrug his shoulders at that—but not if he is a man of vision and equity.

Contractors have themselves largely to blame for this unhealthy state of affairs. There are very few of them who, being told that there were already ten competitors in the field for a given job, would refuse to make the eleventh. But the remedy is in the hands of the professional men. Let them limit their invitations to tender to six, or even four. If they wish to spread their favours, they can do it in rotation.

Much of what we have said about consultants' specifications applies also to

cases where the contractor has to prepare his own scheme and specification. The preparation of the scheme is a technical matter which does not here concern us, but its description may well be the opening of the contractor's specification. It is the most interesting part of it to the customer, and should be in language he can understand, as non-technical as possible, consistent with precision. If the job is a competitive one, any refinements in the scheme should be emphasized and their purpose and advantages clearly explained. Technical diagrams will usually not be necessary, but price lists or illustrations of plant and sometimes special drawings, may be helpful.

The specification should generally be on the lines already discussed. It will usually be shorter, partly because the contractor is not paid for superfluous wording, and partly because he has naturally no wish to bind himself on points of detail more closely than is necessary to secure his prospective customer's confidence and order. His "general conditions" especially will be fewer and simpler. They are, perhaps, better stated at the end of the specification than the beginning. The essential clauses for all jobs of any size are those referring to builders' work, guarantee and maintenance, conformity with authorities' requirements, and terms of payment. If standard conditions are printed on the back of estimate forms, as before suggested, these can be conveniently referred to as embodied in the contract. Preferably they should be those recommended by the E.C.A.

The quality of the material offered should be emphasized—if it will bear emphasis. Any special refinements or improvements on standard rules or methods of working should also be pointed out; and a little obvious liberality, if competition permits it, is desirable, such as the provision of spare ways on fuseboards.

Advantages of Standard Form

A standard form for all but special cases is strongly to be recommended for this section of the specification. Not a printed form, or even a pre-typed form, but an office draft with suitable blanks and alternatives, which can be handed to the typist to copy. This is a great saver of time and brain-wear in dictating each

specification afresh, avoids the chance of accidental omissions, and ensures uniformity of practice.

Contractors commonly use the conditional "would" in their specifications. "The main switch would be of 60 amperes capacity and would . . ." The unexpressed conclusion is, "if the work is carried out by me." This is not incorrect, but the more definite "will" is better. "The main switch will be . . ." and so on. It suggests modestly the tenderer's conviction that so excellent an offer as that which he is making cannot but be accepted by any man in his senses, and that therefore the work *will* be carried out by him.

Plans and Symbols

The contractor, in drafting his own specification, should adopt a standard form of schedule similar to that discussed in the preceding article, unless the scheme has special characteristics which may make an alternative more convenient. Ruled columns are unnecessary: a good typist can make a neat tabular job without them, on plain continuation sheets. It should, whenever possible, be accompanied by marked plans, if prints can be obtained from the architect or elsewhere. There is, curiously and regrettably, no recognized uniform system of marking up plans, other than B.S. 447-1932: "British Standard Graphical Symbols for use in connection with Interior Electrical Installations." Few firms, however, seem to have adopted it; probably because to be candid, it is clumsy and unsatisfactory. A contractor will do better to devise a code of his own, with symbols limited to the essential, simple and easily memorized, and clearly distinguishable even on a defective print.

The contractor's tender is usually a simple one, typed on a separate estimate form. It will probably be a single lump sum, but the character of the installation will sometimes call for several figures covering definite sections of the work. The contractor is usually chary of committing himself to schedule rates, but these are sometimes advisable. Prices for various alternatives are sometimes quoted in the specification itself, but it is better practice to collect them on the estimate form. No expurgation is then necessary before handing a copy of the specification

to the foreman, if the order is secured.

The invariable proviso should be added to every tender that all figures quoted are strictly net. Not only builders but private purchasers sometimes expect a cash discount and are apt to be aggrieved if it is refused them.

To recapitulate, the essential preliminary to the preparation of an estimate is a full knowledge of all the pertinent facts, comprising a full specification, complete schedules, plans and sections, fully marked up, and precise information on every other factor which may affect the cost of the job.

Factors to be Considered

The first three are not likely to be overlooked, for without them the estimator cannot work out a price, or only an approximate one. The fourth, however, is a more fruitful source of errors and omissions. There are so many factors which may affect the cost of a job. Wherever possible, the estimator should visit the site of the proposed installation himself so that he may be acquainted at first hand with the conditions under which it will be carried out. If he has any doubts about them he should protect himself by a proviso in his specification; or alternatively, if the conditions are fully known, but their effect on the progress of the work is doubtful, he must allow a safe percentage under the heading of "contingencies."

The state and construction of the building is the most obvious question. Is it being erected, or is it an existing building, empty or in occupation? Is it of ferro-concrete, stone, or brick; what is the construction of the floors and partitions; are there facilities such as vertical chases, roof spaces, and crawling ways? Incomplete answers may be fatal. The late discovery of double floors in an old house, or of marble panelling in an office building, may easily convert what had seemed a safe profit into a loss.

The rules and regulations mentioned in any "conformity" causes of the general conditions must be carefully considered: for instance, factory regulations, and L.C.C. regulations in the case of theatres and cinemas. The rules of the fire insurance company concerned are usually no more onerous than those of the I.E.E., which most companies now adopt; but

those of the supply authority may be more exacting, particularly on the point of balancing.

The distance of the job from the "shop," and the travelling facilities; whether it is a rushed job, involving perhaps overtime; how far it is dependent on the work of other sub-contractors; the amount of special supervision necessary or possible; what, if any, special tools and tackle will be wanted; all these, and many other points, must be borne in mind by the estimator.

He should be acquainted with all the workmen on the permanent staff, for the personal equation affects as much as anything the accuracy of his labour constants. Ideally, these personal idiosyncrasies should not have to be considered; and, indeed, unless the estimator can be sure that a certain foreman and certain men will be available for a particular job, he can only estimate on the average skill and character of the men employed by his firm.

Even if the men are assumed to be equal, the conditions under which they work will largely affect their efficiency. The weather, and the amount of light available, will have a definite influence on output. Extremes of temperature, too, and difficult conditions such as are met with in mines, cold-storage plants, boiler-houses, chemical works, and so on, all slow up a man's output; and if he has to work among moving machinery, or on scaffolding or high ladders, where he has to exercise care to avoid accident, his efficiency falls considerably and the estimator's labour constants must be increased proportionately.

There are few jobs on which there are not one or more adverse factors for which allowance must be made, either in the form of increased labour costs or of a percentage for contingencies. None must be overlooked, whether by the estimator or by the engineer on whose data he has based his estimate.

Catalogues and Price Lists

Assumed, then, that he knows everything he should know about the job, his other preliminary requirement is a sufficiency of up-to-date catalogues for the pricing of standard material, supplemented by quotations from makers or

wholesalers for any special material specified. Time and trouble will be saved by a judicious selection of standard catalogues. Each estimator will have his favourites; and if he is wise he will, in his moments of leisure, have annotated them with net figures for single articles. It is a pity compilers of catalogues—besides those of cable makers—cannot see their way to save him that trouble. From his point of view there is no obvious reason why net price lists should not be available for all the commoner electrical materials—conduit, for instance—nor why they should not give prices for single articles as well as for dozens or grosses. It would be something if makers, who may consider it impolitic to publish net lists, would at least leave ample margins for the user's own figures.

Useful Schedules

Apart from printed catalogues, the estimator should have at his command special price lists and schedules which he will himself have compiled, most conveniently in the form of a loose-leaf notebook. Their range will depend on the class of work in which his firm specializes. One of the most obviously useful is a schedule of the cost of conduit per foot run, *complete* with conduit accessories, with a percentage added to cover unavoidable waste and petty material, and the cost of labour.

Another useful schedule is one giving the cost of cables per foot run; i.e., of 2ft (or 3ft) of cable per foot of conduit, with an allowance for waste and ends left at outlets, and labour.

By combining the schedule rates for cable with those of the appropriate size of conduit, a third useful schedule, giving the cost per foot run of mains and sub-mains and cable runs for power points can be obtained. By its use a combined entry, such as "50ft run 2 x 19/064 600 C.M.A. in 1½in screwed welded galvanized," can be priced in one operation with a great saving of time and trouble.

In the same way, the estimator can save himself continual reference to a multiplicity of catalogues by preparing a net price list of all the accessories his firm is in the habit of using, or which are commonly specified by consultants. His work will obviously be facilitated if he has, ready worked out, special rates

for certain composite items, erected complete, such as a sunk switch with c.i. box and bevelled switchplate; a switch and socket mounted in or on a 6in by 3in box; or a plain pendant complete with circular box and opal conical shade.

These schedule rates, however, must be used with discretion. They are necessarily compiled for normal conditions, and they must therefore be corrected for any special conditions which may govern the particular estimate in hand. The percentage to be allowed for conduit accessories, for instance, may vary considerably according to the type and construction of the building; e.g., it is usually less on the long runs of a factory than in a private house, and more on surface than concealed work.

The words "quotation," "estimate" and "tender" have been used indiscriminately in this article for the price submitted by a contractor for specified work. It must be admitted that this is lax. "Quotation" is generally used to describe a priced offer of supplies or contract work of normal size and "tender" for the dignified figures submitted for large competitive contracts. An "estimate" is literally an "approximate judgment": a customer has been known to object to receiving an estimate when he wanted a "firm quotation." The word is correctly applied to the contractor's calculation of the cost of a given job; but by the time he has added his profit and made a definite offer, his "approximate judgment" should really be crystallized as a "quotation," or "tender." However, on the authority of the *Concise Oxford Dictionary*, "estimate" can mean a "contractor's statement of sum for which he will undertake specified work"; so we shall continue to use it and "quotation" with the same indiscrimination as before.

I.E.E. Western Centre

THE I.E.E. Western Centre proposes to hold a summer meeting from 29th September to 2nd October at the Hotel Metro-pole, Minehead. Members wishing to attend are asked to notify Mr. A. H. McQueen, 15, Great George Street, Park Street, Bristol, 1, by 30th June.

The annual meeting of the Centre will be held on 12th June at the South Wales Institute of Engineers, Park Place, Cardiff.

ELECTRICITY SUPPLY

Power Station Thermal Efficiencies Recent B.E.A. Contracts

THE following are the twenty steam power stations listed by the B.E.A. in order of overall thermal efficiency achieved during the calendar year 1949.

Station	per cent	Station	per cent
Battersea "B" ...	28.81	Mexborough ...	25.20
Fulham ...	26.79	Little Barford ...	25.13
Kearsley* ...	26.36	Meaford ...	25.13
Hans Hall "B" ...	26.36	Kirkstall* ...	25.01
Llynfi ...	26.09	Ferrybridge* ...	24.97
Battersea "A" ...	25.89	Littlebrook "A" ...	24.79
Dunston "B" ...	25.80	Newport* ...	24.70
Barking "B" ...	25.61	Trafford ...	24.72
Brimmsdown "A" ...	25.49	Rotherham ...	24.71
Earley ...	25.38	Clarence Dock* ...	24.44

In those marked with an asterisk, only the high-pressure portion of the plant has been taken into account. In addition, four more stations which performed well, but have not been listed because they were not in operation throughout the year, are Littlebrook "B" with 26.85 per cent, Brimsdown "B" with 26.13 per cent, Cliff Quay with 26.03 per cent, and Stuart Street* with 25.71 per cent.

Contracts for Power Plant

During the past month the British Electricity Authority has placed contracts for power station, switching and transforming station and transmission equipment amounting to £3,620,120. They include the following:—

Barking "C" power station: Two 377ft reinforced concrete chimneys.—Tileman & Co., Ltd. East Yelland station, near Barnstaple: 132 kV, 2,500 MVA switchgear.—British Thomson-Houston Co., Ltd. Chadderton station, Oldham, Lancs: Foundations, circulating water ducts and pipe bridge.—M. J. Gleeson, Ltd. Huncoat station, Accrington: Superstructure.—J. Jarvis & Sons, Ltd.

Cable contract, Kingston power station, Barking-Ilford 132 kV, 33 kV and auxiliary cables, Barrow-Windscale 132 kV overhead lines, and Oldbury (Worcs) 132 kV overhead lines.—British Insulated Callender's Cables, Ltd. 132 kV and multicore cables, Portsmouth.—Enfield Cables, Ltd.

Grimsbay substation, 45 MVA, 132/33 kV transformers and earthing transformers.—

Fuller Electrical & Manufacturing Co., Ltd. Sowerby Bridge substation (Yorks), 30 MVA, 132/33 kV transformers and earthing transformers.—Hackbridge & Hewitt Electric Co., Ltd. Newcastle-under-Lyme substation (Staffs), 60 MVA, 132/33 kV transformers and earthing transformers, and Thornhill substation (Yorks), 45 MVA, 132/66/33 kV transformers and earthing transformers.—English Electric Co., Ltd. Sale substation (Cheshire), 45 MVA, 132/33 kV transformers and earthing transformers.—Metropolitan-Vickers Electrical Co., Ltd. Cheltenham-Gloucester 132 kV overhead line.—Riley & Neate, Ltd. Lockleaze substation (Bristol), 60 MVA, 132/33 kV transformers and earthing transformers; Boston substation (Lincs), 30 MVA, 132/33 kV transformers and earthing transformers; and Altrincham substation, 45 MVA, 132/33 kV transformers and earthing transformers.—Ferranti, Ltd.

New Oxford Station?

It is reported that a new power station may be constructed on the outskirts of Oxford. The *Oxford Mail*, in an interview with an official of the B.E.A. Southern Division Construction Department, was informed that at present nothing more had been done than look for a site.

Rural Development Hampered

The chairmen of two Area Boards have recently spoken of the restrictive effects which the Government's capital investment cuts are having on rural electrification schemes. Mr. J. Eccles, addressing the Merseyside & North Wales Electricity Consultative Council, said that so long as it was necessary to limit capital expenditure to the present rate it would be impossible for the Board to proceed with the North Wales development scheme at more than half the speed originally planned, which contemplated completion in fifteen years.

At the South Western Electricity Consultative Council meeting held last Friday at Bristol Mr. S. F. Steward also stressed this point, saying he could not over-emphasize the devastating effect which the limitation was having on the momentum of the Board's

development. It would not be possible to carry out in full even the modest programme announced six months ago and unfortunately some of the parishes included in this programme would not obtain their supply during the present year. The Board had made urgent representations to the British Electricity Authority that the South Western Area should receive special consideration in view of the exceptionally large number of farms still without supply. The severity of the cuts also entailed postponement of important schemes for reinforcing existing mains, without which it would be impossible to give new supplies in many parts of the Area.

Trouble at Cliff Quay

The output of the new Cliff Quay power station, Ipswich, was temporarily reduced by 30,000 kW last week and it was later stated that the police were investigating suspected sabotage. The nature of the tampering was not indicated, but it is believed that lubricating oil cocks had been moved, resulting in a minor seizure. The trouble was remedied within a few hours but might have caused a complete breakdown had it not been noted in good time. The station is due to be officially opened to-day (Friday) by Alderman S. C. Grimwade.

Area Revision

From 1st June the electricity undertaking formerly vested in the Congleton Corporation has been transferred from the Merseyside and North Wales Electricity Board to the Midlands Board under the Electricity (Area) (Congleton) Order, 1950.

C.P.R.E. Report

One section of the annual report for 1949-50 of the Council for the Preservation of Rural England (presented at the annual meeting on 1st June) reports discussions with the British Electricity Authority and some of the Electricity Boards on the distribution of electricity in country districts. To representations that underground cables should be used in preference to overhead lines, the reply of the electricity authorities was generally that rural services must be economic. The Council suggests that the terms of the 1947 Electricity Act enable the B.E.A. to recoup losses on supplies to rural areas from its general revenues.

The Council believes that the cost of rural underground cables should be the subject of subvention on a national basis, but the Minister of Fuel and Power has replied that it is not possible under existing legislation to provide for the extra cost out of any national fund.

The C.P.R.E. is supporting the North Wales (Hydro-Electric) Protection Committee in its opposition to the B.E.A.'s water power schemes, and it has also had under consideration the generation of electricity by wind power and the possibilities of cable laying by plough.

Site Work at East Yelland

To provide a temporary electricity supply for work on the site of the new power station at East Yelland, North Devon, G.P.U., Ltd. (Service Division), Wembley, is installing a ring main system. The initial work covers the provision of three main distribution centres around the site of the new station, which will be served by two overhead lines bearing the eight-wire ring main. The remainder of the system will be supplied by two four-core 0.25 sq in. cables connected to the distribution gear in the temporary diesel generating station which has already been installed by the company.

Ash Disposal

Springwood, the second of two diesel hopper barges which will eventually be used for disposing of ash from the Merseyside & North Wales Division's new Bromborough power station, is undergoing speed trials on the Clyde.

Safety-valve Tests

Successful high-pressure, high-temperature capacity tests were recently completed at the Meaford station of the B.E.A. on the full-lift safety valve and "Maxiflow" safety valve made by Dewrance & Co., Ltd.

By-pass Road Lighting

A sodium lighting installation was last week officially inaugurated in Sevenoaks Way, ST. PAUL'S CRAY, and Cray Avenue, ORPINGTON, sections of a Class "A" by-pass road. The switching-on was performed by the chairman of the two local authorities concerned—Mr. G. Udall, of Chislehurst and Sidcup, and Mr. C. S. Saffery, of Orpington, Kent.

The complete scheme consists of 110 G.E.C. prismatic refractor lanterns, each housing a 140 W sodium lamp and mounted on a Concrete Utilities' 25ft column with a 3ft bracket, giving an average carriage-way illumination of 5,225 lumens per 100ft linear. Mr. P. S. Watson, manager of the West Kent District of the South Eastern Electricity Board, tells us that in the case of the Orpington section this is the first electrical installation of any magnitude and the superior lighting is expected to lead to a rapid extension.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

REPORTS AND DIVIDENDS

Associated Electrical Industries, Ltd., held its annual meeting on 31st May when Mr. Oliver Lyttelton (chairman), who presided, said that the volume of production in 1949 was approximately 11 per cent higher than in 1948. This was mainly due to the increased manufacturing capacity and to the large sums which had been expended on modern machine tools and other production facilities during the last few years. Deliveries of finished apparatus amounted to about £52 million during the year and the total volume of orders upon the books of the company at one time during the year exceeded £100 million. Deliveries were well spread out over a number of years and were well within the capacity of the various factories. This total did not include the considerable sales by the group of the products ordered for stock or sales which were normally made direct to the customer without being included in the order book, such as domestic appliances, lamps and fittings.

Orders received for electronic equipment of all kinds exceeded the amounts booked in 1948 by £6½ million, excluding cathode ray tubes and valves. The Edison Swan Co. had made great strides in the production of radio valves and to meet the expanding demand that company had quadrupled its output of cathode ray tubes. Additional plant for further increased output was under construction. Referring to the group's training and apprenticeship scheme Mr. Lyttelton said that Metropolitan-Vickers were building at a cost of about £115,000 an apprentice training school and sports ground at Trafford Park. They had in their training establishments 2,900 apprentices and post-graduate engineers.

The constituent companies of the group continued to take a high proportion of the total orders for generating plant placed in this country and had obtained a large share of international export business. Export orders obtained by Metropolitan-Vickers included generating plant for South Africa, Australia, Turkey and Norway. The company had supplied the first two hydrogen cooled generators built for use in this country which had been installed at Littlebrook, and they were also supplying the electrical equipment at the new oil refinery being built at Fawley, Southampton.

B.T.H. orders included a large hydro-elec-

tric generating plant for Ceylon and steam plant for Meaford and Goldington. Extensive orders had been received for radar equipment for the Scandinavian countries in addition to a number of large orders at home. At Trafford Park Metropolitan-Vickers had installed a 2,000 kW gas-turbine to assist the winter load. A synchrotron for Glasgow University, and a cyclotron for Liverpool University, were being built in connection with atomic energy research. The B.T.H. company had developed a circuit employing ignitrons which would switch 30,000 kVA five times per second. It would be used to excite the cyclotron for Glasgow University.

During the four years 1946-49 £16 million had been invested in the business either by stock or loan issues or by the retention of profits. This had been spent upon the latest machine tools and many extensions to existing plants. Some of these extensions were new factories in themselves and included new heavy plant at Rugby for the B.T.H. Co. which came into production in 1949. Extensions by Metropolitan-Vickers included a large electrical machine shop at Trafford Park for the manufacture of water-wheel alternators. The Edison Swan Co. had a new plant for cathode ray tubes at Brimsdown. The plant at Peterborough had now been taken over by the Hotpoint company and production was being extended. During the year the Motherwell factory was opened and was under the management of Metropolitan-Vickers. The factory was engaged in the production of electrical meters and instruments for Metropolitan-Vickers, X-ray equipment for Newton Victor and thermostats for Sunvic Controls.

Referring to overseas investments the chairman said that good progress had been made with the new production programme of the First Electric Corporation (South Africa) and of L. H. Marthinusen its wholly owned subsidiary.

Babcock & Wilcox, Ltd.—The annual meeting was held on 30th May, Mr. C. K. F. Hague (deputy chairman and managing director), presiding in the absence through indisposition of Lt. Col. Sir John Greenly, the chairman. In his statement which was issued with the report and accounts the chairman says that in spite of the many difficulties encountered in the post-war period they have completed a number of large installations now controlled by the

British Electricity Authority. While the order book is still satisfactory, the rate of orders has declined considerably during the last three years, and he is confident that the expansion which has already taken place in their company's activities is adequate to deal with the steam plant requirements of the future, assuming that the necessary labour and materials are available. Competition in the world markets has increased considerably in the last twelve months, and in some quarters prices are being quoted which do not portend an economic future for the industry, but in spite of this the export business obtained by the company remains at a satisfactory level. In addition to the extension and improvements in the works of the subsidiary companies abroad they have continued their policy of re-equipping the main works in this country. Their overseas subsidiaries and branches are operating satisfactorily, except in China, where the present political situation is still causing serious difficulties.

The Anglo-Portuguese Telephone Co., Ltd.—The annual meeting will be held on 27th June. In his statement, issued with the report and accounts, Sir Alexander Roger (chairman) says that negotiations with the Portuguese Government regarding an increase in tariffs have now been completed. The increase will enable them to complete their plans for raising fresh capital to meet the expansion of the company's system and provide telephone service to the 27,000 applicants still on the waiting list, and also to replace their existing loan from the Telephone and General Trust, Ltd. The proposals include the issue of the unissued ordinary capital of 400,625 shares by way of an offer to the existing shareholders and the creation and placing of new debenture stock. Plans for both these operations are well advanced and details will be announced shortly. The number of stations at the end of the year was 93,434. Of this number, 28,229 have been added in the last four years, involving capital expenditure of approximately £1,500,000.

The British Vacuum Cleaner & Engineering Co., Ltd.—A record turnover for 1949 was announced by Mr. H. C. Booth (chairman) at the annual meeting held on 31st May. Mr. Booth said that the recession in trade in the pre-Budget period was more than made up in the final six months of the year. They had a number of important contracts in hand for B.V.C. ash- and dust-handling automatic plant in power stations both at home and abroad. The sales of "Goblin" vacuum cleaners were maintained, and their new "Goblin" electric washer was well established as a remunerative section of their business.

There had been a further increase in export trade. The improvement in trade in the final six months of the year had been maintained during the current year.

The Ever Ready Co. (Gt. Britain), Ltd.—Speaking at the annual meeting on 31st May, Mr. E. N. Rowbotham (chairman) said that their sales for the year constituted a record in the company's history, but they had had to battle continually with rising costs of production, particularly of raw materials. The current year's trading had started satisfactorily and gave reason to think that sales would be well maintained. The demand for their products in the home market continued unabated, and overseas the sales of their "Berec" brand of batteries and flashlights showed substantial increases. They had not yet been able to meet fully the public demand for their all-dry radio receivers.

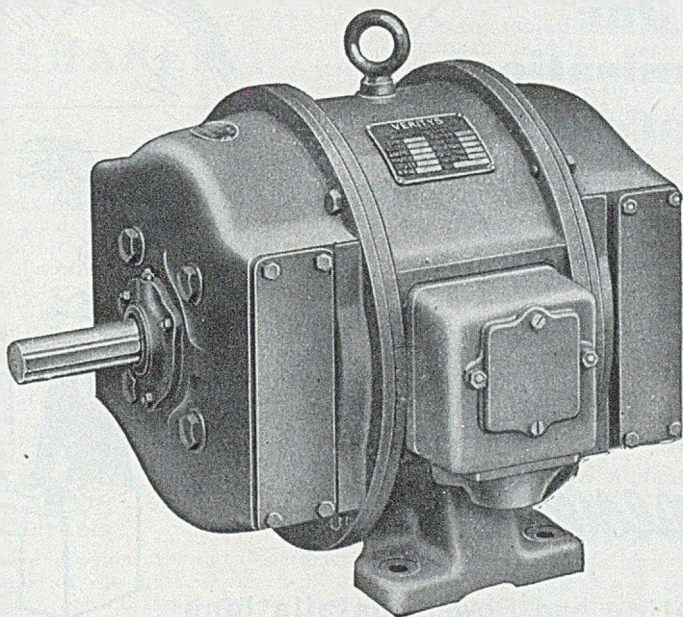
The Telephone Manufacturing Co., Ltd., reports a group profit, after all charges, including tax, of £127,449 for 1949, as compared with £107,301 for 1948. The profit attributable to members of the holding company are £124,351 (against £104,780). It is proposed to pay a final dividend of 7½ per cent (against 6½ per cent), making 10 per cent (against 9 per cent).

The Southern Areas Electric Corporation, Ltd., reports a net profit of the parent company of £32,585 for 1949, as compared with £36,602 for the previous year, before special taxation credits of £29,247. The dividend for the year is unchanged at 5½ per cent, and £69,567 is carried forward.

The Automatic Telephone & Electric Co., Ltd., reports a net group profit for 1949, before charging United Kingdom and overseas taxation, of £1,192,899, as compared with £818,959 for 1948. Taxation absorbed £651,890, leaving a net profit of £541,009 (against £353,531), to which is added taxation provision no longer required of £49,223. After making allocations to various reserves, it is proposed to pay a further dividend on the ordinary stock of 7 per cent, making 10 per cent for the year, and in addition a cash bonus of 2½ per cent, both less tax. It is also proposed to pay a dividend of 10 per cent on the deferred stocks for 1949, and in addition a cash bonus of 2½ per cent, both less tax. These payments are at the same rates as for 1948. The 315,621 new ordinary shares issued in October last rank for the final dividend and bonus.

G. N. Haden & Sons, Ltd., report a trading profit of the group for 1949 of £141,278, as compared with £134,457 for the preceding year. The ordinary dividend for the year is 12½ per cent on doubled capital (against 25 per cent), and £193,317 is carried forward (against £175,527 brought in).

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FINANCIAL SECTION

STOCKS

and SHARES

STOCK Exchange business shows distinct signs of improvement as compared with what it was round about General Election time. A good deal of investment money is coming into the ordinary shares of all the best known industrial undertakings. In the fairly near future it is expected that Cable & Wireless will distribute the cash which some of its stockholders have elected to receive, and this money will make a further contribution, if a small one, to the capital that is steadily flowing into Stock Exchange markets. Gilt-edged prices hold their recent improvements, and politics, domestic and foreign alike, have receded into the background for a time.

Rising Markets

Successive decisions by the Government to end some of the most irksome controls have given a general impression of loosening restrictions. To this, rather than to specific developments, the emphatic advance of industrial shares seems largely accountable. That the latter has reached quite impressive proportions can be measured by the rise, over two months, in General Electrics from 75s to 80s, and in A.E.I. ordinary from 71s 3d to 76s 3d. The result has been to bring down yields, on these two, to £4 6s 9d and £3 18s 3d per cent respectively. Returns of less than 4 per cent, from the dividends paid in respect of 1949, are becoming no uncommon occurrence in the industrial markets.

Dividend Considerations

With investment ideas running very much on the line of the progressive elimination of restrictions, the dividend limitation agreement has again been pushed to the forefront by hopeful considerations. These, in turn, lead naturally to the shares on which present distributions are the most obviously below earning capacity. Without inviting any practical conclusions, the market is pointing out that the apparently meagre return of under 4 per cent gross from Ericsson Telephone 5s shares at 47s 6d, to take a single example, would be transformed into something nearer 5½ per cent by the distribution of no more than a

quarter of last year's rate of earnings. With or without justification, ideas of this nature are abroad in the industrial market.

Company Meeting

On the subject of dividend limitation, the chairman of A.E.I. went into interesting detail at last week's meeting to show how shareholders' interests are affected by the agreement at a time of high taxation and increased earnings. During the three years 1947/9, shareholders have received dividends totalling less than £1½ million net, after tax. This compares with amounts of £8½ million paid in income and profits taxes, and with £52 million in wages and salaries (the latter having been raised by 17 per cent). In the current year, the company is paying in taxation an amount five times the distributed profit. The scale of taxation, Mr. Lyttelton said, seems designed to deplete capital at a time when British industry must employ more.

The Week's Price Movements

Some thirty rises in prices go against falls in only four of the securities quoted in our monthly lists. Taking the falls first, Cable ordinary at 92½, Anglo-American deferred, 19½, and Great Northern Telegraphs, 13½, are all 10s down. Cape Tramways receded to 17s 6d. Rises of about 2s 6d made Aron 37s 6d, De la Rue 25s 9d, Lucas 29s 3d, Hoover 42s 9d, Henley's 24s 6d, Tube Investments 6½ and Walsall Conduits 57s 6d. Radio shares are generally better; a rise in Electric and Musical to 26s being traceable again to American inspiration. Other gains included Automatic Telephone to 60s, Revo 44s 6d, Murex 46s 3d, Decca 17s 3d, Chloride 51s 3d, Crabtree 36s, Brush 7s, Reyrolle 67s 6d.

Telephone Results

Fine figures appeared last week in the Automatic Telephone & Electric Company's preliminary statement for 1949. Group profits having risen well over the million mark; the net figure after tax is more than 50 per cent up at £541,000. Distributions on the ordinary and deferred stocks are kept to the same total of 12½ per cent as before, the final 9½ per cent now declared being payable on the new shares issued in October. After the preference dividends, earnings for the ordinary appear to cover the dividend some 5½ times. At £3, the ordinary shares pay £4 3s 4d per cent on the money. Telephone Manufacturing also report higher profits, and the dividend is raised from 9 to 10 per cent. The 5s shares are ⅙ higher on the week at 10s 9d. Telephone Rentals at 11s are 6d up.

NEW PATENTS

Electrical Specifications Recently Published

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

1944

13388. Skilling, W. H.—Electrical facsimile signalling systems and electro-chemical synchronizing arrangements therefor. 13th July, 1944. (Convention date not granted.) (640446.)

1945

13061. Marconi's Wireless Telegraph Co., Ltd., and Davis, N. E.—High- or ultra-high-frequency electric circuit-arrangements. 15th May, 1946. (640344.)
15036. Telefonaktiebolaget, L. M. Ericsson.—Automatic telephone systems. 13th June, 1945. (640447.)
32371. Raytheon Manufacturing Co.—Tunable electron-discharge devices. 30th November, 1945. (640346.)

1946

4485. Philips Lamps, Ltd.—Discharge-tubes for making and breaking electric circuits. 13th February, 1946. (640498.)
5576. Philips Lamps, Ltd.—Electric-discharge tubes. 22nd February, 1946. (640499.)
8225. Holzer, R. C. de.—Air-core inductor for radio-frequencies with pre-determined dynamic resistance. 2nd May, 1947. (640500.)
15505. Landis & Gyr Soc. Anon.—Electric regulator. 22nd May, 1946. (640503.)
20511. Metropolitan-Vickers Electrical Co., Ltd., and Shand, G.—Radar receiving apparatus. 25th July, 1947. (640504.)
28436. Philips Lamps, Ltd.—Devices for deriving a control voltage from the frequency-difference and/or phase-difference between two alternating voltages, one of which is constituted by periodical pulses. 23rd September, 1946. (640351.)
33868. Marconi's Wireless Telegraph Co., Ltd., Plaistowe, D. L., and Shipway, R. P.—Radar systems. 8th July, 1947. (640353.)

1947

462. Telefonaktiebolaget L. M. Ericsson.—Device for setting selectors by means of audio-frequencies. 6th January, 1947. (640508.)
1537. British Thomson-Houston Co., Ltd.—Rectifier regulators. 16th January, 1947. (640509.)
2286. Western Electric Co., Inc.—Pulse distributor circuits. 24th January, 1947. (640358.)
3289. Western Electric Co., Inc.—Coupled-resonator systems suitable for use in electron-discharge devices. 4th February, 1947. (640251.)
5425. Stivin, J.—Method of scaling metal vessels of electronic-discharge devices. 25th February, 1947. (640252.)
7363. Radio Corporation of America.—Magnetron electron-discharge devices. 17th March, 1947. (640255.)
8667. Standard Telephones & Cables, Ltd., and Childs, P. A.—Discharge-tube circuits. 25th March, 1948. (640257.)
11484. Morgan Crucible Co., Ltd., and Hallett, C. G. H.—Arc lamps and electric welding machines. 1st October, 1947. (Addition to 620299.) (640364.)
12492. Philips Lamps, Ltd.—Electric-discharge tubes. 8th May, 1947. (640461.)
13277. Metropolitan-Vickers Electrical Co., Ltd., Dodds, J. M., and Miller, C. W.—Radar testing equipment. 14th May, 1948. (640262.)
13442. Hazeltine Corporation.—Arrangement for simulating a reactive impedance. 19th May, 1947. (640264.)
13669. Standard Telephones & Cables, Ltd., Davis, L. G., and Reynolds, W. J.—Electric telegraph systems. 21st May, 1948. (640265.)

15286. Hazeltine Corporation.—Signal-translating stage for radio signalling. 10th June, 1947. (640267.)
15566. Robinson, J.—Radio retransmitting systems. 10th June, 1948. (640517.)
16523. British Thomson-Houston Co., Ltd.—Electromagnetic induction apparatus. 23rd June, 1947. (640462.)
19250. General Motors Corporation.—Cooler systems for generator electric locomotives. 18th July, 1947. (640521.)
19262. Western Electric Co., Inc.—Methods of making electrically resistive bodies from finely divided material. 18th July, 1947. (640465.)
20089. Standard Telephones & Cables, Ltd.—Error compensating system for radio direction-finders. 25th July, 1947. (640277.)
21037. Kotterman, C. A.—Metal plate rectifier units. 1st August, 1947. (Convention date not granted.) (640380.)
21081. Sylvania Electric Products, Inc.—Cathode and method of making. 1st August, 1947. (640381.)
21398. Standard Telephones & Cables, Ltd.—Extruding metal sheaths on electrical cables. 6th August, 1947. (640384.)
21461. Sylvania Electric Products, Inc.—Electron-discharge device. 6th August, 1947. (640278.)
22283. Corning Glass Works.—Electric glass melting furnaces and methods of melting and fining glass. 11th August, 1947. (640281.)
25565. General Electric Co., Ltd., Peters, W. H., and Shuard, F. E.—Extension spindles, for example for control devices. 31st August, 1948. (640390.)
26062. Zander, R. A., and Karlstrom, H. O.—Electric switches, particularly of the cross-bar type. 25th September, 1947. (640391.)
26236. Holberton, B. V.—Electromagnetically operated friction couplings. 29th September, 1948. (640287.)
27164. British Thomson-Houston Co., Ltd.—Glass-to-metal seals. 9th October, 1947. (640528.)
27195. Supton, E.—Automatic impulsing apparatus for automatic telephone systems. 2nd February, 1949. (640290.)
27419. General Electric Co., Ltd., and Moore, R. C.—Cathode-ray tubes. 13th October, 1948. (640291.)
28060. Sylvania Electric Products, Inc.—Glass-to-metal seal. 20th October, 1947. (640292.)
29109. Cinema-Television, Ltd., and Freeman, G. S. P.—Methods of insulating conducting target electrodes for use in television or like transmitting tubes. 30th September, 1948. (640295.)
29720. British Thomson-Houston Co., Ltd., and Shurmer, H. V.—Lighting fittings employing tubular elongated light sources. 14th October, 1948. (640475.)
31338. British Thomson-Houston Co., Ltd., and Johnson, J. W.—Elastic-fluid turbines. 22nd October, 1948. (640532.)
31559. British Thomson Co., Ltd.—Circuit-breakers. 28th November, 1947. (640533.)
35380. Obornyak, L.—Electric induction meters. 31st December, 1947. (640400.)

1948

4179. Landis & Gyr Soc. Anon.—Automatic electric switches having inter-engaging plug-and-socket components. 12th February, 1948. (640318.)
5067. Brevets et Procèdes Pyror Soc. Anon.—Thermostatic regulators for electric heating elements. 20th February, 1948. (640322.)
6116. British Thomson-Houston Co., Ltd.—Motion picture film television projectors. 27th February, 1948. (640488.)

(Continued at foot of next page)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

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

Alcester.—27th June. R.D.C. Wiring thirty-three houses in various parishes for electricity. Surveyor, Council Offices.

Australia.—QUEENSLAND.—29th June. City Electric Light Co., Brisbane. 3.3 kV, 6.6 kV and 11 kV insulated lead-covered cables. (C.R.E. (I.B.) 54304/50. Ten/1311.)*

Bath.—Hospital Management Committee. Electrical installation in the new operating theatre block at the Royal United Hospital. (See 2nd June issue.)

Belfast.—23rd June. Electricity Department. 33 kV oil-immersed reactor. (See 2nd June issue.)

Belgium.—BRUSSELS.—21st June. Régie des Télégraphes et des Téléphones. Supply of 52,000 kg of copper wire. (C.R.E. (I.B.) 55198/50. Ten/1328.)* 28th June. Wires and cables. (C.R.E. (I.B.) 55199/50. Ten/1327.)*

Featherstone.—21st June. U.D.C. Duplicate automatic electrically driven pumping sets. Water Engineer, Council Offices.

Herefordshire.—10th July. County Education Committee. Electrical installation at new secondary school, Ross-on-Wye. (See 2nd June issue.)

Newcastle-upon-Tyne.—3rd July. Education Committee. Electrical installation at Hilton Primary School. (See this issue.)

Rayleigh.—23rd June. U.D.C. Electrical wiring of fifty-five Council houses. H. P. Turner, surveyor, Council Offices, 28, High Street.

Romford.—21st June. Engineer and Surveyor's Department. Electrical installations in forty houses. (See this issue.)

NEW PATENTS

(Concluded from page 1160)

7599. Metropolitan-Vickers Electrical Co., Ltd., and Hall, A.—Time base circuit arrangements. 14th February, 1949. (640417.)

12658. Telegraph Construction & Maintenance Co., Ltd., and Smith, E. W.—Electrical communication cables. 27th April, 1949. (640430.)

13727. British Mechanical Productions, Ltd., and Shorey, L. W.—Socket elements for electrical pin plug-and-socket connections. 20th May, 1949. (640432.)

14225. Standard Telephones & Cables, Ltd., Warner, A. J., and Durst, R. F.—Protective coatings for electrical cables. 25th May, 1949. (640559.)

14634. Lucas, Ltd., J., and Flay, J. R.—Electric lamps. 11th May, 1949. (640559.)

20388. Walz, H. P. H.—Galvanic cells. 3rd June, 1949. (640496.)

Slough.—19th June. Town Council. Street lighting equipment. (See this issue.)

Stanley.—16th June. U.D.C. Electric cable. (See this issue.)

Southern Rhodesia.—SALISBURY.—23rd June. Department of Posts and Telegraphs. Supply of 200,000 lb of cadmium copper wire. (C.R.E. (I.B.) 54146/50. Ten/1308.)*

Stretford.—24th June. Corporation. Improvement of lighting of the drawing office and lecture room at the Technical College. (See this issue.)

Syria.—DAMASCUS.—26th June. Director-General Posts, Telegraphs and Telephones. Telephone apparatus and switchboards. (C.R.E. (I.B.) 54649/50. Ten/1319.)*

Thame.—31st July. U.D.C. Two electrically driven vertical spindle borehole type pumps for water supply contract No. 7. John Taylor & Sons, engineers, Artillery House, Artillery Row, Westminster, S.W.1.

Wolverhampton.—17th June. Borough Council. Two electric waste food collectors, including electrical equipment for servicing of the vehicles. J. Brock Allon, town clerk, Town Hall.

ORDERS PLACED

Amble (Northumberland).—U.D.C. Electrical installations in 38 houses, Links estate (£993).—N. Young.

Australia.—QUEENSLAND.—Mackay City Council. Six 500 kVA 33,000/11,000 V three-phase transformers.—Gresham Transformers, Ltd.

Carlisle.—City Council. Electrical installations in 40 flats.—Robert Baty & Co.

Cheltenham.—Corporation Housing Committee. Electrical installations in forty-two flats being erected on the Rowanfield Road Estate (£1,083).—J. Hearson & Co., Ltd.

Cockermouth (Cumberland).—U.D.C. Wiring of 77 houses on the Moor and Kirkbank estates, Cockermouth.—North Western Electricity Board.

London.—Battersea Borough Council Works Committee. Electrical installations on Salcott Road/Bolingbroke Grove Housing Scheme (£2,036), at the Westbridge Road Housing Scheme (£1,224), and Nightingale Lane/Hendrick Avenue Housing Scheme (£1,092).—London Electricity Board. Electrical installations at the St. John's Hill Housing Scheme (£1,183).—Phoenix Electrical Co., Ltd.

L.C.C. Electrical installation at Hurlingham School, S.W.6.—H. A. Lamb & Sons, Ltd.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 0040).

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Abbotts Langley.—Infants' school, Pope's Road (£41,325); county architect, Hertford.

Aberdeen.—Rebuilding paper mill; Middletons, Ltd., Rose Street Works.

Acton.—Reinstatement of factory for Marshall Martin & Co., manufacturing confectioners, Bollo Lane; M. de Metz & Birks, architects, 2, Ludgate Hill, London, E.C.4.

Bangor.—Hospital, Llandegai; Welsh Regional Hospital Board, Cathays Park, Cardiff.

Barnsley.—Sanatorium for Barnsley and Doncaster area; Sheffield Regional Hospital Board, Fulwood House, Old Fulwood Road, Sheffield.

Beccles.—Assembly hall, gymnasium and classroom block at Sir John Leman school; E. J. Symcox, architect, County Hall, Ipswich.

Bedford.—Blocks of flats, Mile Road and Harrowden Road, and shops and flats, Mile Road estate; borough surveyor.

Birmingham.—Maisonnettes (32), Main Street and King Street, Sparkbrook; H. J. Manzoni, city engineer, Civic Centre.

Blaby, Leics.—Houses, Countesthorpe (20), Croft (16) and Whetstone (26); R.D.C. surveyor.

Blackpool.—Maternity and child welfare clinic, Grange Park; A. S. Hamilton, borough engineer.

Bristol.—Factory, Princess Street, Bedminster Trading Estate; Bristol Piping Co., Ltd., 75, King Street, Bedminster.

Caernarvon.—Houses (32), Maes Barcer; Williams & Williams, Caernarvon.

Crook and Willington.—Houses (45) at Howden-le-Wear, for the U.D.C.; Page Son and Hill, architects, 75, King Street, South Shields.

Croydon.—Community hall, with kitchen, canteen, etc., New Addington; borough engineer.

Dagenham.—Flats (60), Dagenham Road; borough engineer.

Darlington.—Divisional police station at Horsemarket; county architect, Court Lane, Durham. Houses (54), Haughton South site; borough architect, Central Buildings.

Dartford.—County technical college, Miskin Road (£375,000); S. H. Loweth, county architect, Springfield, Maidstone. Houses and flats (76), Temple Hill estate, in three contracts; Thomas Armstrong, town clerk, High Street.

Derby.—Houses (110), Mackworth estate; borough architect.

Dorchester.—Transport and storage depot for Dorset C.C.; county architect, County Hall.

Durham.—County primary school at High Usworth; grammar technical schools at Durham and Spennymoor; ambulance depot, Yarm Lane, Stockton; fire station at the junction of Lincoln Crescent and Greenwood Road, Billingham-on-Tees; and divisional depot and office for county surveyors' department, Bishop Auckland; county architect, Court Lane, Durham.

Ealing.—Two blocks of five-storey and three blocks of three-storey flats, Northolt Grange estate; borough engineer.

Gateshead.—Additional houses for the T.C. at Craggside Gardens (32), Oakwood Gardens (16), Coack Road (6), Pinewood Gardens (6); chief architect, Municipal Buildings.

Leicester.—Ambulance station and administrative centre (£39,000), Welford Road; city surveyor.

London.—FITZROY SQUARE.—Hostel for 60 Indian students; R. Tubbs, architect, 31, High Holborn, W.C.1.

FULHAM.—Flats (40), North End Road, for L.C.C.; N. F. Cachemaille-Day & Partners, architects, 1, Port Hill, Hertford.

WANDSWORTH.—Dwellings (124), Roupell Park estate, for Wandsworth B.C.; Culpin & Son, architects, 3, Southampton Place, W.C.1.

BETHNAL GREEN.—Flats (129), in six blocks, Bandon Road, for L.C.C.; Lavender, McMillan, Ltd., contractors, Worcester Park, Surrey (£247,880).

Luton.—Laboratory, etc., building for Laporte Chemicals, Ltd., Kingsway; Taylor Woodrow Construction, Ltd., builders, Adrienne Avenue, Southall.

Middlesbrough.—Houses (54), Saltersgill site; builders, Gilmore and Son, Marton Road (36 houses) and P. Shannon, Acklam Road South (18 houses).

Houses (500), Berwick Hills site; borough engineer.

Nine shops with flats and maisonettes above on the Thorntree estate; R. H. Bailey and Son, builders, Denmark Street.

Newton Aycliffe.—Houses (92), Clarence Farm East site, for the Aycliffe Development Corporation. Builders: M. J. Liddell and Sons, 36, Great North Road, Newcastle (45 houses); Bell and Ridley, North Road, Durham (47).

Plymouth.—Five-storey block of shops and offices, Royal Parade and Phoenix Way; Pearl Assurance Co., Ltd., Pearl House, Holborn, W.C.1.

St. Helens.—Houses (80), Cecil Street, Sutton; borough engineer.

Scunthorpe.—Shops and maisonettes, Lincoln Gardens estate (£36,537); borough surveyor.

Sheffield.—Multi-storey block of premises for Marks & Spencer, Ltd.; N. Jones, Son & Rjgby, architects, Lord Street, Southport.

Houses (110), Stradbroke estate, unit 2, city architect, Town Hall.

Shotley Bridge.—Additions to the Shotley Bridge Hospital for the Regional Hospital Board (£16,110); R. Gallagher, Ltd., builders, Cemetery Road, Blackhill.

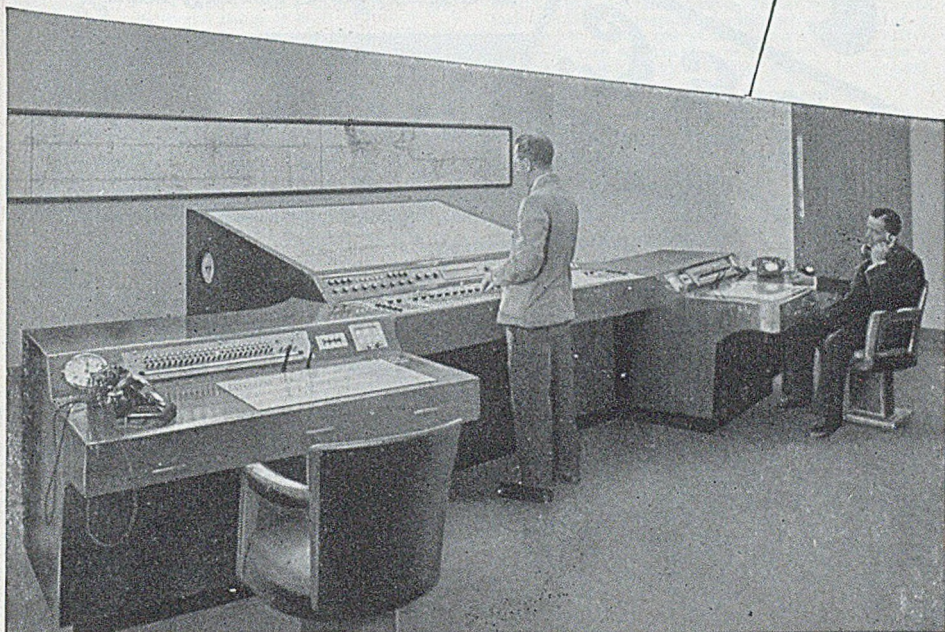
Stockton-on-Tees.—Houses (196) for the T.C. Contractors: C. M. Yuill, Ltd., Villiers Street, West Hartlepool (92); and Lane Fox and Co., Ltd., Barnes Works, Sunderland (104).

Whitby.—Houses (30), off Stakeby Road, for the U.D.C.; Peacock and Bewlay, architects, 224, Hagley Road, Edgbaston, Birmingham, 16.

Whitley Bay.—Houses (36), Foxhunters' housing site for the U.D.C.; E. Roberts, surveyor.

Workshop.—Houses for T.C.:—J. H. & W. E. Ilett (20); G. G. Middleton & Sons (18), J. T. Smith (18); Adam Eastwood & Sons (22); J. J. Jackson (10); all Workshop firms.

TUDOR AGAIN



Interior of Hall Road control room showing control desk in use

Photograph by courtesy of British Railways

LIVERPOOL-SOUTHPORT

ELECTRIC RAILWAY

MODERNISATION SCHEME

In this modernisation scheme, just completed, it's Tudor all along the line. Current is purchased in bulk from the BEA Clarence Dock Power Station, a duplicate 33 k.V. supply being available. In this power station two 100-cell Tudor Batteries are installed, each with a capacity of 720 ampere-hours. In the British Railways distribution substations, no less than 29 Tudor Batteries are in operation, complete with rectifier charging equipment. For switch operating, emergency lighting and telephone supervisory control equipment—for all these purposes—Tudor again plays a vital part. Where the really big jobs are concerned, experience points to Tudor Batteries as the obvious choice.



BATTERIES

T.125A

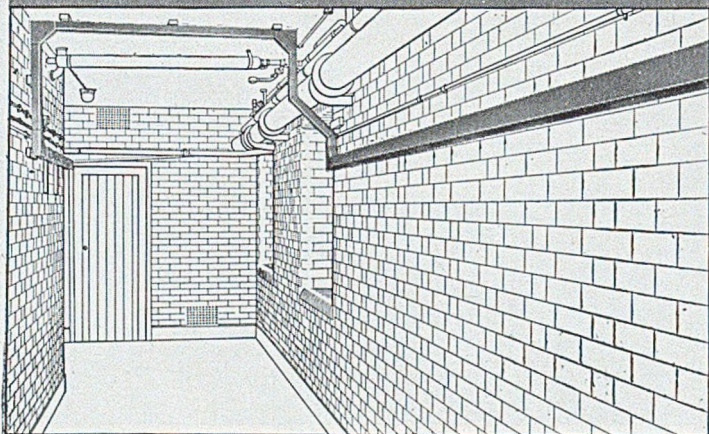
THE TUDOR ACCUMULATOR CO LTD 50 GROSVENOR GARDENS • LONDON • SW1

7 GOOD REASONS

for specifying

G.E.C.

STEEL CABLE TRUNKING



- 1** Replaces multiple conduit runs, looks neater, has less fixing points. Extra circuits can be added with greater facility.
- 2** Maximum accessibility with neatness, simplicity, great flexibility.
- 3** Exceptional strength and rigidity.
- 4** Cover plates overlap to form dustproof enclosures.
- 5** Perfectly smooth interiors, no projecting screws to damage the cables.
- 6** Coupling sleeves are an integral part of each length, making the use of separate couplers unnecessary.
- 7** Cable retaining straps can be supplied if trunking is erected with cover plate inverted.

For full information write to:—

THE GENERAL ELECTRIC CO. LTD.

Magnet House, Kingsway, London, W.C.2.

CLASSIFIED ADVERTISEMENTS

ADVERTISEMENTS for insertion in the following Friday's issue are accepted up to **First Post on Monday**, and should be addressed to Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1. **CLASSIFIED** advertisements are **PREPAID** at 3/- per line (approx. 7 words) per insertion. Where the advertisement includes a Box Number this counts as two words and there is an additional charge of 1/-.

DISPLAYED:— 42/- per inch, per insertion. Cheques and Postal Orders should be crossed and made payable to **ELECTRICAL REVIEW PUBLICATIONS LTD.**

SITUATIONS WANTED:— Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES to Box Numbers should be addressed to the Box Number in the advertisement, c/o **ELECTRICAL REVIEW**, Dorset House, Stamford Street, London, S.E.1. but if not to be delivered to any particular firm or individual they should be accompanied by instructions to this effect, addressed to the Manager of the **ELECTRICAL REVIEW**. Replies in such cases cannot be returned. The name of an advertiser using a Box Number will not be disclosed.

Original testimonials should not be sent with applications for employment.

OFFICIAL NOTICES, TENDERS, ETC.

Newcastle-upon-Tyne Education Committee

HILTON PRIMARY SCHOOL

TENDERS are invited from electrical contractors for the electric lighting, power and floor heating installation valued at more than £10,000. Firms wishing to tender should apply for particulars before noon on Tuesday, 13th June, 1950, enclosing (1) a cheque for £5 5s, made payable to "The Newcastle-upon-Tyne Education Committee," which will be refunded on receipt of a bona fide tender, and (2) evidence that an electrical contract of similar magnitude has been satisfactorily carried out during the past five years. Last date for receipt of tenders—3rd July, 1950. The Education Committee do not bind themselves to accept the lowest or any tender.

GEORGE KENYON,
City Architect.

City Architect's Department,
Education Section,
18, Cloth Market,
Newcastle-upon-Tyne, 1.

3840

BOROUGH OF SLOUGH

Private Street Works Act, 1892

Street Lighting

TENDERS are invited for the whole or any section of the following works in connection with the provision of lighting, under the above Act, in streets on the Lascelles Estate:—

- (a) Provision of 50 precast concrete columns.
- (b) Provision of 35 lanterns, together with 80 watt mercury vapour lighting equipment.
- (c) Erection of 35 columns and installation of lighting equipment.

General Conditions of Contract and terms may be seen, and Specification and Bills of Quantities may be obtained from the Borough Engineer, Town Hall, Slough. Bids, on payment of a deposit of £1 1s, which will be refunded on receipt of a bona fide Tender.

Tenders, in plain sealed envelopes, endorsed "Street Lighting—Lascelles Estate," must be delivered to the undersigned not later than noon on Monday, 19th June, 1950.

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

NORMAN T. BERRY,
Town Clerk.

Town Hall, Slough.
31st May, 1950.

3792

BOROUGH OF STRETFORD

Stretford Technical College

Lighting

THE Town Council invites tenders for the improvement of the lighting of the Drawing Office and Lecture Room at the Stretford Technical College by the installation of fluorescent tubes.

The Specification and Form of Tender and other particulars may be obtained on application to Mr. A. H. Perry, the Borough Surveyor, any day during office hours on payment of Two Guineas, which will be repaid after receipt of a bona fide tender.

Tenders are due at the Town Hall by first post on Saturday, 24th June, and must be forwarded in the special envelope provided, sealed and addressed to the undersigned, endorsed "TENDER FOR LIGHTING, STRETFORD TECHNICAL COLLEGE," and such envelope shall not bear any name or mark indicating the sender.

The lowest or any tender will not necessarily be accepted.

C. TREWAVAS,
Town Clerk.

Town Hall, Stretford.
27th May, 1950.

3844

URBAN DISTRICT OF STANLEY (Co. Durham)

Electrical Cable

TENDERS are invited for the supply of 1,000 yards .01 sq in twin paper insulated, lead covered, bedded, double steel tape armoured, served, 660 volt circular conductors, to B.S.S. 480/1942.

Tenders should be endorsed "Tender for Cable" and sent so as to reach the undersigned not later than Friday, June 16th, 1950.

J. J. SHIPSTON,
Clerk of the Council.

Council Offices,
Front Street,
Stanley,
Co. Durham.

31st May, 1950.

3791

BOROUGH OF ROMFORD

Engineer & Surveyor's Department

THE Council invite tenders for the Electrical Installation to 40 Two-Storey Houses on the Masefield Crescent Estate, Romford. The Specification and Form of Tender may be obtained from the Borough Engineer and Surveyor, Town Hall, Romford, on the payment of £2 2s, which will be refunded on the receipt of a bona fide tender and all documents.

Sealed tenders, endorsed "Electrical Installation (Part 1) Housing," must be delivered to the undersigned not later than Wednesday, the 21st June, 1950.

J. TWINN,
Town Clerk.

Town Hall,
Romford.
May, 1950.

3839

STATE ELECTRICITY COMMISSION OF VICTORIA 22-32, William St., Melbourne, Victoria, Australia

THE Commission is inviting tenders for the manufacture of a Belt Conveyor System, Open Cut to Briquette Factory, Morwell, in accordance with Specification No. 50-51/4 and B 5 Contract Conditions.

Full particulars are available from the Agent-General for Victoria in London.

Tenders, endorsed "Tender to Specification No. 50-51/4," together with a preliminary deposit of £20, are returnable at the Commission's Head Office, 22-32, William St., Melbourne, Victoria, Australia, by 11 a.m. on Wednesday, 2nd August, 1950.

The Commission does not bind itself to accept the lowest or any tender.

3604

SITUATIONS VACANT

BRITISH ELECTRICITY AUTHORITY

South Wales Division

A PPLICATIONS are invited for the appointment of a **COMBUSTION ENGINEER** at Divisional Headquarters at a salary in accordance with Class AX/OK, Grade 3 (£737-£921), of the Revised National Joint Board Schedule.

Applicants should have obtained the Higher National Certificate or equivalent, and had extensive experience in the operation and efficiency control of high-pressure steam plant.

The appointment is superannuable under the British Electricity Authority and Area Board's Scheme.

Forms of application may be obtained from the Divisional Secretary at the address below, to whom completed applications should be returned not later than the 21st June, 1950, in a sealed envelope endorsed "Combustion Engineer."

H. V. PUGH,
Divisional Controller.

Cardiff (Penknam Moors) Airport,
Cardiff.
1st June, 1950.

3842

SNOWY MOUNTAINS HYDRO-ELECTRIC AUTHORITY, AUSTRALIA

Permanent Technical Appointments

APPLICATIONS are invited for the following senior engineering positions for work associated with the construction of a large hydro-electric project. Work includes:—

Hydrological Investigations.

Investigation, design and construction of dams, large tunnels, race lines and allied engineering works.

Establishment and operation of engineering laboratories and engineering scientific services.

Structural engineering.

Supervision of workshops for plant maintenance.

General overall power planning and electrical system design.

Design and installation of power stations, transmission lines, including appurtenant electrical and mechanical equipment.

CHIEF ELECTRICAL ENGINEER. Salary £1,855-£2,042 (Aust.). (S.M.R.T. 103/2.)

CHIEF MECHANICAL ENGINEER. Salary £1,855-£2,042 (Aust.). (S.M.A.T. 103/2.)

EXECUTIVE ENGINEERS, GRADE III. Salary £1,542-£1,855 (Aust.). (S.M.R.T. 103/3.)

EXECUTIVE ENGINEERS, GRADE II. Salary £1,230-£1,480 (Aust.). (S.M.T. 103/4.)

EXECUTIVE ENGINEERS, GRADE I. Salary £1,050-£1,230 (Aust.). (S.M.R.T. 103/5.)

Vacancies exist for Executive Engineers in Civil Engineering, Electrical Engineering and Mechanical Engineering.

Applicants should be graduates in engineering of a recognised university, corporate members of the Institution of Engineers, Australia, of the Institution of Civil, Mechanical or Electrical Engineers (London), or hold examination qualifications that would exempt them from the Association membership examination of the Institution of Engineers, Australia, or any of the above institutions.

Qualifications:—

CHIEF ELECTRICAL ENGINEER.

Applicants should have sound knowledge of the economics of electricity supply and should be experienced in the design and layout, purchase and operation of plant associated with the generation and long-distance transmission of large blocks of power, and should be capable of directing and controlling a large technical staff.

CHIEF MECHANICAL ENGINEER.

Applicants should be experienced in the design, layout and purchase of plant associated with large hydraulic turbine units, and should have knowledge of the layout and operation of workshops for assembling and maintaining power plant, modern earth moving equipment and heavy transport vehicles, and should be capable of directing and controlling a large technical staff.

EXECUTIVE ENGINEERS, GRADE III.

Applicants should have comprehensive knowledge of engineering techniques and criteria pertaining to the assigned area of specialisation involved. Marked ability to review and evaluate work performed by subordinate officers. Ability to initiate and interpret procedures and to improve existing engineering methods, and ability to plan and direct an engineering programme of work.

EXECUTIVE ENGINEERS, GRADE II.

Applicants should have specialised and extensive knowledge of the method, techniques pertaining to the particular phase of the Authority engineering work to which the officer is assigned. Ability to advise on technical problems. Ability to visualise the comprehensive development of the particular job assigned in relation to the overall needs of the Authority and also should have thorough knowledge of administrative practices and procedures.

EXECUTIVE ENGINEERS, GRADE I.

Applicants should have a detailed knowledge of established methods and techniques followed in the engineering field assigned to officers of this grade. Ability to review and evaluate engineering work carried out by subordinate officers. Leadership and ability to plan, supervise, co-ordinate and review the work of such engineers and other officers and to explain the technical and administrative practices, methods and procedures.

Applications are also invited for ENGINEERS.

Grade I. £1,050-£1,230 p.a. (Aust. currency).

Grade IV. £960-£1,050 p.a. (Aust. currency).

Grade III. £810-£877 p.a. (Aust. currency).

Grade II. £742-£787 p.a. (Aust. currency).

Grade I. £607-£742 p.a. (Aust. currency).

Applicants must be graduates in engineering of a recognised university, corporate members of the Institution of Engineers, Australia, or the Institution of Electrical Engineers or the Institution of Mechanical Engineers, or hold examination qualifications that would exempt them from the corporate membership examination of those institutions.

All salaries are subject to variation by cost-of-living adjustments. The competing salary within any particular grade will be in accordance with qualifications and experience.

The Authority will meet the cost of first-class boat fares to Australia for the appointees and dependants. Salary (Aust.) will be paid from the date of reporting for duty in Sydney, New South Wales, and accommodation on arrival is guaranteed. If permanent accommodation is not immediately available, the Authority will pay an allowance where a married officer and family are temporarily quartered in hotel or guest house.

Applicants must be British subjects and may become contributors under the Commonwealth Government Superannuation Scheme. Liberal privileges, including three weeks' annual leave long-service leave, sick leave, etc., are provided.

Information concerning the Snowy Mountains Hydro-Electric Development and particulars of qualifications, duties and conditions of employment may be obtained from the representative of the Authority in Great Britain.

The headquarters of the Authority are at present located in Sydney, but will later be at Cooma near the Snowy Mountains Area in the South Eastern portion of New South Wales.

Applications (in writing only), stating education, qualifications and experience in chronological order, age, nationality, present position and salary, should be addressed to: The Representative in Great Britain of the Snowy Mountains Hydro-Electric Authority, c/o New South Wales Government Offices, 56, Strand, London, W.C.2, endorsed with the appropriate reference number quoted in brackets above. Original testimonials should not be included. Communication will only be made with applicants selected for further consideration. 3814

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following positions at West Ham Generating Station:—
DEPUTY STATION SUPERINTENDENT.

Applicants should have received a thorough technical and practical training and have had a sound operation and maintenance experience in a medium or large capacity power station.

The successful applicant will be responsible to the Station Superintendent for the efficient operation and maintenance of the station and in his absence will be required to assume full responsibility.

Salary and conditions in accordance with the revised N.J.B. Schedule, Class G, Grade 3, plus London Allowance—£229 5s per annum.

TURBINE HOUSE SUPERINTENDENT.

Applicants should have had sound technical training and practical experience in the efficient operation of a medium or large capacity power station.

Character and ability to deal with staff problems are important.

Salary and conditions in accordance with the revised N.J.B. Schedule, Class G, Grade 6, plus London Allowance—£742 7s per annum.

Applications, stating age, experience and present salary, should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1 and be received within fourteen days after the publication of this advertisement.

J. N. WAITE.

Divisional Controller.
3849

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the position of
INSTRUMENT ENGINEER at Stourport Generating Station, Class H, Grade 9, commencing salary £609 per annum.

The successful applicant, whose headquarters will be at Stourport "B" Power Station, will be responsible to the Chief Testing Engineer for the efficient maintenance of all types of instruments associated with the boilers and turbines installed at Stourport "A" and "B" Power Stations, other than purely electrical instruments used in connection with electrical energy produced or consumed.

Candidates must have had experience in the operation and maintenance of full Bailey automatic Boiler Control equipment, Multitec Superheat Controllers, Conductivity and CO₂ Recorders and Radio Visor smoke indicators, and should hold the Higher National Certificate in Electrical and Mechanical Engineering or appropriate equivalent qualifications.

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

Applications should be made on forms which may be obtained from the Divisional Establishments Office, 53 Wake Green Road, Moseley, Birmingham, 13, and should be returned not later than 24th June, 1950.

F. W. LAWTON.
Divisional Controller.
3760

NORTH WESTERN ELECTRICITY BOARD

No. 5 Sub Area

Sub Area Consumers' Engineer's Department

APPLICATIONS are invited for the following appointments in the Consumers' Engineer's Department, No. 5 Sub Area Headquarters, Blackburn.

1. SECTION HEAD—POWER SALES.

Candidates should be technically trained and preferably have experience in the development and utilisation of electricity in industry, with particular reference to Textile, Colliery & Engineering Trades.

Administrative ability together with experience of changeover from d.c. to a.c., the development of Street Lighting systems and a knowledge of the economies of private generating plant are essential qualifications.

Corporate Membership of the Institution of Electrical Engineers would be an advantage.

The salary will be in accordance with the National Joint Board Schedule, Class H, Grade 4, i.e., £878—£898—£918 per annum.

2. ASSISTANT TO SECTION HEAD—POWER SALES.

Candidates should be technically trained and preferably have experience in Power Sales work with particular reference to electrification of the Textile and Engineering Industries.

Experience of changeover from d.c. to a.c., and of industrial uses and Street Lighting, are desirable advantages. Technical training up to Higher National Certificate standard will be an advantage.

The salary will be in accordance with the National Joint Board Schedule, Class H, Grade 10, i.e., £571—£594—£597 per annum.

3. ASSISTANT POWER SALES ENGINEER.

Candidates should have practical training and general electrical engineering experience in the utilisation of electricity in industry.

Experience in changeover from d.c. to a.c. and Street Lighting is desirable but not essential.

The salary will be in accordance with the National Joint Board Schedule, Class H, Grade 13, i.e., £458—£467—£476 per annum.

4. SUB AREA DEMONSTRATOR.

Candidates must have had a good education with training in Domestic Science, and should hold the E.A.W. Diploma. The person appointed will be required to give lectures and demonstrations on all types of domestic appliances, advise consumers on the choice of equipment, and must be capable of handling staff and arranging the training and electrical education of new entrants up to E.A.W. Diploma Standard.

The salary will be in accordance with Grade 2 of the National Joint Council (Administrative and Clerical Grades) for the Electricity Supply Industry, i.e., £390X £20 to £450 per annum.

5. ASSISTANTS TO SECTION HEAD—COMMERCIAL DEVELOPMENT.

Applicants should have experience in each of the following:—

- Supervision of Showrooms.
- Domestic and Commercial Load Development.
- Organisation of Exhibitions and Demonstrations.
- Publicity, advertising and Display.
- Agricultural and Horticultural Applications.

The salary will be in accordance with the National Joint Board Schedule, Class H, Grade 13, i.e., £458—£467—£476 per annum.

6. ASSISTANT TO INSTALLATION ENGINEER.

Applicants should have experience in the supervision of the installation of wiring, switchgear, motors, plant and lighting in Industrial and Commercial Premises and Public Buildings. Experience in the preparation of specifications and estimates would be an advantage.

The salary will be in accordance with the National Joint Board Schedule, Class H, Grade 13, i.e., £458—£467—£476 per annum.

Applications stating age, training, qualifications and experience, present position and salary, and the appointment for which application is made, should be received by R. R. Harral, Esq., M.I.E.E., M.Inst.F., No. 5 Sub Area Manager, North Western Electricity Board, Jubilee Street, Blackburn, not later than Saturday, 17th June, 1950. 3813

BRITISH ELECTRICITY AUTHORITY

North Western Division

THE British Electricity Authority (North Western Division) invite applications for the position of STATION SHIFT CONTROL ENGINEER at Bury Generating Station.

The salary will be £488/£502 per annum in accordance with Class E Grade 10 of the Revised National Joint Board Schedule.

Candidates should preferably possess technical qualifications and experience in a generating station is desirable. Applications, stating age, present position, and giving full details of qualifications, education and experience, should be received by The Establishment Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester, 20, not later than the 17th June, 1950. 3815

BOROUGH OF DOUGLAS, ISLE OF MAN

Electricity Undertaking

APPLICATIONS are invited for the following appointments in the Corporation Generating Station:—

1. POWER STATION SUPERINTENDENT.

Applicants should have a sound technical education and practical experience in the operation and maintenance of a modern steam generating station. Preference will be given to Corporate Members of the Institution of Mechanical Engineers with experience in the supervision of power station staff. Experience with modern p.f. fired high pressure boilers is essential.

The salary will be in accordance with Class C, grade 3, of the Isle of Man Joint Board Schedule, at present £710, rising to £724 p.a.

Accommodation can be made available.

2. SHIFT CHARGE ENGINEER.

Applicants should have experience in the operation of a modern steam generating station, and be prepared to undertake maintenance duties. Preference will be given to candidates with experience in modern p.f. fired boilers and possessing technical qualifications up to National Certificate standard.

The salary will be in accordance with Class C, grade 8, of the Isle of Man Joint Board schedule, at present: £494, rising to £514.

The Corporation operates a steam power station of 10 m.w. capacity. An extension is under construction consisting of one 5 m.w. turbo-generator and two p.f. fired boilers, but the effective capacity of the station would remain at 10 m.w.

The appointments will be established posts under the superannuation scheme of the Corporation, and the successful candidate will be required to contribute to the Council's Superannuation Fund and pass a medical examination.

Particulars of superannuation scheme, income tax and living conditions in the Isle of Man may be obtained upon application to the Town Clerk, Town Hall, Douglas, Isle of Man.

Applications endorsed "Power Station Superintendent" and "Shift Charge Engineer" respectively, giving particulars of age, qualifications, experience and earliest date available, together with three recent testimonials, should be addressed to the Borough Electrical Engineer and Manager, Electricity Offices, Ridgeway St., Douglas, Isle of Man, not later than 26th June, 1950.

PERCY M. SHIMMIN, Town Clerk.

Town Hall,

Douglas, Isle of Man.

24th May, 1950.

3732

SOUTH EASTERN ELECTRICITY BOARD

DISTRICT SENIOR CLERK, Tunbridge Wells District.

Salary of £570X£20—£630 per annum under the N.J.C. Agreement, Grade 5. Superannuation will be arranged. Under a scheme for the future organisation of the East Sussex and South West Kent Sub-Area, the existing Tunbridge Wells District will be enlarged by the inclusion of the present Tonbridge and East Gristead Districts and part of the Weald District and the number of consumers will increase from approximately 17,000 to over 33,000. Applicants should have good organising and administrative ability and a secretarial or accountancy qualification would be an added advantage.

Applications, giving two referees, must reach T. W. Dann, Esq., M.Eng., M.I.E.E., District Manager, South Eastern Electricity Board, Town Hall, Tunbridge Wells, Kent, by 19th June, 1950.

A. L. BURNELL,

Secretary.

June, 1950.

3850

SOUTH WESTERN ELECTRICITY BOARD

APPLICATIONS are invited for the position of A SECOND ASSISTANT DISTRICT ENGINEER, Exe Valley District, Taunton Sub-Area, with Headquarters at Tiverton.

The commencing salary will be in accordance with Class B, Grade 7, of the N.J.B. Schedule, commencing at £492 per annum; this is subject to confirmation.

Applicants should have had extensive experience of H.V./L.V. O/H and U/G distribution systems in an Urban/Rural area, and be capable of assisting in plans for future development. The person appointed will have responsibility for matters connected with construction, operation and maintenance of distribution networks, sub-station plant and ancillary apparatus; he will be required to undertake standby duties.

Applications, stating age, qualifications, experience and present salary, to be submitted to District Manager, South Western Electricity Board, 12, Angel Hill, Tiverton within 10 days

E. M. HUGHES,

Assistant Secretary (Establishments).

Electricity House,
Colston Avenue,
Bristol, 1.

3852

JOHNSON & PHILLIPS, LTD.**Overseas Appointment**

SWITCHGEAR ENGINEER required to take complete in charge of and develop switchgear manufacture in an existing factory in India.

Applicants must be fully conversant with the manufacture and assembly of all classes of switchgear up to 11,000 volts and be competent to plan complete switchgear installations and the layout of switchboards.

The appointment is a senior one offering considerable freedom of action and scope for initiative and advancement. Salary will depend on the successful applicant's qualifications and experience, but will be at a generous level. Suitable provisions for retirement are available. Normal home and local leave arrangements.

Applications, which will be treated in strict confidence, should be addressed to the Managing Director, Johnson & Phillips, Ltd., Victoria Way, Charlton, London, S.E.7. 3956

CITY OF BIRMINGHAM EDUCATION COMMITTEE**Birmingham Central Technical College**

APPLICATIONS are invited for the post of **RESEARCH ASSISTANT** in the Department of Electrical Engineering, for research either on the power or telecommunications side. Candidates should be Honours Graduates of a University to which a thesis for a higher degree (M.Sc. or Ph.D.) may be submitted on the basis of research work conducted externally. The appointment will be for two years in the first instance but may be extended to a third year.

Research Assistants are required to devote some hours weekly in assisting with laboratory supervision.

Starting salary will be £300 with an allowance of up to £20 for degree and training, and with additional allowances for approved industrial or teaching experience.

Further particulars and forms of application may be obtained from the Registrar, Birmingham Central Technical College, Suffolk Street, Birmingham, 1, on receipt of stamped addressed foolscap envelope. Completed forms should be returned to him not later than two weeks after the insertion of the advertisement.

E. L. RUSSELL,
Chief Education Officer. 3758

BRITISH ELECTRICITY AUTHORITY**Merseyside and North Wales Division**

APPLICATIONS are invited for an appointment of **GENERAL ENGINEERING ASSISTANT** in the Transmission Department at Divisional Headquarters, Woolton, Liverpool.

Candidates should have the Higher National Certificate or similar qualifications and are required to carry out overhead line surveys and to prepare profiles and peg out tower positions. Preference will be given to those with experience and training in Civil and Structural Engineering.

The commencing salary will be within the range of £437-£569 per annum in accordance with Class AX, Grade 8, of the National Joint Board Agreement.

The appointment will be superannuable under the British Electricity Authority & Area Board's Superannuation Scheme, and is subject to a medical examination.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, Merseyside and North Wales Division, Clarke Gardens, Woolton, Liverpool, and should be returned to him not later than Saturday, 17th June, 1950. 3793

Mid-Worcestershire Hospital Management Committee**ALL SAINTS' HOSPITAL, BROMSGROVE**
(Enlarging to 468 beds)

ENGINEER-IN-CHARGE required. Salary £425×£15 (4)×£20 (2) to £525 per annum.

Candidates should hold one of the following qualifications: Higher National Diploma in Mechanical Engineering; Higher (or Ordinary) National Certificate in Mechanical Engineering; Diploma in Mechanical Engineering or a recognised Technical College; Extra First-Class Certificate of Competency in Marine Engineering or equivalent Naval Certificate.

Building has commenced on a house and this can be rented from the Committee by the successful candidate.

Applications, stating age, experience and qualifications, together with the names of three referees, to be sent to the Secretary of the Committee at 12a, Birmingham Road, Bromsgrove, not later than 30th June, 1950. 3794

BRITISH ELECTRICITY AUTHORITY**East Midlands Division****Draughtsmen**

APPLICATIONS are invited for positions as **DRAUGHTSMEN** at the Divisional Headquarters, Barker Gate, Nottingham, from persons with experience in one or more of the following branches of work in connection with the construction of Generating Stations.

(a) **ELECTRICAL ENGINEERING.** General Design, assembly and layouts of H.T. and Auxiliary Switchgear, Transformers, Cables, O.H. Lines and Heavy Plant.

(b) **MECHANICAL ENGINEERING.** General Design, assembly and layouts of modern Boiler and Fuel Handling Plant, Turbo Alternators and Condensing Plant, Circulating Water, Steam and Feed Piping, Foundations, etc.

(c) **CIVIL ENGINEERING.** General Design of Steel and Reinforced Concrete structures, foundations retaining walls, tunnels, etc.

(d) **ARCHITECTURAL ASSISTANTS.** Applications are invited from men (preferably qualified) with experience in design of architectural work for modern Power Stations, office and welfare buildings.

The salary will provisionally be within the range of £450-£550 per annum.

The salary range quoted is to be regarded as provisional until final scales have been negotiated with appropriate organisations, and superannuation will be under terms approved by the British Electricity Authority.

Applications must be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity House, Barker Gate, Nottingham, and should be returned not later than the 26th June, 1950.

W. S. BURGE,
Divisional Controller.

British Electricity House,
Barker Gate, Nottingham. 3848

BRITISH ELECTRICITY AUTHORITY**Eastern Division**

APPLICATIONS are invited for the following appointment:

ASSISTANT ENGINEER (MECHANICAL), Little Barford Generating Station.

Candidates should possess Higher National Certificate in Electrical or Mechanical Engineering and should have a sound engineering training and be thoroughly conversant with repairs and maintenance of a large Generating Station.

The salary offered will be in accordance with the N.J.B. Schedule Grade 10, Class G (£539-£561 per annum) but may be subject to negotiation through the N.J.B.

The appointment will be Superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, experience and present position should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmead House, Southgate, N.14, to arrive not later than 23rd June, 1950. Envelopes should be endorsed "Assistant Engineer (Mechanical), Little Barford."

W. N. C. CLINCH,
Controller.

Northmead House,
Southgate, N.14. 3851

FOREIGN OFFICE ADMINISTRATION OF AFRICAN TERRITORIES

APPLICATIONS are invited for a vacancy in the Public Works Department under the British Administration of Tripolitania for a **POWER STATION SUPERINTENDENT.** Candidates should hold an Engineering degree or have corporate membership of Institute of Mechanical Engineers or Institute of Electrical Engineers.

Salary £900×£30-£1,050 per annum. This does not normally attract liability to British Income Tax (Schedule E) but is subject to a local tax of approximately 8 per cent. In addition a tax free Foreign Service allowance ranging from £150-£50 per annum according to circumstances of the candidate, is payable.

Appointment is temporary and offered subject to medical examination. The contract is for two years, but is subject to three months' notice on either side.

Responsible for generation, transmission and distribution of electricity from a central 11,000kw steam turbine/Diesel powered station and several smaller outstations. Sole responsibility to Controller of Public Works for the technical and commercial administration of generation including fixation of tariffs. Knowledge of H.T. transmission and distribution necessary.

Write for Application Form from Ministry of Labour and National Service, Technical and Scientific Register (K), York House, Kingsway, London, W.C.2, quoting reference D.156/50-O-A. Closing date 24th June 1950. 3846

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

Assistant Section Engineer—Coventry Section Office

APPLICATIONS are invited for the position of ASSISTANT SECTION ENGINEER in the Coventry Section of the Transmission Department.

Commencing salary will be within the salary range £516-£647 per annum in class AX, Grade 6, Schedule C, and thereafter according to Divisional Classification at present DX.

Candidates must have had experience in the maintenance and operation of High Voltage Overhead Lines, Outdoor transforming and switching stations. Experience of 132kV equipment would be an advantage.

Corporate or graduate membership of I.E.E. or equivalent qualifications will be required.

The appointment will be subject to the successful applicant entering the British Electricity Authority's Superannuation Scheme.

Applications should be submitted on the official form of application which may be obtained from the Divisional Establishment Office at the undermentioned address, and be returned not later than 12th June 1950.

W. S. BURGE,
Divisional Controller.

British Electricity House,
Barker Gate,
Nottingham.

3715

BRITISH ELECTRICITY AUTHORITY

Merseyside and North Wales Division

APPLICATIONS are invited for the appointment of a SHIFT CHARGE ENGINEER at:—

(1) Wallasey Power Station, Cheshire.

The commencing salary will be in accordance with Class D, Grade 7, of the National Joint Board Schedule, i.e., £563/£573 per annum.

(2) Lister Drive Power Station, Liverpool.

The commencing salary will be in accordance with Class F, Grade 7, of the National Joint Board Schedule, i.e., £625/£643 per annum.

Applicants should have had a good general education and experience in the shift operation of generating plant. The possession of a Higher National Certificate or equivalent qualification would be an advantage.

The appointment will be superannuable under the British Electricity Authority and Area Board's Superannuation Scheme, and is subject to a medical examination.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, Merseyside and North Wales Division, Clarke Gardens, Woolton, Liverpool, and should be returned to him not later than Monday, 19th June, 1950.

A. R. COOPER,
Divisional Controller.
3855

SOUTHERN ELECTRICITY BOARD

No. 1 (Southall) Sub-Area

Junior Testing Assistant

APPLICATIONS are invited for the position of JUNIOR TESTING ASSISTANT in the Meter Department at Waterloo Road, Uxbridge, Middlesex.

Applicants should hold technical qualifications equal to Ordinary National Certificate standard and be fully conversant with the testing, repair and calibration of all types of single and three phase meters, prepayment meters and instruments. A sound knowledge of the Electricity Supply (Meters) Act, 1936 is essential.

Provisional salary, subject to negotiation with the appropriate body, will be £400 per annum with National Joint Board conditions. The successful applicant will be required to join the B.E.A. and Area Boards' Superannuation Scheme, if and when eligible.

Forms on which application must be made may be obtained from the Sub-Area Secretary, No. 1 (Southall) Sub-Area, Southern Electricity Board, 2/6 Windmill Lane, Southall, Middlesex, and when completed should be returned to him not later than two weeks after the appearance of this advertisement.

E. C. T. OLDORN,
Sub-Area Manager.

2/6 Windmill Lane,
Southall, Middlesex.

3847

TRANSFORMER DESIGN ENGINEER

A VACANCY exists for a TRANSFORMER DESIGNER with experience of medium and large Power Transformers, and applicants are invited from men with good technical qualifications. The position carries excellent opportunities for advancement in an expanding organization. Excellent staff amenities are provided.

Applications, giving full details of training and experience, stating salary requirements, should be addressed to the Technical Director, The Brush Electrical Engineering Co., Ltd., Loughborough.

3717

CITY AND COUNTY OF NEWCASTLE-UPON-TYNE

APPLICATIONS are invited for the post of HEATING, VENTILATING AND ELECTRICAL ENGINEERING ASSISTANT in the City Architect's Department, A1, Grade 6 of the A. & T. Division. (Salary £595 rising to £660 per annum.)

Applicants must be experienced in the design of Central Heating and Domestic Hot Water Systems and Electrical Installations for large buildings, the preparation of specifications, estimates and reports, and the supervision of such installations.

Applicants should be Members or Associate Members of the Institute of Heating and Ventilating Engineers or the Institution of Electrical Engineers.

The appointment will be subject to the National Conditions of Service as adopted by the City Council; to the provisions of the Local Government Superannuation Act, 1937, and to one month's notice on either side.

Applications, stating age, particulars of training, qualifications, experience, present and previous appointments, together with copies of two recent testimonials and the names and addresses of two persons to whom reference may be made, should be addressed to the City Architect, 18, Cloth Market, Newcastle-upon-Tyne, 1.

JOHN ATKINSON,
Town Clerk.

Town Hall,
Newcastle-upon-Tyne, 1.
31st May, 1950.

3795

SOUTHERN ELECTRICITY BOARD

No. 1 (Southall) Sub-Area

APPLICATIONS are invited for the post of SENIOR ASSISTANT in the Sub-Area Secretary's Department, Windmill Lane, Southall, Middlesex.

Candidates must have knowledge and experience of insurance, including the settlement of claims also general secretarial and administrative experience.

Knowledge of the Electricity Supply Acts and other relevant legislation will be a necessary qualification.

The salary will be in accordance with Grade 4 of the Agreement negotiated by the National Joint Council (Administrative and Clerical Grades) for the electricity supply industry and will commence at a point dependent upon qualifications and experience within the range of £510-£570 per annum.

The successful applicant, if not already a member of a superannuation scheme in respect of his present service in the supply industry, will be required to join the B.E.A. and Area Boards' Superannuation Scheme if and when eligible.

Applications should be made on the standard form obtainable from the Sub-Area Secretary, Southern Electricity Board, 2-6, Windmill Lane, Southall, Middlesex, and returned to him not later than fourteen days after the appearance of this notice.

F. W. KEMPTON, Secretary.
3785

BRITISH ELECTRICITY AUTHORITY

APPLICATIONS are invited for the appointment of ASSISTANT TO THE FUEL TECHNOLOGIST in the Generation Operation Branch, of the Chief Engineer's Department at Headquarters in London.

Applicants should have a Fuel Engineering or Chemical Engineering Degree or equivalent qualifications and a knowledge of the properties of British Coals and their combustion, particularly in relation to suitability for use in Power Stations. Experience of operation of large boilers and of the effect of fuel quality and cost on the economics of Power Station operation is essential.

The starting salary will be determined according to the qualifications and experience of the selected applicant within Grade 3 Schedule C of the N.J.E. Agreement, £755 to £1,017 per annum rising ultimately to £1,120 per annum including London Allowance.

The appointment is superannuable and the successful candidate may be required to pass a medical examination.

Application forms may be obtained from D. Moffat, Director of Establishments, British Electricity Authority, British Electricity House, Great Portland Street, London, W.1, and should be completed and returned to him not later than 23rd June, 1950. The information on the application form may be supplemented on separate sheets if the applicant so desires.

Please quote reference AE/48. 3845

CLASSIFIED ADVERTISEMENTS
ARE PREPAID

BRITISH ELECTRICITY AUTHORITY

Midlands Division

A PPLICATIONS are invited for the position of **COMMUNICATION ENGINEER** in the Divisional Technical Engineer's Department. The position is graded as Second Assistant Engineer, and the salary range will be in accordance with schedule C of the National Joint Board Agreement, Grade 2, £752 to £966 per annum.

Applicants must be Corporate Members of the Institution of Electrical Engineers or possess equivalent qualifications, and should have wide experience in the design, manufacture, commissioning and maintenance of various types of supervisory apparatus and communication equipment as applied to power undertakings. Experience must not be restricted to telephone exchange practice, and preferably should not be confined to one particular manufacturer's products.

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

Applications should be made on forms which may be obtained from the Divisional Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, and must be returned not later than 24th June, 1950.

F. W. LAWTON
Divisional Controller, 3853

BRITISH ELECTRICITY AUTHORITY

Midlands Division

A PPLICATIONS are invited for the position of **DRAUGHTSMAN** in the Divisional Transmission Engineer's Department at Divisional Headquarters, Moseley. The salary will provisionally be within the range £430-£570 per annum.

Applicants should have good technical training in Mechanical or Electrical engineering, and experience in one or more of the following:—

- Layout of 132kV and Lower Voltage Sub-stations.
- Electrical Diagrams.
- Reinforced concrete structure and foundations.
- Brick Buildings of the industrial type.

The salary range quoted is to be regarded as provisional until final scales have been negotiated with appropriate organisations, and superannuation will be under terms approved by the British Electricity Authority.

Applications should be made on forms which may be obtained from the Divisional Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, and be returned not later than 24th June, 1950.

F. W. LAWTON
Divisional Controller, 3759

BRITISH ELECTRICITY AUTHORITY

Yorkshire Division

Shift Charge Engineer

A PPLICATIONS are invited for the position of **SHIFT CHARGE ENGINEER** at the Blackburn Meadows Power Station, Sheffield.

Applicants should have had a good general education and be technically trained to Higher National Certificate Standard, and be thoroughly experienced in the operation of modern high-pressure plant.

Conditions of service and salary will be in accordance with the N.J.B. Schedule, Class H, Grade 7, £692-£722 per annum.

The appointment will be subject to the provisions of the Authority's Superannuation Scheme.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, Yorkshire Division, British Electricity House, St. Mary's Road, Leeds, 7, to whom completed forms must be returned within 14 days of the appearance of this advertisement. Envelopes to be endorsed Shift Charge Engineer.

G. A. VOWLES,
Divisional Controller, 3854

A NUMBER of vacancies will arise this summer for draughtsmen at the Bradford works of the English Electric Co. This is due to further expansion, and stable employment under excellent conditions is offered to suitably experienced men. The new drawing office will be concerned with control gear for rolling mills and mining equipment to be manufactured at Bradford. Applications are invited from switchgear and control gear draughtsmen. Electrical and mechanical draughtsmen who have not had previous experience in this field but who have had sound electrical or mechanical D.O. experience will also be selected. Junior or intermediate grade draughtsmen who wish to gain experience of this interesting electro-mechanical work are also invited to apply.—Write giving full details quoting reference 138, to Central Personnel Services, English Electric Co., Ltd., 24-30, Gillingham St., London, S.W.1. 3700

A COMPETENT man with initiative, able to carry increasing responsibility in a rapidly growing organisation, is required as assistant switchgear engineer; applicants must have had works and drawing office training; experience on h.t. switchgear design engineering, and, at short circuit testing stations, essential; house available for married man; superannuation scheme; applications giving full details of technical qualifications, experience and personal particulars should be endorsed "Switchgear Engineer," and addressed—South Wales Switchgear, Ltd., Blackwood, Monmouthshire, 365

A LARGE and progressive company in the South, manufacturing small electric motors in large quantities, requires an experienced shop superintendent to control machining, winding and assembly sections, preferred age 30-50; experience on a similar class of work desirable; together with real ability to achieve results by sound methods of production control; house will be provided; please state, in strict confidence, age, full details of education and apprenticeship, subsequent positions held and salary requirements.—Box 3762.

A TRANSFORMER designer, also draughtsman; electrical engineers for consulting, power station sections (home and overseas) sales; also diesel/electric maintenance; storekeepers; electric furnace and welding designers; radio and television designers, service, wiremen, aerial erectors, etc.; ex-R.A.F. and R.N. radar mechs.; telephone engineers; draughtsmen (various power station hydro-electric switchgear, etc.); other positions vacant.—Technical Employment Agency, 179, Clapham Rd., S.W.9 (Brixton 3487).

ALBRIGHT & WILSON, Ltd., invite applications for a vacancy in their silicones department; electrical engineer who will be mainly concerned with giving technical service to users of silicones in the electrical industry and the development of new uses of silicones; the work will be centred in the London office and will involve visits to customers; applicants should possess a degree in electrical engineering or its equivalent and be between the ages of 27 and 35.—Applications which will be treated in strict confidence should include particulars of education and experience and should be sent to the Technical Staff Committee, Albright & Wilson, Ltd., 49, Park Lane, London, W.1 3866

AN experienced design draughtsman is required for the Nelson Research Laboratories of the English Electric Co., Stafford; the successful applicant will be required for duties connected with special electronic valve and other vacuum devices and it is essential that applicants should have experienced in this class of work.—Write, giving full details, quoting reference 143, to Central Personnel Services, English Electric Co., Ltd., 24-30, Gillingham St., London, S.W.1. 3824

ANGLO-AMERICAN OIL Co., Ltd., requires for its large new refinery now under construction at Fawley, near Southampton, an electrical engineer to be responsible for the electrical section of the engineering department; the appointment in the first instance will be on the supervision of construction, and subsequently the operation and maintenance of all the electrical engineering plant. Qualifications: Electrical engineering degree or equivalent with apprenticeship with manufacturer of heavy electrical equipment or with a fully authority; applicants should have had a wide experience in the operation and maintenance of high-voltage underground distribution systems, associated sub-stations up to 10,000kva and protection systems and also supervision of maintenance work on heavy industrial equipment, including motors up to 1,250hp, circuit-breakers up to 250mva, control panels, etc.; the post offered is pensionable, and applicants should not be more than 45 years of age; applications should state age, qualifications and experience, together with the salary expected. 3858

AIR MINISTRY have vacancies for designers/draughtsmen in the design branch of the works department for high class work in the following fields, mechanical and electrical engineering. The work includes design for London Airport; salaries are on ranges up to £750; starting pay according to age and qualifications.—Applications stating age, qualifications, previous appointments and salary required should be sent to Air Ministry, S.2 (h), Cornwall House, London, S.E.1. It is regretted that applications of candidates not called for interview cannot be acknowledged. 3736

APPLICATIONS are invited from senior and medium draughtsmen with good practical training and work in the fields of mechanical and radio engineering at the research laboratories of The General Electric Co., Ltd., North Wembley, Middlesex; men with Higher National Certificate or equivalent will be preferred; details of age, experience and qualifications should be sent in writing to the Personnel Office. 3818

ATUS Co., Ltd., from Engineers with first class technical design and sales ability. Motor control gear, switchgear or instruments. Appropriate remuneration. Living accommodation available.—Apply in confidence, Secretary The Electrical Apparatus Co., Ltd., St. Albans, Herts.

ARMATURE winder, a.c. and d.c. fractional to 50hp machines, skilled man, with prospects of taking charge in small repair winding shop, S.W.6 area; write stating age, wage and experience to—Box 3767.

ARMATURE winders required, top rates paid.—Apply
Hirst Electrical Co., 138, Lever St., London, E.C. 1.
3741

ASSISTANT Engineer wanted for wood pole and steel
tower contracts in Northern Ireland, Salary according
to experience.—Apply J. L. Eye Construction Co.,
Ltd., 17, Hill Side, Ridgway, Wimbledon, S.W.19. 3608

BRITISH ENGINE, BOILER & ELECTRICAL INSUR-
ANCE Co., Ltd., 93, West George St., Glasgow.
The company has a vacancy for an electrical plant in-
spector in Glasgow; permanent position carrying progres-
sive salary scale £450 to £650 and non-contributory
pension; candidate, age 26 to 33 years, with apprentice-
ship in the manufacture of electrical machinery and
preferably with subsequent experience of repairs and
industrial use of electrical machinery and who has gained
the Higher National Certificate in electrical engineering
or is Grad. I.E.E. is invited to apply in own handwriting
stating age, qualifications and experience. 3862

BOY wanted to assist electrician, state exp. if any.—
Write Mourton, Electrical, 53, Tooting Bec Rd.,
London, S.W.17. 3726

CHARGEHAND or foreman wanted for standard and
miniature electric lamp works, non-combine, knowl-
edge of stem making or sealing and pumping required;
applicants should state experience and salary required;
progressive situation for ambitious and go-ahead man.—
Box 8706.

CHESHIRE electrical engineering firm require young,
well educated gentleman to train as junior repre-
sentative for the Southern Counties; reply stating age,
education and salary required to—Box 3764.

COMPROLLER wanted for group of engineering com-
panies; applicants must possess solid experience of
light engineering industrial methods and administrative
techniques; also first-class cost accounting qualifica-
tions and sound knowledge of financial accounting; this
requires not only combination of engineering and
accounting experience, but also vigorous clear-headed
and effective personality; appointment based on head
office, London, but frequent visits to Provincial branches
necessary; medical examining required; state salary
staff pension fund; salary £1,000-£1,500. Write, with
full data and in confidence, to Box E.R.901, at 191,
Gresham House, E.C.2. 3819

CONSULTING engineers require experienced installa-
tion designer-draughtsman, age 24-30. Must be
capable of exercising initiative to produce complete de-
tailed designs and be good draughtsman; state salary
expected and experience. F. Myers & Partners, 9,
Victoria St., London, S.W.1. 3701

CONTRACTS manager required by electric cable man-
ufacturers to take full control of installation con-
tracts department; must have experience in 33kV cable
laying and power station contracts and be capable of
organising and controlling entire department including
estimating, technical correspondence, costing and outside
staff.—Apply in writing, stating age, qualification, ex-
perience and salary required, to Box 3727.

COOKE & FERGUSON, Ltd., require fully qualified
Designer-Draughtsmen having experience on switch-
gear, or alternatively men with suitable engineering
training, at least up to Ordinary National Certificate
level, and willing to undertake specialised training.
Applicants should apply to the Personnel Manager,
South Street, Works, Openshaw, Manchester, 11, stating
age, details of experience and salary required. 3671

COOKE & FERGUSON, Ltd., require a chief of test,
preferably of higher national certificate standard,
must have experience of high voltage switchgear and
be capable of taking charge of all routine testing.—Ap-
licants should apply to the Personnel Manager, Saxon
Works, South Street, Openshaw, Manchester, 11, stating
age, qualifications, experience and salary required. 3805

CROMPTON PARKINSON, Ltd., have a vacancy for a
man between 20 and 23 years of age, to be
employed as a tracer in their lighting engineering sec-
tion; applicants should have had experience in the
tracing of drawings in connection with civil engineering
or large-scale engineering projects.—Please send ap-
plications, with full details of experience and salary re-
quired, to Reference J.H.F./P. Crompton House, Aldwych,
London, W.C.2. 3826

DESIGN draughtsman required by progressive com-
pany in N.W. Kent for design of high quality elec-
tronic equipment; applicants, who should preferably
have experience in military requirements contract work,
should apply, stating full details of age and experience;
salary £450 p.a. and upward, according to ability.—
Box 3521

DESIGNER draughtsman required for the design and
development laboratory of an engineering company
of international repute in London; applicants must
possess Higher National Certificate or equivalent qualifi-
cations, and have a practical experience of plastic
moulds, small special purpose machinery, press tool
work and general machine tool knowledge; apply stating
age, qualifications and experience to—Box 3765.

DRAUGHTSMAN experienced in mechanical design
of electrical rotating machinery.—Apply, giving full
details of experience, to—Laurence, Scott & Electro-
motors, Ltd., Gothic Works, Norwich. 3693

DEWHORST & PARTNER, Ltd., Hounslow, Middle-
sex, require senior and junior technical circuit
design draughtsmen with experience of motor control
practice for lift and mechanical handling equipment;
progressive position; pension scheme, etc.; salaries in
accordance with age and experience; please write in
first instance to Personnel Manager giving details of
training, subsequent experience, etc.

DRAUGHTSMEN; it is necessary to expand consider-
ably Marconi's Wireless Telegraph Co., Ltd., draw-
ing office at Acton; all grades of draughtsmen (elec-
trical or mechanical D.O. experience) are required for
design and detail work on radio and electronic equip-
ment.—Write, giving full details, quoting reference 127A,
to Central Personnel Service, English Electric 3530
Ltd., 24-30, Gillingham St., London, S.W.1. 3525

DRAUGHTSMEN (section leader and senior standard)
fully qualified to design mechanical or electrical
equipment in connection with (a) instruments, (b) light
precision mechanisms, (c) electronic equipment, (d)
servo-mechanisms; practical training and experience in
one of the above headings together with ability to work
on own initiative is essential; progressive staff positions
with good prospects and congenial working conditions.
—Apply, stating training, qualifications and experience
in chronological order, to Personnel Officer, Ferranti,
Ltd., Ferry Rd., Edinburgh.

DRAUGHTSMEN, senior jig and tool, experienced in
the design of jigs and fixtures, press tools, gauges,
etc., for light precision engineering production work;
staff position with good prospects; apply giving full de-
tails of training and experience and quoting ref. J.T.D.
to the Personnel Officer, Ferranti, Ltd., Ferry Rd.,
Edinburgh. 342

ELEC design department assistant read, H.N.C. std.,
with experience in design of small a.c. and d.c.
motors.—Apply in writing, giving details of age, qualifi-
cations, experience and salary reqd., to Personnel Officer,
Woods of Colchester, Ltd., Colchester, Essex. 3605

ELECTRIC lamps (miniature) S.W. London; works
management assistant works manager, to take full
responsibility production (belt system), control and process
planning; must have wide experience, also in production
engineering of modern miniature lampmaking machinery;
house available; state age, education, experience and re-
muneration required.—Box 3601.

ELECTRICAL designer (senior assistant) required by
The Harland and Engineering Co. Ltd., Alloa, Scot-
land; candidates should have at least 5 years' industrial
experience in the designing of a.c. and d.c. motors/gen-
erators in the range 50 to 1,000hp.—State technical
qualifications, give full particulars of experience and
positions held, also age and salary desired, to Works
Director, B.E.P. Works.

ELECTRICAL draughtsman required by a small firm
of control gear manufacturers in Manchester
district; must have had 5 years' experience on drawing
board in detailing, specification and diagrams; apply,
stating age, experience and salary required, to Box 3761.

ELECTRICAL Draughtsman for oil, lay-out, and
performed in wiring and installation, layouts, and
taking off quantities. Should be capable of laying out
small sub-stations and switch-houses. Knowledge of cable
layouts and flame-proof conduit work desirable. Five-day
week with paid overtime.—Apply by letter, stating age,
experience expected, when free to commence con-
tract work, to Chief Draughtsman, The Lummus Co., Ltd., 525,
Oxford St., London, W.1. 3557

ELECTRICAL draughtsmen, seniors and juniors, re-
quired for long programme of work on oil refineries
and chemical plants; opportunities for good men; pension
scheme, 5-day week with overtime as required; salary
commensurate with ability.—Write, stating age, qualifi-
cations, experience and starting salary, to Chief Engi-
neer, E. B. Badger & Sons (G.B.), Ltd., 40, Parkgate
Rd., Battersea, London, S.W.11. 8720

ELECTRICAL engineer required for the laboratory of
a large engineering organisation in the West Lon-
don area; applicants should be between 24 and 30 years
of age and possess Higher National Certificate (elec-
trical) or equivalent; experience of the problems asso-
ciated with the manufacture of light electrical
mechanical products is essential; preference will be given
to those who have served an apprenticeship.—Apply,
giving details of age, qualifications and experience, to
Box 3827.

ELECTRICAL engineer required for Central London
office to be responsible for the electrical develop-
ment and maintenance of all the Company's oil and
cake mills throughout the U.K.; applicants should be
thoroughly experienced in the erection and maintenance
of the generating plant, sub-station, h.t. and m.t.
cables, power, lighting, heating and telephone instal-
lations required by such factories; applicants should be
preferably between 30 and 40 years of age and should
have had previous experience in a similar industry; they
should be Corporate members of the Institution of Elec-
trical Engineers or hold qualifications up to A.M.I.E.E.
standard; superannuation scheme; salary according to
age and experience; all applications (which should con-
tain copies of two or more recent testimonials) would
be treated under the strictest confidence and should be
addressed to—Lever Brothers & Unilever, Ltd.
Personnel Division (FMD), Unilever House, Blackfriars,
London, E.C.4. 3769

ELECTRICAL engineers required for service in Middle East; applicants should (a) possess Ordinary or Higher National Certificate and have had full apprenticeship with heavy electrical equipment manufacturers or with a large colliery or allied fully electrified industry, or (b) possess a degree and have had two years' technical apprenticeship with similar firm to above; in each case applicants must have had at least three years' subsequent experience on the installation and maintenance of heavy electrical equipment; maximum age limit 35 years; attractive salary, plus generous allowance in local currency, free passages out and home, free medical attention, kit allowance, good leave arrangements, pension scheme. Write giving personal particulars and details of qualifications and experience, quoting Dept. F.191, to Box 2592, at 191, Gresham House, E.C.2. 194

ELECTRICAL inspectors required by major oil company operating in Middle East. Applicants should have a wide experience of inspection and testing of motors, switchgear and the electrical equipment associated with modern large generating stations, substations and transmission and distribution networks with voltage range of 33kv to 440 volts. Knowledge of flameproof equipment an advantage. Possession of Higher National Certificate essential and qualifications up to A.M.I.E.E. desirable. Age limit 37 years. Attractive salary plus generous allowance in local currency, free passages out and home, free medical attention, kit allowance, pension scheme, good leave arrangements.—Write, stating age and full details of qualifications and experience, quoting Dept. F.182, to Box 2334, at 191, Gresham House, E.C.2. 188

ELECTRICAL laboratory assistant, 15-18 years interest in radio engineering essential; applicants must have school certificate or some electrical qualification; write stating particulars and salary.—Box 3603.

ELEXCEL, Ltd., require additional sales representatives to operate the following areas: South Western, Yorkshire, East Midlands and South Wales Electricity Boards.—Applications, giving full particulars of previous experience, etc., in strictest confidence, to Sales Manager, Victor Works, Broadgreen, Liverpool, 14. 3816

ENGLISH ELECTRIC has further vacancies at Stafford and Liverpool for Draughtsmen to meet greatly increased switchgear programme. Men with electrical or mechanical D.O. experience on any class of electrical switch or control gear are required and every consideration will be given to draughtsmen at present on other classes of work who wish to make a career on this vitally important and interesting work.—Apply, quoting reference 141, to Central Personnel Services, English Electric Co., Ltd., 24-30, Gillingham St., London, S.W.1. 3676

ESTIMATING and technical engineer required by leading firm of London (W.C.2) contractors; actual experience contractor's office and of designing schemes essential; excellent and permanent position for good man.—Write detailed experience, technical training and salary required Box 3613

EXECUTIVE to take charge of technical research and development on mineral insulated metal sheathed cables and their application in service; experience, in research management as well as sound technical qualification is desirable; important position at commensurate salary offered by Pyralox Ltd., Highburn, Wyke, York, Durham; please address application to the Managing Director. 3806

EXPERIENCED engineer wanted for factory process development and quality control in modern light engineering factory N.W. London area.—Box 3661.

EXPERIENCED telephone cable installation engineer required immediately to take charge of contract in the Middle East; remuneration according to age, experience and qualifications.—Further details on application to the Staff Officer, B.I.C.C., Ltd., Prescott, Lancs. 3663

INSIDE sales engineer required for the preparation of tenders for all types and sizes of rotating electrical plant for home and export markets.—Applications, stating age, experience and salary expected, to Manager, Rotating Plant Department, Bruce Peebles & Co., Ltd., Edinburgh, 5. 3797

JUNIOR draughtsmen required by progressive N.W. Kent manufacturers for the design of high quality electronic apparatus; knowledge of Ministry contract work would be an advantage, but is not essential; excellent prospects of advancement for the right applicants; please give full particulars of age, experience, and salary required.—Box 3820.

LIGHTING fittings and decorative metalwork; first class London representative required—trade and stores connections—for old established manufacturing firm; state age, salary, and experience.—Box 3602.

MALAYAN power supply company require services of an engineer, age 23-32, preferably single. Experience diesel-operated generating stations essential. Should be Grad. I.E.E. or Higher National Certificate Electrical Engineering.—Full particulars of service contract from Shaw Darby & Co., Ltd., 19, Leadenhall St., London, E.O.3. 3786

MALAYAN company of engineers require services of an electrical engineer, age 23-32, single. Should hold Higher National Certificate Electrical Engineering and have good general background. Some previous sales experience an advantage but not essential.—Full particulars of service contract from Shaw Darby & Co., Ltd., 19, Leadenhall St., London, E.C.3. 3787

MANUFACTURING electrical engineers and brass foundry require young man to take charge of small section producing brass valve-trip plugs, etc., for marine and industrial use; must have good general knowledge of business and production methods, excellent opportunity and permanency for right man.—Apply in writing only, giving full particulars of age, training, experience and salary required, to Secretary, William McGeech & Co., Ltd., Coventry Rd., Birmingham 10. 3369

MARCONI'S WIRELESS TELEGRAPH Co., Ltd., M Chelmsford, require experienced draughtsmen for (a) design of radio communication and radar equipment, (b) design and detail of light structural steel work, (c) installation drawing office; previous D.O. experience essential, preferably on radio or electronic equipment; for (c) previous electrical layout experience would be suitable.—Write, giving details of age, qualifications and experience, quoting reference 142, to Central Personnel Services, English Electric Co., Ltd., 24-30, Gillingham St., London, S.W.1. 3623

OVERHEAD line engineer.—Enfield Cables, Ltd., seek experienced transmission engineer to customise design and erection overhead power lines, railway electrification projects, etc.; to take charge department handling contracts at home and overseas; salary according experience, age not over 50; write full particulars in confidence.—C. J. Armstrong, M.I.E.E., Design, Development, Contracts Department, Enfield Cables, Ltd., Victoria House, Southampton Row, London, W.C.1. 3799

PLANNING engineers (senior), experienced in the production and operational planning of electro-mechanical precision instruments and/or radar equipment together with the materials used in their manufacture; knowledge of costing an advantage; flats available for successful applicants; excellent prospects.—Apply, stating salary expected and giving full details of training, qualifications and experience, to the Personnel Officer, Ferranti, Ltd., Ferry Rd., Edinburgh, 141

PRODUCTION manager; experienced large quantity mass produced electro-mechanical precision instruments; foremost concern of its kind in Europe; North London district; initiative and drive essential; send details age, past experience, remuneration received and now required; all replies treated in confidence.—Box 3601

REPAIR department vacancy for first-class energetic man, a.c. and d.c. winding, 1 to 50hp, London N.1 area; state age and experience; replies treated in confidence.—Box 3798.

REPRESENTATIVE, full- or part-time for electrical contractors engaged in supply and overhaul of electric drives, installation and repairs, etc.; applicants should have contacts to obtain business; salary and commission.—Box 3768.

REPRESENTATIVE—Old-established manufacturers require well-connected sales representative, able to handle additional line of domestic and light industrial sales covering Cheshire, Yorkshire, Lancashire, Northumberland and Durham area.—Full details in the first instance to Box 3719

REPRESENTATIVES required by well-known electrical manufacturer, Midlands, N. Ireland and Eire, Scotland, to take over existing connection wholesalers and B.E.A. State full particulars and approximate salary required. With car preferred. Pension scheme.—Box 3771.

REPRESENTATIVES required for all areas in U.K. to call on factors by a small firm manufacturing fuseboards, etc., incorporating a new patent fuse; remuneration by a good commission, car an advantage.—Box 6731.

REPRESENTATIVES required for London area, North of England and Scotland; to have good personality and comprehensive up to date knowledge of switchgear, up to 132kv; state previous experience, qualifications, age and salary required.—Apply to Personnel Manager, Messrs. Cooke & Ferguson, Ltd., South Street Works, Openshaw, Manchester, 11. 3504

REQUIRED instantly for important manufacturing company export accountant with knowledge of paper and rubber insulated cables.—Box 3870.

SALES representatives required in all areas for marketing an entirely new 5amp switch of revolutionary design and phenomenal performance; previous experience and sound established connections essential; good salary and commission, plus car allowance, write, stating age, experience, etc., and area, thoroughly covered; replies treated in strictest confidence.—Managing Director, Box 3796.

SENIOR and junior staff having experience of meter engineering and testing, are required for polyphase and test departments.—Applications giving full particulars should be forwarded to Test Superintendent, Aron Electricity Meter, Ltd., 72/92, Salusbury Rd., London, N.W.6. 3865

SENIOR draughtsman required by firm in mid-Essex; good mechanical engineering experience is essential and some previous experience of special purpose machine design would be an asset.—Apply, giving full details of training and experience, to Personnel Office, Crompton Parkinson, Ltd., Chelmsford, Essex. 3860

SENIOR electrical engineer able to direct and control research, development, design and drawing office of old-established light electrical manufacturers; excellent prospects for man with first-class experience.—Fullest particulars of career to date and salary required in confidence to Box 3822.

SENIOR factory layout draughtsman required by firm in mid-Essex; recent experience of medium-size factory planning is essential together with first-rate knowledge of works' services.—Apply, giving full details of training and experience, to Personnel Officer, Crompton Parkinson, Ltd., Chelmsford, Essex. 3859

SENIOR electrical draughtsmen are required by an established British firm with American affiliation, experience of power distribution and lighting installations has applied to the design of instrument, and is essential, qualifications to I.N.C. standard; substantial salaries will be paid to suitable applicants.—Write stating age, qualifications and experience, Foster Wheeler, Ltd., 3, Ixworth Place, London, S.W.3. 3592

STAFF required for engineering division of a firm engaged on instrument and radar equipment; duties involve (a) the engineering and production design of new items to be put into production after the prototype has been evolved in the laboratories, and (b) the clearing of technical snags during the various stages of production; applicants should have (a) degree or equivalent, (b) knowledge of production methods, and (c) several years' experience in production design of instrument or radar equipment, salary in accordance with age and experience.—Apply, giving full details of training, qualifications and experience in chronological order, to Personnel Officer, Ferranti, Ltd., Edinburgh. 140

TECHNICAL engineer, with fractional horse-power motor experience, is required by an international organisation with factory in Great Britain. Preference will be given to a man who has had some commercial experience and is able to act in an advisory capacity to sales engineers and customers in the north of England and Glasgow areas. Applicants should be prepared to operate away from home when necessary. Age 25-35. Minimum technical qualifications, National Cert. Salary £500-£650 per annum, plus expenses.—Box 3788.

TECHNICAL sales engineer required by large London firm for Herts, Essex, Beds and East Anglia areas; must have sound knowledge of instruments for industrial processes; apply with details of age, experience, salary, etc.—Box 3857.

TELEPHONE engineers required for the circuit and equipment divisions of the engineering department of the Automatic Telephone & Electric Co., Ltd., Liverpool; sound knowledge of automatic exchange practice is essential.—Write to the Personnel Manager, A.T. & E. Co., Ltd., Edg. Lane, Liverpool, giving full details of experience, etc. 3864

TEST room assistants required by manufacturer of telephone equipment in East London area. Applicants should have experience of testing of telephone transmission equipment and preferably experience of electrical measurements.—Please state full details to Box 3770.

THE BRUSH ELECTRICAL ENGINEERING Co., Ltd., Loughborough, have vacancies in their transformer department for experienced draughtsmen and transformer technicians with both electrical and mechanical training and experience; candidates who have served a recognised apprenticeship are preferred and those with technical qualifications to Higher National Certificate standard are especially invited to apply.—Replies giving full details of qualifications, age, etc., should be addressed to the Technical Director. 3738

THE GENERAL ELECTRIC Co., Ltd. invite applications for the position of works manager of their switchgear works at Witton; the factory employs approximately 1,800 people and makes all types of electric switch and control gear; applications should be sent in writing to The Manager, Switchgear Works, G.E.C., Witton, Birmingham, 6. 3763

THE GENERAL ELECTRIC Co., Ltd. invites applications for the position of resident sales engineer in West Africa; the appointment is based on Lagos, but the duties would involve travel throughout the British West African Colonies and adjacent countries; applicants must be sound technically, have served an apprenticeship and have had fairly wide and responsible experience in the electrical engineering industry; professional qualifications are desirable; a single man would be preferred; age between 30 to 40 years; the position is a permanent one and will be well remunerated.—Apply to the Staff Manager, The General Electric Co., Ltd., Magnet House, Kingsway, W.C.2. 3628

THE position of cost accountant with a large manufacturing company is immediately available; experience with the costing of paper and rubber cables desirable. Box 3871.

TRANSFORMER assemblers required for the assembly of transformers from 20 to 2,500kva; permanent, progressive positions offered to suitable applicants; housing accommodation available in a delightful area.—Apply giving full details of practical experience, age and salary required to London Transformer Products, Ltd., Trading Estate, Gate Rd., Bridgend, Glamorgan, South Wales. 3611

TRANSFORMER estimator and technical correspondent required; must be capable of dealing with tenders for home and overseas business; practical experience an advantage.—Applications, stating age, qualifications, experience and salary required, should be addressed to Employment and Welfare Manager, Johnson & Phillips, Ltd., Charlton, London, S.E.7. 3631

VICKERS ARMSTRONGS, Ltd., Weybridge, invite applications for the post of Electronics engineer to take part in electronic side of special projects.—Write stating experience and qualifications to Employment Manager, Weybridge Works. 3566

VICKERS ARMSTRONGS, Ltd., Weybridge, invite applications for the post of project engineer to work on certain special projects; qualifications required for this post include experience of control methods and knowledge of electronics and instruments.—Write stating experience and qualifications to Employment Manager, Weybridge Works. 3567

APPOINTMENTS FILLED

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

BOX 8672, maintenance engineer; all applicants are thanked.

SITUATIONS WANTED

ELECTRIC lamp sales manager requires representation in Scotland; resident Edinburgh; car available; state terms.—Box 8716.

TOOLMAKER (press and M/c), 47, responsible position held for past 22 years, seeks change, London or Home Counties preferred.—Box 8685.

AUCTION NOTICES

G. R.
By Order of the Minister of Supply.
FIFTH SALE
MINISTRY OF SUPPLY STORAGE DEPOT,
ROTHERWAS, HEREFORD.
(about 2 miles from the Centre of the City).
RUSSELL, BALDWIN & BRIGHT, LTD.
are instructed to Sell by Auction at the above Depot on **THURSDAY & FRIDAY, JUNE 22nd & 23rd, 1950,** at 11 a.m. precisely each day.

A Large Quantity of
RADIO EQUIPMENT,
including chassis with components, receiver units, power units, amplifiers, stabilisers and modulators.
Tracked Vehicles and Trailers, 170 Heavy Petrol Engines, Assorted Wooden Packing Cases and CABLE DRUMS,
and a collection of Miscellaneous Stores.

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100 kVA modern diesel alternator set, comp. vert. 4-cyl solid injection oil engine on baseplate coupled to 400-230 volts 3-phase 50 cycles, 1,000rpm alternator. Details on request.—Thos. W. Ward, Ltd., Albion Works, Sheffield. 180

100 v, 5kW, Lister-Mawdsley diesel generating set (unused), self-contained unit with radiator cooling; £225.—Scottish, Ltd., Kingston Rd., New Malden, Surrey. Tel. Malden 3633. 132

110 Hoover type 201 shaded pole F.H.P. motors, 200-250 volts a.c., 50 cycles, 950rpm, output 1.25 watts approx., price 12/10 each; 200 Frost, as above, 1.275rpm, output .009hp approx., price 23/6 each; 75 dot, brass dome Nute & T., 2BA, 2 1/2 each, or best offer for any of the foregoing. Inspection invited. Apply Norliss Air Conditioning Corp., Ltd., Bury House, Theobalds Rd., London, W.C.1, or Tel. Holborn 7833. 3773

230 kva 3/50/400v oilbrake switch and auto-transformer starter 20/L, 11 v/S.—A. C. Bilby, A.M.I.E.E., A.M.E.E., Grosveils Engineering Works, Langley Green near Birmingham. 82

240 kW generator, 100/120 or 200/240 volts at 420/490 rpm, 6 pole, compound interpole.—Fyfe, Wilson & Co., Ltd., Bishop's Stortford. 3933

250 kw rotary converters (2) with transformers and switchgear, input 6,500 volts, 3-phase, 50 cycles output, 420/210 volts; also a.c. and d.c. motors, switchgear generating sets, welders, etc.—Midland Counties Electrical Engineering Co., Ltd., Grice St., Spon Lane, West Bromwich. 36

350 hp G.E.C. slip ring motor, 400 volts 3-phase 50 cycles, 375rpm on baseplate with Ellison oil-immersed control gear.—Thos. W. Ward, Ltd., Albion Works, Sheffield. 'Phone 26311 (ex. 347). 177

375 kva L.D.M. alternator, 400 volts 3-phase 50 cycles, 4-wire, 375rpm, with exciter, mounted on baseplate with single pedestal bearing.—Thos. W. Ward, Ltd., Albion Works, Sheffield. 'Phone 26311 (ex. 347). 181

500 yard drum of 25 sq in, 3 core, 11,000-volt cable, P.I.L.C.S.T.A. & J.S.; immediate delivery.—Apply Lipton Products, Ltd., Lower Glory Mill, Woburn Green, Bucks. 'Phone Bourne End 680. 3811

ARTICLES WANTED

ALTERNATORS wanted in good condition, must be 1,000 r.p.m., 15 to 30kva any voltage.—Box 236.

CENTRAL heating portable plant required for small factory, about 50ft x 50ft.—Box 3674.

DIESEL engines or diesel-driven generator sets, 100kw up to 400kw, slow speed preferred.—Britannia Manufacturing Co., Ltd., 22-26, Britannia Walk, London, N.1. 53

MERCURY (Quicksilver) wanted. Write for packing instructions. Gold, silver and platinum also purchased.—Collingridge & Co., Ltd., Riverside Works Riverside Rd., Watford. (Tel. 5963.) 20

SPRAY booth required, preferably with turntable fitted in base.—Box 3875.

WANTED, d.c. and a.c. ball-bearing motors. Full details to Britannia Manufacturing Co., Ltd., 22-26, Britannia Walk, London, N.1. 29

WANTED—Diesel engine driven generator set, 175-200 kW, 400-500v, 3-wire d.c. Alternatively generator only, 5/600 rpm.—Box 3684.

WANTED for prompt cash, ferrous and non-ferrous scrap, also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. & H. Cooper, Ltd., 176, Brady St., Bethnal Green, E.1. 202

WANTED, rotary converters, any size.—Universal, 221 City Rd., London, E.C.1. 22

WANTED, several 7kw 125 volts d.c. generators, electrical condition not important.—Fyfe, Wilson & Co., Ltd., Bishop's Stortford. 3834

WANTED, Lister diesel engine, 18hp, 1,000rpm, 18/2 type, ditto, new or s/hand 3 1/2hp and 6hp; dynamos, 150kw, 230v, 480rpm; Petter diesel S-type, 5-hp.—Box 8725.

WANTED, vacuum impregnating plant.—Send full details to Britannia Manufacturing Co., Ltd., 22-26, Britannia Walk, London, N.1. 3692

WANTED 12 ft fluorescent light fittings complete commercial type.—New Laundry, 14, Temple St., Aylesbury. 3643

WANTED. 50hp automatic starter, 220 volt d.c. supply and suitable for remote control.—Fyfe, Wilson & Co., Ltd., Bishop's Stortford. 3835

WANTED. 55kw Maclaren/Brush diesel set, 400/3/50 at 1,000rpm, must be as new.—Fyfe, Wilson & Co., Ltd., Bishop's Stortford. 3836

WANTED. 500kva alternator, 375rpm, 400/3/50 4-wire, two bearing.—Particulars of make, age, price, etc., to Southern & Redfern, Ltd., Woodhead Rd., Bradford. 3837

WANTED.—750-1,200 kW steam turbine or engine driven generator set, 160 lbs pressure, condensing, 240v d.c. generator. Alternatively generator only, 300 rpm.—Box 3685.

22kw 110v 1,000-1,100rpm compound generators; 1 30-35kva ditto, modern b. bearing only; also Tillings P.E 110v generator.—J. Jones & Co. (Nottm.), Ltd., 28-30 Canal St., Nottingham. 3783

400-cycle 3-phase output motor generator sets or alternators wanted.—Full details to Box 3784.

WORK WANTED AND OFFERED

CASTINGS

Fisher Foundries, Ltd., Great Birmingham have capacity for brass gunmetal and soft grey iron machine moulded repetition castings weighing 1-30lb. loose pattern work up to 3cwt; delivery by road to all parts.

Tel. B'ham. Victoria 0197. 225

A BETTER and speedier motor rewinding, repairing and maintenance service at the Max Electric Co. Ltd., 190, Thornton Rd., Croydon (Tho. 4276/8). 161

A.C. and d.c. motor rewinds and repairs. Prompt service, fully guaranteed.—Edgware 8631 (4 lines), Service Electric Co., Ltd., Stanmore, Middx. 92

ADVERTISEMENT pays if properly presented. I have had 20 years' first-class advertising experience, and will prepare layouts and copy at nominal fees of 1/- per single column inch and 2d per word respectively. Please send full details of your products. Ross, 32, Shaftesbury Av., London, W.1. Tel. Gerrard 1330. 8715

ARMATURES.—Vac. dryer and small electric tools re-wound and returned in 7 days. Guaranteed service.—Streatham Transformer Co., Ltd., 69, Streatham High Rd., London, S.W.16. Streatham 7625. 118

Do you want something made in quantity? If it is a metal pressing or assembled component, we can offer you the factory space and manufacturing "know-how." Send us your enquiries.—Metal Components, Ltd., Dolphin Rd., Shoreham, Sussex. Tel. Shoreham 2224-5. 74

DRAWING and tracing any class of mechanical and electrical work, scale drawings from sketches drawings coloured, etc., by fully experienced staff.—Full details sent on enquiry to Box 8718.

MODERN well-equipped factory in West Yorkshire has capacity available; presses up to 60 tons. Capstans up to 1½ in bar. Milling. Spot welding. sub-assembly work.—Box 3781.

MOTOR rewinds, all types of motors re-wound and repaired, quick delivery. Various motors in stock new and second-hand.—C. A. Penny, 43, Benson Rd., S.E.23. For. 3397. 8696

MOTOR rewinds of all types. Heating elements and spirals of every description.—Elementa (Leicester) Winding Co., 307, St. Saviours Rd., Leicester. 203

TIME switches of all makes and electric clocks repaired and reconditioned as new; 12 months' guarantee.—J. W. Hughes, Clockwork Engineers, 3, St. Thomas' St., London Bridge, S.E.1. Tel. Hop 2759. 3439

TRANSFORMER and coil winding.—We have capacity for all types of transformers up to 1kva; coil winding to special shapes and types per specification; quick delivery.—Miniput Appliances, Ltd., 87-89, Edmund St., Birmingham, 3. 3621

ZEROS refrigerators. Complete range of repair and service now available. Equipment reconditioned to conform to pre-war manufacturers' specifications.—Time Engineers, Refrigeration Specialists, 60, Southend Rd., Rainham, Essex (Rainham 2358), or Southern Area Agency (Tel. Springpark 4217). Electrical spares supplied to trade 241

AGENCIES

ADVERTISER, well connected B.E.A. and wholesalers, Midlands, requires further line; commission basis.—Box 8722.

AGENCIES required by long established firm of manufacturers agents with large sales organisation covering the whole of Great Britain, for conduits, conduit fittings, cables and flexibles, fans or any lines suitable for distribution to wholesalers; commission or buying basis.—Box 64.

MANUFACTURERS' agents with office and stores in Glasgow, about to distribute well-known electrical cables in Scotland, wish additional agencies in the electrical trade to run in conjunction; only well-known makes will be considered; live representation guaranteed.—Box 8727

MIDLAND firm of excellent repute require an energetic agent to introduce new type of control gear to manufacturers of fluorescent fittings, and large undertakings; fine opportunity for right type of man with existing connections; North and South of England available.—Box 3782

REPRESANTATIVE, well connected with wholesalers, London and home counties, now carrying switch-plugs, switches and bell, desires an additional agency.—Box 8721.

BUSINESSES FOR SALE AND WANTED

A WELL-ESTABLISHED firm wishes to expand its business by acquiring a company manufacturing precision, indicating recording, or controlling instruments for industrial purposes. Applications invited from principals, which will be treated in strict confidence.—Box 3782.

CONTRACTING, radio and television business for sale owing to ill health, main road, 5 minutes Oxford Street, London, lease, 4-storey, cheap rental, living accommodation, or as offices, vacant possession, partnership considered.—Box 8732.

ELECTRICAL repairs, rewinding and electrical contracting business, comprising retail sales with universal stock of saleable goods approx. £600 with shop fittings and fixtures, machine and workshop behind with all machines for general turning and fitting, good stock of usual raw materials, back storeroom with conduit stores, office fully equipped with all usual files, etc., telephone, roll-top desk, self-contained flat above, two nice bedrooms, lounge, kitchen, and bathroom, newly decorated, modern ranges, glass and flush doors, wall lighting, busy East Lancashire area, for quick private sale, all in £2,500.—Box 8717.

HIGH-CLASS radio and electrical showrooms, situated in excellent position main shopping centre Sussex market town. Main agencies many well-known makes radio, television, refrigerator, washing machine, etc. First-class service connection with qualified personnel. Average turnover approximately £500 per week. Double fronted shop, adequate storage and office accommodation, separate radio and television demonstration studio. Long lease at moderate rental. For sale as going concern, £7,500, s.a.v.—Box 3789.

NOTTINGHAM.—Established electrical engineer, radio and television. Well stocked freehold retail shop and living accommodation attached. All at £3,400. Further particulars, J. T. Whitworth & Son, 8, Eldon Chambers, Wheeler Gate, Nottingham. 3838

OWNERS of old-established businesses wishing to retire should consult Business Brokers, Ltd., 46, St. James's Place, London, S.W.1. (Regent 4720.) Many buyers available, particularly for large proposition. 205

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CITY & Guilds (Electrical, etc.) on "No Pass—No Fee" terms. Over 95% successes. For full details of modern courses in all branches of Electrical Technology send for our 176-page handbook—Free and post free.—B.L.E.T. (Dept. 12A), 17, Stratford Place London, W.1 200

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A SKILLED team of engineers and fitters available for outside erection or dismantling; survey inspection, etc., of large power plant of any description.—For details, write to G.P.U., Ltd., Service Division, Wembley. 3779

COMPANY MEETINGS

BRITISH VACUUM CLEANER AND ENGINEERING COMPANY

Gratifying Expansion

Demand for Goblin Appliances

Developing Export Trade

The forty-sixth ordinary general meeting of The British Vacuum Cleaner and Engineering Company, Limited, was held at Goblin Works, Leatherhead, Surrey, on May 31, Mr. H. Cecil Booth, F.C.G.I., M.I.C.E., the chairman of the company, presiding.

The chairman, in the course of his speech, said:—You will remember that when I addressed you last year I informed you that there had been a considerable recession in trade in the pre-budget period, affecting the accounts which I am now presenting. It is with satisfaction, therefore, that I am able to tell you that in the final six months of the year we more than made up the turnover lost, and that our total turnover for the year was a record.

The results from our industrial section were gratifying, and it is with pleasure that I am able to tell you that

we have a number of large and important contracts in hand for the installation of B.V.G. ash and dust handling automatic plant in power stations both at home and abroad. This class of apparatus has now become an essential part of the boiler equipment of generating stations and other large steam raising units.

Most of you will probably have noticed the new methods used by chimney sweeps where by the use of a vacuum cleaner the old boggy of cleaning up the rooms after his visit has been eliminated. You will be interested to know that your company has been foremost in the provision of special apparatus relating to this new method.

"Göblin" Home Appliances
Over the year, sales of our well-known "Göblin" electric vacuum cleaners were satisfactorily maintained and during the latter months of the year we developed and commenced production of our new "Göblin" electric washer. I am able to tell you that this new "Göblin" product which is complementary to our other "Göblin" home appliances is already well established in public favour, and I am happy to say that production on this has meantime been built up and it is now established as a remunerative section of our business.

Substantial efforts have been made during the year to further develop our export trade ratio and I am glad to tell you as a result that further increase in our overseas trading has taken place. In this connection your company has again been well represented at a number of the important International Exhibitions overseas; and at the British Industries Fair at Olympia, Earls Court, and Castle Bromwich, our products were well displayed on various stands relating to the company's fields of manufacture. In accordance with the company's entering policy your directors intend to expand their export endeavour and to play an increasingly vigorous part in the dollar export drive.

Financial Position
Turning now to the accounts, I will, with your permission, seeing that they have been in your possession for the statutory period of 21 days, take them as read.

It will be seen that our financial position has been well maintained. During the year we have been able to effect a very considerable reduction in our stock inventories and this has largely enabled us to reduce our bank loan account by £200,000. The profits for the year, including those of our subsidiary companies, after making the necessary adjustments for external interests show a substantial increase over last year, reflecting the improved trading results of our subsidiaries.

Your directors propose that a dividend of 20 per cent, less tax, on the ordinary shares be declared (being the same as last year), allowing for an increased carry forward.

Board's Dividend Policy
I should here remark that although we have fully subscribed to the principle of dividend limitation it must not be overlooked that your company has for some years past been paying a substantially lower dividend than obtained in pre-war years, and my undertaking as to dividend limitation on your behalf was qualified accordingly. I think I should make this position clear so that the present dividend of 20 per cent is seen equivalent to 5 per cent of the pre-war issue price and clearly calls for adjustment when possible. If, and when, the profits of the company provide for an increased dividend your directors will not be unmindful of their duty to the shareholders in this matter, but consideration will first have to be given to the capital requirements of the company in the light of its trading requirements.

You will be interested to know that taxation in various forms takes approximately five times the total sum provided during the year to cover depreciation of plant, management remuneration, loan and fixed interest, and that dividend. It can scarcely be contended that the shareholders of your company receive any undue proportion of the company's revenues! On the other hand one may well reflect on the incidence of taxation as a heavy and ever crushing burden on industry.

Order Book at High Level
In all the conditions of what may be regarded as a difficult year through which we have passed, I feel that you will join with me in paying tribute to our managing directors and the whole management and employees for the very able way in which the business has again been conducted during this period.

Although I do not wish to venture a forecast of the current year, I am glad to tell you that the improvement in trade in the final six months of the year which has been under review has been progressively maintained during the current year, and our order book continues at a high level.

In the coming year, during the Festival of Britain, the company will be celebrating the 50th anniversary of my original vacuum cleaner patent which gave rise to the foundation of this company, and the vacuum cleaner industry throughout the world. I feel that your company has played a proud part in British industrial history.

The report and accounts were unanimously adopted. In a warm tribute, Mr. J. J. Hamblidge proposed the

re-election of the retiring directors, Mr. H. Cecil Booth and Mr. F. Heron Rogers, and the motion was seconded by Col. C. F. Hitchins, D.S.O., and carried unanimously. The proceedings closed with a vote of thanks to the chairman proposed by Mr. A. I. Bellshin. 3541

ASSOCIATED ELECTRICAL INDUSTRIES

Higher Production Figures

The Fiftieth Annual General Meeting of Associated Electrical Industries Limited was held on May 31 in London.

The Rt. Hon. Oliver Lyttelton, D.S.O., M.C., M.P., the chairman, in the course of his speech, said:—
The volume of production in 1949 was approximately 11% higher than in 1948.

The total volume of orders upon the books of the Company at one time during the year exceeded £100,000,000.

Electronics

I should particularly draw your attention to the striking increase in the orders received for electronic equipment of all kinds, which have exceeded the amount booked in 1948 by no less than £6½m. excluding cathode ray tubes and valves. The business is still rapidly expanding.

Some Technical Achievements

At Trafford Park Metropolitan-Vickers have installed a 2,000 kW gas turbine to assist the winter load. It is designed to run on medium grade oil fuel, and is providing invaluable experience.

A synchrotron for Glasgow University and a cyclotron for Liverpool University are being built in connection with atomic energy research. An experimental gas turbine locomotive on order for British Railways is well advanced and should be running this year.

The B.T.H. Co. have developed a circuit employing ignitrons which will switch 30,000 kVA five times per second. It will be used to excite the synchrotron for Glasgow University.

New Plant

I referred earlier in my speech to the fact that £16,000,000 had been invested in the business during the past four years. It may be appropriate at this point to mention some of the projects upon which this has been spent. Apart from large sums spent upon the latest machine tools, designed to increase productivity per man and to keep the Company abreast of modern developments, we have also undertaken many extensions to our existing plants; some of these extensions are new factories in themselves. For example, the B.T.H. Company have a new heavy plant building at Rugby, which came into production in 1949. It has an area of 150,000 sq ft and we consider it to be the last word in modern design.

Metropolitan-Vickers have concentrated motor production in the Moseley Road Works in order to free more of the main works for heavy production. They are also extending the large electrical machine shop at Trafford Park for the manufacture of water wheel alternators. The Edison Swan Company have a new plant for cathode ray tubes at Brimsdown.

We feel confident that, supported as we are by a loyal body of staff and workpeople, and the most modern equipment, we have a great part to play in the new field which electrical engineering is opening up in the second half of the twentieth century.

The report was adopted.

3790

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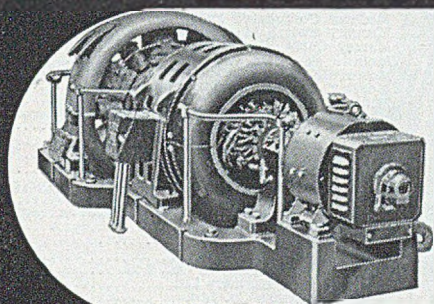


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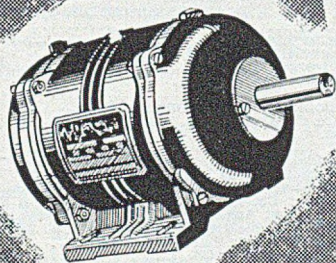
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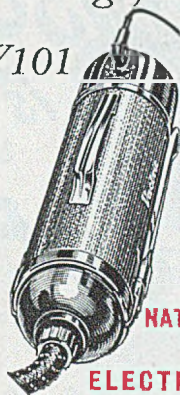
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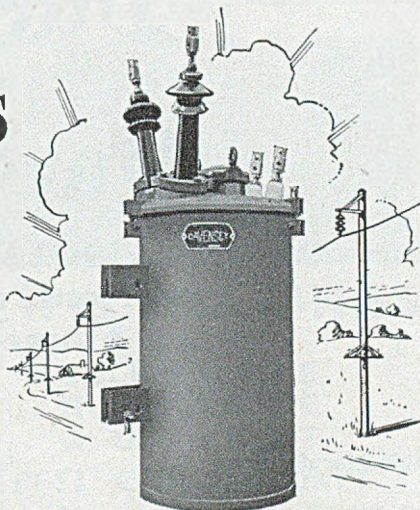
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ELECTRICAL APPLIANCES
THE 'FINEST MAID'

VACTRIC LIMITED, NEWHOUSE, MOTHERWELL, LANARKSHIRE, SCOTLAND

**Pole Hanging
TRANSFORMERS**
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Davenset weatherproof transformers for the distribution of electricity in rural areas give lasting service in supplying electricity to various dispersed consumers in single farms or small villages. Sound design and robust mechanical construction are features characteristic of all Davenset products. Supplied with tapping links or tap changing switch.



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The extensive range of Davenset products includes the Models 'H' and 'HO' battery chargers suitable for re-charging farm transport or tractor batteries and as an electric fence energizer when electricity is available.
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100% DISCOUNT
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ORIGINAL MANUFACTURERS OF

Self-aligning

**SALT-GLAZED STONWARE
MULTIPLE & SINGLE WAY**

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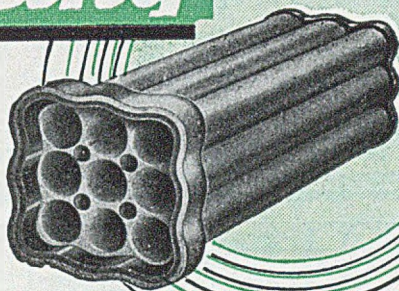
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Also

*Rectangular Troughing and
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For Underground Electrical Cables

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ALBION CLAY

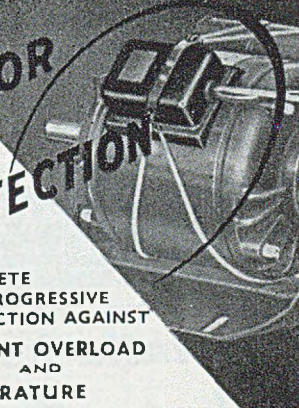
COMPANY LIMITED

HEAD OFFICE: **ALBION WORKS, WOODVILLE, Nr. BURTON-ON-TRENT**

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**MOTOR
PROTECTION**



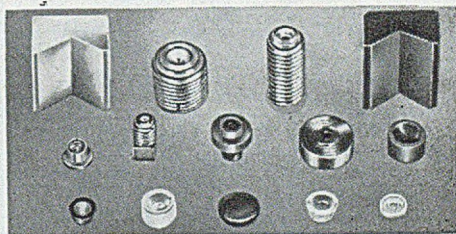
COMPLETE
AND PROGRESSIVE
PROTECTION AGAINST

- ★ CURRENT OVERLOAD
AND
- ★ TEMPERATURE

An Otter cannot be fused because the bi-metal carries the motor current and so heats up as do the motor windings. Otters switch off cold motor (stalled) in 10/15 secs. and a hot motor (stalled) in 1/2 secs. The Otter is fitted in 10 minutes, no need to remove motor. Simply "clamps-on." Provided with 7,029 P.V.C. Pigtails. Sealed against interference.

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**SAPPHIRE
RUBY, AGATE
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BEST QUALITY ONLY

**Accurately ground, burnished, polished
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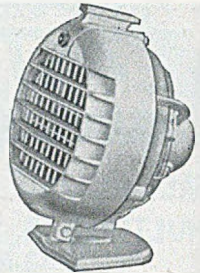
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 3 k.w. UNIT HEATER The "Spiraluxe"

Outstanding features:

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PRICE
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 "FLUXITE GUNS"
 AT WORK**

"Get cracking up
 there! Hast away!
 Thank FLUXITE
 our schedule's O.K.

Our output is rising,
 Which isn't
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"But this one's not
 finished!" bawled
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Used for over 40 years in Government works and by leading Engineers and Manufacturers. OF ALL **IRONMONGERS** in tins—10d., 1/6 and 3/-.

The "FLUXITE GUN" puts FLUXITE where you want it by a simple pressure. Price 2/6 or filled 3/6.

FLUXITE
SIMPLIFIES ALL SOLDERING

Write for Leaflets on Case-Hardening Steel and Tempering Tools with **FLUXITE**, also on "Wiped" Joints. Price 1/6, each.
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 for
**AMBULANCE
 BELLS**



Underdome type bells
 for Ambulance, Fire
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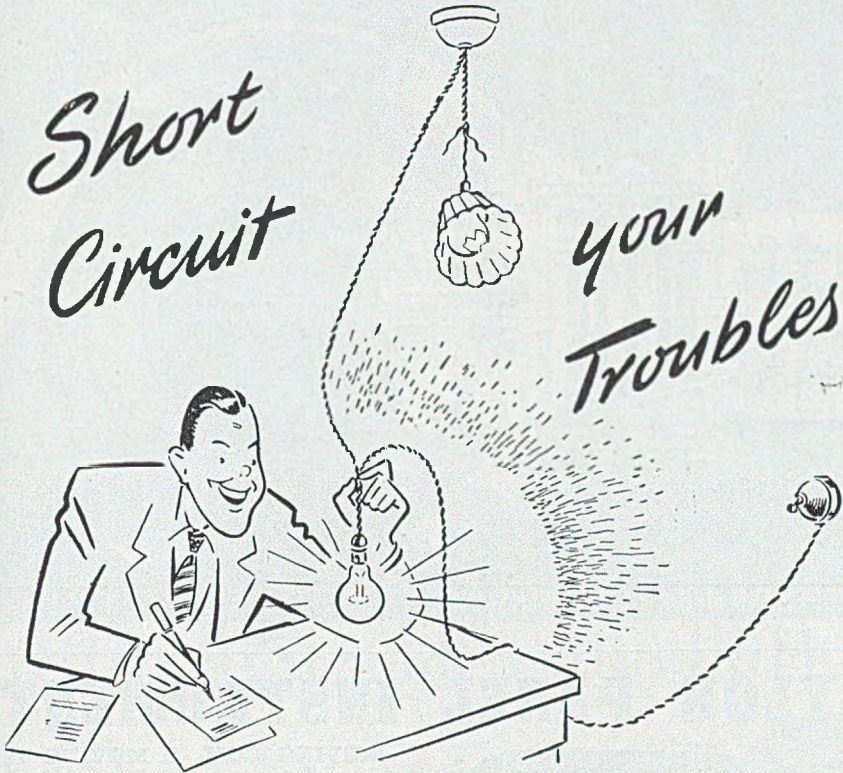
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*Short
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*Your
Troubles*



Purchase your

ELECTRICAL EQUIPMENT

FROM THE WHOLESALER WHO HAS IT IN STOCK

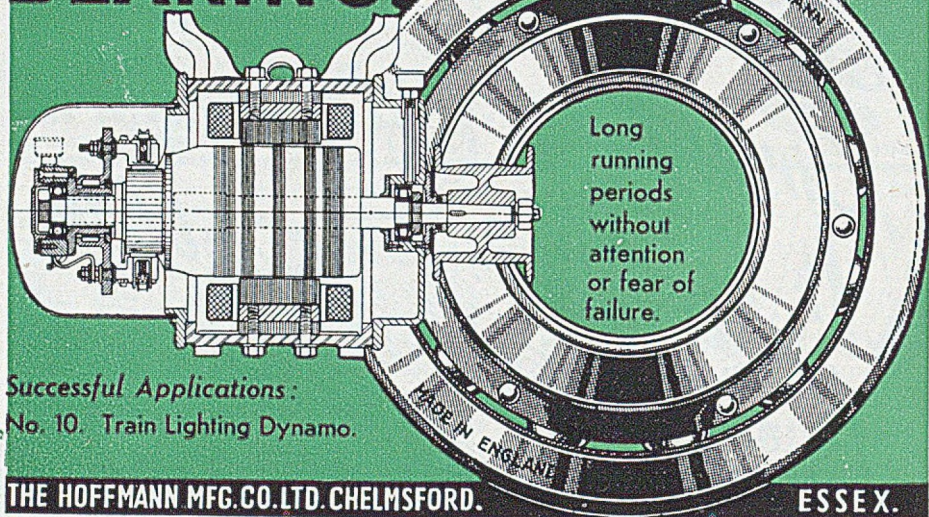
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Telephone : MIDLAND 0153-5

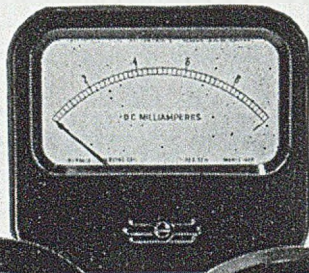
Telegrams : "ANGELICH, BIRMINGHAM"

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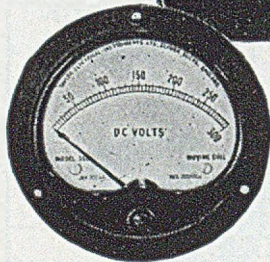


TAYLOR PANEL INSTRUMENTS

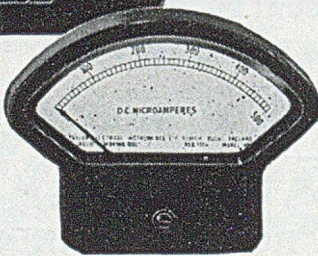
MODEL 400
Scale 4"



MODEL 350
Scale 3½"



MODEL 415
Scale 4"



MOVING COIL & MOVING IRON

Illustrated are three examples from the extensive range of Taylor Panel Instruments. These are available as moving coil, rectifier and thermo-couple types with scale lengths from 2"—5". Moving iron instruments can also be supplied with scale lengths from 3½"—5". Many ranges are "ex-stock"

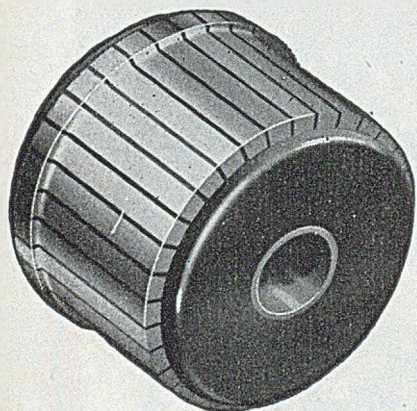
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TAYLOR ELECTRICAL INSTRUMENTS LTD

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Telephone SLOUGH 21381 (4 lines) • Grams & Cables TAYLINS, SLOUGH

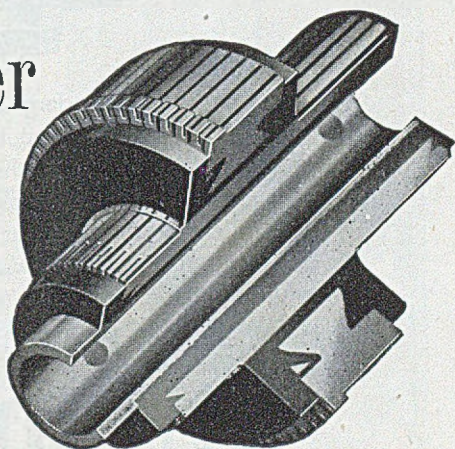
Other products include: MULTIRANGE A.C. D.C. TEST METERS
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Moulded **COMMUTATORS**
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give long life,

with first-class insulation,
backed by over
20 years'
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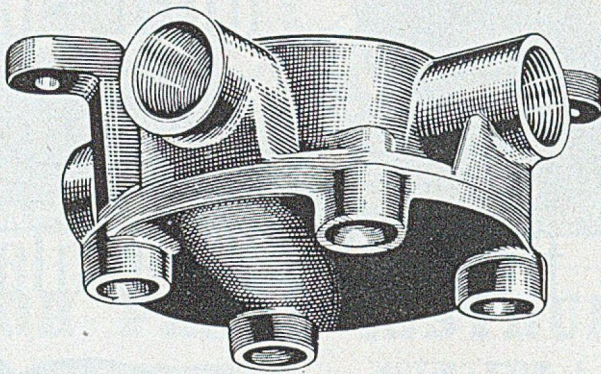


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SHALFORD, NEAR GUILDFORD, SURREY

Flameproof Connection Boxes




These boxes made in large and small sizes are designed for use at all intersection points of a conduit system and greatly facilitate drawing-through operations. Strongly made and designed to comply with all the special regulations affecting danger areas. M.O.F. & P. Certificate No. FLP 1573. *Standard finish: black enamel (also available galvanized or Z.I.R.) Write for further information*

MADE BY THE HOUSE OF

Simplex

Simplex Electric Company Limited
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A  COMPANY



For use on a
TABLE
or with
SPECIAL
STAND



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'PEERLESS'

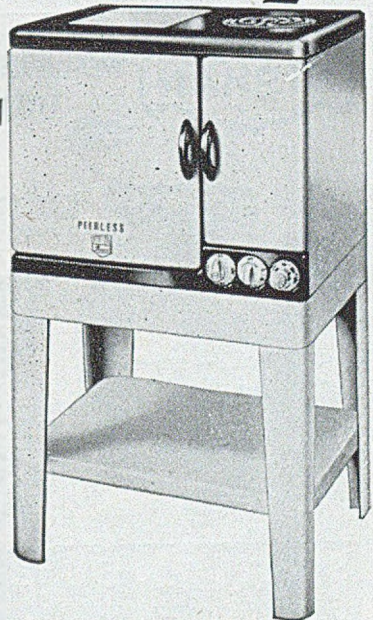
ELECTRIC
COOKER

*'BIG COOKER' capacity —
'SMALL COOKER'
consumption*

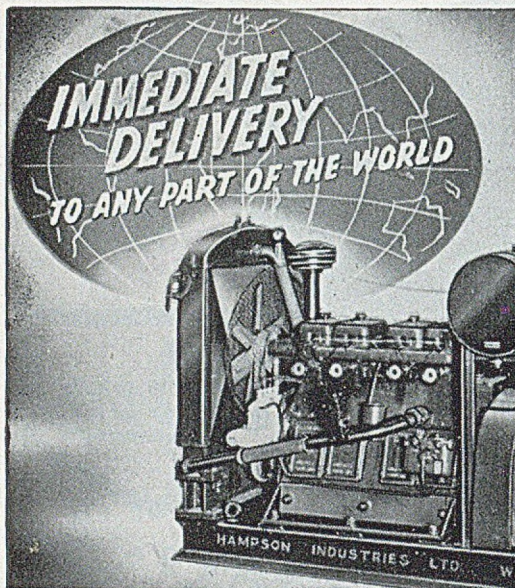
A table cooker of unique qualities, providing the facilities of a full-sized model, but so designed to allow for connection to the electric supply by means of a standard 13- or 15-amp. plug.

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(PATENTS APPLIED FOR)



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Immediate delivery of guaranteed Generating Sets A.C. or D.C. up to 30 kW. Also early delivery of 3 kW and 6 kW fully automatic Diesel Plants to start when the first light is switched on and to stop when the last light is switched off. Write for details. Agents required in some countries.

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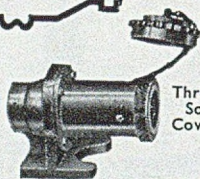
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WEATHERPROOF METAL-CLAD PLUGS, SOCKETS, SWITCH PLUGS, ETC. for all electrical purposes

5 300 amp. 250 500 volt.

Plug



Through Angle Socket with Cover and Plug



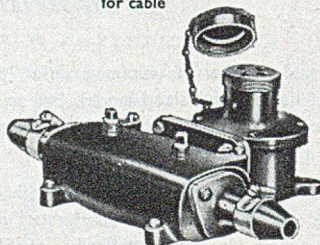
C.I. Terminal Socket & Cover with through sealing chamber and glands for cable



C.I. Switch Socket and Plug



Flange Socket and Cover



(Latest Catalogue on Application)

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MANUFACTURING ELECTRICAL ENGINEERS

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The "Agro" Heat and Light Adaptor, has a switch action embodying the best features of switch design and is extremely robust. Catalogue No. 7700.

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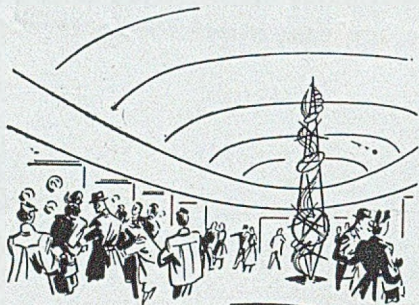
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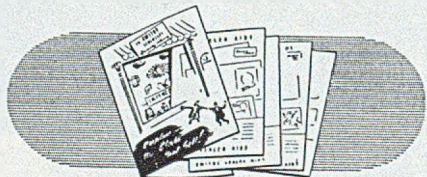


**ALL THE YEAR
ROUND FROM
B.I.F. TO B.I.F.**



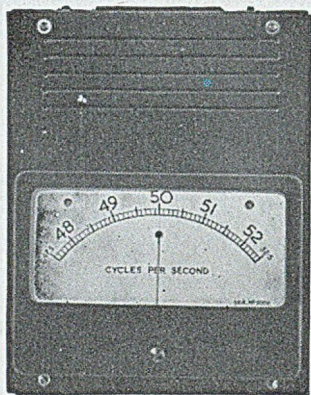
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A NEW FREQUENCY METER
incorporating
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Patent Pending

DIRECT INDICATING FREQUENCY METER
Range 47.5 to 52.5 or 45 to 55 cycles. Accuracy 0.1%

Supply voltage 200 to 250 volts
Available with 5" scale f/m or protecting meter

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Telephone: Radlett 5674-5-6

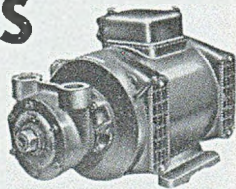
FIXED IN A MINUTE **AT EVERY WIRES END**

COLLETT
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TERMINALS
MADE IN ENGLAND

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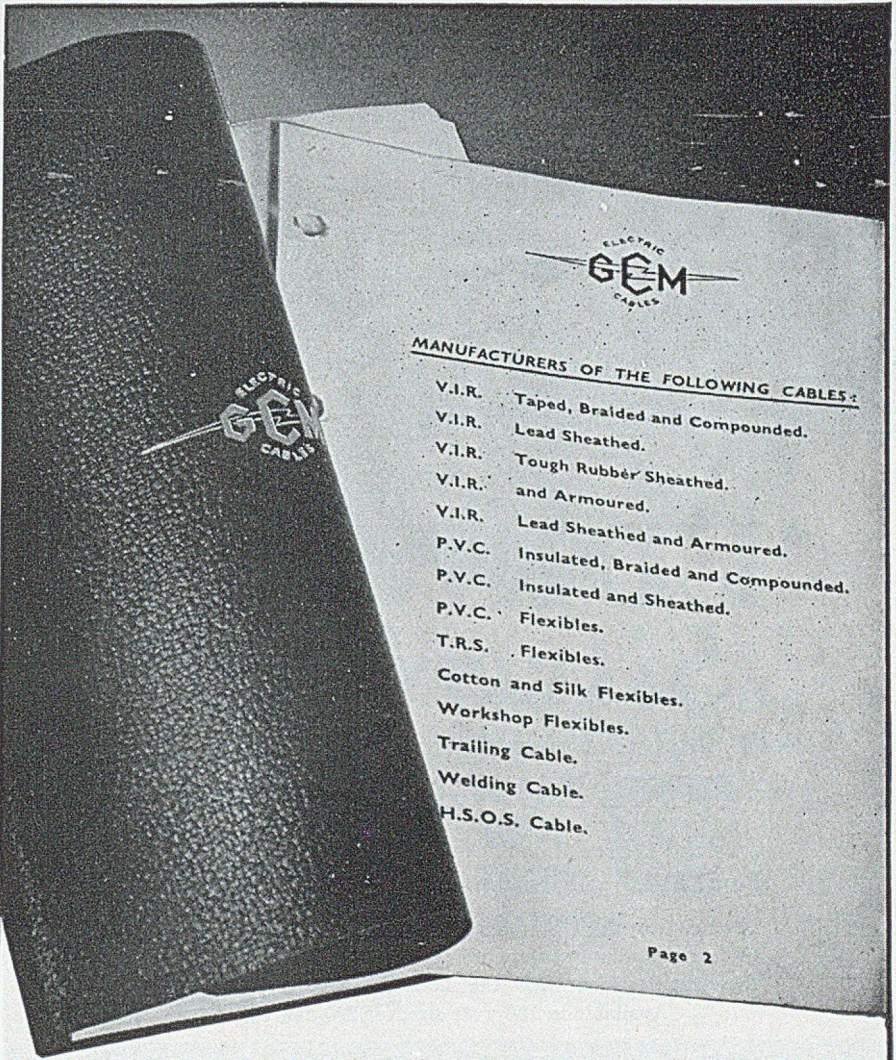
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**WATER,
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Suction lifts 25ft. without priming

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- V.I.R. Taped, Braided and Compounded.
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Page 2

"Good cables today — reduce trouble tomorrow"

GENERAL CABLES

THE GENERAL CABLE MANUFACTURING CO. LTD.,
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Telephone: Leatherhead 3021-4

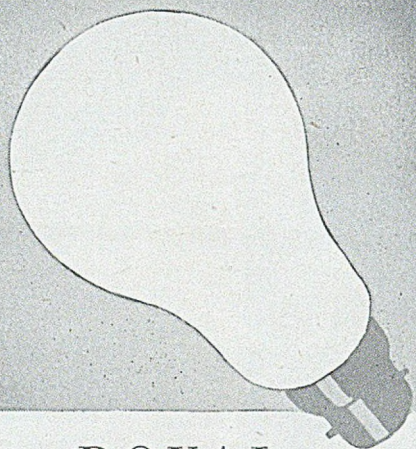
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Silverlight

(INTERNALLY SILICA COATED)

COILED-COIL LAMP

*Internal Silica Coating gives * Excellent diffusion
Low light absorption * Freedom from glare*

The new Royal "Ediswan" SILVERLIGHT lamp is ideal for table standards, open shades, general shop lighting, and for those applications where the light source is exposed to view.

Available in 100 watt size, for 200-260 volts.

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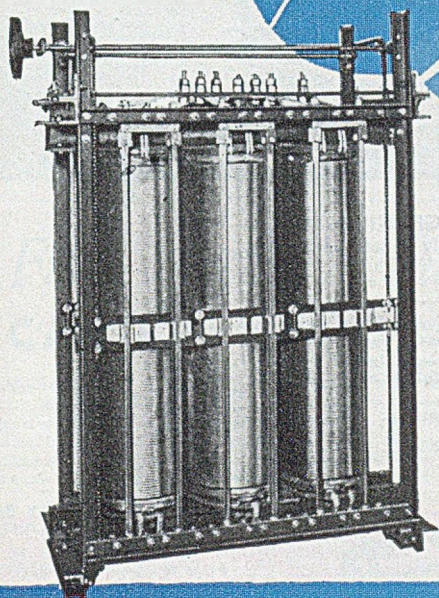
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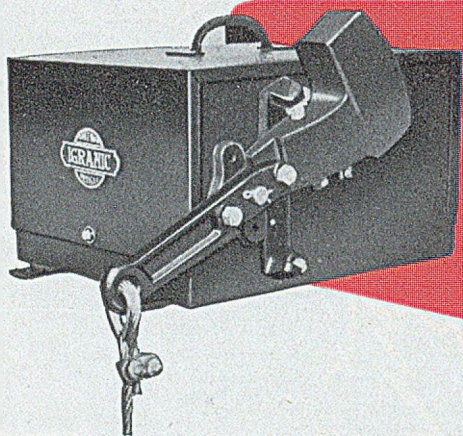


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**“BRECO” ON LOAD
VOLTAGE REGULATOR**

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GOOD CRANE PRACTICE

Good Crane practice—as recommended by British Standards Specification No. 466—entails the provision of a “. . . positively acting mechanism of the self-resetting type which cuts off the current and stops the motion when the hook has risen to a pre-determined level, to prevent over-winding.”

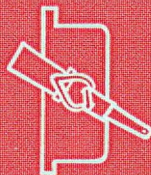
For D.C. Motors up to 200 h.p. the IGRANIC 93662 Crane Safety Limit Switch completely meets these requirements.

Special features of this switch include :—

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- ★ Rapid deceleration of motor allows point of cut-off to be set higher, thus taking fullest advantage of available head room.
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EXPORT DEPT.: VICTORIAN ROAD, HOLLIS, W. VICTORIA ST., E.W.I.

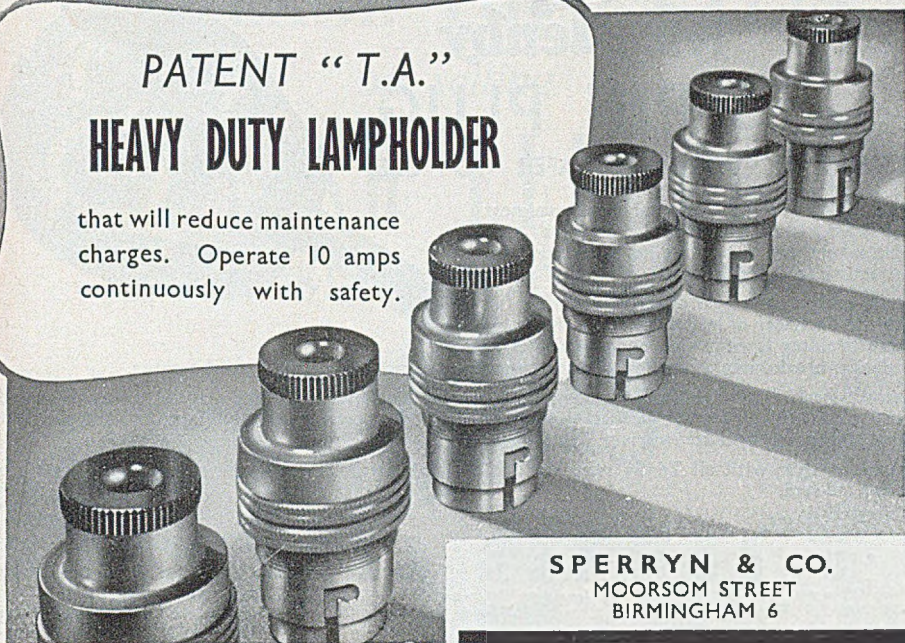
Grams: "IGRANIC, Limited"

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PATENT "T.A."
HEAVY DUTY LAMPHOLDER

that will reduce maintenance charges. Operate 10 amps continuously with safety.



SPERRYN & CO.
 MOORSOM STREET
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False Teeth... and
CARTER MOTORS

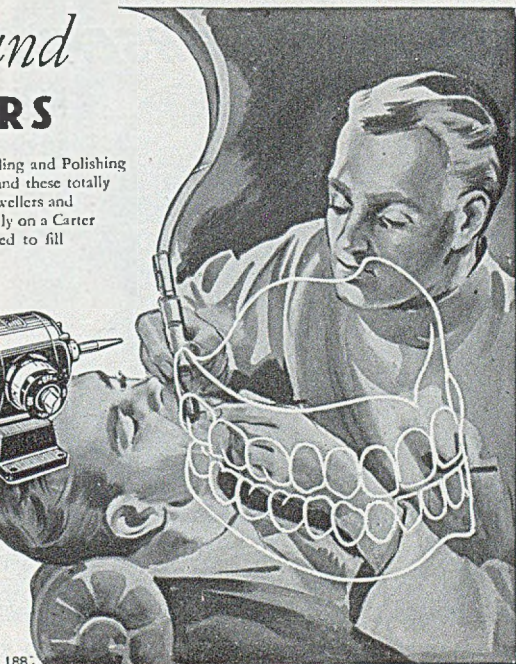
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Purpose-built Motors

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 Standard Types of Motors up to 1 H.P.

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188

THE Tenby

15-AMP. 3-PIN PLUG

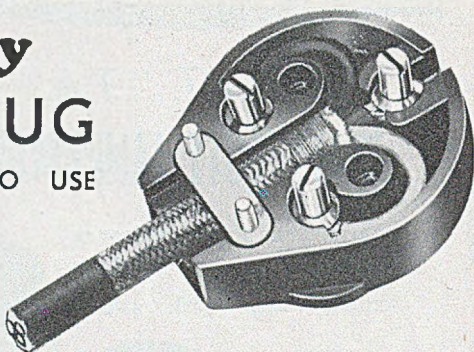
EASIER TO WIRE — SAFER TO USE

Designed to overcome the universal weakness usually associated with these accessories—that point where the flex braiding is stripped for connection to the plug.

A saddle type cord grip effectively clamps full external diameter of lead away from the point where braiding is removed, reducing risks of insulation breakdown due to excessive pressure being applied directly to the cores.

Special flanged Terminal Nuts provide ample contact area and effectively grip all the core strands without damage. They are easy to handle and may be screwed home by thumb and finger, only a final tightening by a screwdriver being necessary.

These together with all Tenby switches are available in brown, white and a limited range of special colours.



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Write today for full details!

high speed rotating,
vibrating, and
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— IN A FLASH! —

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ELECTRONIC STROBOSCOPES

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- require no contact with mechanism under measurement
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- enable high speed operations to be observed in slow motion

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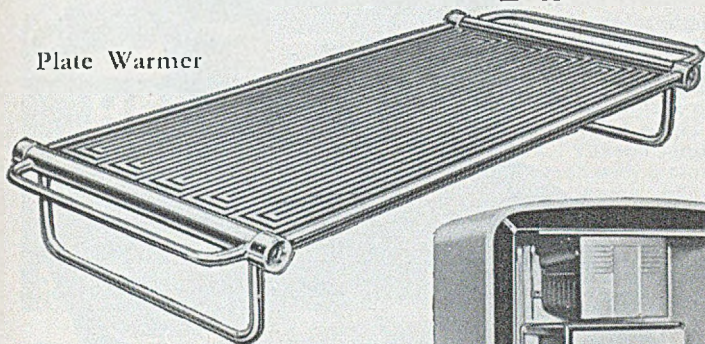
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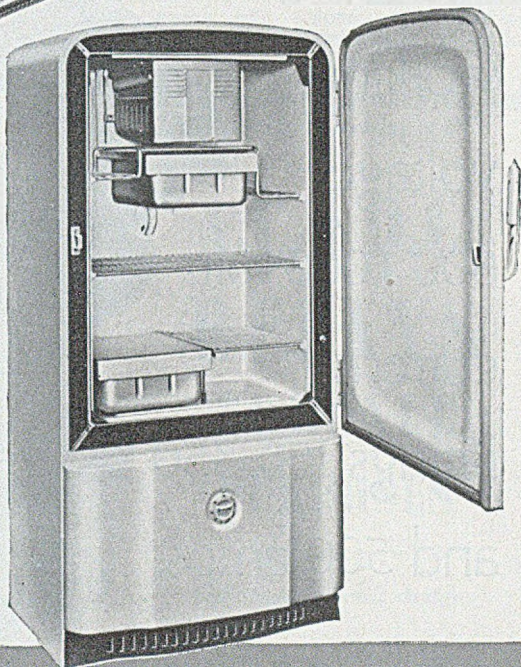
'ENGLISH ELECTRIC'

domestic appliances

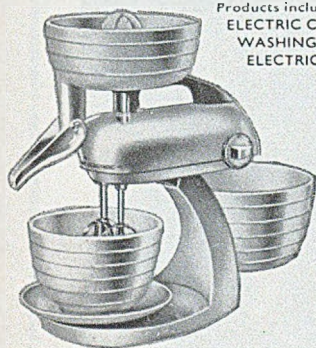
Plate Warmer



Refrigerator
Model 64A



Other ENGLISH ELECTRIC
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Food Mixer

The ENGLISH ELECTRIC Co. Ltd.

DOMESTIC APPLIANCE SALES DEPT.
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See also 'English Electric' 'Enrox' Welding Electrodes advertisement, page 45

S.P. Transformer Bushings

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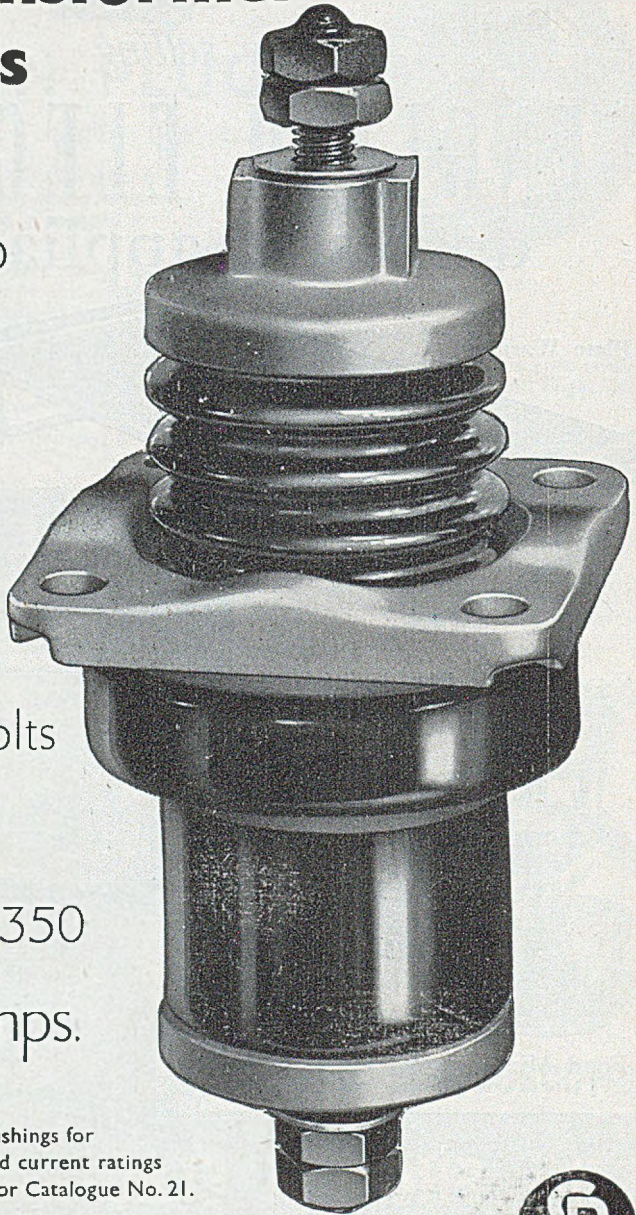
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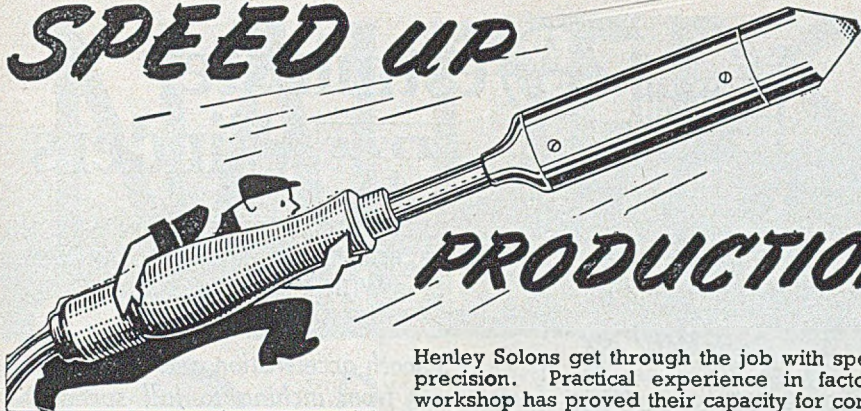
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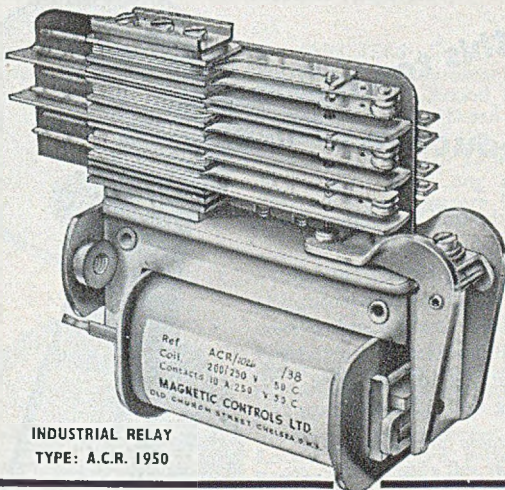


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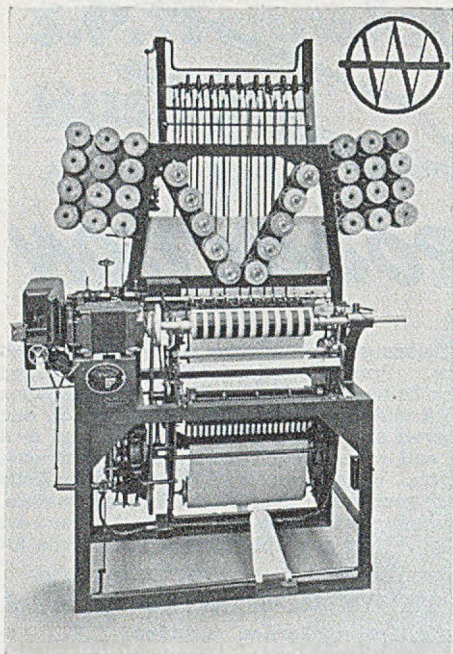
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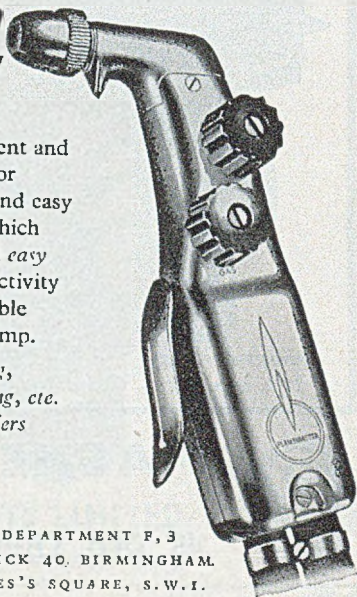
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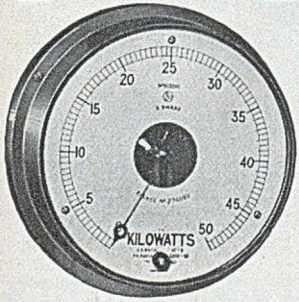
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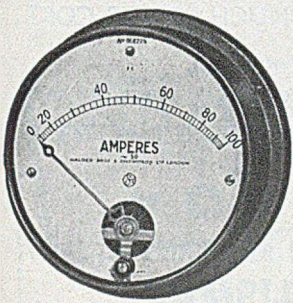
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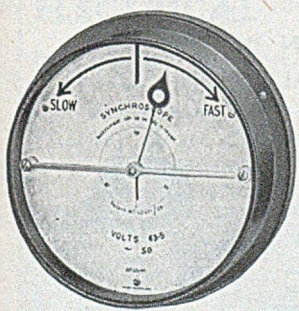
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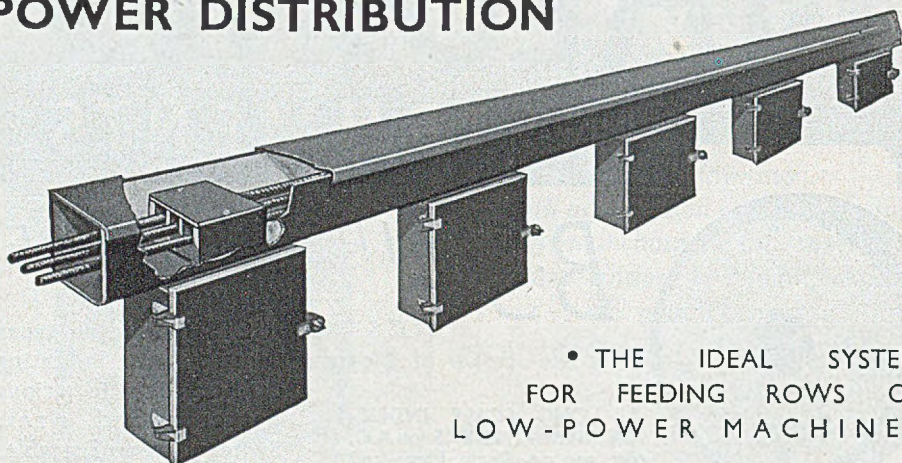
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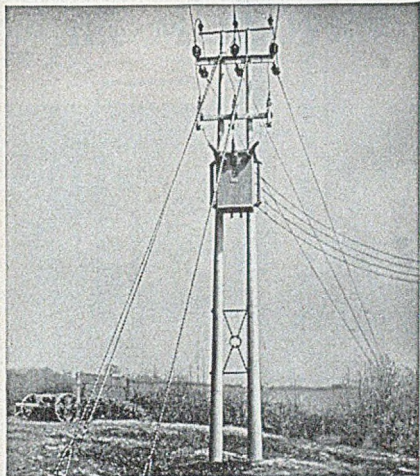


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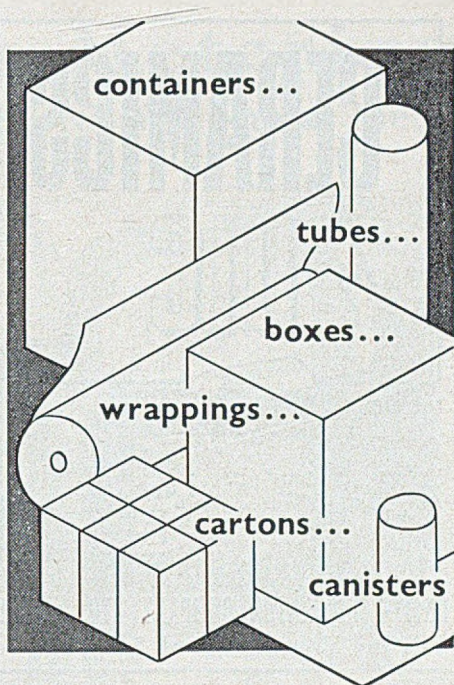
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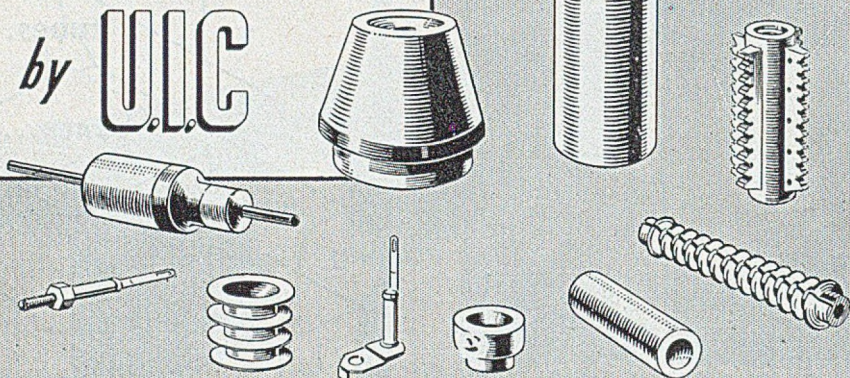
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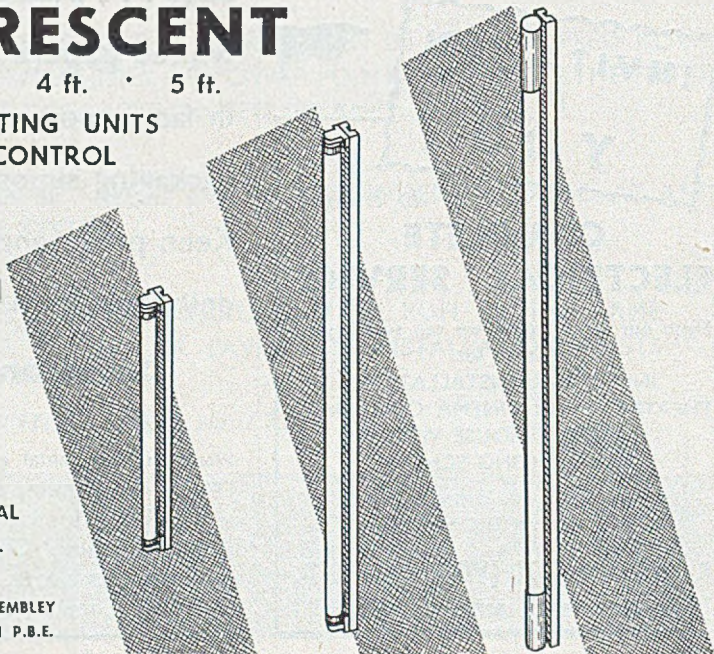
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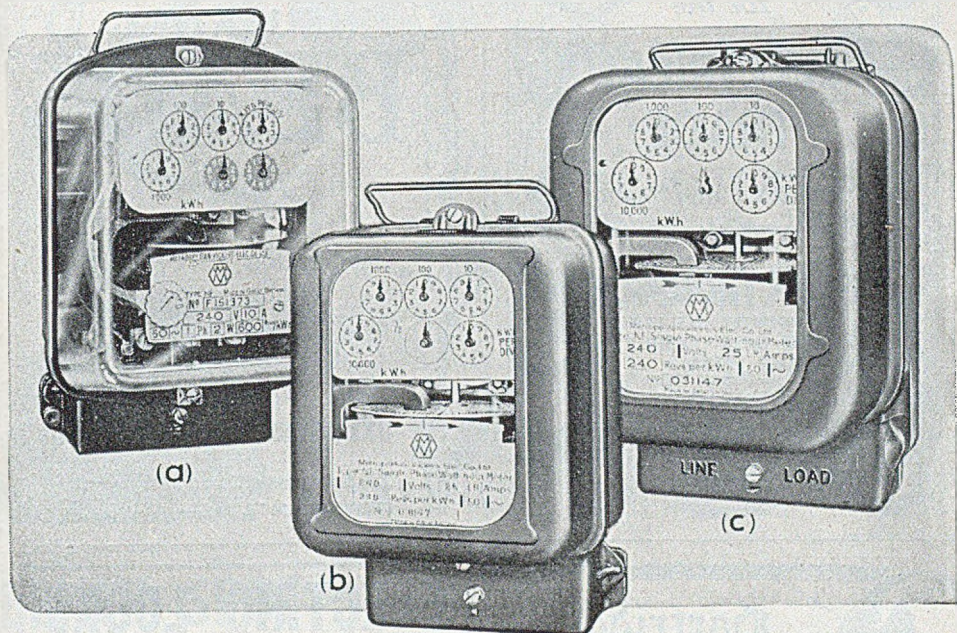


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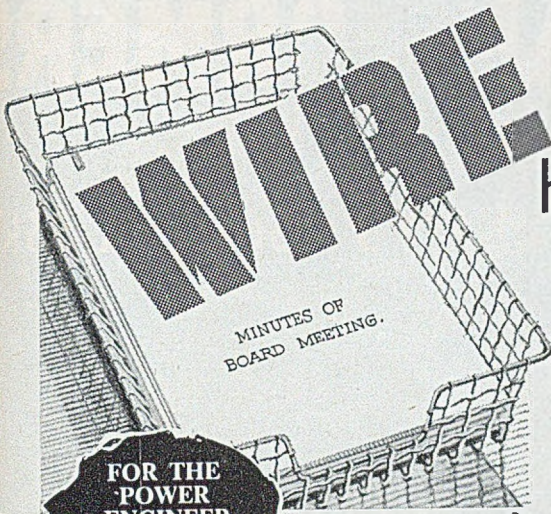
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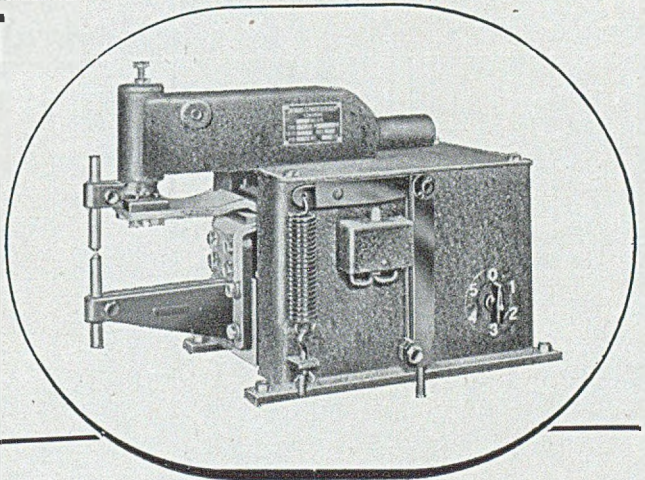
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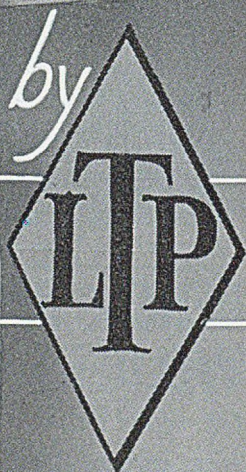
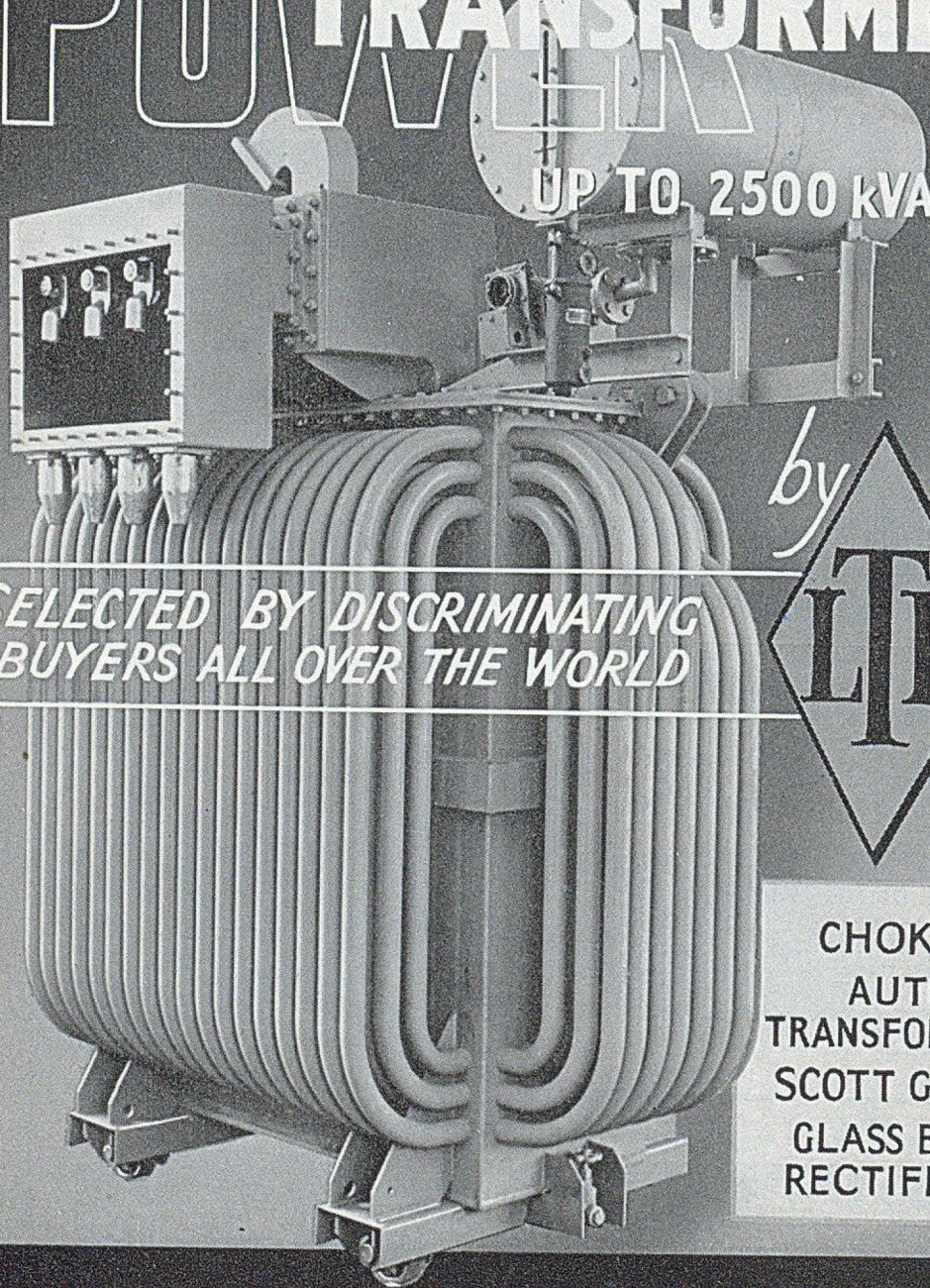
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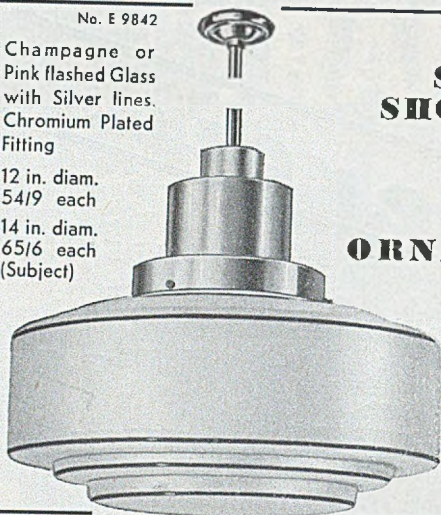
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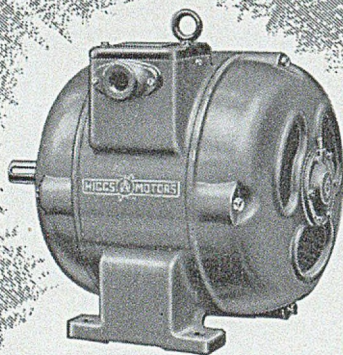
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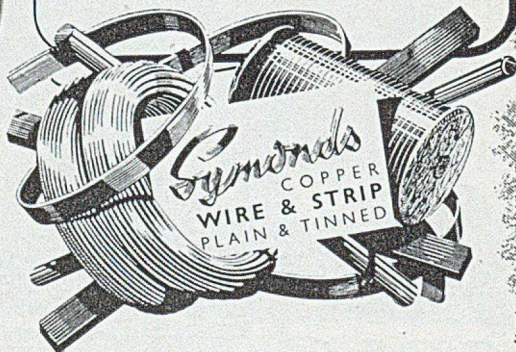
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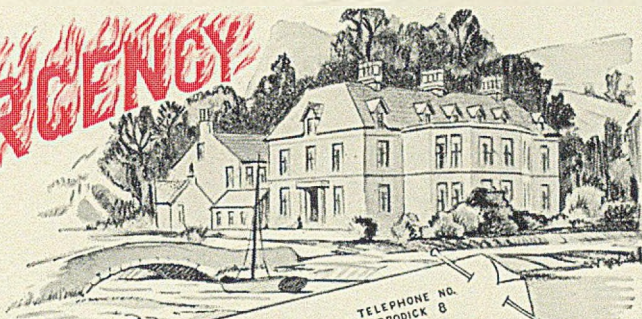
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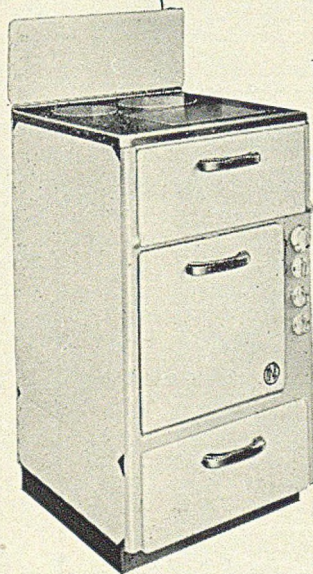


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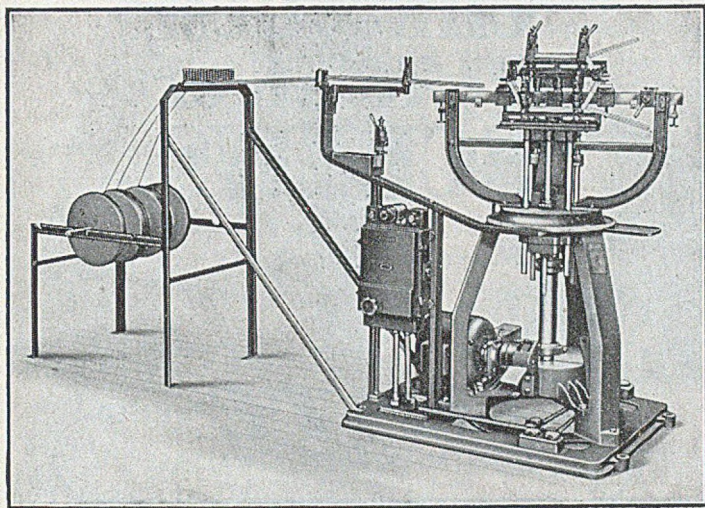


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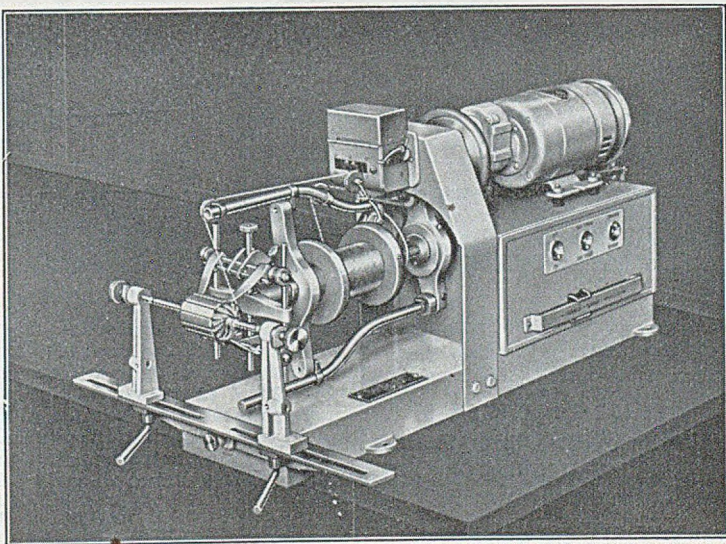
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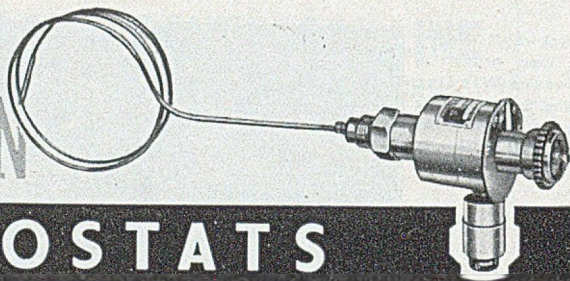
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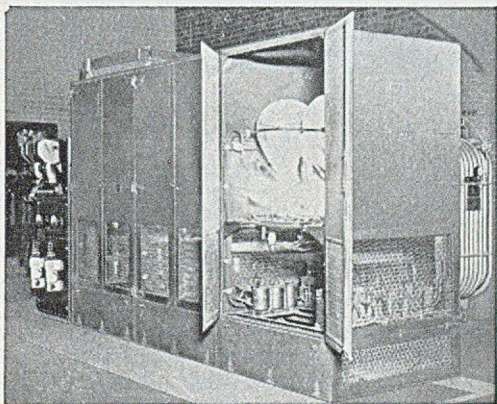
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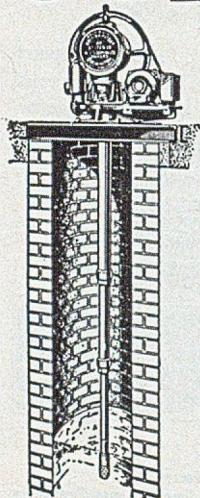
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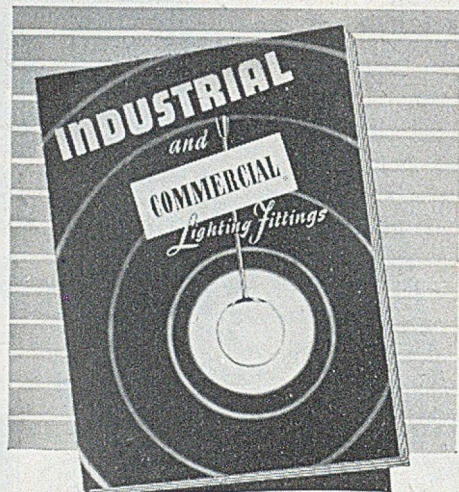
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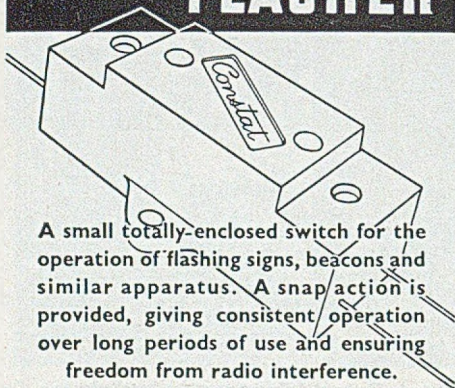
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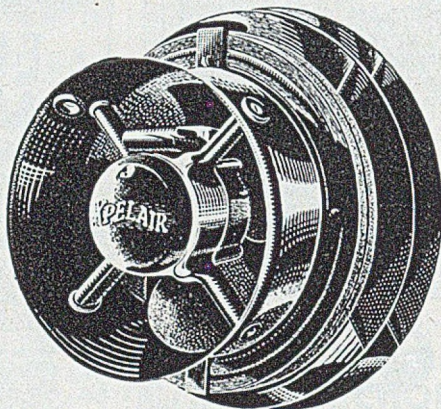
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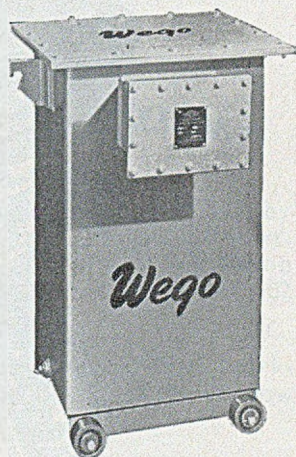
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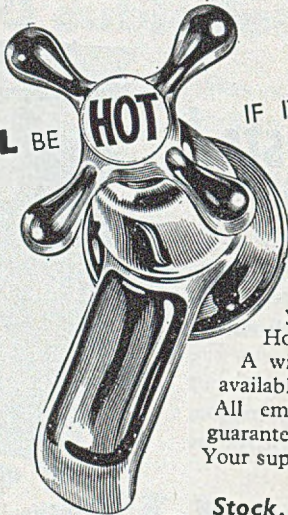
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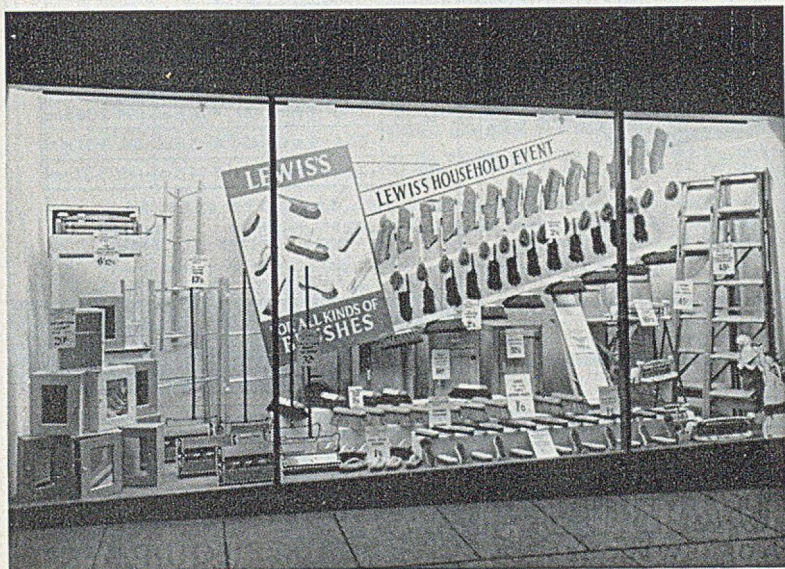


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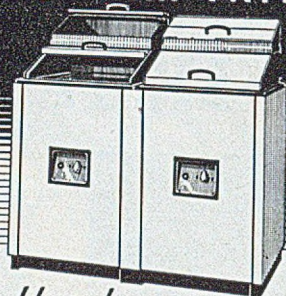
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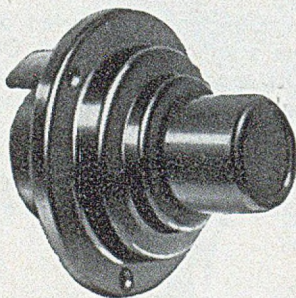
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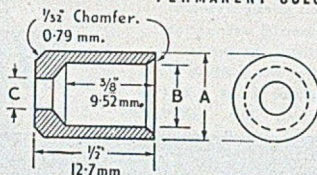
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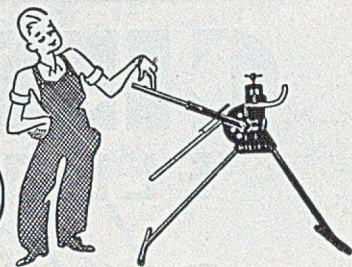
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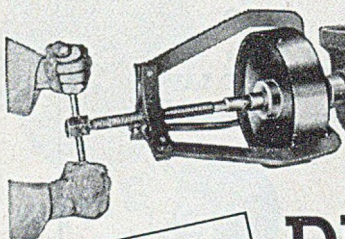
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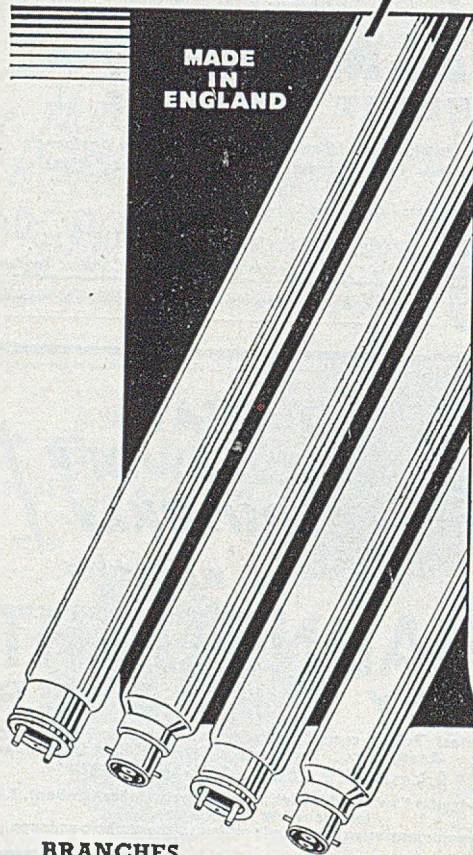
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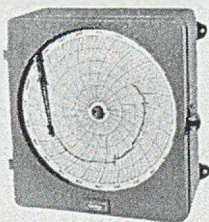
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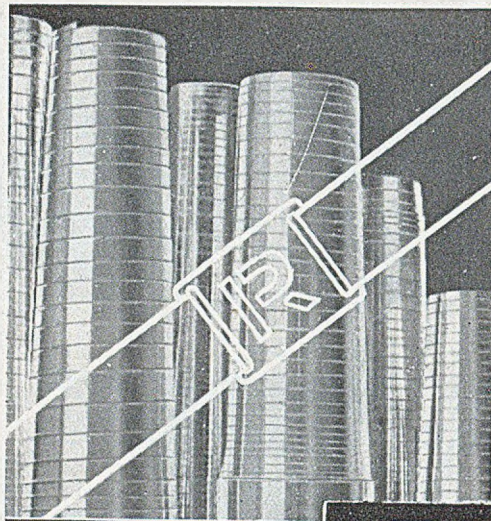
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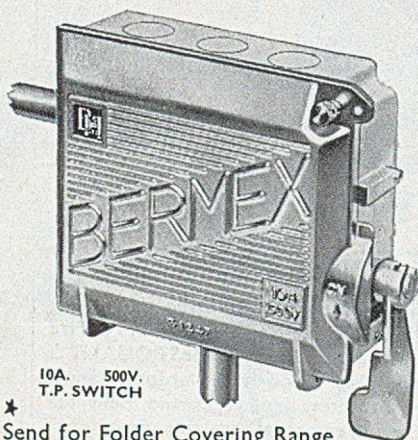
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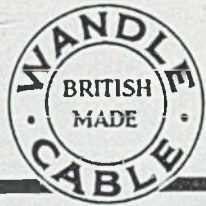
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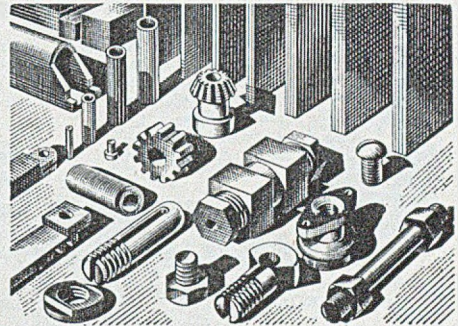
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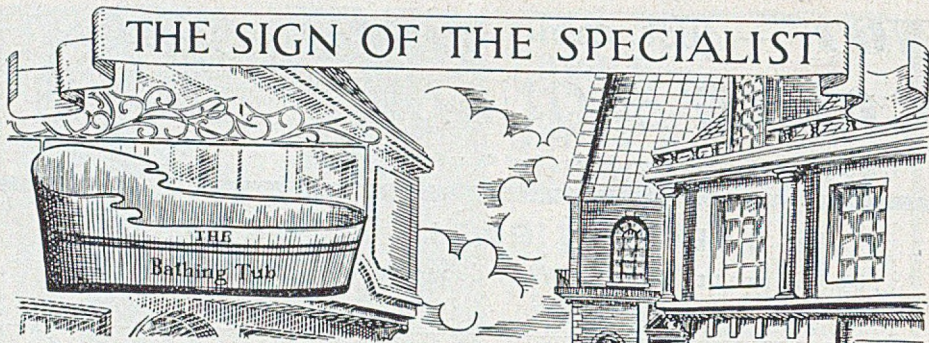
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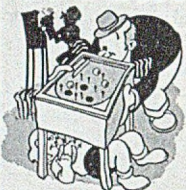
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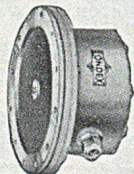


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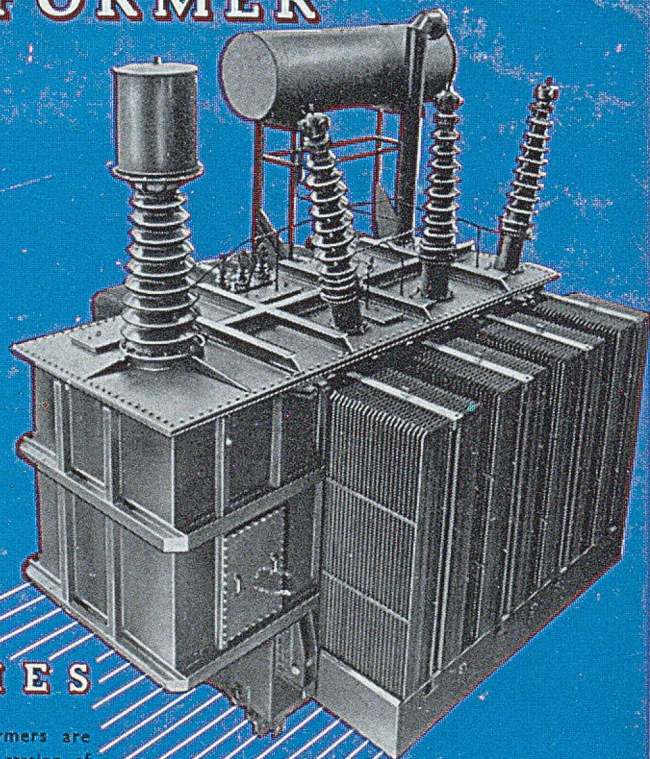
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