

ELECTRICAL REVIEW

FOUNDED
1872

Vol. CXXXV. No. 3477

JULY 14, 1944

9d. WEEKLY



INTEGRATING PHOTOMETER

MADE and used in the BTH Research Laboratories, this remarkable precision instrument, opening in two halves, measuring 6ft. in diameter, is the largest of its type.

It enables a single measurement to deter-

mine *precisely* the light output and luminous efficiency of any electric lamp; it is just one of many scientific devices employed in the BTH Laboratories in their unremitting effort to maintain and improve the quality of Mazda Lamps.

BTH Research Aids Industry

BTH Research Laboratories have made an intensive study of both the physical and psychological aspects of lighting in wartime industry and their knowledge and experience are at the disposal of the principals of industrial undertakings through the Lighting Advisory Service

MAZDA
LAMPS

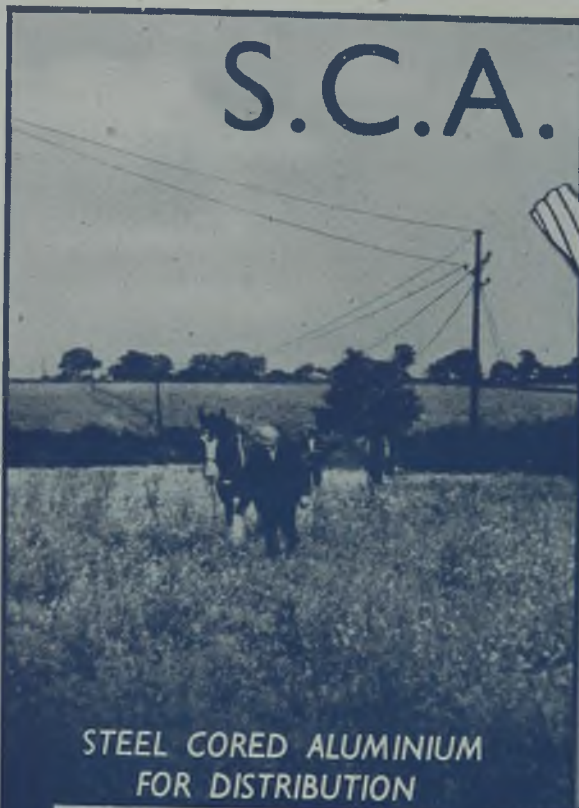
LIGHTING ADVISORY SERVICE

The British Thomson-Houston Co., Ltd., Crown House, Aldwych, London, W.C.2

M4006



S.C.A. every time



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So, before Heatrae puts down anything "on the 'board,'" every possible "check" is carefully studied.

Art of the Seer? No—simply the art of precalculation, based upon a long experience.



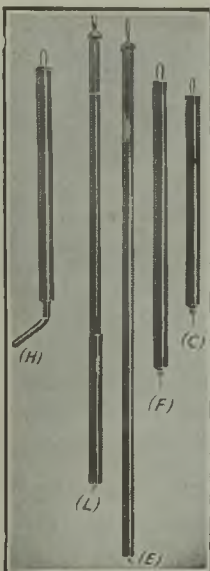
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H	11,000	36"
L	33,000	72"

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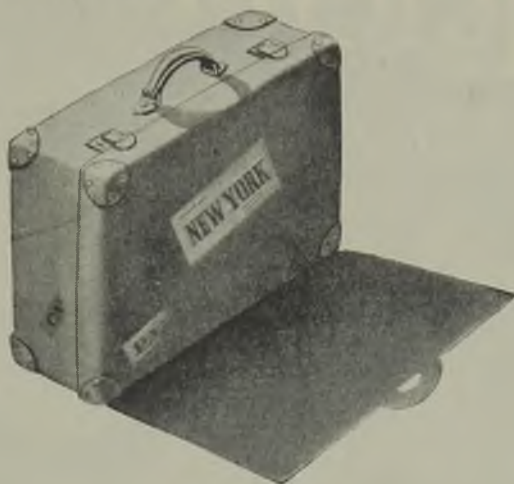
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(for commutator bars, brushes, etc.)
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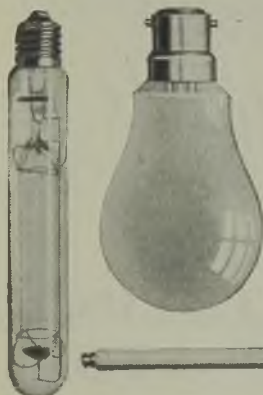
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MORE LIGHT ON THINGS TO COME . . .



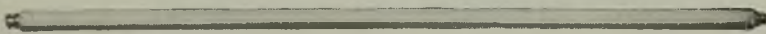
When you need no longer 'keep it dark'

When the lights go on again they will be better lights. The war has seen important progress in the science of lighting. And when these improvements are released for general use you can rely upon finding them all in Crompton Lamps.



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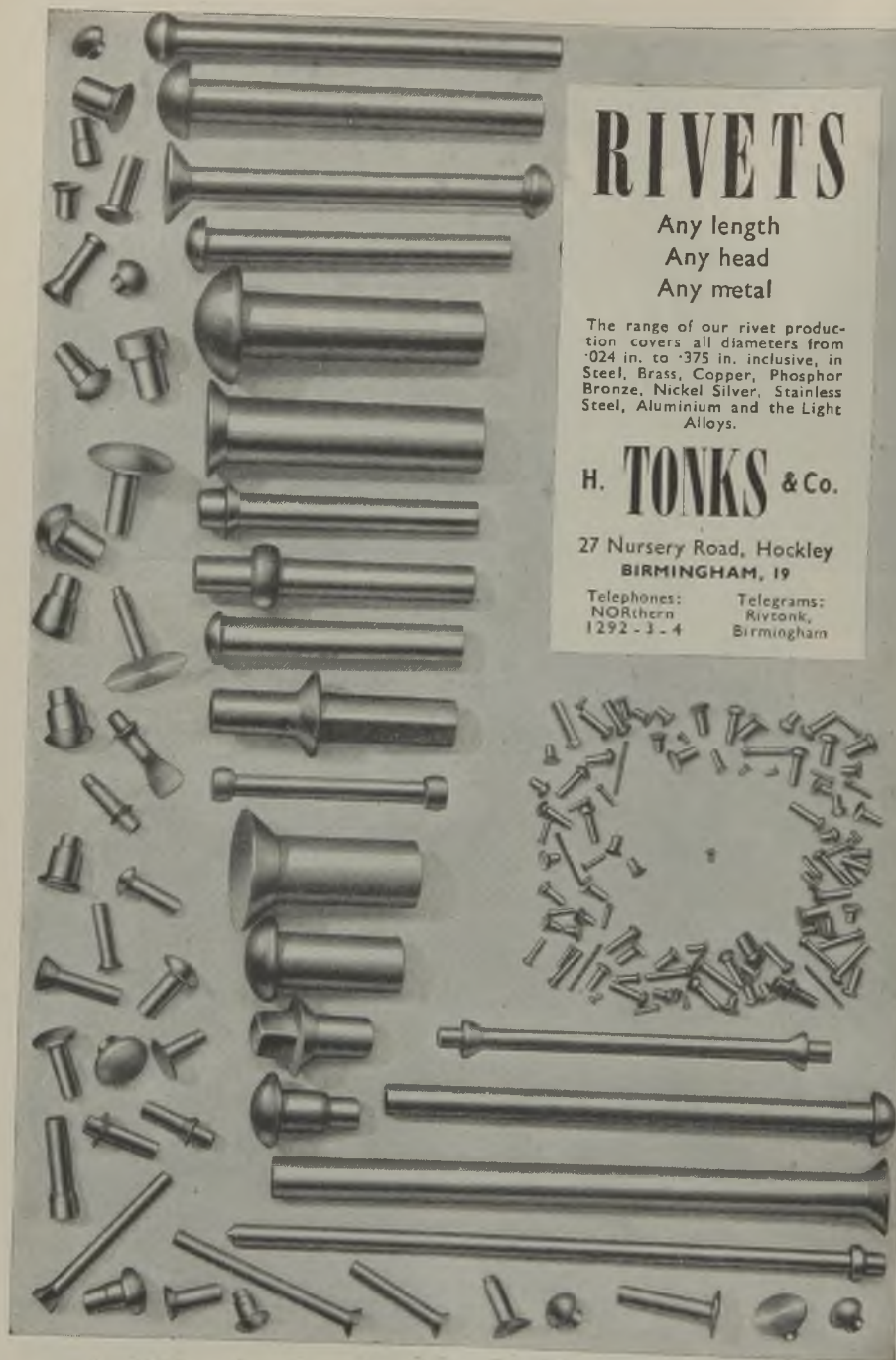
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FM79



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This enlightening little work — “STABILITY IN INSULATION” — is the last word on the subject of modern insulation. It is full of facts worth noting.

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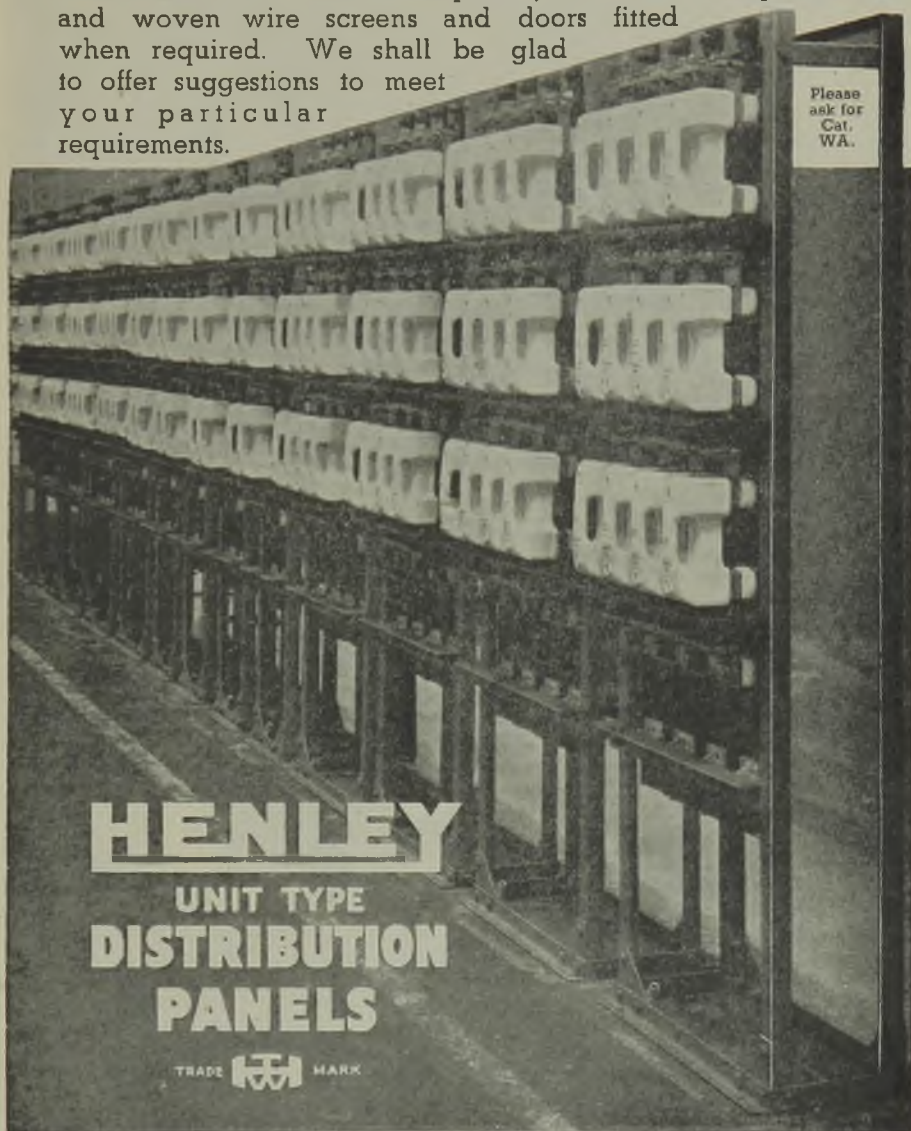
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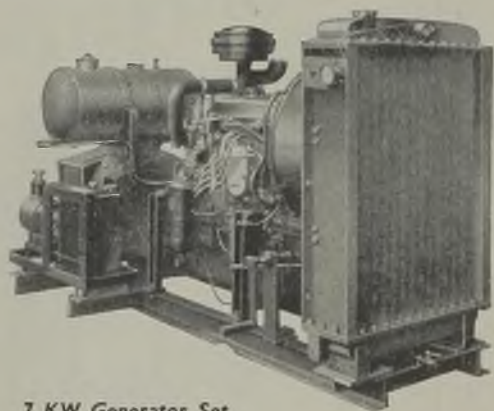
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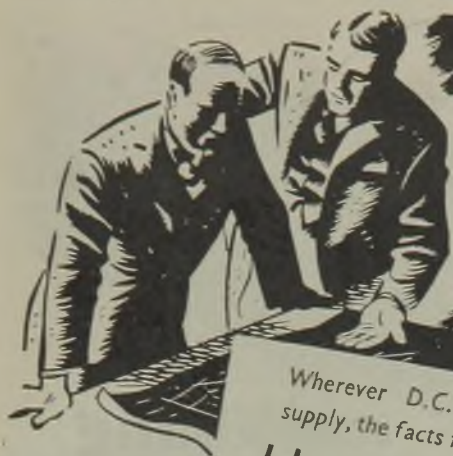
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It must be

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Savers



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*Light aids
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METROVICK'S ILLUMINATING ENGINEERS

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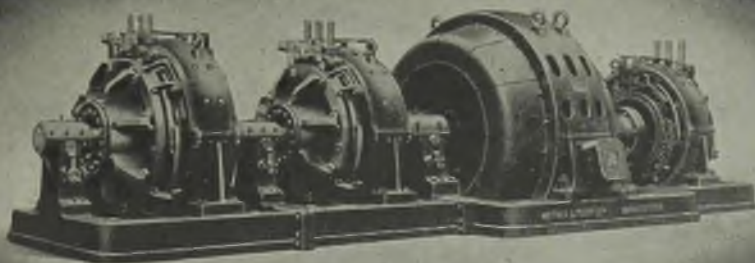
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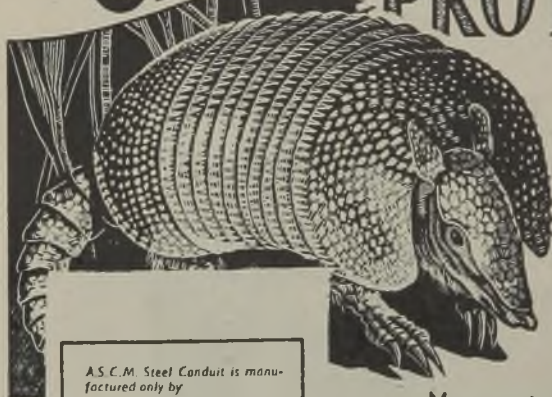


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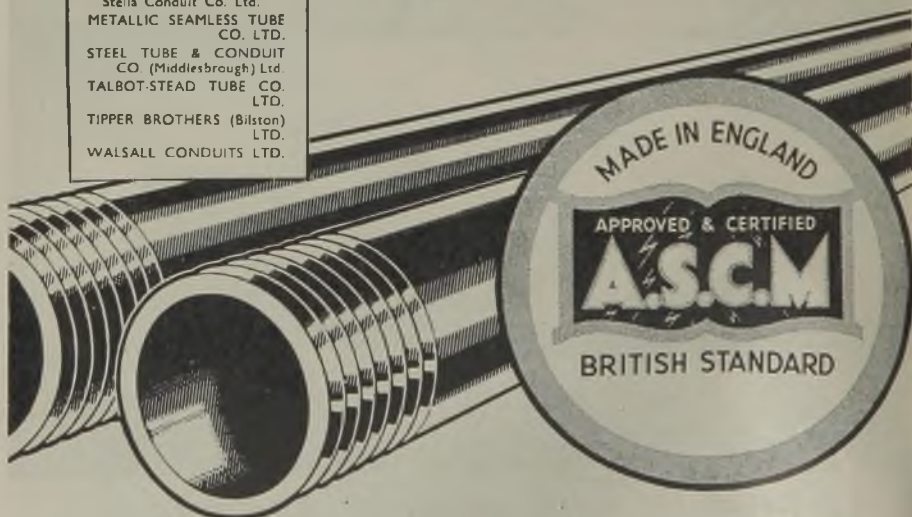
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Many natural species demonstrated long ago that it "doesn't pay" to be "soft-natured."

Cables, like many animals and reptiles, equally deserve adequate protection, and Steel Conduit has proved its worth for the complete shielding of cables from all harm.

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URGENT REQUIREMENTS FOR AUTHORISED PRIORITY AVAILABLE EX-STOCK OR SHORT DATE

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VOLTS**

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15	L 152	L 153	L 153/N
30	L 302	L 303	L 303/N
60	L 602	L 603	L 603/N
100	L 1002	L 1003	L 1003/N

Cable boxes available for all sizes

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861**TYPE **LP** SWITCH-FUSES

H.R.C. FUSES — 440AC4 & DC4

**500
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30	LF 302	LF 303	LF 303/N
60	LF 602	LF 603	LF 603/N
100	LF 1002	LF 1003	LF 1003/N

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FUSE-SWITCHES

**BSS
861**

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"COMBINATION" FUSE-SWITCHES ARE ALSO MANUFACTURED IN 500 AMP AND 750 AMP RATINGS. DELIVERY PERIODS OF UNITS NOT LISTED ABOVE ON REQUEST

Cable boxes available for all sizes

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THE ENGLISH ELECTRIC COMPANY LTD.
— STAFFORD —



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THE DAVIS CUP.

The British pair all out to win! Score stands at 'vantage, and server has dashed in for a crashing volley to win game and set.

Won't it be thrilling? Just now, however, our sportsmen and women are engaged in a different struggle, where "service" and "advantage" take on a different meaning. Maybe they'll return to the courts in the not distant future, to apply the same zest to tennis as they did to war—putting over a "service" without "fault", as brilliant as—shall we say?—the Ensign Light Service.

Meantime, only essential war effort really counts. With everything else it is time of shortage, makeshifts and substitutes. A time, incidentally, when Ensign are proud to continue National Service.



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SOLEN ELECTRIC SOLDERING IRON

SOLEN ELECTRIC INSULATION STRIPPER

SOLEN ELECTRIC SOLDER POT

SOLEN Industrial Electric Appliances are designed for practical use under factory conditions. They are robust and efficient.

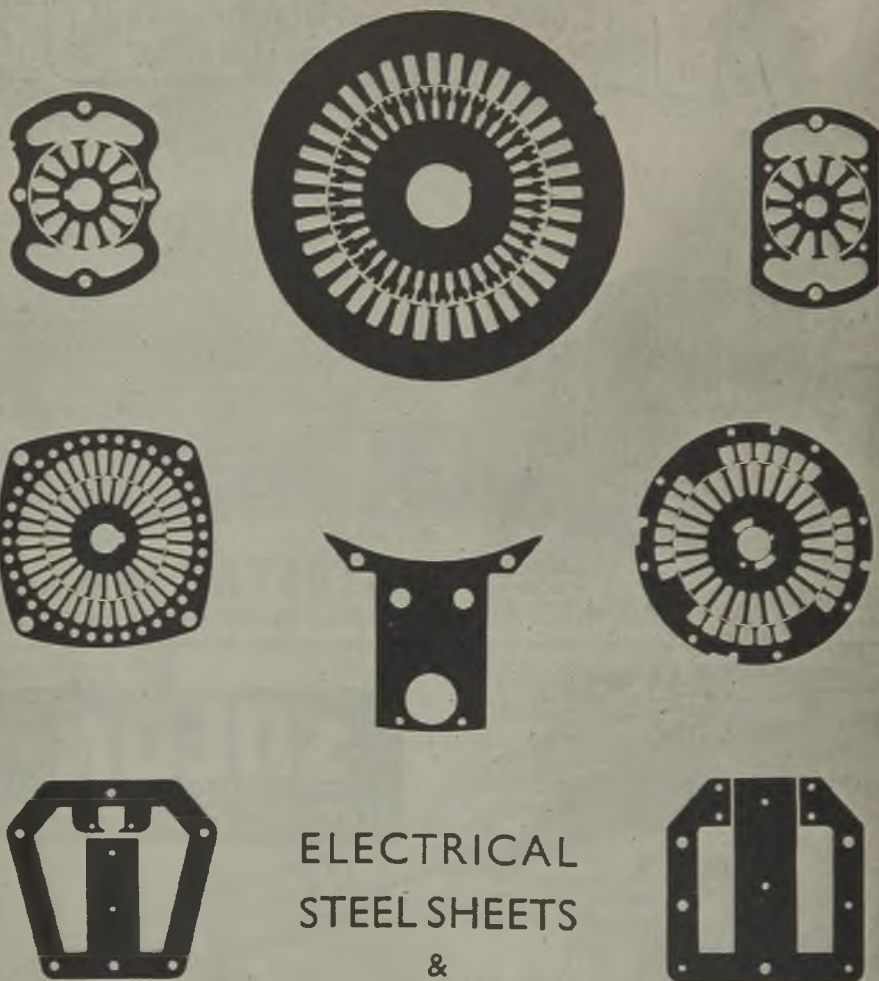
The Soldering Iron illustrated is representative of a range which includes models with various types of bits suitable for a wide variety of jobs.

The Insulation Stripper provides a quick method of severing the insulation neatly without damaging the conductor, by means of an electrically heated wire.

The Solder Pot maintains 1lb. solder at working temperature.

Please write for Folder Y9.

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WESTINGHOUSE



"Westalite" - the modern metal rectifier-in action in a modern setting

Recently, a large firm of electro metallurgists in the Midlands modernised their equipment. They specialise in hard-wearing deposits, and for years have used Westinghouse metal rectifiers for power supply.



This Company's long and varied experience with these rectifiers has resulted in Westinghouse being chosen 100% for the new plant.



'Westalite' selenium-compound units are used, and the photographs show part of the installation of six 8-volt 1,000 amp. and one 7½-volt 2,000 amp. equipments. This latest Westinghouse development does not require water cooling and has the added advantage of being immune from chemical attack.

metal rectifiers

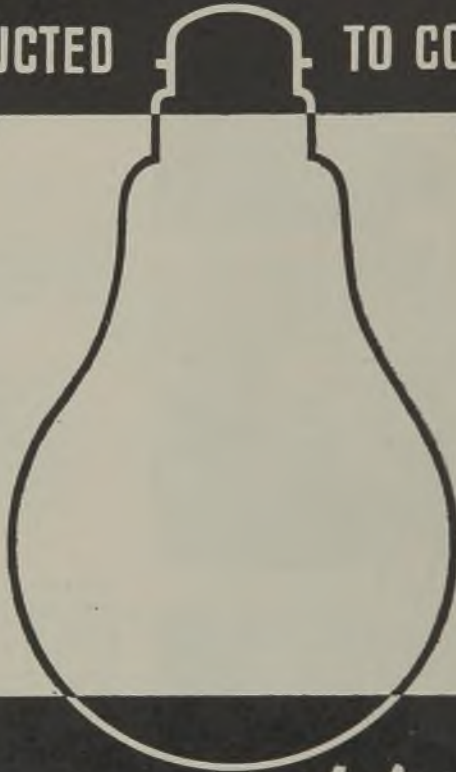
FOR ELECTRO-DEPOSITION POWER SUPPLY

WESTINGHOUSE BRAKE & SIGNAL CO., LTD.
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CRYSELCO

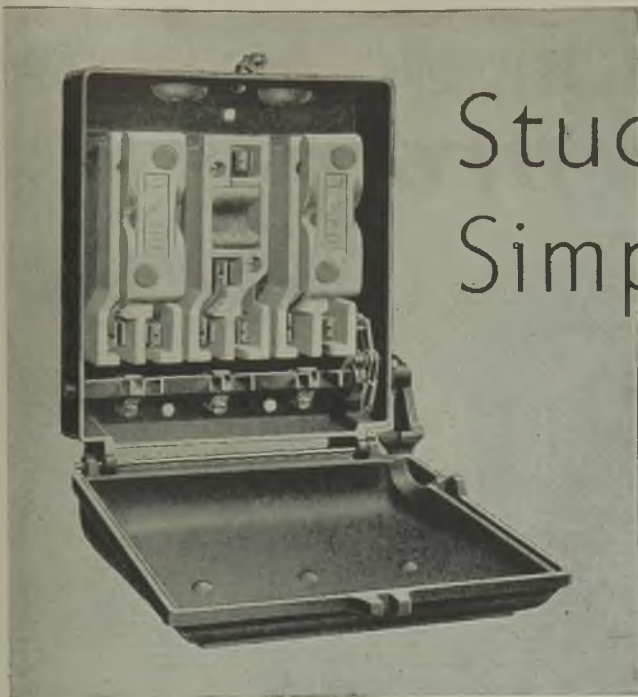
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TO CONSERVE



*Save light
- save FUEL*

CRYSELCO · LIMITED · BEDFORD



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Compact and complete without unnecessary parts—that's the "Memrex," an ironclad switchfuse for industrial use having that simplicity of perfect functional design you find in all M.E.M. products. It is a simplicity that brings you ready accessibility, positive, unvarying action, low cost and ease of installation and maintenance. M.E.M. Switch and Fuse Gear is designed to render unflinching service by the simplest and most economical means.

M·E·M

SWITCH, FUSE AND MOTOR CONTROL GEAR AND LOCALISED LIGHTING EQUIPMENT

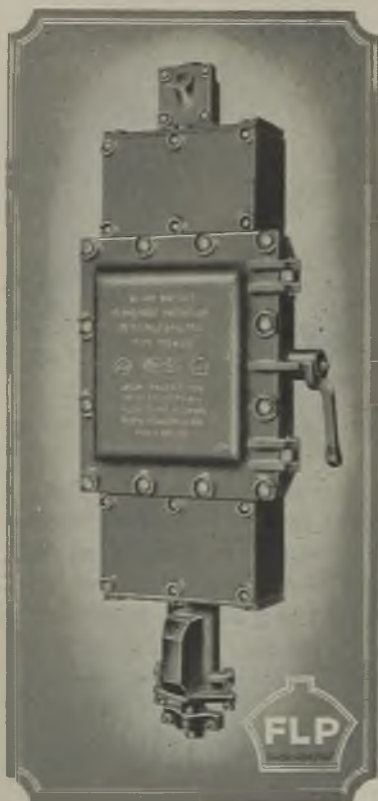
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Walsall *Flameproof* **SWITCHGEAR**



RANGE

30, 60, 100, 150, 200, 300 ampere in double pole, triple pole, triple pole and neutral, and four pole.

Tested and certified by "Buxton" for Groups I and II gases under certificates FLP. 1667, 1668, 1705, 1717, 1718, 1728 and for Group III gases under MD. Tests P. 199, 200, 205, 209, 210 and 214.

FUSED SWITCHES

either HRC or rewirable. Solidly built quick make and break semi-rotary action giving simultaneous make and break on all poles.

SWITCHES

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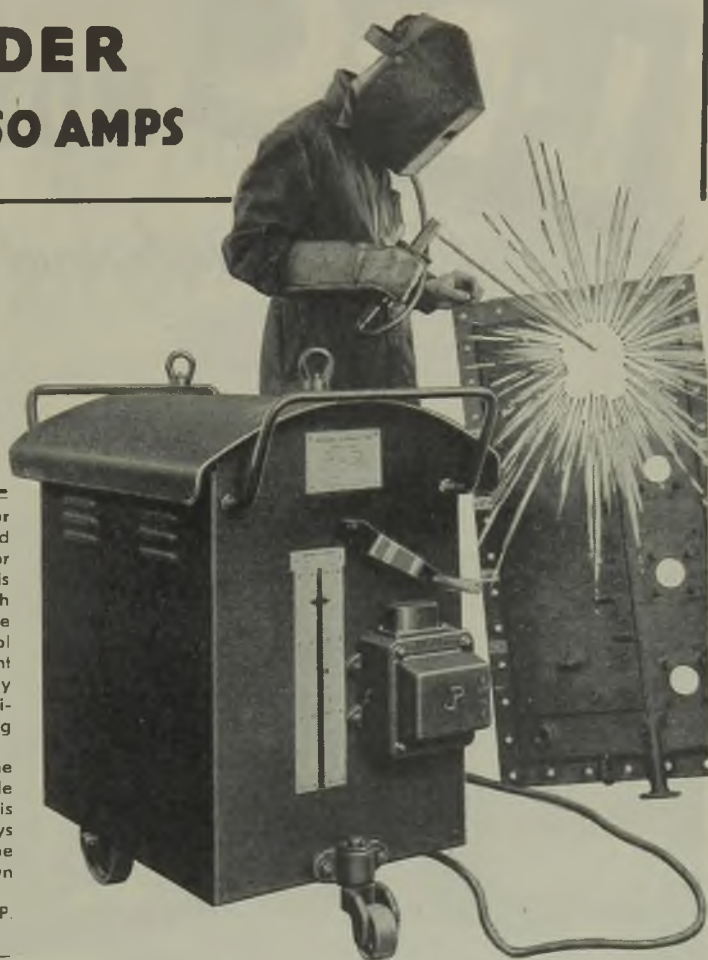
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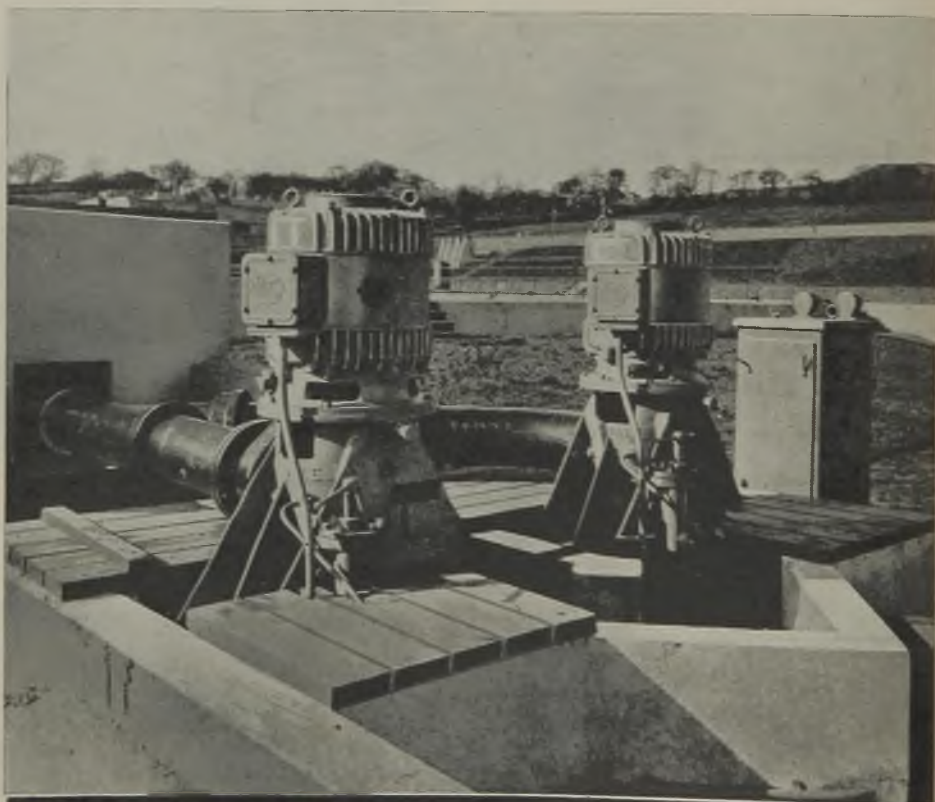
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ELECTRICAL REVIEW

July 14, 1944

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THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXV. No. 3477.

JULY 14, 1944

9d. WEEKLY

Paying for Research

Electricity Supply Authorities' Share

MUCH desirable and necessary work, is delayed by lack of funds. There may be general agreement as to its desirability or necessity but too often this unanimity does not extend to the provision of the means for carrying it out. Each section is inclined to think that another will derive the major benefit and should naturally meet most of the cost. If there ever is general accord it is in the direction of placing the burden on the State—or as some say, "The Government will pay."

Industrial research is one of the matters which is regarded as essential by all save a few who see peril in the rapid advance of science and desire a "moratorium," as if that were possible. Electrical research is particularly prominent, largely because it is already so well organised and possesses an institution for the purpose which is recognised as a model for other industries in several respects.

Prospective Expansion

The Electrical Research Association has done an enormous amount of good work and the reputation which it has built up has enabled it to raise funds more easily than some other similar bodies. Nevertheless, its activities have not been so great as they might have been and at present they are limited by its present quarters which the Association has outgrown. Consequently arrangements are in hand for the provision of facilities which will permit of a substantial expansion of its work. This means that the present rate of income will be inadequate after the war and steps must be

taken now to ensure sufficient funds to finance the additional responsibilities.

These funds will have to come from the industry and the public. So far as the public is concerned, the Government has agreed that its contribution on the sliding scale portion of the annual grant should be on a £1 per £1 basis, so that the greater the industry's contribution the greater will be the amount received from public funds. The manufacturers will no doubt arrange to increase their subscriptions to the Association and we shall probably hear something about that in due course. Our present concern is with the electricity supply section of the industry, and to draw attention to the article by Mr. R. W. Steel, of Cheltenham, published in this issue.

Convincing the Committees

Mr. Steel shows that at present about a quarter of the Association's revenue comes from electricity supply undertakings; this represents 0.00023d. per kWh sold, a very small amount in comparison with other items less likely to "pay dividends." Mr. Steel's appeal for greater support for E.R.A. is addressed to the engineers of supply undertakings. It is their task to convince their committees (and, we suppose, boards of directors) of the importance and value of the Association's work. In this task, likely to be onerous in many cases, they would be assisted if there were a statement from E.R.A. indicating particular pieces of research which had actually saved electricity supply undertakings money—either by reducing the cost of equipment or

by improving and cheapening operation. Past reports should provide material for a brief review of this kind; estimates of the financial saving would be a less simple matter but some indication might be arrived at.

Activities in and
Fifty Years around Caen, Normandy,
Ago make it of interest to
recall that fifty years ago,

Dr. S. Z. de Ferranti visited the town for the official inauguration of its first electric lighting plant which included a Ferranti alternator. In a letter to Mrs. de Ferranti dated June 10th, 1894, he described the blessing of the plant by the Bishop of Bayeux who turned on the steam for the engine. He thought that the people of Caen were "very English in their general appearance." Dr. Ferranti, just before this, had attended the official opening of the Portsmouth station which has recently celebrated its jubilee.

Reference was made in
Inspection our issue of June 9th to
Lamps accidents due to the
breakage of electric lamps
in explosive atmospheres. Information
that has reached us subsequently indicates
the need to emphasise that although
limitation of the energy available in a
circuit can inhibit ignition of an explosive
atmosphere from open sparking, this
precaution is no safeguard against the
risk of ignition from an incandescent lamp
filament should this be exposed as a
result of the breakage of the glass bulb.
The design of safety-type lamp for use in
an "intrinsically safe circuit" must provide
for adequate physical protection of the
vulnerable glass bulb.

Export of the Board of Trade,
Credits stated in the House of
Commons last week that

it was hoped to introduce legislation
next session for the extension of export
credit facilities. The conditions which
are likely to exist after the war will
necessitate such an extension of a system
which has been of great assistance to
British exporters before and during the
war. Two years ago the facilities were
extended to cover additional risks and
expenses, other than those taken care of
by marine or Government war risk
policies. These extra wartime facilities

were fully described in the *Electrical
Review* of May 8th, 1942. They comprise
an all-in war emergency policy and a
c.i.f. charges policy—the latter being
designed to enable exporters to quote
firm c.i.f. charges to overseas buyers,
in spite of rises in freight rates, war risk
premiums, etc., between the dates of
booking the order and its delivery.

A Wise It is agreed that nobody
Judgment should be punished twice
for the same offence, but
it is always possible to

infringe more than one law by one lapse.
This has occurred several times since the
economy of fuel Orders were put into
force. People have been summoned under
the black-out regulations for inadvertently
leaving lights on and at the same time have
been charged with wasting electricity;
the result has been two fines. We are
glad to see that a more reasonable view
was taken by Mr. Harold McKenna,
the Bow Street magistrate, recently when
a woman charged with the double offence
was fined "approximately a farthing"
on the second of the two summonses.
We agree with the view of the *Evening
Standard* that this was a salutary check to
bureaucracy.

Purchase It is possible that
Rights exercise of purchase (or
repurchase) rights in elec-
tricity undertakings by

local authorities may mean the breaking up
of a co-ordinated system. At a time when
reorganisation, which surely means inte-
gration, is in the air there is much to be
said against such a change of ownership.
Local authorities have a good political
case; any attempt to prevent the transfer
of undertakings from "private" to public
ownership is sure to be strongly contested
as "anti-democratic." These transfers
have virtually been suspended during the
war by the operation of the Special Enac-
tments (Extension of Time) Act, 1940, and
it has been suggested that they should not
be operable at all until the wider, national,
question of reorganisation has been
decided.

The point has been
Case in Point raised again by the
decision of the Brighouse
(Yorks) Borough Council to give notice to
the Electrical Distribution of Yorkshire,
Ltd., of its intention to repurchase the

Hipperholme undertaking in two years' time. Upon seeking the Electricity Commissioners' sanction to this the Council has been told that not only would it be necessary to obtain their consent under the West Riding Review Order, 1937, the consent of the Capital Issues Committee to the raising of the necessary money would also have to be sought. It is considered unlikely that this Committee would give consent in the absence of exceptional reasons for the repurchase. Accordingly the Commissioners suggest that the existing position should be preserved by securing a further postponement under the before-mentioned Act.

Irish Contractors So many links between this country and Eire have been broken that the strengthening of any of the remaining connections is worthy of mention. The annual report of the Dublin branch of the Electrical Contractors' Association mentions that, thanks to the efforts of Messrs. A. C. Bruty (a past-president of the E.C.A.) and J. Fitzgerald, fourteen applications for membership had been received from Cork. As, according to the latest E.C.A. Year Book, the total membership of the branch is eighteen, acceptance of only half of the applicants would represent a considerable increase in membership as well as an opening-up of new territory, most of the present members being in Dublin. Cork has only one member as have Limerick and Dun Laoghaire (still better known to most as Kingstown).

Detachable Fittings At a recent meeting of the Liverpool branch of the Electrical Contractors' Association post-war installation practice was discussed and one of the matters mentioned was the improvement of ceiling-fitting suspension. It was suggested that ceiling roses should be abandoned in favour of adaptable "bayonet-cap" devices or other outlets to facilitate the changing of fittings. The point is not new but it certainly deserved revival. It should not be necessary to disturb the wiring of the ceiling outlet when it is desired to install a new lighting fitting. Such an arrangement might possibly take a little work out of the contractors' hands, but it is more probable that it would prevent "handymen" from carrying out doubtful jobs if the consumer

could just plug in a new, already-wired, fitting. After all it is common practice in lighting fitting showrooms.

Commercial Television VIEWS upon the desirability, or otherwise, of adopting "commercial" broadcasting in this country after the war are divided. In the United States, of course, there seems to be little doubt as to its advantages. Indeed the system is being extended to television—there was no alternative probably—and the American public will no doubt remain unperturbed. Consequently we read in an American contemporary of the enterprise of an electrical manufacturing concern which is using the new medium rather forcibly. One item was a "sponsored" play "featuring" its electric iron; another was an actual demonstration of domestic appliances. We rather doubt whether the British public would invest in television sets for this class of programme—and would we want them to?

Telephone Operators ONE of the most irritating things in business is the casual, indifferent, or even rude, telephone operator who gives the impression that she resents the interruption of whatever she was doing and gets rid of one as rapidly as possible by "plugging the call through" and leaving the rest to Providence. A lot of it is due to many employers' idea that this is a job for anyone possessed of normal hearing and ability to read numbers. The fact is, of course, that the telephone operator is in a similar position to a doctor's or dentist's "receptionist," who is chosen for quite other reasons, and her function is just as important. Response from a pleasant helpful voice makes a favourable impression which can be of considerable advantage to the telephone girl's employers.

This matter is raised in **Ambassadors?** the June-July issue of *Standard News* and we endorse the sentiments there expressed—with one reservation. The *News* refers to telephone operators as "ambassadors." Now an ambassador has been defined as "one who is sent to lie abroad for the good of his country," whereas telephone operators stay at home and are, we hope, always strictly truthful.

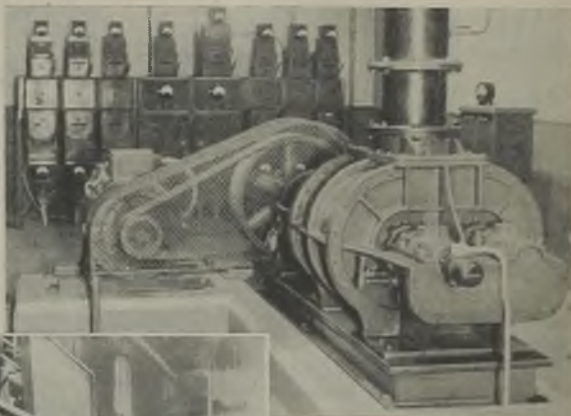
Steelworks Distribution

Methods Employed in an Installation for Direct Casting

SINCE the publication of the articles "Modern Steel Making" and "Up-to-date Foundry,"* both relating to a factory in which expression is given to the modern idea of producing castings from the molten metal direct from the steel furnaces, we have visited another but larger Ministry of Supply factory of similar character and built by the same engineers. This embodies a number of interesting and novel features in electrical distribution, with which the present article is mainly concerned.

Although the number of drives is increased and the ratings are larger in some cases, there is a considerable measure of standardisation of the motors throughout both factories. The four cupolas in the factory we are now describing have two 45-HP fan motors and two 3-HP hoist motors. There are two rotary furnaces, each with a 15-HP commutator motor for the blowers and a 50-HP motor for the pulverised fuel mill and the

stations for this section of the plant are outside in the shop and are arranged in two groups with the convertor tilting panels opposite each end of the group of convertors. There are also two cupolettes, or miniature cupolas, for melting the ferro-alloy additions required in making the particular steel used, and these have two 5-HP, 2,850-RPM flange-mounted blower motors and two 3-HP, 930-RPM skip hoist motors. The blower motors have direct-on starters but the hoist



Convertor blower house distribution board showing one of the blowers and (left) sequence control board No. 2 and foundry No. 2 distribution board



fan drive. The four steel-making convertor blowers are each driven by a 55-HP, 1,400-RPM commutator motor with induction regulator control. The remote control

* *Electrical Review*, March 10th and 31st, 1944, respectively.

motors are automatic push-button contactor starters controlled by limit switches.

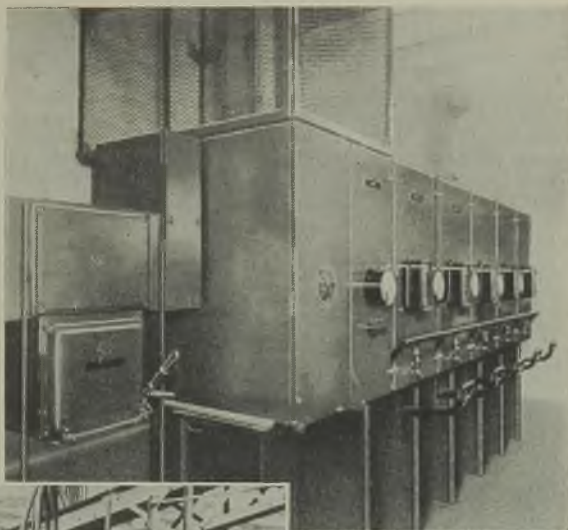
The factory is designed for the straight mass-production of one class of casting and is laid out as two self-contained separate moulding and casting sections with a common sand recovery and preparation plant operating on a sequence control system. Casting is effected on a mould casting conveyor for each half of the foundry and these conveyors are driven by 10-HP, 965-RPM slip-ring motors controlled by air-break starter and rotor contactor starters with remote push-button stations for local control by the operatives. The empty mould boxes are returned to the moulding sections by con-

tinuously moving motor-driven steel slat chains for humping the boxes up to the top of a roller conveyor switchback down which they run by gravity back to the moulding machine lines. The humper sections are each driven by a 2-HP, 940-RPM squirrel-cage motor with push-button direct-on starting. The power-driven vibrating knockouts are operated by 7.5-HP, 965-RPM s.c. motors which represent the first drives in the flow of the sand recovery and treatment plant.

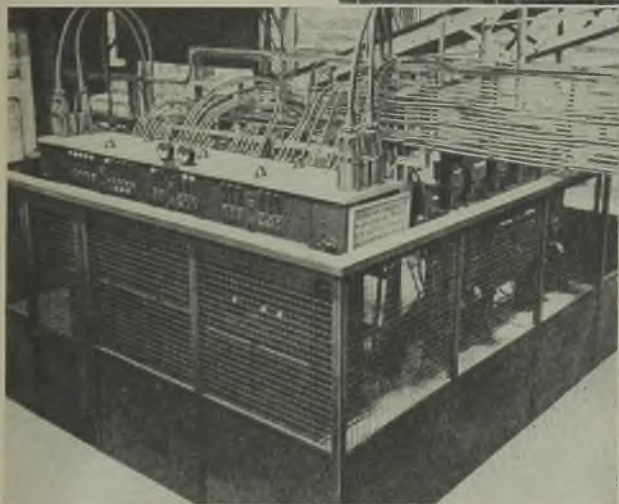
Recovered and treated sand in this plant is delivered to a used-sand bin and, together with new sand from similar bins, it is passed on to hoppers over the mixers. From these hoppers the sand is fed to the mixers by belt feeders operating independently of the sequence control system. The control of these feeders is unusually interesting in that the starters are fitted with motor-operated timing devices which can be adjusted to deliver known quantities of sand automatically after

switches on the bases of the machines.

From the knockout stations the castings are hooked on to a pendulum type casting cooling conveyor which winds its way outside the shop through a lean-to building and so back with the cooled castings into the end of the fettling bay. The slow-moving conveyor



Low-voltage room in one of the substations and (left) looking down on sequence control board No. 1 and foundry No. 1 distribution board



is driven by a 2-HP, 940-RPM s.c. motor with a push-button operated direct-on starter. The cooled castings, after rough fettling, are placed on a slow moving table-type floor conveyor which runs on rails past the grinding machines. The floor conveyor is driven by a 3-HP, 950-RPM s.c. motor housed in a man-hole in the floor and the transmission is taken through a tensioning

device to the table propelling chain. The starter is a push-button direct-on air-break contactor unit which is also controlled in emergency by a number of push buttons along the route of the conveyor.

The fettled castings then pass to the annealing furnaces which are of the split crown continuous gas-fired type with a battery of suction gas producers. Castings are taken off the floor conveyor and placed

the start button is pressed. These starters, together with the isolators for cutting out the mixer motors without stopping the sequence, are mounted on the mixer platform and all of them incorporate pilot indicating lights.

The mixer belt feeder motors are 1½-HP, 960-RPM s.c. machines and are the same as those for the belt feeders over the moulding machines which are controlled by push-button

on hangers suspended from bogies which are pushed along an overhead runway to the charging machine. This machine is essentially a crane which transfers the bogies sideways from the track outside the furnace to a track which runs the length of a specially sealed slot in the top of the furnace. The bogies with their hangers carrying the castings are then pushed into the furnace. Subsequently each batch of bogies added at the charging end has to be removed at the discharge end which is provided with a similar machine which receives the bogies in batches, lowers them into a quenching tank and raises them back on to the outside runway. The bogie handling machines have 5-HP, 1-hr.-rated, 700-RPM s.r. hoist and traverse motors, 5-HP pusher and 3-HP discharger motors, the latter being continuously rated 700-RPM s.c. machines.



High-voltage switch room in one of the substations

The motors are controlled by a combined air-break contactor panel and master controller in the cab of each machine. Limit switches and pilot lamps are provided to prevent the bogies being pushed out of the discharge end of the furnace before the pneumatically controlled doors are opened. To complete the furnaces there are 2-HP, 2,680-RPM motor-driven fans for firing and 4-HP, 1,440-RPM motor-driven fans for the gas producers.

The annealed castings are then lifted off the hangers and placed on the tables of another floor conveyor which takes them slowly past a hardness testing station, inspection tables, a number of stages of hand grinding and finishing tables and a welding station and so on to assembly and final inspection and dispatch. The finishing tables are equipped with "Hicycle" hand grinders operating in groups from 200-cycle

frequency changers equipped with Butcher-Black and Decker earth-leakage protection. For handling the assembled castings at the later stages a system of overhead motor-operated chain blocks on runways are provided on floor-mounted structures. Compressed air for the foundry in particular is supplied by three belt-driven compressors driven by 115-HP, 965-RPM "No-lag" induction motors, which serve to correct the power factor of the factory load. The 200-cycle frequency changers are mounted in the same house to avoid the dusty atmosphere at the finishing-shop tables.

Electricity supplies for the factory as a whole are received at 11,000 V at two main substations situated at opposite corners of the factory site. A high-voltage interconnector links these two stations, thus forming two tappings from a through line which can be fed from either end in emergency. The substations are identical in lay-out, each having back-to-back separate h.v. and l.v. switchrooms and a third room housing a 1,500-k.V.A. 11,000/400-V transformer. Bare connections through the walls from the h.v. and l.v. switchrooms respectively connect the transformer very simply with screens provided for safety. The English Electric h.v. switchgear is of the air-insulated cubicle type with pole-operated isolators and automatic oil circuit-breakers. The B.T.H. l.v. switchgear is of the air-break metal-clad type in which the circuit-breakers are racked out for horizontal isolation.

Normally, the whole of the factory is supplied from one of these substations, the other being used as a standby. Once a month the substations are changed over and in this way ample opportunities are afforded for maintenance and inspection. Feeder panels on the substation l.v. boards supply four factory main distribution boards, each of which is normally connected to one of the main substations, but by means of duplicate cubicles on each board the internal distribution board may be changed over to the other substation or connected to both substations to suit the convenience of the factory working or to meet emergency conditions. The incoming feeder isolators are manually operated off-load and the outgoing circuits are controlled by switches and fuses in separate compartments. The factory distribution boards are of B.T.H. production.

The factory supply is metered on the h.v. side, the h.v. supply meters being summated for the two substations. On the metering circuit there are also a power factor meter and a recording ammeter for checking the

overall power factor and the maximum demand. The overall power factor is maintained at 0.85 lagging by means of the compressor motors already referred to. External services common to the life of the factory are supplied from a service station fed from either of the two main substations. This service station also houses the battery for the time recorder and clock apparatus, main and emergency lighting control and the works broadcasting system and it can also be used for the internal telephone system in the event of a failure of the main supply.

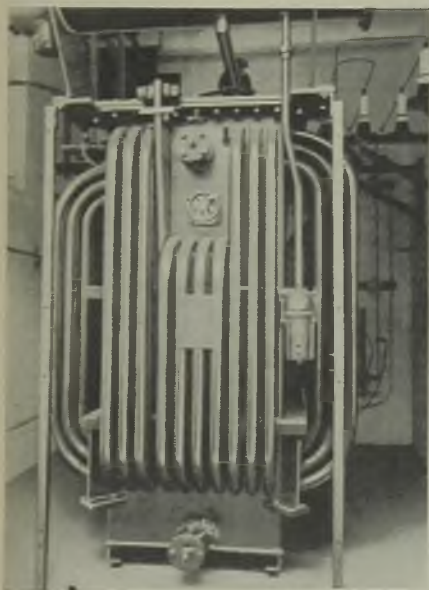
Most of the factory motors are supplied direct from the four factory distribution boards, but in the case of the pulverising plant there is a factory sub-distribution board serving the group of motors associated with this plant and fed from one of the main factory boards. From this sub-distribution board is supplied the 50-HP direct-on-line started pulverising motor and the interlocked starting panels for the pump and fan motors in this group. The 50-HP drive also incorporates a drive for a small dynamo which provides the DC supply for the fuel control valves.

The various sections of the factory served by the respective main distribution boards are as follows:—Foundry No. 1 main

tool room and pattern shop. Foundry No. 2 distribution board: mould conveyors; compressor; No. 1 core ovens; No. 2 core ovens; water station; annealing furnaces; grinding and finishing bay crane; grinders; high-frequency machines; lighting, part foundry



Factory sub-distribution board for pulverising plant showing fuel circuit diagram



1,500-kVA transformer at one of the substations

and part finishing bay. Cupola distribution board: cupola blower fans; cupola skip hoists; brick crusher grinding mill; rotary furnaces; stockyard bay magnet cranes; pulverised fuel plant; stockyard bay lighting; pulverised fuel plant lighting; and part of melting bay. Converter distribution board: converter blower motors; converter tilting motors; cupolette blower fans; cupolette skip hoists; 3-phase welding plugs; manganese crusher; casting bay crane; melting bay crane; and lighting, part melting shop and part foundry.

Distribution of energy from the frequency changers to the "Hicycle" machines in the grinding shop is via an English Electric plug-in fuse type steel-clad busbar distribution system with a central main trunking running over the bench line. The sequence controlled system for the sand plant is very similar in operating principle to that in the other factory referred to, but the motor starters in this case are grouped in three main motor control boards which are also essentially distribution boards for this section of the factory and are supplied direct from the low-voltage switchboards in the substations.

distribution board: sand bay cranes; engineers' fitting and blacksmiths' shops; laboratory and stores; belt feeders; compressors; lighting, part foundry, sand plant,

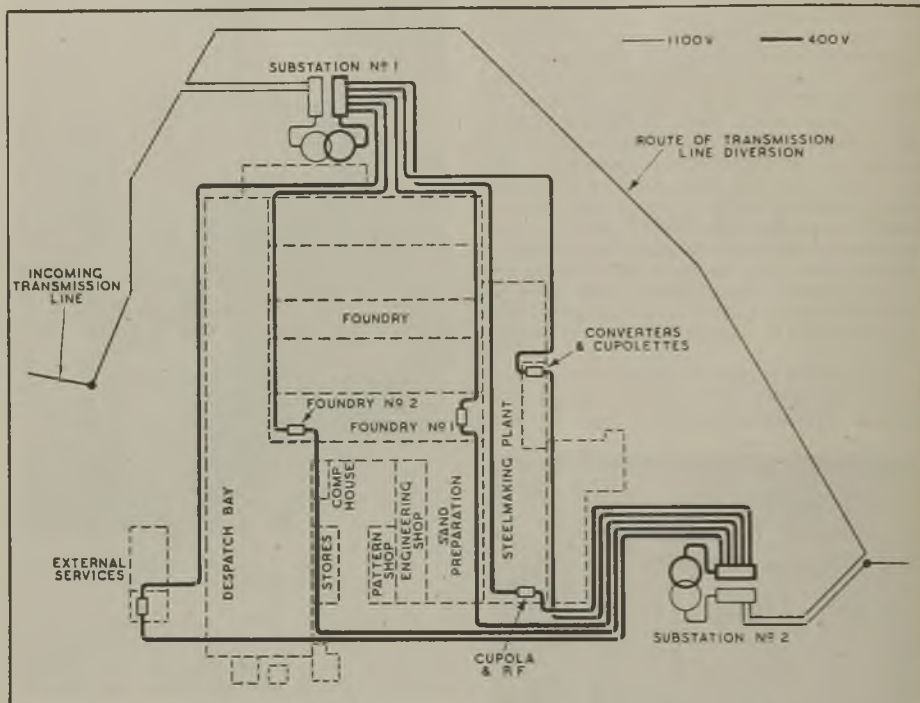
These sequence control and distribution boards are Brookhirst productions and the incoming main isolators are interlocked to give sequence continuity.

Number 1 board has four sequence groups and Nos. 2 and 3 boards have one group. In view of the centralised nature of the control boards they are provided with pilot lamps for each circuit and stop push-buttons at a

Paint Drying

I.C.I. High-Intensity System

ARTICLES which have been painted are stoved either to accelerate drying, or to harden the paint film, or both. For speedy wartime production radiant heat has been employed with excellent results, saving time and, in some cases, improving the finish. An



Diagrammatic sketch of 11-kV and 400-V distribution system

number of remote points which operate to shut down the whole of any sequence group in emergency. Changeover switches are provided on each circuit for independent testing of the drives for maintenance. The cabling and wiring tubing throughout the installation is painted orange to distinguish it from the air, gas and water systems which are painted in standard colours. These identification colours together with red markings on danger spots such as crane conductor supports and crane buffers against the light background of the factory are very effective for maintenance and from the safety point of view.

The installation work was carried out by Electricity House, Ltd., to the design and under the supervision of H. A. Brassert & Co., Ltd., consulting engineers for the complete factory.

explanation of what is involved is given in a 20-page booklet compiled by Imperial Chemical Industries, Ltd., Paints Division, Slough, Bucks. This differentiates between heat transfer by conduction, convection and radiation in order to indicate how the absorption spectrum of one substance differs from that of another. Methods of drying paint are next commented upon, it being remarked that the mode of heating makes no significant difference to the results.

The I.C.I. Paints Division has developed a high intensity system which utilises an "energy flux" density far in excess of any previously used for the purpose. Tunnels formed of refractory surfaces, which are heated electrically or otherwise to 1,000 deg. C., are claimed to enable painted articles to be stoved in a few seconds instead of several minutes when treated with low intensity radiation. Paint films on massive metal articles can be satisfactorily stoved in this way without raising the temperature of the whole body to the same degree.

Intensified Research

Call to Supply Authorities

HARDLY a week goes by without some eminent industrialist or well-known educationalist urging the importance of research, either because of its indispensability to manufacturing progress and national recovery or of its close association with scientific education in our universities. Many questions on the subject have been asked in Parliament and towards the end of April, Sir Granville Gibson in the House of Commons moved a resolution urging "the declaration of a bold and generous Government policy of financial assistance directed to the expansion of teaching and research facilities in our universities and technical colleges, to the extension of pure and applied research in all fields by the State, by industry through private firms and research associations, and to the effective and rapid application of the results of research."

In the debate which followed, there was unanimous support for the resolution, and two points in Mr. Attlee's reply for the Government deserve particular attention by the electricity supply industry. One is that while the Government is willing and apparently anxious to assist, it cannot be expected to carry the whole burden of scientific research. Industry must first do something for itself. The other point is that there must be a greater public awareness of the necessity for increased research and readiness to use its results.

The Cheltenham Electricity Committee has accepted the principle that research must be extended and that there should be increased financial support from electricity supply undertakings. The Committee has therefore resolved to increase its present full rate of subscription to the Electrical Research Association by 50 per cent. provided a substantial number of other municipal undertakings do the same. It may be claimed that the municipal undertakings are already doing as much or more than other sections of the supply industry. Even so, there are many undertakings which subscribe less than the full rate, and others who are not subscribing at all.

The cost of research must necessarily be borne by electricity consumers, but they as an unorganised body cannot determine how much or how little shall be spent for this purpose. The pace can be set either by the manufacturers, the Electrical Research Association or by the electricity supply authorities.

By

R. W. Steel,

A.M.I.E.E.

**Borough Electrical
Engineer, Cheltenham**



If by the manufacturers, there can be no control either by consumers or by supply authorities and most of the money would be spent in individual effort, with a great deal of overlapping on the one hand and many gaps on the other.

In my opinion the Electrical Research Association, which itself calls for increased contributions, is not the appropriate organisation to determine its own rate of expenditure, as it is only the instrument by which the research work desired by the electrical industry is carried out. The Association

can only provide for making the best use of its existing income, although its Council may recommend the members of its constituent bodies to increase their financial support. It seems preferable that the supply authorities themselves

should largely determine the scope of the work and the rate of subscription. Collaboration with manufacturers, although necessary, should not entail any definite ratio of their subscriptions to those of undertakings, which should be free to increase their own efforts quite independently. Moreover, manufacturers will always do a considerable amount of research individually, and this should be borne in mind when comparing contributions.

The magnitude, or rather the lack of magnitude, of the cost deserves to be put in its proper perspective. The E.R.A. in its 1943 report showed that a total of £28,000, approximately 25 per cent. of its whole revenue, was subscribed by authorised undertakings. This averaged £10 for each £40,000 of revenue, or only 0.00023d. per kWh sold. This may be compared with many other expenses undertakings have to bear, which differ from expenditure on research in that they offer no prospects of a similar return. The cost for each shilling rise in the price per ton of coal, for instance, can hardly average less than twenty times the cost of the increase in the rate of subscription proposed by Cheltenham while, in most cases, an increase in the war bonus of 1d.

per hour to employees engaged at N.J.I.C. rates would have a similar effect. Contributions to rate relief, where this practice still persists, are enormous by comparison.

Indeed, expenditure on research should be considered as an investment yielding dividends over a period of possibly many hundreds per cent. The greatest enthusiasm, or at least solid support, should be forthcoming from those responsible for the direction of electricity supply undertakings, but my experience shows that it is not so great as might have been expected. Recently I have asked a number of electricity supply engineers to co-operate by urging their committees to follow Cheltenham's lead. While a number of them have promptly agreed and others have expressed their sympathy (though without any hope of agreement on the part of their committees), some have offered neither sympathy nor support and one or two have not yet found time to reply.

Arguments Against

Arguments advanced against positive action may be summed up as follows:—

(1) All undertakings should contribute at the full rate before there is any further increase.

(2) All research should be left to the manufacturers.

(3) The Government is proposing to increase its contributions to research, and increased contributions from the supply industry should be unnecessary.

(4) A request for increased subscriptions should come from the E.R.A.

(5) Other increases in costs are so heavy that no more burdens can be accepted.

(6) The funds of the E.R.A. are in a healthy condition, and therefore no action is necessary.

With the desirability of all undertakings subscribing at the present full rate, no one but the defaulters themselves will disagree. It surely cannot be contended, however, that undertakings should refrain from doing what is not only right but inevitable because there are defaulters among their ranks; nor that the supply industry should await events on the off-chance that the Government will relieve it of the cost of its fair share of this vital work. As for the suggestion that increased subscriptions cannot be afforded, surely the more costs rise in other directions the more extended and intensified should research activities be, in order to discover new ways of reducing costs over which we still have some measure of control.

Concerning the contention that the funds of the E.R.A. are in a healthy condition, this, of course, is perfectly true. They would be in an even more healthy condition if the Association's activities were still further curtailed! Or if a greater proportion of its work were carried out directly for the Govern-

ment, for which they would be recompensed. But if the E.R.A. is to have new laboratories worthy of our great industry for carrying out work on an increasing scale, the existing balance in hand and the existing revenue will need to be greatly augmented. An argument against further contributions on account of the present state of the Association's finances takes no account of future needs.

The call for increased annual subscriptions does not necessarily mean that they should be paid during the current year, but the decision in principle to meet them, in order that the whole matter may be put on a proper basis, should be made now.

All electricity supply engineers should help in creating, wherever they can, particularly among the members of electricity committees, that awareness of the importance of scientific research, which is a pre-requisite not only for the industry to do more for itself, but also for the Government to do more for industry.

Information for Contractors

MEMBERS of the Electrical Contractors' Association have been notified by Mr. L. C. Penwill, the director and secretary, that owing to an unexpected temporary reduction in the supply of polyvinyl chloride the Cable Planning Officer of the Ministry of Supply has issued instructions reserving supplies of p.v.c. for those special cables for which the use of the material results in the greatest economy in rubber.

There is no reversal of the long-term policy of introducing p.v.c. as the primary substitute for natural rubber, but until the supply situation is restored (in about two or three months' time) the manufacturers will take advantage of their option to supply the following types in natural or synthetic rubber, except insofar as demands may be met from existing stocks:—Rubber-insulated cables for electric light and power (B.S.S. 7); ships' cables (B.S.S. 883); and rubber-insulated cables and flexibles (Government Department specifications 1, 5, 8, 9, 10 and 19).

War Damage Ruling

Under a scheme prepared by the Board of Trade in consultation with the War Damage Commission contractors or owners of plant can protect themselves against the risk of damage by enemy action during its erection or installation. As a result of representations made by the E.C.A. the War Damage Commission has agreed that this arrangement shall apply to electrical installations, including private telephone installations.

A memorandum has been circulated giving particulars of the scheme. This distinguishes between contracts for sale and erection and contracts for work, labour and materials.

Annual Meeting

This year's annual meeting of the E.C.A. and Allied Associations is to be held on July 19th at the Imperial Hotel, Birmingham (10.30 a.m.).

Organisations of the Industry—IV

Electrical Contractors' Association

WITHIN an article of reasonable length it is far from easy to give a connected summary of the long history of the E.C.A. and its Allied Associations. The Electrical Contractors' Association (Incorporated) dates from 1904 and claims to be the oldest trade organisation within the British electrical industry. This date, however, does not represent the commencement of electrical contractor organisation in this country because the installation trade was served by the old National Electrical Contractors' Association from 1901 up to the date of its change of name and incorporation by the Board of Trade. But "E.C.A." records go further back than this. For several years prior to 1901 many local bodies of organised contractors were in existence in London

By **L. C. Penwill**, Companion I.E.E.
(Director and Secretary)

quity of the E.C.A. is strictly in keeping with the extreme youth of the electrical industry itself. When one tries to review the industry as it was forty years ago, and then takes a glance at its giant proportions of to-day, it is difficult to realise that all this development has taken place within the lifetime of a good many men who continue to be active at the present time.

More than forty years ago, for example, Mr. W. R. Rawlings, A.M.I.E.E. (E.C.A. President in 1904, 1914 and 1931) was an extremely live member, and repeatedly chairman of the London Branch. In spite of this very early start, however, "Mr. W. R." is very much with us at the present day, his robust figure and sage advice being available on all major E.C.A. occasions. And not only on E.C.A. occasions, because he has a proud record of long service to the electrical industry as a whole.

Take another thought-compelling glance at the past. In the first issue (May, 1903) of the E.C.A. official journal, the *Electrical*



Mr. W. R. Rawlings, the first President of the incorporated Association, has occupied the position twice since



Mr. Walter Riggs, M.B.E., M.I.E.E., President of the E.C.A. and Allied Associations for the past six years



Mr. W. H. Walton, Chairman of the Executive Committee



Mr. L. C. Penwill, Director and Secretary of the Association

and the Provinces, in addition to others in Scotland and Ireland, the establishment of the national body in 1901 representing a general recognition of the fact that local bodies were necessarily limited in scope, and that national organisation was necessary if real progress was to be made. To this end a national meeting was called at Anderton's Hotel, London, in 1901, the rather noisy assembly (as it was reported) being presided over by a cordially supporting, but none-the-less independent, chairman in the person of the late Mr. Henry Alabaster of the *Electrical Review*.

The older E.C.A. members remember this fact with great satisfaction because, all through its long history, the *Review*, in common with the trade Press as a whole, has always been prepared to support the Association, no matter where the "big battalions" might happen to be drawn up at the time.

As a simple paradox, of course, the anti-

Contractor, the very first article to be published was devoted to "piece work" and was written by Mr. R. G. Tyler, M.I.E.E., who, to this day, continues an active member of the E.C.A. London Branch. In view of later E.C.A. developments—which will be outlined in due course—that particular article is of more than passing interest. Mr. Tyler regarded "piece work" as "rush work," and because installation work was largely hidden work he resolutely opposed the idea of "payment by results." He regarded the safety of good work as being of far greater importance than its cost—and this, be it remembered, was in the old DC days of forty years ago.

In that early—indeed, *first*—E.C.A. article, an indication was obtained of the clear policy that has animated the Association from its very inception. Within the limits of one sentence, the sole purpose of the Electrical Contractors' Association has been to raise the technical and commercial status of installation engineers, to protect the trade against all types of unfair and dishonest competition, and to promote the friendly unity of all sections of the industry in the common cause of sound electrical development and effective public service.

N.E.C.T.A., Ltd., and the N.F.E.A.

Following the establishment of the E.C.A. (Incorporated) in 1904, two striking developments took place in 1916. It is well enough known that an incorporated body is required to work for the general good of the community it represents and is not permitted to trade for the commercial advantage of its constituents. This limitation of function carries with it certain legal advantages of considerable value to such a body as the E.C.A.; but, in 1916, the Association realised that allied bodies must be formed if the organisation was to work to the full advantage of all concerned. In the year mentioned, therefore, E.C.A. members promoted the N.E.C.T.A., Ltd., and the National Federated Electrical Association (N.F.E.A.) which was registered as a trade union.

The mutually supporting strength of this triple organisation is, of course, apparent. With its legal and Parliamentary standing, the E.C.A. is in the best possible position to represent the interests of the installation trade as a whole. On the other hand, N.E.C.T.A. as a limited company, can trade in any way that is deemed to be to the personal interest of members; while, from the employers' point of view, the Federated Association can deal with all labour matters on level terms with its trade union operatives or employees. The Council of the E.C.A. also happens to be the board of directors of N.E.C.T.A., Ltd., and the national executive of the N.F.E.A., the triple organisation in question being entirely unique in electrical trading history. Indeed, it is not known that a similar triple organisation exists in any other branch of British commercial enterprise.

At this juncture in electrical trading history there is no need to dwell on the Association's early fighting days. In years gone by, "individualism" was a characteristic national creed, and was very much in evidence in an infant industry attempting to run before it could walk. Comparatively minor differences of opinion were magnified into enemy actions which were only to be restrained by force.

But times have changed and it is desirable to dismiss many years of strenuous E.C.A. activity designed to compel opponents to recognise a particular point of view. In this

matter it was truly remarked some little time ago that the E.C.A. harbours no bitter memories at all. The Association has fought and won, and fought and lost, and is all the better for both experiences.

This necessarily brief glance at the work of a great trade organisation achieves much calmer waters by dwelling on the constructive work undertaken by the E.C.A. on behalf of installation trade enterprise, integrity and fair trading. Under the first heading it is to be noted that the Association was an early and cordial supporter of the Electrical Development Association when that body represented all sections of the industry rather than the supply authorities alone. The E.C.A. contributed liberally to the general and special campaign funds of E.D.A. and one of our past-presidents, Mr. Howard Marryat, M.I.E.E. (whose recent death is very deeply lamented), served as chairman of E.D.A. during a particularly active year. It may also be noted in passing that Mr. Marryat had also acted as president of the E.I.B.A. and that he achieved an outstanding development of that Association's financial position during his year of office.

Under the second heading the E.C.A. is proud of the fact that one of its old members, Mr. H. T. Young, M.I.E.E., won the electrical industry's highest honour when he achieved the presidency of the Institution of Electrical Engineers; while, for solid work on behalf of installation security, it is entitled to derive great satisfaction from the long service of its members who have served on the Wiring Regulations Committee of the same Institution. An E.C.A. past-president, Mr. H. J. Cash, M.I.E.E., has worked unselfishly in the cause of sound installation practice and has been rewarded (or burdened as the case may be) with the vice-chairmanship of the important Institution Committee already mentioned. In the same way, many able E.C.A. members have served their industry as chairmen of I.E.E. Local Centres, three recent names in this category being provided by Mr. E. A. Reynolds, M.A., M.I.E.E., of Birmingham, Mr. J. Gaunt Craven, M.I.E.E., of Leeds, and Mr. T. E. Alger, M.I.E.E., of Newport.

Registration of Contractors

In the formation of the National Register of Electrical Installation Contractors the E.C.A. played a major part in the reorganisation of the installation trade. For many years past the E.C.A. has advocated the principle of compulsory registration—and, indeed, continues to do so at the present day—but in 1924 gladly accepted the powerful assistance of the I.E.E. in setting up the voluntary N.R.E.I.C. as a first step to this earnestly-desired compulsory end. At the present day the E.C.A. gives whole-hearted support to the National Register and welcomes the additional support now forthcoming from the

Association of Supervising Electrical Engineers and from the Inter-Associations Committee under the chairmanship of Mr. S. B. Donkin, M.Inst.C.E., set up to further the basic principle of compulsory registration.

Fair Trading

Coming now to the last item, namely, Fair Trading, in this section of constructive work for the better organisation of the electrical industry the efforts of the Association stand supreme. In actual fact the E.C.A. produced the first Electrical Fair Trading Policy in 1922 which was extremely useful in regulating disputes and in persuading the industry that trading by agreed rules was far more sensible than trading under no rules whatever.

In due course the E.C.A. Fair Trading Policy was developed into something better. As a consequence of the active negotiations that took place prior to the passing of the 1926 Electricity (Supply) Act—a work in which "Committee D" took an active part—a Fair Trading Committee representing all sections of the electrical industry was set up under the chairmanship of Mr. F. W. Purse, M.I.E.E., and the Electrical Fair Trading Policy as it is known to-day was duly evolved. Ultimately, of course, the Fair Trading Council was brought into being in order to administer, amend and develop this Policy as and when the need arose; but most unfortunately, the supply interests have not as yet seen their way to serve on the Council.

So far little direct reference has been made to the activities of N.E.C.T.A., but it will be apparent that the work of this limited company is in a sense the private concern of its individual members. N.E.C.T.A. is able to enter into trading agreements with other organised sections of the industry to the direct advantage of all concerned, and is equally in a position to negotiate insurance and other financial benefits for all its members. In some of N.E.C.T.A.'s insurance work, for example, a block policy covers the entire membership by one centralised payment, while other specially negotiated insurance policies are substantially more comprehensive than can be obtained in the open market. In the direction of organising hire-purchase and similar arrangements the N.E.C.T.A. holds a very strong financial position, and in many other ways endows its membership with important material benefits.

Wartime Activities

The war record of the E.C.A. has been one of continuous service alike to the national effort and to its membership. All through the war years the Association has been in constant and co-operative touch with Government Departments to secure the maximum possible war-output from the British installation trade. The gigantic efforts that have been made in connection with the electrical equip-

ment of camps, aerodromes, national and other factories, ships and shipyards, cannot be discussed at the present juncture, but in due course they will provide a story of which installation engineers may well be proud.

By E.C.A. "Regional Conferences" and by hundreds of postal communications the E.C.A. membership has been kept fully informed of all Government needs and orders covering war-time technical and trading activities, and prominent E.C.A. members are serving on all post-war planning committees in any way associated with the future of installation work in this country.

Educational Work

Since the earliest days the E.C.A. has taken a very keen interest in the technical education of its members' apprentices. The principle of indentured apprenticeship has been strongly supported, the closest possible co-operation has been maintained with the City and Guilds of London Institute, and E.C.A. gold, silver and bronze medals and money awards (upwards of £100 per annum) have been given every year to successful apprentices in the City and Guilds examinations. For many years now, past-presidents of the E.C.A. have been installation "examiners" to the City and Guilds, the present holder of that office being Mr. E. A. Reynolds, M.A., M.I.E.E., of Birmingham. At the same time constant contact has been maintained between the National Federated Electrical Association and the Electrical Trades Union; and, in these difficult times, it is sufficient to say that labour peace—and the benefits of peace—have been successfully maintained in the electrical installation industry for many years past.

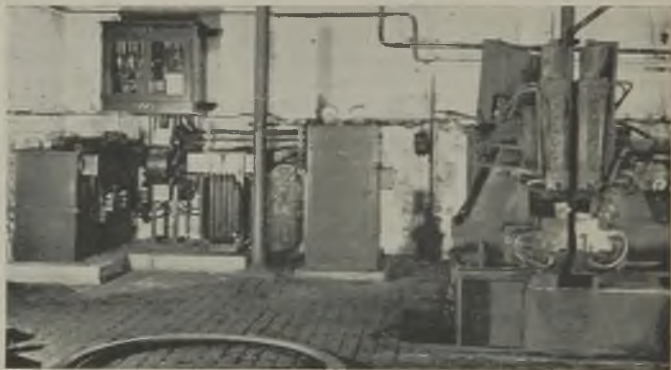
The E.C.A. and its Allied Associations are wholly democratic in their general organisation. The Association comprises 80 branches distributed throughout England, Wales, Northern Ireland and Eire—Scotland maintaining an independent organisation in the shape of the E.C.A. of Scotland. The membership is now approaching 1,500. Members assembled in their respective branches send forward representatives to their appropriate Sectional Boards, and from these assemblies members are elected to serve on the E.C.A. Council. The Council itself is presided over by the President for the time being. Since 1938 up to the present moment (1944) the President has been Mr. Walter Riggs, M.B.E., M.I.E.E. (London). A smaller Executive Committee of the Council, under the chairmanship of Mr. W. H. Walton, carries on the more detailed business of the Association. Mr. Walton has held this office for the past twelve years. The Vice-Chairman is Mr. H. M. Drake, B.A. The Association has three Vice-Presidents, the present ones being Messrs. E. W. Andrews (Newcastle), E. A. Reynolds (Birmingham), and John Walsh (Blackburn).

Balancing Welding Loads

J. & P. System at Railway Works

AT the time of installing a 200-kVA automatic resistance butt welder at the Doncaster works of the London and North Eastern Railway, no practicable alternative to connecting the machine across two phases of a 400-V three-phase system presented itself. The resulting loading conditions were unsatisfactory on account of the unbalanced conditions imposed on the system, which resulted in rapidly fluctuating current on two phases.

Some months ago the proposed installation of additional machines in the area necessitated consideration of an increase in the capacity of the supply cable and the provision of additional switchinggear, but this expensive solution was avoided by the adoption of balancing equipment consisting of two condensers and a reactor. This method of balancing had been developed



Balancing equipment for welding machine at the L.N.E.R. Doncaster works

taken and the voltage variation was reduced to 5 V from 15 V. By this means a further 150 to 200 kVA can be carried by the cable and the times occupied in the actual welding processes have been decreased by 25 per cent.

by Johnson & Phillips, Ltd., for steady single-phase loads, as furnaces, but this is believed to be its first application to a heavy fluctuating demand such as that provided by a large butt welder. The requirement was that while a reasonable balance should be obtained at the maximum load, the current in any phase at no-load should not be excessive.

Results are said to have exceeded

When welding light sections one condenser only is in circuit and to meet this the reactor is fitted with a tap-changing switch.

Writ Against I.M.E.A.

THE South Shields Corporation, at its monthly meeting on July 5th, approved the action of the town clerk and chairman of the Electricity Committee in issuing a writ against the I.M.E.A. claiming that a resolution passed by the Association on April 26th dealing with the ownership of electricity undertakings was not valid, on the grounds that the chairman had wrongly dealt with the demand for a poll after a resolution had been carried on a show of hands.

The Electricity Committee reported that a resolution opposing the Association's decision of April 26th had been submitted for consideration at the annual meeting of the Association which was to have been held on June 22nd, but had been postponed. The I.M.E.A. had been asked to suspend taking action on the April 26th resolution pending consideration of the South Shields resolution, but this request had been rejected, and it was stated that various associations and groups who were party to the memorandum of April 26th were to see the Minister of Fuel.

The resolution passed on April 26th, to which South Shields objected, suggested that the rights of local councils to acquire parts of private undertakings in their areas should not be exercised pending the formation of area committees which would make representations on the subject.

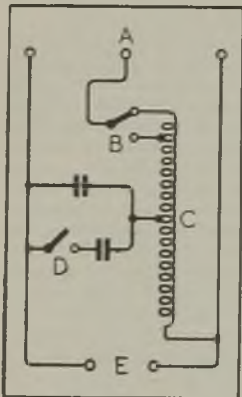


Diagram of connections

A. 400-V, three-phase supply.
B. Change-over switch. C. Reactor. D. Single-pole contactor. E. Single-phase welder

expectations. When welding mild steel of 13-14 sq. in. section the maximum currents in the three phases became 380, 420 and 225 A, instead of the 700, 700 and 0 A previously

PERSONAL and SOCIAL

News of Men and Women of the Industry

CONSEQUENT upon the staff changes already announced to take effect at the beginning of next month the Central Electricity Board has appointed Mr. J. D. Peattie, B.Sc., M.I.E.E., operation engineer, head office, as deputy chief engineer and Mr. A. R. Cooper, A.M.I.E.E., M.Inst.F., operation engineer for the South-East England and East England Areas, as operation engineer, head office.

Mr. Peattie has been the Board's chief operation engineer for the past fifteen years. He is a native of Dundee, where he received his early education, and took his technical course at the City and Guilds College, London University, gaining a B.Sc. in engineering with first-class honours. For three years before the last war, in which he served with the Royal Naval Division, he was with Siemens Schuckertwerke, Berlin, and in the interval between the war and his joining the staff of the Board in 1929 he held appointments successively with the Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Edmiston Brown & Co., Ltd., Glasgow, and the Manchester Corporation Electricity Department.

Mr. Cooper entered the Board's service as assistant operation engineer for the North-West England and North Wales Area in 1935 and joined the head office staff as chief assistant operation engineer two years later. He has held his present appointment since November, 1942.

The *Manchester Guardian's* War Correspondent says that one of the biggest tasks in preparing for the invasion of France was the preparation, or "waterproofing," of thousands of fighting, transport and technical vehicles to make them capable of travelling through several feet of water without harming them if the landing craft could not get close inshore. The whole of this work was in charge of Lieut.-Col. A. Graham Woods, D.S.O., M.C., of the R.E.M.E., who before the war was with the Central Electricity Board (North-Western Area).

The University of Leeds is inviting applications for appointment to the chair of electrical engineering. It is stated that the date of appointment will be a matter of arrangement. Applications are required to be received by September 30th.

The Council of the Institute of Welding has awarded the Sir William J. Larke Medal for 1944, together with a first prize of £50, to Mr. H. W. Clark, M.Inst.C.E., for a paper entitled "Some Applications of Arc Welding, Embodying Specific Details of Welded Work." Mr. Clark is assistant engineer (Bridges and Structures) in the Department of the Chief Engineer (Civil) of the London Passenger Transport Board.

In presenting the Keith Prize (1941-43) to Prof. James Ritchie, of the Department of Natural History, Edinburgh University, Prof. E. T. Whittaker, president of the Royal Society of Edinburgh, said that Prof. Ritchie's experiments at the electricity generating station at Portobello illustrated a practical application

of zoology. When the station was being built it was foreseen that its efficiency would be seriously hampered by the growth of mussels in the great sea-tunnels, and Edinburgh Corporation invited him to plan and carry out experiments to prevent such interference. When the station was opened in 1923 a successful method of dealing with mussel growth had been devised and was already in operation and that method had been an essential part of the routine activities of the station ever since.



Sir James Devonshire

Owing to ill-health Sir James Devonshire, K.B.E., has resigned his seat on the board of the Northmet Power Co. and its subsidiary companies. Sir James Devonshire, who has been a director of the Northmet Company for over 40 years, was managing director from

1907 to 1923, chairman and managing director from 1923 to 1929 and deputy chairman from 1929 until his resignation.

Mr. E. Bruce Ball, joint managing director of Glenfield & Kennedy, Ltd., has been appointed senior managing director upon the death of his father, Mr. E. Bruce Ball, senior. Mr. H. Gardner has been appointed an additional managing director and Sir Thomas Kennedy, for many years the company's general manager in India, has joined the board.

Blackburn Town Council has decided to increase the salary of the electrical engineer, Mr. R. H. Harral, for a period of two years from June 1st by £75 a year to cover war emergencies. His deputy's salary will be increased by half that amount.

Flight-Sgt. William D. Harral, son of Mr. R. H. Harral, electrical engineer to Blackburn Corporation, has been awarded the D.F.M. for special work. He has over 800 flying hours to his credit and has taken part in numerous operational flights.

Major Simon Green has been appointed managing director of E. Green & Son, Ltd., fuel economiser makers, Wakefield, in succession to Mr. Harold Livsey, who has recently retired.

Mr. W. W. Watt has been elected president of the Institute of Welding for the year 1944-45.

Mr. J. A. Harle has been elected chairman and Messrs. W. Dixon and T. M. Ayres vice-chairmen of the North-Eastern Centre of the Institution of Electrical Engineers for next session. For the Tees-side Sub-Centre Mr. J. H. Harris has been elected chairman and Messrs. J. A. Braidwood and J. B. Lancaster vice-chairmen. The annual reports for the past year show that membership of the North-Eastern Centre has increased from 853 to 900 and of the Tees-side Sub-Centre from 151 to 168.

We are sorry to learn that **Mr. R. P. Hilton**, of the London Office of Bruce Peebles & Co., Ltd., has recently sustained serious injuries as the result of enemy action. He is at present in hospital where, we understand, he is making satisfactory progress.

At a meeting of engineering representatives at Newcastle-on-Tyne on July 7th a committee was appointed to draw up a practical plan for aiding the development of light engineering in the North-East. The members include **Mr. H. B. Leeson** (A. Reyrolle & Co., Ltd.).

Mr. Martin S. Smith, first president and founder of the New Zealand Institute of Electricians, Inc., has retired after having occupied the position of president since the Institute's inception. In recognition of his work he was elected the first life member of the Institute at its eighth annual conference held recently at Palmerston. The new president is **Mr. L. G. P. Mahoney**.

Mr. L. E. Potvin, president of the Quebec Municipal Commission, has been appointed chairman of the Quebec Hydro-Electric Commission in succession to Senator Bouchard, who was recently relieved of his duties by the Premier of Quebec.

Obituary

Mr. F. Hughes-Caley.—We regret to announce that **Mr. F. Hughes-Caley**, manager of the Birmingham district office of the British Thomson-Houston Co., Ltd., from 1923 until his retirement a few months ago, died suddenly on July 2nd in Birmingham.

Mr. Hughes-Caley was born in 1876 at Birkenhead, where he started his business life in the offices of Geo. F. Milnes & Co., tramway and railway carriage builders. By 1900, when there was a large expansion of business in connection with the development of the electric tramway systems throughout the country, he had risen to the position of commercial manager. In

1903 he joined the B.T.H. Co. at Rugby as commercial assistant in the traction department, and in 1907 he was appointed to represent the company throughout the Midlands and South of England for the sale of industrial electrical equipment. Reorganisation brought him back to Rugby in 1918, and in 1923 he was appointed manager of the Birmingham district office, controlling also the lamp and lighting department depots at Leicester, Norwich, Cambridge, Northampton, Stoke and Cheltenham.

Mr. Hughes-Caley's three sons all received an engineering training at the B.T.H. company's works. The eldest is now in the U.S.A. on war production work; the second eventually decided to take up missionary work, was ordained in the Anglican Church, and is now in Manitoba; and the youngest is on the industrial sales department staff of the B.T.H. Co.



The late
Mr. F. Hughes-Caley

Mr. F. Dudley Docker, who died at his home at Amersham on July 8th at the age of eighty-two, was a director of the Electric & Railway Finance Corporation, Ltd., and other companies. He was a founder and first president of the Federation of British Industries.

Mr. A. Moir.—The death occurred at Wandsworth Common, S.W.18, on July 8th, of **Mr. Alexander Moir**, O.B.E., M.I.E.E., who retired from the position of superintending engineer, London District, G.P.O., some years ago. He was eighty-five years of age.

Mr. F. Escott.—The *Electrical Contractor* reports the death of **Mr. Frank Escott**, a director of Bennett & Escott, Ltd., electrical contractors, Bournemouth. He was the son of **Mr. T. H. Escott**, vice-chairman of the Bournemouth branch of the E.C.A.

Mr. A. Bentley.—The death is reported from Johannesburg of **Mr. Arthur Bentley**, formerly chief electrical inspector for the Johannesburg Municipality.

Monsieur J. Bethenod.—The *Journal des Télécommunications* (Berne) reports the death earlier this year of **Monsieur J. Bethenod** in his sixty-first year. **M. Bethenod** was well-known for his work in radio science and in the electrical field generally. At twenty years of age he published an original study on repulsion and asynchronous motors and our contemporary considers that his principal production was the high-frequency alternator which he introduced in 1907. In 1942 he was elected a member of the French Academy of Sciences.

Electricity in S.E. Europe

A DETAILED survey of the electricity supply situation in South-Eastern Europe has recently been published in the *Donauzeitung*.

Dealing first with Hungary, the author records that in 1942 a committee was appointed to draw up plans to assure an increase in power production in general and particularly to make the best use of Hungarian water supply. The findings of the investigators have now been submitted to Parliament. All existing electrical works throughout the country will have to contribute 2 per cent. of their gross revenues to pay for plant extensions; some four or five million pengos are expected to be contributed by this means. The programme accepted by the Government includes the erection of a dam and hydro-electric plant on the upper Tiza with an annual output of 500 million kWh and two other hydro-electric plants (location not given) to be completed by 1947. A company has been formed with a share capital of 16.5 million pengos to develop the use of natural gas for electricity generation in order to reduce the consumption of coal for power production (up to now responsible for 90 per cent. of the total output).

In Rumania similar developments have taken place. Wood and mineral oil were the main fuels used in power production, but these are rapidly being replaced by water-power. Hitherto, 57 per cent. of the country's electricity was produced by wood and mineral oil, 2 per cent. by water-power and 26 per cent. by coal. The plan to extend production by water-power has so far not made much headway owing to a shortage of necessary materials.

CORRESPONDENCE

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

Peaks and Voltage

AS a way of reducing maximum demands during certain periods, for example, between 8 and 9.30 a.m. on five days a week from the beginning of November to the end of March (105 days each year), a reduction of voltage could, I suggest, be carried out without ill effects by many undertakings if these now maintain voltage at the maximum permissible. It has been shown (F. S. Naylor, *I.E.E. Journal*, Vol. 79, p. 34) that a lowering of voltage by $2\frac{1}{2}$ per cent. gives the following percentage reductions in energy consumption: lighting, 4; heating, 5; wireless, 5.5; gaseous-discharge lighting, 6.25.

Taking the hypothetical case of a maximum demand of 3,000 kW, made up of 1,000 kW of lighting, 1,800 kW of heating and 200 kW of wireless, such voltage reduction would decrease the peak by about 140 kW. It would also effect a saving in fixed charges, at £3 per kW, of £420 per annum, ignoring a slight decrease in m.d. of losses. There would, on the other hand, be a loss of revenue through the fewer kWh sold, but this would not amount to much—£25 per annum under the conditions named. The increased net profit to the undertaking would thus be about £400 for 3,000 kW of m.d. Tests of a few seconds each, carried out at various times of the day with a stop watch and high-grade kWh meter, have confirmed these results in 90 per cent. of the cases.

Although this method has not been tried so far as I am aware, a voltage reduction in the neighbourhood of $2\frac{1}{2}$ per cent. during peak periods is, I believe, practicable and permissible where the right conditions exist. The result would bring benefit to the national generating system and financial advantage to the undertakings concerned.

Newton-le-Willows, Lancs. J. C. BEARD.

The Electrical Development Association

WHILST the activities of the British Electrical Development Association as outlined by Mr. V. W. Dale in your issue of June 23rd are interesting, there is in many people's minds some doubt as to whether the great electrical development which has taken place during the existence of E.D.A. has been due in any way to the activities of that Association or whether it would have occurred in any case.

However that may be, there can be no doubt whatever that the Association's advertising has been futile and far less effective than it could have been, bearing in mind the

fact that electricity should lend itself to most striking advertising in many ways without the necessity for adopting feeble imitations of the gas industry's "Mr. Therm." Admittedly, advertising in wartime is restricted, but I have on numerous occasions drawn the attention of various ladies to E.D.A. advertisements, and invariably the first reaction has been that they were not interesting, and the second reaction was: whose advertisement was it? Perhaps for some reason which is not very clear, it is considered undesirable for E.D.A. to be known to the general public.

I shall always remember the wretched example of utter ineptitude which comprised the E.D.A. stand at the last British Industries Fair at Birmingham, merely a massive looking structure where a relatively small number of people could go and ask questions and have a rest. The relative ineffectiveness of this display was thrown into high relief by the really wonderful display staged by the gas industry which was so striking that hundreds of people thronged round it all day and every day.

Whether this feeble state of affairs, which appears to have been emphasised since E.D.A. parted company with the manufacturers, is likely to be remedied in the future remains to be seen, but all the available evidence goes to show that a very vigorous overhauling of the publicity activities of the Association is long overdue.

Saddleworth, Yorks.

JOHN BAGGS.

Earth-Leakage Trips

WITH reference to an article on earthing which appeared in your issue of September 19th, 1941, by "Rotor," I should very much like to have the following paragraph amplified:—

"On the other hand, if direct earthing were employed in conjunction with a leakage trip connected to the motor frame (necessitating separate trips for each motor) the trip would operate in the event of a dangerous rise of potential on any connected metalwork between the motor and main switch. The trip coil would then receive the highest voltage on the framework less a negligible drop due to the passage of the trip current along the earth conductor. Separate leakage trips have the further advantage that only the effected motor is tripped out in the event of a fault."

My queries are: (1) Are the individual trips on each motor connected to a common earth electrode installed approximately 6 ft. from the main earth electrode? (2) In the case mentioned in the article the earth resistance

had a value of 0.1 ohm and the earth continuity condenser 0.2 ohm, but in actual practice in Northern Ireland values of under 2 ohms for the main earth electrode are in some cases impossible to obtain. In such circumstances I would be very interested to know if there is any method of connecting earth-leakage trips to provide independent isolation of motors of, say, 200 HP.

My point is that the high earth resistance combined with high fault leakage current would superimpose a voltage of over 40 throughout the installation, causing all the leakage trips to operate.

Belfast.

ELECTRODE.

["Rotor" has seen "Electrode's" letter and his reply is printed below.—Editors, *Electrical Review*.]

Where individual earth-leakage trips are employed it is essential that a common direct earthing electrode shall not be used for all the circuits, otherwise a fault on one section is likely to cause all the trips to operate. Furthermore, it is not advisable to use a common earth electrode for the individual earth-leakage trip coils, as the connection between any one trip coil and earth will then be shunted by other trip coils in series with any accidental or intentional direct-earthing connections for the framework of the plant.

Independent isolation of motor circuits due to earth faults can be obtained by using separate earth-leakage trips having independent earthing electrodes; the latter need not be of very low resistance. If direct earthing is also to be employed there should be a separate direct earthing electrode for the framework on each circuit; this electrode should be well spaced from the trip coil electrode and the trip coil should preferably be connected to the framework at the opposite end of the circuit to the direct earthing connection.

Post-War Development

IN the June issue of the I.M.E.A. *Journal* there appears an article under the initials "J.W.S." entitled "Post-War Development—What's in a Name?" The first part of the article, by means of a number of trite criticisms, endeavours to set out the dangers of over-centralisation, but the final paragraph seems to call for some comment. The author states that "the electricity supply industry on the whole is well managed—so why worry about—reorganisation, regionalisation, etc.—What's in a name? If we are to accept some form of altered control let it be 'public control and ownership' as outlined in the Joint Memorandum prepared by the Electricity Supply Associations."

In view of the signatories to the Memorandum and the statement therein that

"unless it can be proved that consumers will derive substantial and permanent benefit thereby, the ownership and organisation of existing undertakings shall not be subject to drastic alteration," it seems to be somewhat of an exaggeration to claim that the Joint Memorandum advocates "public ownership and control."

Further, we are asked to "let evolution do its work unhindered—revolutionary changes will not be to the ultimate benefit of the consumer." May we assume from this that the somewhat revolutionary recommendation contained in the Brown Memorandum, that all generating stations at present owned by authorised undertakings be transferred to the Central Electricity Board, has now been thrown overboard? And does the I.M.E.A. Council know where it is going?

ELECTRON.

Plugs and Sockets

IT is quite legitimate under existing I.E.E. rules to wire three 5-A socket outlets looped on 7/029 in. cables and connected to a 15-A fuse on the distribution board. The 5-A socket is generally accepted as a domestic size, and do what we will the householder will connect any portable appliances ranging from a radio set to an electric fire to his 5-A plugs. As the fuse is generally of the wire type, he will, moreover, replace it when it blows with whatever wire he has to hand. Thus the safety and protection offered by strict adherence to existing I.E.E. rules by the contractor boils down to the fault current attainable with a short-circuited domestic appliance connected by 7/029 in. cables to a problematical 15-A fuse wire. Laboratory tests will, I think, prove the amount of energy released in a short-circuit under these conditions to be very much greater than that possible using Mr. Amberton's 13-A h.r.c. fuse, whilst, of course, his system has the great advantages of simplicity, interchangeability and cheapness.

The theorists who would like to attain perfect conditions in domestic installations must come down to earth and would be advised to devote their energies to prohibiting the manufacture and sale of the "cheap and nasty" appliances which are usually the prime cause of the trouble, but so long as the householder is able (and he always will be) to connect his own plugs and replace his own fuses then so long will we see fires plugged into lampholders and clocks connected to power points with hairpins in the fuse bridges. The ring main, by ensuring an adequate number of outlets with complete interchangeability, and the fused plug, by offering almost foolproof protection of a known standard, are the only answers so far.

May I also be allowed to put in a plea

for standardisation of another article which appears to have been overlooked. I refer to the appliance connector used for connecting the flexible to the iron, kettle, etc. In my own home I am obliged to use four different sizes on various makes of appliances. This, in conjunction with two sizes of plug, makes quite an imposing assortment of leads to be used. Surely not even those who object to a standard plug and socket would oppose this, or do they maintain that even in this matter "variety is the spice of life"?

High Wycombe.

B. RAYNOR.

FROM Mr. Moss's letter in your issue of June 30th it seems that his argument about the spacing of the pins is due to a certain degree of conservatism. No plug has previously been made to carry a relatively large load in comparison with its size, but there is no reason why it should not be made. If the plug carries 2 A or 13 A on our normal supply voltage, I fail to see how it can be dangerous or undesirable, as the pins are of sufficient diameter to carry full load. I would like Mr. Moss to say what exactly is wrong with the plug and not to use an argument which has nothing to do with the matter.

That the new plug is not wanted by the trade seems unlikely in view of Mr. Atherton's and Mr. Illingworth's letters, and it is rather curious that all the people with whom Mr. Moss has discussed the plug share his opinion of it. I believe, however, that the cord grip can be improved upon. At the present time quite a few manufacturers are using a clamping bar made of fibre, held on to the flex by means of two screws. By using this device in conjunction with an entry hole of triangular or similar shape, a large variety of flexibles can be securely clamped. The size of the plug would not be greatly increased by the use of such a device.

With regard to Mr. Moss's criticism about the rating of the plug, I think he has misunderstood Mr. Illingworth's point of view. Mr. Moss also refers to reliability and quality. The ring main has still to undergo certain trials, and if they should prove successful as I believe they should be, I am sure that the I.E.E. and all supply authorities will approve such a design.

Reliable firms usually make reliable articles, and although rubbish will always be made, a solid article, which in my opinion includes the described plug, will always have a good sale and be beneficial to the name of the firm producing those articles.

London, W.C.1.

J. VAN BUEREN.

WE have followed with interest the correspondence that has taken place for the past few weeks regarding domestic plugs and socket outlets. We have also seen with some concern that a particular design of plug and socket is being widely

advertised as the "domestic standard" plug and socket. This particular article departs in almost every respect from the plugs and sockets complying with the current British Standard Specifications, and the use of the term "Standard" in connection with the article referred to above is to be deplored.

It should be clearly realised that only the current B.S. Specifications for plugs and sockets are revised or replaced by a new specification. No new design of plug and socket can be regarded as having received the approval of this Institution. The manufacturers of the so-called "domestic standard" plug and socket no doubt adopted this description in good faith without in any way intending to convey the impression that the article had been approved as a standard. Those, however, who are not fully conversant with the discussions that are at present going on with regard to the standardisation of plugs and sockets for the post-war housing programme may be rather puzzled, if not misled, by the publicity which has been given to this new article.

London, S.W.1.

P. GOOD, *Director,*
British Standards Institution.

Registration of Contractors

REFERRING to the matter of the compulsory registration of electrical contractors, I may say that during some thirty years in the installation trade most of the faulty work I have come across has been done by amateurs and householders rather than by incompetent electrical contractors.

As matters stand, every new installation is subjected to a rigorous inspection and test by the supply authority, and the contractor is therefore compelled to observe the Regulations. The trouble begins when the consumer decides to make alterations or additions himself. We all know the householder who buys a 2-kW fire, and connects it to a 2-A plug or the nearest lampholder. When the fuses go, he can replace them with 15-A wire now obtainable at every general stores.

I recently saw a 5-A socket wired in thin flex, teed into the main cable just above the main switch. This was stapled round the walls and run through holes in brickwork into the next room. The occupier told me that his son had done it and was surprised when I pointed out it was both dangerous and unworkmanlike.

Surely meter readers might be instructed to look out for and report such examples of shoddy work. The average man is scared of doing his own gas-fitting or plumbing, but sees no danger in tinkering with his electrical installation. The consumer needs

to be guarded against his own folly, and I fail to see how compulsory registration of contractors is going to achieve this end.

Wellingborough.

F. COOPER.

A Service Man's Views

CORPORAL C. RICHARDSON is entitled to his views and I have pleasure in answering his queries. Firstly, I am a small contractor, but have been an advocate of compulsory registration for many years, not from personal motives but simply because I would like to see the contracting industry cleaned up. This cleaning-up can only be accomplished by some form of licensing of employers and employees. The reasons for my point of view are the numerous horrible examples of installations that I have examined over a period of thirty years and in many

of these cases the "big stick" was necessary.

Consumers would not be called upon to pay towards registration; the cost would be borne by the employers and operatives. Apprentices and craftsmen should be safeguarded and I would have every sympathy in that direction. I might ask the Corporal, however, who is to safeguard the small contractors, many of whom have been pushed out of business and who get no assistance from the Government? On the plug and socket question I have already expressed my opinion and my views thereon have not altered.

In the meantime I wish Corporal Richardson and all his colleagues the best of luck in "registering" the knock-out blow to the enemy.

Glasgow.

ALEXANDER MILNE.

Electric Vehicle Association

Past Year's Report

WE have received the report of the Electric Vehicle Association of Great Britain, Ltd., for the year ended December 31st last which was presented at the annual meeting on June 21st. This sets out in full the names of members of the various committees and notes that during the year Mr. V. W. Dale was appointed secretary in succession to Mr. A. C. Cramb. Other changes in representation were as follows:—B.E.A.M.A.: Mr. H. V. Schofield in place of the late Mr. E. S. New; Metropolitan-Vickers Electrical Co.: Mr. W. Heyman in place of Mr. A. Mackenzie Wallis; Chloride Electrical Storage Co.: Mr. W. H. Denby in place of Mr. H. V. Schofield.

The list of members shows five representatives for the British Electrical Development Association; two for B.E.A.M.A.; one for the Electrical Contractors' Association; one for the Commercial Motor Users' Association; fourteen for electric vehicle manufacturers; ten for accumulator makers; two for charging equipment manufacturers; one for an accessories manufacturer; and five "personal" members. It is stated that the Association is considering encouraging the enrolment of service depots and distributors as associate members.

Advertising has been carried out in a number of trade papers and as a result of this and other activities 245 special and general inquiries have been dealt with. A sum of £320 was contributed by the E.D.A. to the total of £784 spent on advertising. Members also paid an additional levy of £3 3s. 0d. each for the purpose. There was a small surplus of income over expenditure.

Standard Vehicle

During the year the first prototype national standard electric vehicle was completed and a deputation led by the president (Sir Felix Pole) met the Minister of War Transport, Sir Cyril Hurcomb, Mr. F. G. Smith and other Ministry officials, when the vehicle was demonstrated. A leaflet embracing an abridged specification was prepared and application for authorisation

to manufacture the vehicle was made to the Ministry of Supply. Arrangements are in hand to make the vehicle available in London for inspection.

A small committee was formed to deal with the withdrawal of certain authorisations for the manufacture of electric delivery prams and a deputation was received by the Ministry of Supply. Information has been submitted by some members of the Association direct to the Industrial Supplies Department of the Board of Trade concerning obstacles likely to confront the electric vehicle industry immediately after the war and other matters having an important bearing on rehabilitation of equipment and technology and the manufacture of repair parts and goods for stock during the change-over.

Difficulties in obtaining supplies of material and labour persist and licences for road vehicles are still being granted only for work of national importance.

Forthcoming Events

Saturday, July 15th.—Barnsley.—Queen's Hotel, 3 p.m. Association of Mining Electrical and Mechanical Engineers (Yorkshire North-West Branch). "High-frequency Drills," by Mr. P. P. Hartley.

Wednesday, July 19th.—Birmingham.—Imperial Hotel, 10.30 a.m. Electrical Contractors' Association and Allied Associations. Annual general meeting.

Saturday, July 29th.—London.—Oak Restaurant, 18-24, Kensington High Street, 6-10 p.m. I.E.E. London Students' Section. Summer dance.

Telephone Progress in Switzerland.—The *Journal des Télécommunications* (Berne) says that steady progress is being made in converting the country's telephone system to automatic operation and that 89 per cent. of Swiss subscribers are now equipped with automatic apparatus.

COMMERCE and INDUSTRY

Drumm Battery Secrecy. Leyton Hire Proposals.

Power Engineers' Salaries

THE National Joint Board of Employers and Members of Staff (Electricity Supply Industry) announces that there will be no cost-of-living adjustment of electrical power engineers' salaries for the half-year ending December 31st next. The figures will therefore remain adjusted to five points of addition as shown in the Board's circular dated December 1st, 1943, and reproduced in the *Electrical Review* of December 10th, 1943.

The Drumm Battery

A great deal of secrecy has surrounded the Drumm storage battery since its introduction some years ago. The Irish Government has an interest in the company producing the battery and a train operated by Drumm batteries has been running between Dublin and Dun Laoghaire (Kingstown).

A recent attempt in the Dail to obtain information about the battery proved fruitless. Answering Deputy Briscoe, who made the inquiry, the Minister for Supplies, Mr. Lemass, said that during the emergency, the operations of the Drumm Battery Co. had been suspended and a decision as to the future could not be reached. In the circumstances no indication could be given as to when a report on the battery might be made.

"Homes of To-morrow" Exhibition

Among the exhibitors at the *Yorkshire Evening News* "Homes of To-morrow" exhibition which is being held at Lewis's, Leeds, until July 22nd, are the British Electrical Development Association, De La Rue Plastics, Ltd., and the British Vacuum Cleaner & Engineering Co., Ltd. So great was the attendance at a "Women's Day" organised by E.D.A. that two meetings had to be held. The lecture hall at the exhibition holds 200, but women's organisations requested seats for 400. The speaker, Mrs. A. L. Hayes, had for her subject "Homes of To-morrow," and the chairman was Mrs. A. Kaye, president of the Yorkshire Federation, Electrical Association for Women.

Ottawa Purchase Proposal

The Ottawa Hydro-Electric Commission has adopted a resolution to begin negotiations immediately for the purchase or control of the assets of the Ottawa Light, Heat & Power Co., which has a capital of \$10,000,000. The resolution, adopted unanimously, now goes to the Ottawa City Council.

Reigate Showroom Tableaux

The Reigate Corporation Electricity Department introduced a novel feature in support of the local "Salute the Soldier" campaign. In one of its showroom windows a section of the battlefield in North Africa was portrayed in miniature, all troops and apparatus being placed in proper battle order attacking an enemy strong point, and even a first line air unit and tanks were included. In a second

window there was a full display of massed bands performing outside Reigate Castle. The bandsmen, numbering 236, comprised units from each of the Guards Regiments, together with drums and fifes. Many congratulations have been received by the Department.

Study of Illuminating Engineering

Fewer students appear to be studying illuminating engineering in the United States. A survey of one hundred colleges and universities has revealed a wartime tendency of students to choose courses in communications in preference to lighting. The result is a shortage of young illuminating engineers now and the possibility of a greater lack of trained men for future needs. Out of more than half of the survey returns, only three colleges were able to say that they are at present conducting courses in the principles of illuminating engineering and in each case to skeleton classes.

N.F.S. Competition Successes

N.F.S. brigades in the North-West Region took part in a display and competition at Peel Park, Accrington, on July 1st. The English Electric Co. won the cup given by Fire Force Commander Blackledge for the best collective effort. The English Electric Co. also won the light trailer pump competition, with the B.T.H. Co. second. The large pump competition likewise went to English Electric, with the Dunkerhalgh Works second. In the N.F.S. part-time v. works brigades contest, the N.F.S. "B" team came first, English Electric West second and B.T.H. third.

Manufacture in Spain

The Sociedad Industrias Termoelectricas has, according to *Metalurgia y Electricidad*, recently been officially authorised to proceed with the establishment of works in Bilbao for the production of nickel-chrome, duraluminium and other wires of alloy metals. The Sociedad Espanola de Construcciones Babcock & Wilcox has also lately started works in Bilbao for the production of weldless steel tubes up to a diameter of 273 mm. The plant has, it is stated, an annual capacity of 19,000 metric tons.

Other developments include new works to be set up in Seville by the Sociedad Española de Carburos Metalicos for the electrolytic production of hydrogen and liquid acetylene; and new works at La Felguera to be erected by the Sociedad de Productos Quimicos Sinteticos for the electrical manufacture of carbide of calcium, the plant to be capable of producing about 6,000 tons per annum. A new company is also in course of formation to establish works at Cardona for the electrical production of caustic soda, hydrogen and other associated materials.

Spanish manufacture of electrical machinery, tools and equipment has increased considerably in the course of the last few years, reports the German official news agency from Madrid. In 1941, the country's imports of the above-mentioned goods amounted to 45 million

"gold" pesetas. In 1943, however, Spanish manufacturers produced goods to the value of about 500 million pesetas and imports decreased to 15 million pesetas. About 60 per cent. of the entire imports are provided by Germany, and Switzerland and Sweden jointly supply about 20 per cent. of the requirements.—*Reuter's Trade Service.*

Hire Policy at Leyton

Mr. A. E. Morgan, who was last year appointed borough electrical engineer and manager of Leyton, Essex, has submitted a preliminary report on the post-war development of schemes for the hire and hire-purchase of domestic electrical apparatus. The engineer's proposals, covering all types of apparatus, have been approved in principle by the Electricity Committee.

At a Council meeting Councillor A. W. Bourne, chairman of the Electricity Committee, said it was felt that after the war there would be much wider recognition of the value of electrical labour-saving devices. The Committee proposed to encourage the use of good electrical appliances of all types and to bring them within reach of the public. All appliances in general use except those selling at a low price should, it was suggested, be included in a hire-purchase scheme. Hire charges should include free maintenance and free installation and house wiring should be regarded as an essential part of the scheme and should be resumed as soon as possible.

Lighting Equipment

Open-lamp and reflector fittings of 28 different designs for 80-W, 5-ft. industrial fluorescent lamps are mentioned, including a flameproof model, in a folder (L.742/M) and price list issued by the British Thomson-Houston Co., Ltd., Crown House, Aldwych, London, W.C.2, which has also circulated "Business Guide L.749/M, Lighting Series No. 1," being a 44-page pocket size catalogue of general industrial lighting equipment indicating the latest price advances.

Ultra-Violet-Ray Treatment

The fourth edition of an illustrated 16-page booklet entitled "Fitness in Industry," which has been compiled by Hanovia, Ltd., to provide information for welfare workers about tonic "sunbaths," indicates how helpful are ultra-violet rays from quartz lamps for maintaining the health of factory and office workers despite long hours and short holidays.

Lecture Theatre Lighting

Apart from any consideration of actual intensity, the first essential in the lighting of a lecture theatre is the absolute avoidance of glare. In the lecture theatre at the King Edward VII Nautical School, Commercial Road, London, E.14, the re-planned lighting has been carried out with "Glassteel" diffusers and Siemens 150-W standard tungsten filament lamps; the ceiling height is 18 ft. and the diffusers are mounted at 12 ft. 6 in. from floor level. This mounting height gives a completely uninterrupted view of the lecturer, blackboard, charts, etc. The illumination intensity is approximately 14 to 15 ft.-candles, with a pleasing very smooth

result, devoid of any harsh shadows. A chart bench running the whole length of the theatre has local lighting by means of 40-W standard tungsten filament lamps in intensive-type reflectors on "Invisaflex" adjustable arm fittings.

The lighting was planned by the Illuminating Engineering Department of Siemens Electric Lamps & Supplies, Ltd., in collaboration with the architects, George Baines & Sons, and the installation work was carried out by Electricity Services, Ltd.

Standards for U.S. Radio Exports

American radio manufacturers propose to set up minimum standards for radio sets intended for export after the war and a special committee of the American Radio Manufacturers' Association has been established to consider the requirements of receivers for export.

American Housing Exhibition

An exhibition of photographs telling the story of American housing before and during the war is to be held at the Royal Institute of British Architects, 66, Portland Place, W.1, from July 19th to August 26th. It has been prepared by the Museum of Modern Art in New York and has been brought here by the U.S. Office of War Information.

Metal Hacksaws

Power-driven hacksaws for cutting metal are described in a leaflet (A.151) circulated by Edward G. Herbert, Ltd., Atlas Works, Levenshulme, Manchester, 19. The light-duty machine has a 6 by 6 in. capacity and utilises a 14 in. blade. It has a double reduction V-rope motor drive and is fitted with a clutch. The four larger "Rapidor" sizes are intended for heavier duty production work, with capacities up to 12 by 12 in. They have overhung driving motors with push-button starters bolted to the machine frame and an adjustable automatic stop for arresting saw motion at any desired depth of cut.

Welding Electrodes

Electrodes with specially compounded "Bronalex" coating to enable complex aluminium-bronze alloys of high tensile strength to be more easily welded for repair, salvage and fabrication are the subject of a leaflet (M.35) issued by Murex Welding Processes, Ltd., Waltham Cross, Herts. These electrodes contain aluminium 10 per cent., iron 4 per cent., nickel 4 per cent., and are claimed to be more advantageous than tin-bronze alloys, which are liable to fatigue in service, for the welding of copper-rich metals which has only recently been done with any degree of success because of the formation of tenacious films of aluminium oxide when welding or casting.

Dust Collection

Many industrial processes create dust in considerable volumes. Means of efficient collection are discussed in a 23-page illustrated publication (No. 441) of the Visco Engineering Co., Ltd., Stafford Road, Croydon, Surrey. The plant described is of various kinds, ranging from large factory installations down to models designed to serve a single machine tool or grinder and adaptable to almost every kind of powder and

fibrous material, or fumes. Simple cyclone working on the centrifugal force principle is reasonably efficient, but when a material proportion of fine dust is mixed with coarser particles a textile filter may have to be added, for which a wet arrestor can be substituted when the refuse is conveniently recoverable as a sludge.

Change of Name

Stichling Electrical Equipment, Ltd., 12, Warren Court, Euston Road, N.W.1, has changed its name to Malden Electrical Equipment, Ltd.

Trade Announcements

The Albion Electric Stores are moving to Dover House, 36, Piccadilly, Bradford. The telephone number remains unchanged.

Simpson, Baker & Co., Ltd., have moved their stores and sales departments to 1-3, Broad mead, Bristol, 1.

The Gresham Electrical Co., has moved to 17, Percy Street, Tottenham Court Road, London, W.1 (telephone: Museum 5774).

TRADE MARK APPLICATIONS

THE following applications have been made for British trade marks. Objections must be lodged within a month from July 5th.

MISTRAL. No. 628,439, Class 7. Electric motors (not for land vehicles), electric generators, and parts thereof not included in other classes. No. 628,440, Class 11. Fans (not for personal use); blowers for cooling and ventilating.—Hugh J. Scott & Co. (Belfast), Ltd., Volt Works, Ravenhill Avenue, Belfast.

UNITAS. No. 623,836, Class 9. Electric lighters for smokers and for gas, soldering irons, electrical apparatus for domestic and household purposes not included in other classes, and heating elements for all these goods; electric plugs and adaptors, vacuum cleaners and sweepers, floor polishers, torch lamp batteries; scientific, nautical, surveying, photographic, cinematographic, optical and wireless instruments and apparatus; electric bells; cases for electric pocket lamps; electric cables, etc.—Scottish Co-operative Wholesale Society, Ltd., 95, Morrison Street, Glasgow, C.5.

WANDALITE (design). No. 627,933, Class 11. Adjustable standard lamps.—Cornercroft, Ltd., Ace Works, Queen Victoria Road, Coventry.

INFORMATION DEPARTMENT

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

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

"KINETIC" organ blower.

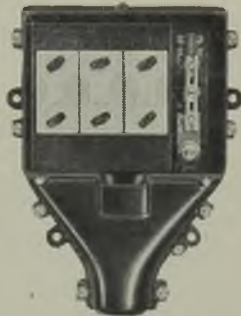
Recent Introductions

Service Cut-outs

A NEW range of ironclad cut-outs for indoor installation is announced by W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., Milton Court, Westcott, Dorking, Surrey. These four-pole "Isco" service fuse housings have combined vertical entry sealing chambers; they are suitable for h.r.c. cartridges with $3\frac{1}{4}$ in. centres, of varying capacities from 60 to 400 A.

Features of interest are that the cartridge carriers, made of glazed porcelain, embody an efficient grip, shaped insulated knobs for operating the wedge tightening devices, and an unglazed square recess on the front for recording the rating of the fuses. The incoming and the outgoing cable connection fittings, mounted on an insulating base, are of the non-sweating type with the exception of the incoming fittings on type-CF. Various arrangements of outgoing phase and neutral conductor fittings are available for cables up to 0.15 sq. in. for type-CE and up to 0.3 sq. in. for type-CF.

The sealing chambers are provided with wood bushes,



"Isco" indoor service cut-out

but brass wiping glands can be fitted if required. The "universal" glands are of substantial construction with a tapered portion grooved to facilitate cutting to suit various diameters of cable. The glands are supplied with minimum bore so that they may be easily cut on site as required to suit larger diameter cables.

Micanite tubes can be supplied, if required, for fitting over the conductors at compound level. An earthing screw is provided, but a clamp type earthing socket can be supplied if required.

Wire Tester

The latest addition to the wire testing equipment offered by WATFORD INSTRUMENTS, Loates Lane, Watford, Herts, is a machine for gauging the elongation of wire before fracture.

A sample 10 in. length of wire is attached to two clamps, one fixed and the other on a moveable carriage carrying a pointer that registers against an adjacent scale calibrated in percentages of the original length of the specimen. When the stretched sample breaks, the carriage is automatically stopped so that the scale indicates percentage elongation before fracture.

The carriage is moved by a pair of half-nuts engaging with a lead screw, which is driven through V-belt reduction gear by a G.E.C. split-phase 230-V motor. The limit switch is of Burgess manufacture. Subsequent tests are made by instantly disengaging the half-nuts and returning the carriage by hand to its starting position.

NEW BOOKS

Power Station Design. The Ionosphere Simply Explained.

Electric Power Stations, Vol. I. By T. H. Carr, M.I.E.E. Second Edition. Pp. 507; figs. 249. Chapman & Hall, Ltd., 11, Henrietta Street, London, W.C.2. Price 32s.

The publication of a second edition within three years of the first is a good indication of a need to be met. The present volume has been enlarged by the inclusion of some new material and revised in the light of suggestions made by reviewers of the first edition. This volume deals mainly with mechanical and structural features of power station design, gives reasonably full explanations of the effect of the many factors which have to be taken into consideration, and discusses the comparative merits of various types of plant.

The statement on page 12 that with pulverised fuel firing a higher thermal efficiency has been noted with coal of 9,500 BThU per lb. than with coal of 10,500 BThU per lb. is rather surprising and one can only surmise that this was an exceptional case, for boiler efficiency generally increases with calorific value. In the second paragraph on page 23 the word "adiabatically" needs inserting after "expanded" for if the expansion were isothermal the statement would be incorrect. The section dealing with gain in cycle efficiency with increase of steam pressure and temperature could with advantage be made clearer by including a further set of curves resolving the bottom curves on Fig. 12 and corresponding curves of adiabatic heat drop in Fig. 13 into a group of curves giving theoretical heat consumption. This would show the potential gains more clearly. In discussing the worth of thermal efficiency it would have been advantageous to have brought out that in practically all cases a relatively high load factor can be given to new plant.

The amount of make-up water for cooling towers is given as 1 per cent. of the flow. Actually the quantity evaporated by the towers is governed entirely by the quantity of steam passing to the condensers and can be more rationally stated as a proportion of that amount, usually about 95 per cent. Atmospheric conditions do not have much influence on the value.

The book is a good general summary of the art of power station design and its value is appreciably increased by the very complete and up-to-date bibliography at the end of each chapter, so that any reader can readily find where to obtain detailed information on any points discussed in the chapter.—J.N.W.

Radio Waves and the Ionosphere. By T. W. Bennington. Pp. 81; figs. 27. *Wireless World*, Dorset House, Stamford Street, London, S.E.1. Price 6s.

This little book sets out to explain the ionosphere in simple terms for the benefit of those having only a slight background of mathematics and physics. The task is clearly a difficult one although the subject can be made of great interest to any general reader with a scientific turn of mind. In few departments of applied

science have there been such unexpected "breaks" in the general line of progress as that which the discovery of the propagation to great distances of short waves brought to radio engineering.

The author has largely succeeded in his task. His style is interesting and the reader is gently led on from fundamentals concerning wave motion till, on reaching the end of the book, he should have quite a detailed knowledge of the ionosphere, its structure, its treatment of radio waves and its vagaries. The mechanism by which long waves reach a distant point on the earth's surface may not, however, be appreciated. Only in the small type in Table I is the reader clearly told that the ionosphere plays a vital part in long-wave transmission. From the main text he might easily suppose that diffraction of the purely ground wave was the sole phenomenon involved whereas we know that this alone would give negligible field strength at great distances. It was a realisation of this fact which caused Heaviside and Kennelly to postulate the existence of the ionosphere.

Almost inevitably, some of the explanations are not very convincing, as, for example, the discussion on wave velocity and on the effect of the earth's magnetic field. The behaviour of obliquely-incident rays might be more easily understood if it was clearly stated that the amount of bending decreases with increasing frequency and the vertically-incident pulse, which has already been discussed, re-stated as a special case of oblique incidence.—C.R.S.

Porcelain and other Ceramic Insulating Materials.

Vol. I. By Dr. Ing. Ernst Rosenthal. Pp. 287. Chapman & Hall, Ltd. Price 28s.

There are comparatively few books on the manufacture of porcelain as British porcelain manufacturers have tended to disseminate their craft and technology directly from workman to workman rather than through the medium of print. It may be partly for this reason that electrical engineers know little about the manufacture of one of the principal insulating materials—the only insulating material, apart from glass, which is suitable for outdoor use. Dr. Rosenthal's book is therefore welcomed as it should do much to give electrical engineers a better understanding of this important material.

The book may be considered in three main parts, the first dealing with the characteristics and testing of porcelain and raw materials (Chapters I-VII), the second with manufacturing methods (Chapter VIII), and the third with high-frequency ceramics (Chapters IX and X).

The first part gives details of test methods, and is based mainly on American and German standard specifications. Data are given on the electrical and mechanical characteristics of porcelain, and comparative figures are also included for some plastics. These figures have been collected from a number of sources, and it would have assisted the non-specialist reader if the author had used a consistent nomenclature and system of units. For example, there are references to "bakelised paper," "laminated phenol resin," "laminated phenolic

paper filled," and "laminated phenolic paper base"—all of them being presumably the same material.

The second part is devoted to the preparation of porcelain bodies and glazes, mixing machinery, shaping methods, drying, firing, and temperature recording. It contains much useful information, and, in particular, the hints to designers of porcelain articles given on pp. 187-189 should be found helpful. Electrical engineers will be interested to note that the use of electricity for heating high-temperature tunnel kilns now appears to be quite practicable. It seems, however, from the table on p. 227 that, in the case of existing kilns, oil or gas firing is generally used. The third part dealing with high-frequency ceramics will be of most interest to the radio engineer. Details are

given of the constitution and characteristics of the various low-loss and high-permittivity bodies.

In general, the descriptive matter is clearly written although there is rather a large number of misprints and minor errors. For the most part, these errors are obvious mistakes, but in a few cases they might cause the reader some difficulty. For example, the 50-cycle dry flashover of the insulator shown in Fig. 5(a) should not be 950 kV, but about half this value. Further, in the discussion on X-ray diffraction (p. 121), CB is not the path difference as stated. In addition, the meaning of "hydraulic propellers of the vestibule type" (p. 221) is not clear. The book is well produced and illustrated, and should be a useful addition to the electrical engineer's reference library.—J.S.F.

Electricity and Metallurgy

Survey of Recent Developments

THE interplay between the electrical and metallurgical sciences has resulted in the advance of both and this article summarises a number of the more important recent developments. Electric furnaces are being made of higher outputs. Methods adopted include scrap improvement through washing, briquetting and the use of a roasting medium and low-carbon steel turnings and through quicker loading.

Amplidyne generators are being used for the regulation of electrode motion in arc furnaces for steel manufacture. Each electrode motor is supplied by an individual amplidyne.

For automatic operation the control field of the amplidyne is provided by a system in which a voltage proportional to the electrode current is opposed by a voltage proportional to the arc voltage. When these voltages are balanced, no field is applied to the amplidyne and zero voltage is applied to the electrode motor. Any variation in the operating conditions of the furnace destroys this balance, and the consequent voltage is applied to the control field. The ensuing power output of the amplidyne causes the electrode motors instantaneously to vary the height of the electrodes until voltage and current vectors once more achieve equality.

Investigations have been carried out upon the influence of variations in power input and duration of current flow on the microstructures of carbon steels hardened by the induction process at frequencies of 3,000 cycles per sec. These appear to have demonstrated that the surface hardness obtainable depends on the carbon percentage, rising from Rockwell C 61 for 0.35 per cent. carbon steel to C 68 for 0.7 per cent. carbon steel, the best depth of hardness ranging from 0.125 to 0.150 in. The electrical input is

proportional to the volume of steel hardened and is expressed as $V = 0.0024P - 0.12$, when V represents the volume of steel hardened and P the kW-sec. input. This applies to a steel of 43.6 Rockwell inches. To harden a unit length of a round bar to a specified depth, the power input necessary increases directly with the diameter of the bar. For a specified bar diameter and power input, a variation of one Rockwell inch increases the depth of hardening by about 0.0025 in.

Experiments have been made in Germany with a resistor furnace of cylindrical tilting type, which is heated by radiation from one, two or three horizontal graphite rods passing through it. A 2-cwt. furnace is said to have produced 196 heats with an average consumption of 1,420 kWh per ton. In a total of 551 heats with a charge weight of 49.59 metric tons total, the electricity consumption was 1,880 kWh per ton of steel, which is claimed to be extremely clean and as good in quality as crucible steel.

Combustion risks in industrial furnaces fired with oil, gas, or pulverised fuel are being reduced by the use of electrical controllers for fuel valves based on the electrical resistance of a flame actuated by photo-electric cells in such a manner that, if the flame drops, the fuel supply is immediately cut off. Instruments giving precise indications of the quantities of moisture and oxygen present in hydrogen are reported to be obtainable in the United States for use with heat treatment furnaces. The gas is passed in a continuous stream through the instrument.

For the measurement and control of high temperatures, "solid" photo-electric cells are claimed to represent an advance on the normal photo-tube pyrometers because of

By **L. Sanderson**

their extremely high sensitivity. These cells are made up of a layer of selenium upon a metal disc with a thin, transparent film of gold on top. Radiant energy traverses this film and is absorbed close to the upper surface of the selenium layer, thus liberating electrons, which flow in the direction of the film.

For keeping the tops of steel ingots hot an electric arc from a carbon electrode has been employed with 8-in. sq. ingots at one steel plant; the electrode consumption was $\frac{1}{2}$ lb. per ton of ingot and the power consumption 14 kWh. The same method applied to the vertical casting of large rolls for rolling mills enabled the weight of the feeding head to be decreased to 31 per cent. of the weight of the casting and the consumption of power to be reduced by approximately 24 kWh per ton of metal cast.

Metallic arc welding of high-sulphur free-cutting steels has been found to present a number of difficult problems, and experiments have been carried out with mild steel and dead-soft steel electrodes. While the ability of these steels to be arc welded inevitably fluctuates with either form of electrode, in general dead-soft steel electrodes are better than those of mild steel for this work.

Progress has been made in the electric welding of tubes. It has been established that the most effective method of conveying the current to the welding electrodes is to rotate the transformer and electrode rolls on a common shaft running in anti-friction bearings. The current is carried to the primary side of the transformer by a commutator and brush. On the secondary side the current is carried through a copper sleeve, on which one of the electrode rolls is mounted, returning through another electrode roll mounted on a further copper sleeve insulated from the first.

Helium in Welding

In the heliarc process of welding stainless steel, a special torch contains a carbon electrode around which flows helium gas in a steady stream. The specific heat of helium being above five times that of air, the gas when in motion stops heat from collecting about the weld, thus cooling it and producing superior penetration with reduced warping or distortion. Stainless steel of less than 0.01 in. in thickness is said to be readily welded by this process.

Developments in the galvanic coating of stainless steel with metal, such as copper for the bottoms of some cooking utensils, include the abandonment of concentrated acid for the baths and the addition of a greater amount of chlorides (as compared with usual practice in nickel baths) and of organic acids.

A new process for lengthening the life of high-speed steel tools has been brought out in the United States. Hitherto, chromium

plating has not done all that was hoped of it, owing to embrittlement of the tool by absorption of hydrogen. The plating solution is composed of 50 oz. of 99.75 per cent. chromium-trioxide dissolved in water, to which 0.5 oz. of concentrated sulphuric acid is added. The bath temperature is maintained between 110 and 150 deg. F. and current density between 130 and 200 A per sq. ft., depending upon the dimensions of the tool. The tool itself has $\frac{1}{4}$ in. of the cutting edge immersed in the plating bath and becomes the anode for a brief period with a high current density. Reversal of the current then takes place, the tool constituting the cathode. The anodes are of lead or stainless steel. When plated, the tool is washed in cold water and dried, placed in an oil bath at 350 deg. F., held there for 60 min. and then air cooled. The oil bath prevents hydrogen embrittlement.

Metal Spraying Method

A new electrical method of metal spraying gives a better adhesive surface when coating worn or other parts of hard steel. A series of six electrodes made of an alloy high in nickel content is clamped between cooling discs in a holder. These and the steel to be dealt with are linked up by flexible leads to the secondary coil of a small transformer with an open circuit voltage of 9 V, maximum. The surface to be roughened is stroked quickly and gently with the extremities of the electrodes. Heat is generated at the points of contact and this creates a metallic foam to be fused on to the base metal.

Detection of cracks by comparing the electrical resistance of the metallic wall being tested with that of a correspondingly shaped wall of identical metal, known to be without cracks or discontinuities, has been widely adopted in this country. Cracks have thus been found in cast-iron plate $\frac{1}{2}$ -in. thick.

Electro-magnetic apparatus for detecting flaws in metals and for establishing the thickness of non-magnetic coatings and checking the uniformity of their surface structure has been developed in the U.S.S.R., which has also produced a magneto-metallographic analyser by means of which the microstructure of various magnetic alloys is pictured. To achieve this, magnetised polished sections are covered with stable magnetic colloids having a particle size of approximately 10^{-5} and studied when magnified 500 diameters.

Permanent magnets are being made by pressing a crushed and finely powdered alloy at a temperature below the sintering point, employing a synthetic resin binding medium. Their magnetic properties are about one-fifth of those of the ordinary cast magnets. It is claimed that the process, which is German, can be applied to the mass production of permanent magnets.

Locomotive-Shed Lighting

Portable Equipment to Facilitate Repairs

GENERAL lighting of the usual works type often cannot be provided effectively in steam locomotive running sheds, chiefly because of the narrow spaces between adjoining engine roads. Wartime black-out conditions add a further difficulty, even during daylight hours. So, to speed up the overhaul of locomotives, the L.N.E.R. has designed portable equipment for the illumination of engines undergoing repairs, and six sets are to be tried out at various running sheds.

For convenience and to economise flexible

sockets must have three cores; the main plugs and sockets are of the three-pin type.

All the portable lighting fittings will be "Home Office" type handlamps so that earthing of their metal parts is not necessary, and the flexible cables between the distribution boxes and the portable lighting fittings will therefore be 2-core.

Fixed plug points are of the 15-A 3-pin type situated over the alley way at a sufficient height to clear a man leaning out of the cab of a moving engine, one each side of an engine under repair, so that the main flex connected to each distribution box does not have to cross over the engine. The number of pairs of fixed plug points depends upon the number of engine positions for repairs and varies with each shed.

The plugs and sockets at the fixed points and connecting the main flex to each distribution box are of the Reyrolle 15-A 3-pin type with the plug portion enclosed in a metal cup which protects the pins from damage and also the hand from burns when opening a circuit, so that switches with their attendant maintenance troubles, cost, weight and bulk are avoided.

Illuminated locomotive undergoing repairs



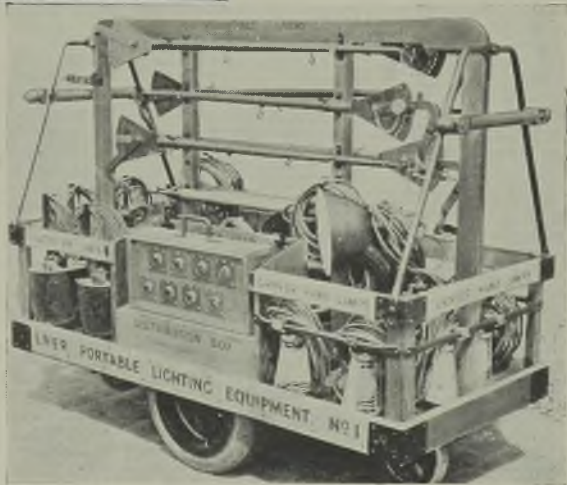
cable, the equipment for each engine is divided into two sections. For use on the near side there is one portable 8-way-and-main plug and socket distribution box, arranged to be hung on the engine handrail, to which are plugged three 60- or 100-W general lighting units, suspended at the ends of adjustable outrigger rods hooked on the engine handrail; two 40-W "Gripper" handlamps for local use; two 25-W tubular inspection lamps for examining interiors; and a 100-W pedestal for use in the pit, to floodlight the engine from below.

For use on the offside there is one 8-way-and-main distribution box, as before, with three 60- or 100-W general lighting units, four 40-W "Gripper" handlamps and a 25-W tubular inspection lamp.

To provide for satisfactory maintenance and mobility a fitted trolley has been designed for accommodating the various items when not in use.

For safety, as the total loading on each distribution box may be just over 500 W, double-wound 230/50-V transformers are used with the mid-point of the secondary winding earthed, thereby limiting possible shock to 25 V. For one complete engine equipment the capacity of the transformer is 1.25 kVA, but larger multiple sizes are used where two or more engine repair berths are immediately adjacent.

As the bodies of the plugs and sockets on the distribution boxes are metal the main flexible cables connecting them to the fixed 50-V



Portable lighting equipment on trolley

The plugs and sockets connecting the individual portable lamps at the distribution box are of the Reyrolle 5-A 2-pin low-voltage type and, to avoid possible accident, are made so that it is impossible to insert them in normal voltage sockets.

ELECTRICITY SUPPLY

Cheltenham Rural Charges. Nesco Power Station Site.

Ammanford.—CHEAPER LIGHTING.—It was announced at a meeting of the Urban District Council last week that the lighting flat rate in the urban area would be reduced from 6d. to 4d. per kWh as from October next.

Brighouse.—HIPPERHOLME UNDERTAKING.—When the Borough Council recently considered a recommendation by the Electricity Committee that consideration of the repurchase of the Hipperholme undertaking should be deferred to next January, an amendment was passed that two years' notice to repurchase the undertaking should be given (*Electrical Review*, June 16th). At the last Council meeting the town clerk reported that he had accordingly made application to the Electricity Commissioners for sanction to the exercise of the Council's right to repurchase the undertaking and had submitted a copy of the notice which it was proposed to serve on the Electrical Distribution of Yorkshire, Ltd. The Electricity Commissioners had replied that before such purchase rights could be exercised it would be necessary for the Council not only to obtain their consent under Article 133 (2) of the County of York West Riding Review Order, 1937, but also to the borrowing of the purchase price, and the consent of the Capital Issues Committee to the raising of the money. The Commissioners indicated that they would not be disposed, under the present war emergency circumstances, to entertain favourably such an application unless some exceptional reasons could be advanced, nor was it likely that the Capital Issues Committee would be prepared to give their consent to any such proposal, in the absence of such exceptional reasons. The Council could, in order to preserve the existing position, lodge a further application with the Commissioners for an extension of time under the Special Enactments (Extension of Time) Act, 1940.

Cheltenham.—RURAL SUPPLY TERMS.—At a meeting of the Electricity Committee the borough electrical engineer (Mr. R. W. Steel) reported that he considered the time was now appropriate to make some recommendations which would have the effect of removing the present restrictions on the extension of mains in rural areas and the consequent penalties which the present policy placed upon the agricultural community in particular. There were in the area some 224 farms of which 111 were already supplied with electricity while 113 were without supplies. A preliminary estimate for eleven farms showed that the cost of extending the mains amounted to £2,279, whilst the services would cost about £146. The revenue to be obtained was estimated at £389, so giving a return, if the Corporation bore the whole cost, of a little over 6 per cent. on the capital invested.

The engineer recommended that electricity supplies should be given to farms subject to the following terms:—The cost of the low-voltage service line to be borne by the consumer; a minimum annual revenue to be guaranteed for each of five years, equal to 20 per cent. of the

cost borne by the Corporation; the consumer to make a contribution of the difference between the total cost and the cost borne by the Corporation; wayleaves to be granted for all poles and apparatus installed on the property supplied, including the transfer of land required for substations at the valuation of the district valuer; and the consumer to undertake to give all consents and facilities necessary to enable Corporation supplies to be given to adjacent premises.

The electrical engineer also recommended that the same terms should be applied to agricultural cottages or cottages built during the war in the rural areas for the purposes of housing agricultural workers.

The Committee agreed to these recommendations.

Durham.—PROPOSED POWER STATION.—A post-war plan by the North-Eastern Electric Supply Co., Ltd., to build a £3,500,000 generating station at Kepier was discussed at a meeting of the City Council. After a long debate it was decided to inform the Electricity Commissioners that the Council did not formally object to the Kepier site provided no alternative was available. It was suggested that the station should be built in a manner to harmonise with the surrounding country, and that the emission of steam and fumes should be controlled.

Councillor H. L. Gradon, who opposed the plan, said that the new building would be nearly as long as Durham Cathedral, with three enormous cooling towers 260 ft. high and two chimneys 350 ft. high. He doubted whether the building could be made to harmonise with the district and spoke of the tons of grit which would be emitted daily from the chimneys. Another opponent, Councillor Peele, declared that the station would be a monstrosity, while Councillor J. W. Pattinson considered that as the Council intended erecting 1,000 houses near the proposed station it would impair the people's health.

Councillor J. F. J. Smith supported the plan on the grounds that it would increase the city's rateable value and Councillor W. F. Edge suggested that the new station might encourage new industries for the surrounding area.

The Dean of Durham (Dr. Cyril Alington), speaking at a school speech day, expressed the hope that the plan would be opposed; he described the scheme as an outrage.

Eastbourne.—POST-WAR RECONSTRUCTION.—Some details of a report by the borough electrical engineer on post-war reconstruction were given by Councillor S. M. Caffyn, deputy chairman of the Electricity Committee, at last week's meeting of the Town Council. It was stated that the proposals would involve an expenditure of about £440,000. Answering a request for more details, Councillor Caffyn said that it would be inadvisable at present to disclose all the particulars—such as purchase of sites for instance. He mentioned some of the suggested improvements in street lighting, including the provision of centralised remote control. On the electricity supply side, the extension of the 11-kV system to Pevensey and

Friston was suggested, but he doubted whether the finance would be available for five years after the war. He pointed out that if the proposals of the Government White Paper were put into force they would involve the undertaking in £150,000 for standardising voltage, and £500,000 more for standardisation of the system.

Hull.—SUPPLY TO GAS COMPANY.—At a meeting of the Electricity Committee the general manager (Mr. D. Bellamy) reported that the East Hull Gas Co. had accepted the Department's terms for a bulk supply of electricity to be afforded to its works. Hitherto the company has generated its own requirements.

Manchester. — EXHIBITION HOUSE. — The Housing Committee states that it is unable to co-operate with the Electricity Committee in the proposed erection of an exhibition house in the electricity showrooms, but expresses its willingness to offer facilities to the Electricity Committee in one of the four experimental houses to be erected on the Wilbraham Road estate.

Mansfield.—COMPANY'S SPECIAL ORDER.—At a meeting of the Electricity Committee the town clerk reported that the Derbyshire & Nottinghamshire Electric Power Co. had promoted a Special Order with a view to adding to its area of supply parts of the urban district of Staveley and of the rural districts of Blackwell, Chesterfield and Clowne and part of the rural district of Worksop, and that he had lodged objections on behalf of the Corporation. A communication was received from the town clerk of Chesterfield on the matter and a sub-committee was appointed to carry out such further negotiations as may be required and to attend any conference which may be convened representing the interests of electricity distributors in the area.

Rugby.—REBATE.—Consumers other than those taking a high-voltage supply are to receive a rebate of 25 per cent. on their next three quarterly accounts. The *Birmingham Post* states that this concession has been made possible by a payment of £8,000 to the Corporation by the Leicestershire & Warwickshire Electric Power Co. in settlement of all the Corporation's claims up to March 31st last.

Salford.—LOAN.—The Light, Heat and Power Committee is seeking sanction to borrow £1,300 for change-over and standardisation of voltage.

Warrington.—CHANGE-OVER.—The Electricity Committee is to make application to the Electricity Commissioners for consent to change over the electricity supply to certain firms from DC to AC.

Overseas

Eire.—INDUSTRIAL RATION INCREASED.—The ration of electricity for motive power and industrial process heating which from June 9th had been 75 per cent. of the 1943 consumption has reverted to 85 per cent. as from July 1st.

France.—REPORTS OF SUPPLY COMPANIES.—The Union d'Electricité has increased its sales, in value, by 25 per cent. over 1939, but nevertheless complains that equal increases in cost have made it impossible to carry out important and necessary maintenance work. The chairman also warned the Government that France

would not be ready to meet the problems of the post-war world unless electricity prices were permitted to adjust themselves. Nord Lumière showed a gross profit of 60 million fr. compared with 55.5 million in 1942-43 and a net profit of 26.4 million which is about equal to that of the previous year.

The *Journal des Debats* reports that at a meeting of the Energie Industrielle the chairman stated that the company, despite difficulties, had succeeded in carrying out the planned concentration of electrical networks. He also spoke of the important hydraulic works being carried out by associated companies, and hoped that an early peace would enable them to be quickly completed.

TRANSPORT

Felling-on-Tyne.—TROLLEY-BUS PROPOSAL.—The question of introducing trolley-buses into the town along routes other than those served at present by tramcars has been raised by the Urban District Council. The Council has been informed, however, that only the conversion of tram routes can be considered at present.

Glasgow.—TRAMWAY JUBILEE.—At a dinner held in Glasgow recently to mark the jubilee of the tramway undertaking, broad and ambitious local and national planning, with first place being given to transport, was urged by Mr. Noel Baker, Parliamentary Secretary to the Ministry of War Transport. Councillor Ernest Greenhill, convener of the Transport Committee, pointed out that the revenue had risen from less than £250,000 to £1,500,000 at their semi-jubilee, and to-day was over £4,000,000. Sir Patrick Dollan, who also spoke, maintained that the policy of the Committee in continuing the trams as opposed to trolley-buses and petrol buses was right, and had been proved during the war.

STATION LOUDSPEAKERS.—A loudspeaker system comprising fifty-six units was brought into operation on June 27th at the L.N.E.R. Queen Street station.

Leeds.—REVISED FARES.—By a small majority (51 votes to 45) the City Council has approved proposals by the Transport Committee for raising tram and bus fares. Councillor Leach, chairman of the Committee, said that in many cases costs of materials had risen by 200 per cent. and electricity charges had increased by £26,000 per annum. For the first time in the history of the Department there had been a trading loss and with one exception reserves had been practically extinguished. In 1944-45 the deficit would be increased. He mentioned that in a full year the revised fares would yield £112,000. Alderman G. Brett opposed the recommendations and suggested that for the time being the transport services should be helped from the general rates. Alderman Clarke said that this would put 6d. on the rates.

Mersey.—TRAIN FIRE IN TUNNEL.—An electric train caught fire last week in the mid-river tunnel section of the Mersey Railway connecting Liverpool and Birkenhead.

The fire, which caused a serious hold up of nearly two hours, occurred in the motor cabin at the rear of the train and dense volumes of smoke pouring from the tunnel completely enveloped the underground station at Hamilton Square, Birkenhead. No one was injured.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Venner Time Switches, Ltd.—Speaking at the annual meeting on July 7th, Mr. A. A. Rowse (chairman) said that although operating efficiency had increased during the year there had been no financial gain as the cost investigation methods of the Supply Departments had resulted in price reductions. The effects of the alteration in the nature of the company's production emphasised the uncertainty of industrial operations under war conditions and endorsed the wisdom of a conservative financial policy. It was to be hoped that the Government was fully alive to the effect of the variations in the industrial war load and the problem of reverting to normal production after the war.

Mr. Rowse strongly disagreed with the fixing of profit as an arbitrary percentage on "employed capital," which prejudiced the efficient firm doing a large turnover on a small employed capital. The reward of enterprise should be measured in relation to the skill with which the tools were used, represented by the output obtained from them.

The Watford Electric & Manufacturing Co., Ltd., reports that the trading profit for 1943 was £65,719 (against £62,418 for 1942) and the net profit £65,650 (against £62,472). Income tax and E.P.T. absorb £58,297 (£55,047). Two interim dividends amounting to 15 per cent. (same) have been paid and it is not proposed to make a further payment.

In order to meet taxation liabilities without hampering the company's activities it is proposed to create 60,000 6 per cent. cumulative preference shares of 10s. each and 300,000 ordinary shares of 2s. each, raising the capital from £100,000 to £160,000. Subject to Treasury consent, existing shareholders will be offered the new preference shares at 10s. 3d., in the ratio of three for each five held, and the ordinary shares at 3s. 1½d. in the same proportion.

The Morgan Crucible Co., Ltd., reports a trading profit for the year ended March 31st last of £794,219 (against £775,762) to which is added £41,625 (£31,979) from investments, £44,283 (nil) from specific reserve no longer required and £1,059 brought forward, making £881,186 (£808,007). After deducting tax provision, £652,112 (£623,800), directors' fees, bank loan interest, etc., the net profit is £207,119 (£163,168). Preference dividends take £54,475 and £44,283 (nil) is allocated to general reserve. The final ordinary dividend is 6½ per cent., making 10 per cent. for the year (same) and £1,520 is carried forward. The directors also recommend the payment of a capital bonus of 2½ per cent. from realised capital net profits; this will require £53,950 and will leave a balance of £64,202 in capital reserve.

Anglo-Argentine Tramways Co., Ltd.—A meeting of holders of the company's debentures was held in London on July 6th for the purpose of authorising, with modifications, the extensions of the 1940 scheme of arrangement, but owing to

lack of the necessary quorums the meeting was adjourned until July 27th. Explaining the present position of the company the chairman (Mr. B. H. Binder) stated that since the circular calling the meeting was printed the Argentine Government had issued a decree ordering its trustee to assume his responsibilities under the terms of the acquisition of the Buenos Aires Transport Corporation's short-term debentures by the Government. In this way by a single payment of 40 million pesos the authorities had obtained full control of the Corporation, having by its persistent delay in sanctioning increased fares rendered the Corporation impotent either to attract fresh capital or meet its debenture obligations.

The Revo Electric Co., Ltd., reports a profit for 1943-44, after providing for depreciation, of £201,446, as compared with £372,451 for 1942-43. Taxation takes £125,586 (against £287,533) and the balance is £66,845 (against £72,638). The dividend is maintained at 15 per cent., plus 2½ per cent. bonus. General reserve again receives £25,000, plant depreciation takes £5,000 (against nil) and provision for taxation £16,500 (against nil). The balance carried forward is reduced from £92,012 to £80,201.

E. K. Cole, Ltd., are reverting to the practice of declaring an interim dividend and announce the payment of 8 per cent. on the ordinary stock, including that issued or to be issued in exchange for Ensign Lamps shares. A dividend of 15 per cent. was paid for the year 1942-43.

The Delhi Electric Supply & Traction Co., Ltd.,—The directors recommend the payment of a final dividend of 5 per cent., free of tax, making 9 per cent., tax free, for the year ended December 31st last (same).

Mirrlees, Bickerton & Day, Ltd., announce a net profit of £32,136 for 1943-44 (against £26,186). As already reported, the ordinary dividend is again 8 per cent.

The West of England Electric Investments Co., Ltd., is maintaining its dividend at 7 per cent. for 1943-44. The net income rose from £34,225 to £35,613.

The Telegraph Construction & Maintenance Co., Ltd., is maintaining its interim dividend at 5 per cent.

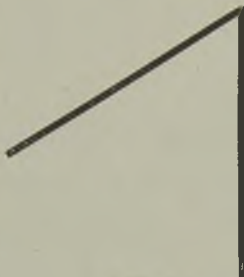
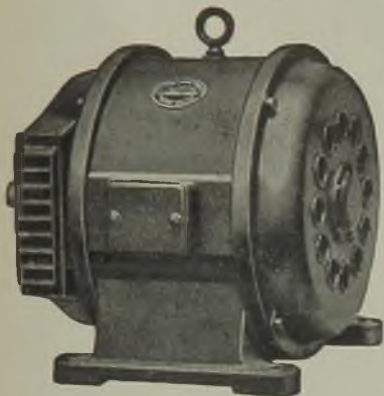
Ultra Electric Holdings, Ltd., have again declared a dividend of 10 per cent. for the past year.

New Companies

James Wright (Radio), Ltd.—Private company. Registered June 23rd. Capital, £100. Objects: To carry on the business of radio, electrical and television engineers, etc. Subscribers: A. D. H. Fairlams and Eleanor M. Cattell, both of 11, Sheffield Street, W.C.2.

Harcast, Ltd.—Private company. Registered June 23rd. Capital, £12,000. Objects: To adopt an agreement with J. Caldwell and to carry on the business of agents for the sale of electric furnaces, etc. Directors: J. Caldwell,

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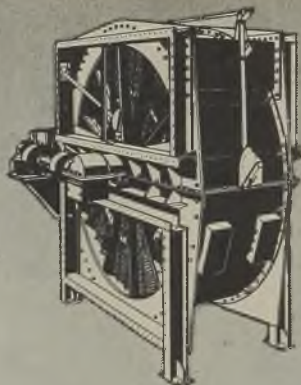
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195, Scotland Street, Glasgow. C.5, and
101-103, Baker Street, London. W.1.

35, St. Bernards Road, Olton, Warwickshire; J. C. Hart, Old House, The Ratts, Bushey Heath; and P. S. E. Seth-Smith, C.A., Plough Cottage, Cadsden, Bucks. Registered office: 20, Essex Street, London, W.C.

W. H. Trace & Son, Ltd.—Private company. Registered June 21st. Capital, £10,000. Objects: To acquire the business of electrical, radio and general engineering contractors carried on by W. T. Trace and G. A. S. Trace at Upton Road, Birkenhead, and elsewhere, as "W. H. Trace & Son." Directors: W. T. Trace, 75, Grosvenor Road; G. A. S. Trace, 63, Forest Road; and P. Griffith, 50, St. David Road, all Birkenhead. Registered office: 6, Upton Road, Birkenhead.

Thermionic Products, Ltd.—Private company. Registered July 1st. Capital, £10,000. Objects: To carry on the business of manufacturers of, and dealers in, electronic, radio, electrical and mechanical apparatus, optical and photographic instruments and accessories, etc. Directors: J. F. Atkins, 141, The Avenue, West Wickham, Kent; and S. T. Apps, 74, Smitham Bottom Lane, Purley, Surrey. Registered office: Lloyds Bank Chambers, Sutton, Surrey.

G. & R. Stent, Ltd.—Private company. Registered June 19th. Capital, £2,000. Objects: To carry on the business of manufacturers of and dealers in electrical fittings, goods and accessories, etc. Directors: G. Stensch, 9, Belmont Road, Harrogate; and R. W. Stent (formerly Rudolf W. Stensch), 15, Creffield Road, W.5. Registered office: Norwich House, 13, Southampton Place, W.C.1.

Sergeants Wholesale Electrical Co., Ltd.—Private company. Registered June 27th. Capital, £1,000. Objects: To carry on the business of manufacturers and wholesale suppliers of electrical apparatus and machinery, etc. Directors: C. W. Bunce, Selsfield House, Turners Hill, Sussex and F. D. Pratt, 71, West Hill, Sanderstead, Surrey. Registered office: 147, London Road, Kingston-on-Thames.

County Machinery Co., Ltd.—Private company. Registered June 23rd. Capital, £1,000. Objects: To acquire the business of the Three Counties Electric Motor Co. formerly carried on by Ivy D. J. Burgoyne and later by W. E. Lawton, and to carry on the business of electrical and motor engineers, etc. Directors: W. E. Lawton, 78, Lyndhurst Gardens, Finchley, N.W. and E. F. Howe, Mornonih, Priests Lane, Brentwood. Registered office: 1, Budge Row, London, E.C.

C. W. Gosling, Ltd.—Private company. Registered June 23rd. Capital, £1,000. Objects: To carry on the business of manufacturers of, and dealers in, radio and electrical equipment, etc. First directors: C. W. Gosling and Elsie Gosling, both of 34, Albert Road, Bromley, Kent and L. C. Gosling, 51, Harwood Avenue, Bromley. Registered office: 69a, Albert Road, Bromley.

Companies Struck Off the Register

The following companies have been struck off the Register and are thereby dissolved:—Express Radio Factors, Ltd.; R. & W. (Electrical), Ltd.; and Wicotex Wireless Components (Experimental), Ltd.

Companies' Returns Statements of Capital

Elkay Electrical Manufacturing Co., Ltd.—Capital, £1,000 in £1 shares. Return dated June 30th, 1943 (filed March 25th, 1944). All shares taken up. £1,000 paid. Mortgages and charges: Nil.

Electric Sign Co., Ltd.—Capital, £5,000 in £1 shares. Return dated February 3rd (registered April 12th). All shares taken up. £1,000 paid. £4,000 considered as paid. Mortgages and charges: Nil.

H. J. Electrical Services, Ltd.—Capital, £1,000 in £1 shares. Return dated March 22nd, 1943. 750 shares taken up. £450 paid. £300 considered as paid. Mortgages and charges: Nil.

Three Spires Electric, Ltd.—Capital, £500 in £1 shares. Return dated April 12th. 108 shares taken up. £108 paid. Mortgages and charges: £700.

St. Mary's (Scilly) Electricity Supply Co., Ltd.—Capital, £15,000 in £1 shares. Return dated March 13th. 10,452 shares taken up. £7,435 paid. £3,017 considered as paid. Mortgages and charges: £3,500.

Mortgages and Charges

Callender's Cable & Construction Co., Ltd.—Satisfaction in full on April 13th, 1944, of trust deed dated July 24th, 1902, and registered August 5th, 1902, securing £300,000 debenture stock.

Receiver Appointed

Willson Brothers (Surrey), Ltd.—F. Hagley, of Abford House, Wilton Road, S.W., was appointed receiver and manager on June 19th, 1944, under powers contained in debenture dated December 13th and registered December 16th, 1943.

Liquidations

Witty & Wyatt (Cardiff), Ltd.—Proofs of debts or claims to be sent to the liquidator, Mr. W. R. Greysty, 97-100, Bute Street, Cardiff, by August 15th. (This notice is purely formal. All claims admitted will be paid in full.)

Bankruptcies

Michael Skulnick, battery manufacturer, Wellesley Court, Maida Vale, W.—A sitting of the London Bankruptcy Court was appointed to be held on July 4th at the Old Hall, Lincoln's Inn Fields, for the public examination of this debtor, who, in December, 1940, started business as a battery manufacturer at Stanhope Street, N.W. He sold the business in July, 1943, to a company for £1,200 and in May last he was made bankrupt on the petition of a creditor claiming £219. The debtor has stated that this is his only debt and he possesses no assets. Mr. L. A. West, Senior Official Receiver, reported that the debtor was not in attendance that day and that he was not present or represented at the original sitting for his public examination. Under those circumstances he asked for the examination to be adjourned *sine die*. Mr. Registrar Kean made an order in those terms.

STOCKS AND SHARES

TUESDAY EVENING.

THERE is no gainsaying the strength of Stock Exchange markets and prices at the present time. The news from the various war fronts is read as being consistently satisfactory. Confidence in post-war prospects increases among capitalists, large and small alike. Improvement in prices is a matter of almost daily occurrence, nor is this improvement confined to any particular class or market.

It is noticeable that where prices are advanced under the pressure of buying, they are usually maintained, even when the support slackens off. The reactions which occasionally occur prove as a rule to be but temporary.

Home Railway Hopes

Home railway stocks took on a slightly better tone upon digestion of the Government's somewhat vague promise to consider the question of extra allowances in respect of wear and tear when the proper time arrives. As things stand now, the agreement between the Government and the railway companies makes it virtually certain that Home railway junior stocks will receive the same dividends as those which have been paid in each of the past few years. These will be continued during the war, and for one year afterwards. Expectations of any increase during the war have been dispelled and at first, on this being announced, prices gave way. Support came in at the lower levels, and the market presents a harder appearance.

Equipment and Manufacturing

Nearly a score of rises are marked in our lists of equipment and manufacturing shares. Those in the larger companies, e.g. British Insulated, Callender's, General Electric and Henley's, are leading the way. Lancashire Dynamo have advanced to within $\frac{1}{8}$ of £5, and Tube Investments are not far behind them. Enfield Cables at 58s. 6d. are 1s. higher. Ever Ready at 44s. 6d., and Brush Electric at 11s. 3d., have gained 9d. each. British Aluminium and Hopkinsons are equally better at 49s. and 69s. respectively. Falk Stadelmann hardened to 34s. A few falls have occurred, Automatic Telephones losing a florin at 64s. 6d. and Crompton Parkinsons 9d. at 31s. 6d. The strength of the manufacturing group spread to shares in the heavy industries; Babcock & Wilcox, for example, are 1s. 9d. higher at 53s. 6d.

Electricity Supply

In the Home electricity supply group, the yields on preference shares are, roughly, 3½ per cent. Clyde Valley eights, Electrical Distribution of Yorkshire sixes and Electric Supply Corporation sixes return £3 18s. 6d. per

cent., and North Eastern Electric sevens, at 35s. 6d., give £3 18s. 9d. In view of the attention turned to Indian shares, it may be of service to mention that 5,000 Cawnpore Electric 7 per cent. preference, January and July dividends, can be bought at 24s., these yielding £5 16s. 6d.

The ordinary shares retain all their previous strength. Gains of 6d. appear against five of the quotations. There is little floating supply.

Preference Shares

Good class preference shares have now arrived at a price-basis which offers an average of about 4 per cent. on the money. There are still some which give a higher yield. For instance, Consolidated Signal 6 per cent. preference, dividends due once a year in April, are obtainable at 29s., yielding £4 2s. 9d. per cent. on the money. To pay the dividend takes £6,400 per annum and in the last accounts there was £27,000 available to meet this, after allowing for income tax. Brush Electrical 5½ per cent. preference pay a little over 4 per cent. on the money; of these, there are 5,000 shares on offer at 27s., April and October dividends. The dividend service was covered sixteen times over according to the last issued figures. Crompton Parkinson 6 per cent. second preference at 31s. pay £3 17s. 3d. English Electric 6½ per cent. preference, at 33s., return £3 18s. 9d. There are shares on offer in each case and at the prices quoted.

British Electric Traction

Besides working about 8,400 omnibuses in the provinces, the British Electric Traction Co. has interests in electricity supply and in laundry work. Its electricity supply companies are mostly engaged at the present time upon wartime contracts. The laundries are called upon to handle a large amount of trade, and priority is extended to orders from the Services. At the recent meeting, the chairman made an urgent plea for private enterprise as opposed to official control. He declared that the B.E.T. group could never function so efficiently as it does now if it came under the dictation of a Whitehall department obsessed with rigid regulations.

Calcutta Trams

Official notification of the Calcutta Corporation's intention to take over the Calcutta Tramways undertaking next January has caused another jump in the price of the shares. Last week's gain of 7s. 6d., to £3, was followed by a reaction to 57s. 6d., then came renewed buying, and the price rose to 65s. Some people say that this is well below the value at which the company will be expropriated. Calcutta Electric Supply have moved in sympathy, and show a florin gain at 46s. 6d., Cawnpore

(Continued on page 70)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend		Middle Price July 11	Rise or Fall	Yield p.c.	Company	Dividend		Middle Price July 11	Rise or Fall	Yield p.c.
	Pre-vious	Last					Pre-vious	Last			
Home Electricity Companies						Public Boards					
£ s. d.						£ s. d.					
Bournemouth and Poole	12½	12½	61/6		4 1 2	Central Electricity 1955-60 (Civil Defence)	3	3	100		3 0 0
British Power and Light	7	7	33/-		4 4 10	1955-75	5	5	115		4 7 0
City of London	7	5½	29/6	+6d.	3 14 7	1951-73	4½	4½	107		4 4 4
Clyde Valley	8	8	41/6		3 17 0	1963-93	3½	3½	103½		3 7 8
County of London Edmundsons:	8	8	42/-		3 16 0	1974-94	3½	3½	100		3 5 0
7% Pref.	7	7	34/6		4 1 4	London Elec. Trans. Ltd.	2½	2½	97½xd	+1	2 11 3
Ord.	6	6	30/-	+6d.	4 0 0	London & Home Counties 1955-75	4½	4½	112xd		4 0 4
Elec.Dis.Yorkshire	9	9	45/6		3 19 6	London.Pass.Trans.:					
Elec. Fin. and Securities	12½	13½	57/6		4 13 9	A	4½	4½	121½		3 14 1
Elec. Supply Corporation	10	10	47/-		4 5 0	B	5	5	121½		4 2 4
Isle of Thanet	Nil	Nil	18/-		—	C	3	3½	72		4 10 3
Lancs. Light and Power	7½	7½	36/-		4 3 4	WestMidlandsJ.E.A. 1948-68	5	5	108½		4 12 4
Llanelli Elec.	6	6	26/-		4 12 4	Telegraph and Telephone					
London.Assoc.Electric	3	4	25/-	+6d.	3 4 0	Anglo-Am. Tel.:					
London Electric	6	6	28/6		4 4 3	Pref.	6	6	120½		4 19 7
LondonPowerRed.						Def.	1½	1½	30		5 0 0
Deb.	5	5	104½		4 14 7	Anglo-Portuguese	8	8	27/-		3 18 6
Metropolitan E.S.	8	8	41/6		3 17 0	Cable & Wireless:					
Midland Counties	8	8	41/-		3 18 0	5½% Pref.	5½	5½	114½	+½	4 16 1
Mid. Elec. Power	9	9	44/-		4 1 9	Ord.	4	4	80		5 0 0
Newcastle Elec.	7	7	31/-		4 10 4	CanadianMarconi\$1 Nil	4cts.	10/6	+3d.		—
North Eastern Elec.						Globe Tel. & Tel.:					
Ordinary	7		34/6	+6d.	4 1 4	Ord.	8½*	5*	40/-		2 10 0
7% Pref.	7		35/-		4 0 0	Pref.	6	6	30/-		4 0 0
Northampton	10	10	49/-	+6d.	4 1 8	GreatNorthernTel. (£10)	Nil	Nil	24½		—
Notting Hill 6% Pref. (£10)	6	Nil	11		—	Inter. Tel. & Tel. Nil	Nil	22½		—	
Northmet Power:						Marconi-Marine.. 7½	7½	34/3		4 7 7	
Ordinary	7	7	39/6		3 11 0	Oriental Tel. Ord. 16	10	49/6	+6d.		—
6% Pref.	6	6	30/6		3 18 8	Telephone Props. 6	Nil	17/6		—	—
Richmond Elec.	6	6	25/6		4 14 1	Tele.Rentals (5/-)	10	10	12/-		4 3 4
Scottish Power	8	8	41/-		3 8 0	Traction and Transport					
Southern Areas	5	5	23/-		4 7 0	Anglo-Arg. Trans.:					
South London	7	7	28/-		5 0 0	First Pref. (£5)	Nil	Nil	2/6		—
West Devon	5	5	23/6		4 5 1	4% Inc.	Nil	Nil	6		—
West Glos.	4½	3½	24/6		2 17 4	Brit.Elec.Traction					
Yorkshire Elec.	8	8	43/-		3 14 5	Def. Ord.	45	45	1315		3 8 6
Overseas Electricity Companies						Pref. Ord.	8	8	180		4 9 0
Atlas Elec.	Nil	Nil	7/9		—	Bristol Trams	10	10	56/6		3 10 10
Calcutta Elec.	6*	6*	46/6	+2/-	2 11 6	Brazil Traction.. \$1	\$12	27½	-½	6 7 3	
Cawnpore Elec.	10	7	37/-	+9d.	3 14 1	Calcutta Trams.. 5½	6½	65/-	+5/-	2 0 0	
East African Power	7	7	34/-	+6d.	4 2 4	Cape Elec. Trams	5	6	25/6		4 14 1
Jerusalem Elec.	7	5	29/-		3 9 0	Lancs. Transport	10	10	45/6		4 8 0
Kalgoolie (10/-)	5	5	10/6		4 15 3	Mexican Light:					
Madras Elec.	4*	Nil	30/-	+4/6	—	1st Bonds	5	5	104½		4 15 7
Montreal Power	1½	1½	23		6 7 8	Rio 5% Bonds	5	5	105½		4 14 9
PalestineElec."A"	4*	5*	41/6	+6d.	2 8 2	Southern Rly.:					
Perak Hydro-elec.	6	7	11/-		—	5% Prefd.	5	5	78	-1	6 8 2
ShawiniganPower	83cts.	90cts.	16½		—	5% Pref.	5	5	118½		4 4 9
Tokyo Elec. 6%	6	6	20		—	T. Tilling	10	10	59/6		3 7 3
Victoria FallsPower	15	15	4½		3 12 7	West Riding	10	10	44/6		4 10 0
Whitehall Inv. Pref.	—	6	24/6		4 18 0						

(Continued on next page)

(Continued on next page)

* Dividends are paid free of Income Tax.

Company	Dividend		Middle Price July 11	Rise or Fall	Yield p.c.	Company	Dividend		Middle Price July 11	Rise or Fall	Yield p.c.	
	Pre-vious	Last					Pre-vious	Last				
Equipment and Manufacturing												
					£ s. d.							
Aron. Elec. Ord. . .	10	15	61/-	..	4 18 4	General Cable (5/-)	15	15	15/-	..	5 0 0	
Assoc. Elec. :						Greenwood & Batley	15	15	45/-	..	6 13 4	
Ord.	10	10	55/-	..	3 12 9	Hall Telephone (10/-)	12½	12½	29/-	..	4 6 3	
Pref.	8	8	40/6	..	3 19 0	Henley's (5/-)	20	20	27/-	+3d.	3 14 1	
Automatic Tel. & Tel.	12½	12½	64/6	-2/-	3 17 2	4½% Pref. . .	4½	4½	24/-	..	3 15 0	
Rabcock & Wilcox	11	11	53/6	+1/9	4 2 1	Hopkinsons	15	17½	69/-	+9d.	5 1 5	
British Aluminium	10	10	49/-	+9d.	4 1 8	India Rubber Pref.	5½	5½	23/6	..	4 13 9	
British Insul. Ord.	20	20	5½	+½	3 11 0	Intl. Combustion	30	30	6½	..	4 10 8	
British Thermostat						Johnson & Phillips	15	15	74/6	..	4 0 6	
(5/-)	18½	18½	21/-	..	4 8 1	Lancashire Dynamo	22½	22½	98/9	+1/9	4 11 2	
British Vac. Cleaner						Laurence, Scott (5/-)	12½	12½	12/3	..	4 14 2	
(5/-)	15	30	30/-	..	5 0 0	London Elec. Wire	7½	7½	39/-	..	3 17 0	
Brush Ord. (5/-)	8	9	11/3	+9d.	4 0 0	Mather & Platt . .	10	10	53/9	+½	3 14	
Bureau (5/-)	15	17½	16/-	..	5 9 5	Metal Industries (B)	5	8	50/-	..	3 4 0	
Callender's	15	20	5½	+½	3 11 4	Met. Elec. Cable Pref.	5½	5½	21/3	..	5 3 6	
Chloride Elec. Storage	15	15	85/-	..	3 10 7	Murex	20	20	105/9	..	3 15 6	
Cole, E. K. (5/-)	10	15	32/-	+1/-	2 6 10	Pye Deferred (5/-)	25	25	30/-	..	4 3 4	
Consolidated Signal	24	27½	6½	..	4 4 6	Revo (10/-)	17½	17½	43/-	..	4 1 4	
Cossor, A. C. (5/-)	7½*	10*	26/-	+6d.	1 18 6	Reyrolle	12½	12½	70/6	..	3 11 0	
Crabtree (10/-)	17½	17½	40/-	..	4 7 6	Siemens Ord.	7½	7½	34/6	..	4 7 0	
Crompton Parkinson						Strand Elec. (5/-)	7½	10	8/-	..	6 5 0	
Ord. (5/-) . . .	20	22½	31/6	-9d.	3 11 6	Switchgear & Cow-						
E.M.I. (10/-)	6	8	33/9	..	2 7 4	ans (5/-)	20	20	18/6	..	5 8 1	
Elec. Construction	10	12½	54/-xd	+1/6	4 12 7	T.C.C. (10/-)	5	7½	22/6	..	3 6 8	
Enfield Cable Ord.	12½	12½	58/6	+1/-	4 5 6	T.C. & M.	10	10	55/-	..	3 12 6	
English Electric	10	10	53/3	..	3 15 2	Telephone Mfg. (5/-)	9	9	11/9	..	3 16 8	
Ensign Lamps (5/-)	25	15	21/3	..	3 10 8	Thorn Elec. (5/-)	20	20	26/-	..	3 17 0	
Ericsson Tel. (5/-)	22*	20*	56/3	..	1 15 7	Tube Investments	20	20	98/-	+6d.	4 1 8	
Ever Ready (5/-)	40	40	44/6	+9d.	4 10 0	Vactric (5/-)	Nil	Nil	16/6	..	—	
Falk Stadelmann	7½	7½	34/-	+6d.	4 8 3	Veritys (5/-)	7½	7½	8/3	..	4 11 0	
Ferranti Pref. . .	7	7	31/3	-9d.	4 9 7	Walsall Conduits (4/-)	55	55	49/6	..	4 9 0	
G.E.C. :						Ward & Goldstone						
Pref.	6½	6½	34/-	..	3 16 6	(5/-)	20	20	27/3	..	3 13 6	
Ord.	17½	17½	97/-	+1/-	3 12 0	Westinghouse Brake	12½	14	75/-	..	2 14 9	
						West, Allen (5/-)	7½	7½	7/3	..	5 3 5	

* Dividends are paid free of Income Tax.

Stocks and Shares (Continued from page 68)

Electrics, despite the recent cut in dividend, are 9d. better at 37s. 9d. Madras Electric ordinary, which received no dividend for last year, put on 4s. 6d. to 30s. India is known to be bulging with money—to drop into colloquialism—and one method of employing it would be for industrial companies to be taken over, where such a course is permissible, by public interests.

Watford Electric

The Watford Electric & Manufacturing Co. held a meeting on Monday in this week to consider a proposal to increase the capital from £100,000 to £160,000 by the creation of 6 per cent. preference shares and 2s. ordinary shares. It was proposed to offer the new preference to existing shareholders at 10s. 3d. each and the ordinary at 3s. 1½d., in the proportion of three new shares for every five shares held. The preference stand at about 11s. 6d. and the ordinary at 4s. 9d. The company came out in June, 1936, and has paid a steady 15 per cent. per annum on its ordinary shares, out of earnings considerably in excess of this rate, with the exception of the

year ended 1940, when the earnings were 17½ per cent. Goodwill stands in the balance sheet at £9,223, up to the end of December, 1942. Last year the best price reached was 5s. 3d.; during the general decline in 1940 the shares fell to a florin.

Radio Shares

Conditions active and optimistic prevail in the market for the industrial shares which are now popular. The recent excitement which attended the rises in radio shares has died down to some extent, interest being diverted to other markets. Prices hold their improvements and, in spite of profit-taking, there has been little setback in the favourite shares. Radio Rentals have advanced to 27s.; Philco changed hands between 13s. 6d. and 14s. 6d.; there has been renewed inquiry for Cossor, and the price strengthened to 26s. E.M.I. remained at 33s. 9d. E. K. Cole, at 32s., have risen 1s.

Correction.—It was inadvertently stated in "Stocks and Shares" last week that the Telephone Manufacturing Co., Ltd., had an interest in Radio Rentals, Ltd.—this should have been Telephone Rentals, Ltd. The error is regretted.

NEW PATENTS

Electrical Specifications Recently Published

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

J. L. Baird.—"Colour television." 10416. July 25th, 1942. (562168.)

J. Beresford & Son, Ltd., and A. Allison.—"Dynamo-electric machines." 18136. December 21st, 1942. (562277.)

British Insulated Cables, Ltd., C. Wilkinson and H. S. Northway.—"Manufacture of covered wires." 1173. January 22nd, 1943. (562218.)

British Thomson-Houston Co., Ltd.—"Clothes wringers." 6540/42. May 17th, 1941. (562164.)

"Washing machines." 6801/42. May 23rd, 1941. (562165.)

"Resinous condensation products." 13447/42. September 27th, 1941. (562174.)

"Electric-discharge devices." 15094/42. October 30th, 1941. (562178.)

"Resinous condensation products." 13602/42. September 30th, 1941. (562242.)

"Transformer regulating arrangements for poly-phase electric supply systems." 1241/43. January 28th, 1942. (562289.)

"Transformer system for supplying electric-discharge devices." 1365/43. January 28th, 1942. (562292.)

Callender's Cable & Construction Co., Ltd. and F. Moor.—"Mounting for socket members of plug-and-socket electrical connectors." 2581. February 16th, 1943. (562223.)

W. Canning & Co., Ltd., and G. A. Pope.—"Electroplating plant." 4061. March 12th, 1943. (562153.)

R. L. Cleaver (Okonite-Callender Cable Co., Inc.).—"Electric cables." 725. January 14th, 1943. (Convention date not granted.) (562260.)

De Renzi, Holmes & Co., Ltd., and C. T. Scarf.—"Means for use in delayed-action electric switches." 1105. January 22nd, 1943. (562263.)

B. J. Edwards and Pye, Ltd.—"Electron-discharge devices." 18028. December 18th, 1942. (562211.)

Electric Resistance Furnace Co., Ltd., W. J. Millar and J. A. Monks.—"Muffle furnaces." 14462. November 10th, 1941. (562162.)

"Muffle furnaces." 7661/44. December 10th, 1942. (Divided out of 562162.) (562297.)

Electric Transmission, Ltd., and K. Dannenberg.—"Electric cut-outs embodying fusible elements." 16099. November 13th, 1942. (562272.)

English Electric Co., Ltd., and H. S. Chirnside.—"Electric resistance welding." 18406. December 28th, 1942. (562254.)

Foster Instrument Co., Ltd., and J. T. Davies.—"Radiation pyrometers." 16241. November 17th, 1942. (562135.)

D. C. Gall.—"Movements of galvanometers and similar electrical instruments." 18246. December 23rd, 1942. (562279.)

B. Hinks.—"Electro-magnetic switches." Cognate applications 18085/42 and 11757/43. December 21st, 1942. (562275.)

Hoover, Ltd.—"Suction cleaners." 17820/42. August 20th, 1942. (562142.)

W. R. Hume.—"Automatic arc welding." 2483. February 25th, 1942. (562197.)

Igran Electric Co., Ltd., and C. E. Randall.—"Means for reducing the induced voltage when an inductive circuit is interrupted." 3408. March 2nd, 1943. (Addition to 548345.) (562226.)

K.D.G. Instruments, Ltd., and F. Mack.—"Zero-setting mechanism for indicating instruments." 15968. November 11th, 1942. (562182.)

Landis & Gyr Soc. Anon.—"Toggles, particularly applicable to electric switches." 15053/42. November 8th, 1941. (562177.)

H. McClean.—"Lighting apparatus for buoys, lightships, and such like." 961. January 19th, 1943. (562285.)

Marconi's Wireless Telegraph Co., Ltd.—"Television pick-up tubes." 17965/42. August 29th, 1941. (562149.)

"Luminescent materials." 14124/42. October 30th, 1941. (562270.)

"Electro-magnetic relays." 18130/42. December 20th, 1941. (562276.)

N. Pensabene.—"Brush-gear of dynamo-electric machines." 17650. December 11th, 1942. (562187.)

F. Rimmington.—"Remote control of electric generators or other current supply means, particularly for arc welding." Cognate applications 14377/42, 14764/42, 2103/43 and 10946/43. October 14th, 1942. (562131.)

Siemens Bros. & Co., Ltd., and G. M. Lambert.—"Electrical primary cells." 18405. December 28th, 1942. (562280.)

Standard Telephones & Cables, Ltd.—"Cooling means for electron-discharge tubes." 17052/42. February 7th, 1942. (562274.)

"Glide path radio beacon." 774/43. January 19th, 1942. (562284.)

Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—"Electrical signalling systems." 1117. January 22nd, 1943. (562286.)

J. Stone & Co., Ltd., and W. A. Crotch.—"Electric regulators of the carbon-pile type." 17874. December 16th, 1942. (562191.)

R. H. Streete and W. Whitticase.—"Apparatus for measuring electric inductance and capacitance values." 17841. December 15th, 1942. (562145.)

L. M. Ericsson Telefonaktiebolaget.—"Driving arrangements for automatic telephone selectors." 17673/42. December 17th, 1941. (562139.)

C. G. Vokes.—"Magnetic oil and like filters." 14029. October 6th, 1942. (562175.)

Watford Electric & Manufacturing Co., Ltd., and B. A. Vuille.—"Controlling mechanism for heating installations." 12535. September 4th, 1942. (562173.)

Westinghouse Brake & Signal Co., Ltd., and A. H. B. Walker.—"Supply of single-phase alternating electric current load circuits from three-phase supply circuits." 17938/9. December 17th, 1942. (562206/7.)

Woods of Colchester, Ltd., and R. H. Holbeche.—"Ventilating and air conditioning." 9901. July 16th, 1942. (562266.)

Amended Specification.

358714. **Johnson, Matthey & Co., Ltd., and another.**—"Electrical condenser plates."

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.

Belfast.—July 27th. Corporation. Supply and delivery of (1) armature coils and (2) steel pinions for trams. Forms of tender, conditions, etc., from the acting general manager, Transport Department, Sandy Row.

Inverness.—July 31st. Town Council. Various works (including electric lighting) in connection with the erection of 20 houses at Dalneigh. Schedules from burgh surveyor's office; tenders to town clerk.

Orders Placed

Birkenhead.—Electricity Committee. Accepted for twelve months :—Paper-insulated cables.—Britannic Electric Cable & Construction Co. Rubber-insulated cables.—Wm. Geipel; Hackbridge Cable Co.; Mersey Cable Works. Meters.—British Electric Meters; English Electric Co.; Landis & Gyr; Sangamo Weston. Switchgear and transformer for Co-operative Society.—English Electric Co.

Hull.—Electricity Committee. Accepted. 6,600-V switchgear (£20,231).—A. Reyrolle & Co., Ltd. Structural steelwork for boiler house, turbine house and switchhouses (£98,420).—Heenan, Beddow & Sturmeay. Turbo exhaust pipe (£514).—C. F. Struthers.

Manchester.—Electricity Committee. Accepted. Two 400,000-lb. per hr. boiler plants.—John Thompson Water Tube Boilers. Sub-contractors for pulverised-fuel equipment. International Combustion. Renewal of lagging plates. John Thompson Water Tube Boilers.

Sheffield.—Electricity Committee. Accepted. Two steam generator units (£330,050).—Mitchell Engineering.

Southport.—Gas Committee. Accepted. 250-kW generating set (£3,355).—Electric Construction Co.

Electricity Committee. Accepted. Transformers for twelve months.—Electric Construction Co.

Health Committee. Accepted. Radio equipment for hospitals (£153).—H. Foster, Bolton.

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.

Ancoats.—Additions to factory; A. E. McCutcheon, architects, 1180a, Chester Road, Stretford.

Bournemouth.—Permanent laboratory accommodation for school (£17,000); W. L. Clowes, borough engineer, Municipal Offices.

Alterations and additions, Latimer Road and Wimborne Road; J. Steane, Ltd.

Bromsgrove.—Adaptations, etc., at Beech Tree House, The Strand, for works extensions; Essanbee Plaster Co., Ltd., Alcester Road.

Cheltenham.—Offices and stores, London Road, Charlton Kings; F. T. Seagrim & Co.

Coventry.—Three community centres (\$75,000 from U.S.A. war relief fund) and adaptation of premises for aged (£6,000); city engineer.

Darlington.—Hostel for the blind in Woodlands Road; E. Minors, borough surveyor.

Guildford.—Nursery school, St. John's Road site; borough engineer, Municipal Offices.

Hampshire.—New School, Portchester; county architect, The Castle, Winchester.

Ilford.—School, The Glade (£6,045); E. A. Russell, Ltd.

Additions, Research building, New North Road; H. Hughes & Co., Ltd.

Isle of Ely.—Extensions at Wisbech Grammar School; C. D. Robson, county architect, County Hall, March.

Keighley.—School canteen, Elm Estate Fields site; E. J. Felgate, borough architect, College Street.

Lancashire.—Senior school at Burscough; county architect, County Offices, Fishergate Hill, Preston.

Liverpool.—Two additional wards and dining block at Fazakerley Sanatorium; director of housing, Blackburn Chambers, Dale Street.

Llandudno.—Operating theatre, wards, and staff accommodation, War Memorial Child Welfare Centre; G. A. Humphreys, chairman of governors.

Llanfairfechan.—Extensions to St. Winefred's School; P. M. Padmore, architect.

Manchester.—Social centres (£2,000) and additions to Brownlow Green school (£1,580); city architect.

Mansfield.—Machine shop, Moor Lane; Hodgkins & Co.

Northampton.—Two new wards, Manfield Hospital, Spinney Hill; governors.

Northenden.—Works extensions; A. A. G. Toone, architect, 37, Princess Street, Manchester.

Pendlebury.—Plant repair workshop to works, Lumns Lane; J. Gerrard & Sons, Ltd., building contractors, Pendlebury Road, Swinton, Manchester.

Rochdale.—Additions to mills; Shawclough Mills (1920), Ltd.

Conversions at premises for offices, etc.; Deanhead Chemical Co., Ltd., Smithy Bridge, Littleborough.

Salford.—Huts, Stowell School (£1,700); borough engineer.

South Shields.—Conversion of building into youth club in Hudson Street (£1,300); acting borough engineer.

Tynemouth.—Box assembly shop for Dryers, Ltd.; L. J. Couves and Partners, architects, Carloli House, Newcastle-on-Tyne.

Urmston.—Works canteen, Garden Factory; Simpson Ready Foods, Stretford Road.

The
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MOTOR CONTROL
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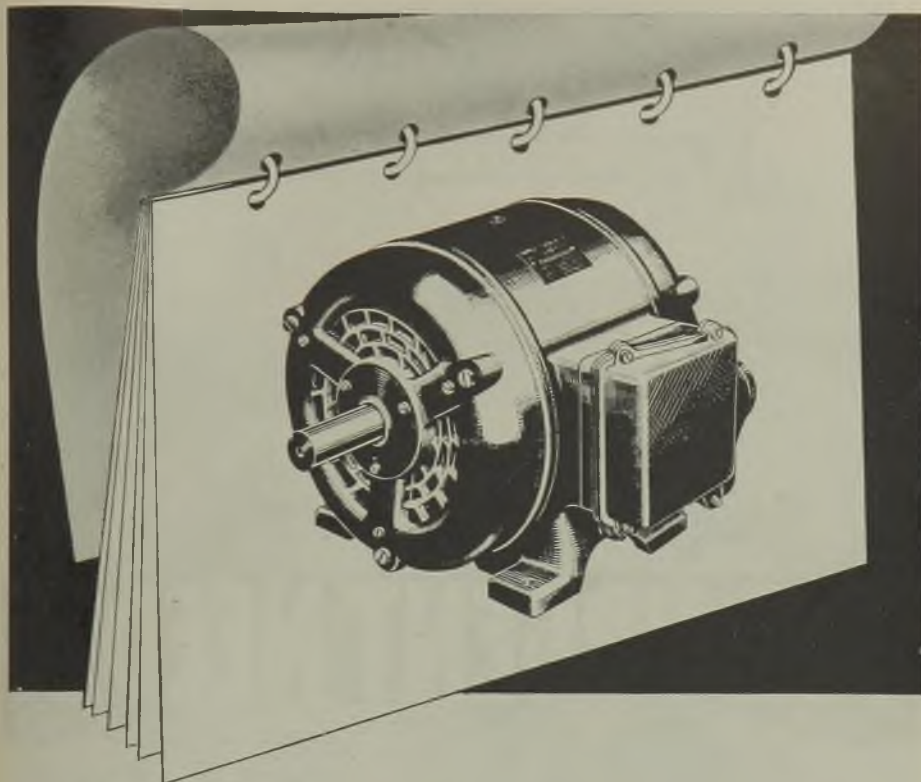
Each aspect of machine-tool control is dealt with in a general descriptive manner under appropriate subheads, and the various pages exemplify control equipment for a wide variety of machines, both as regards type and make.

In the application of the individual electric drive to machine tools one effect has been the substitution of full comprehensive electric control, for mechanical methods involving clutches, gears, and loose pulleys, not only on machines with single drives, but on machines where the control facilities now available, has encouraged the use of separate electric drives for each of several mechanical motions.

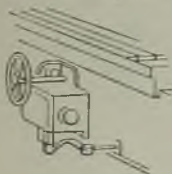
Brookhirst have been closely linked with the development of electric control in this sphere, and the Machine Tool Booklet gives as a minimum some indication of the part they have played, and the extent to which they are equipped to deal with present and future requirements of machine-tool manufacturers.

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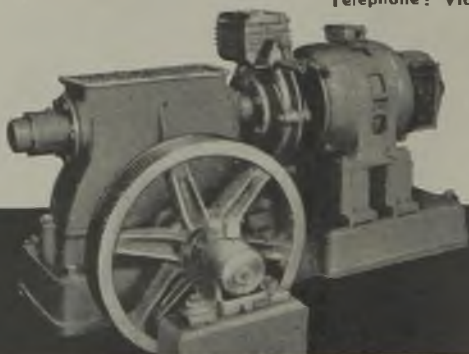
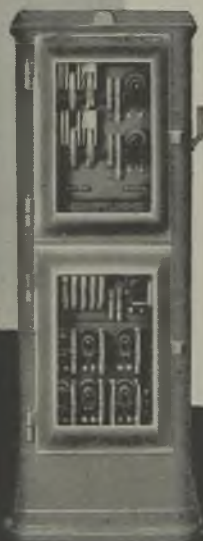


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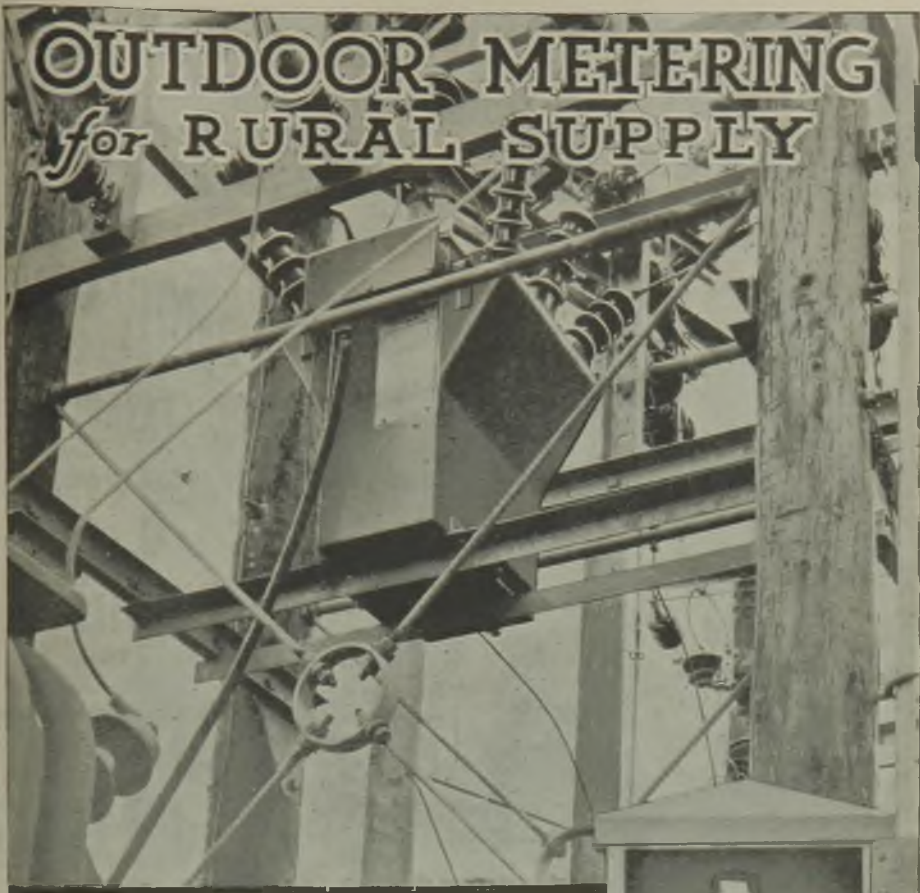
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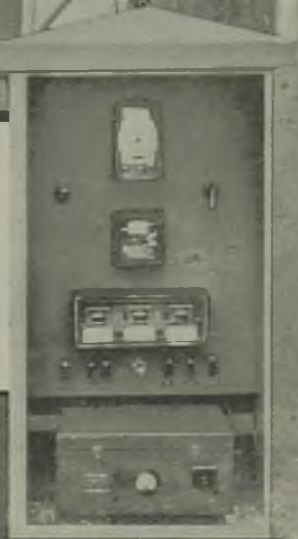


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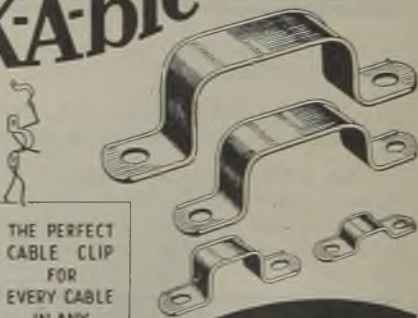
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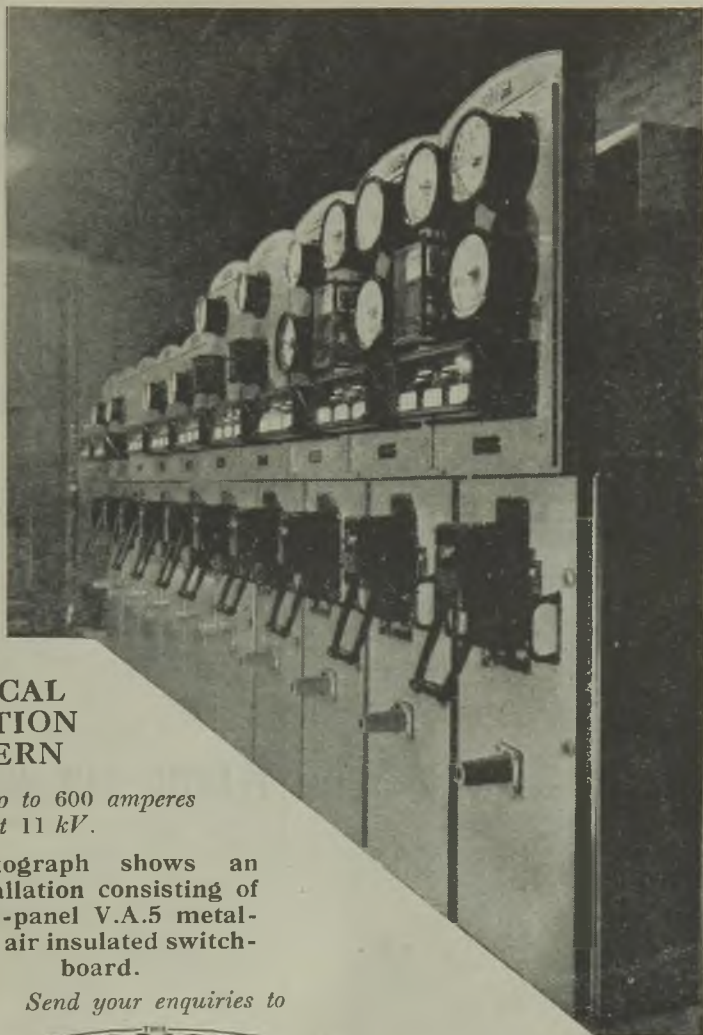
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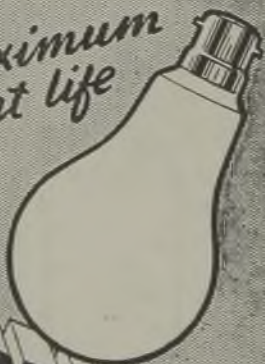
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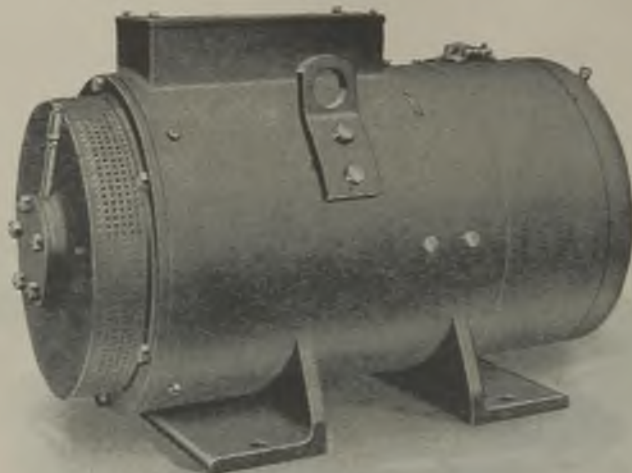
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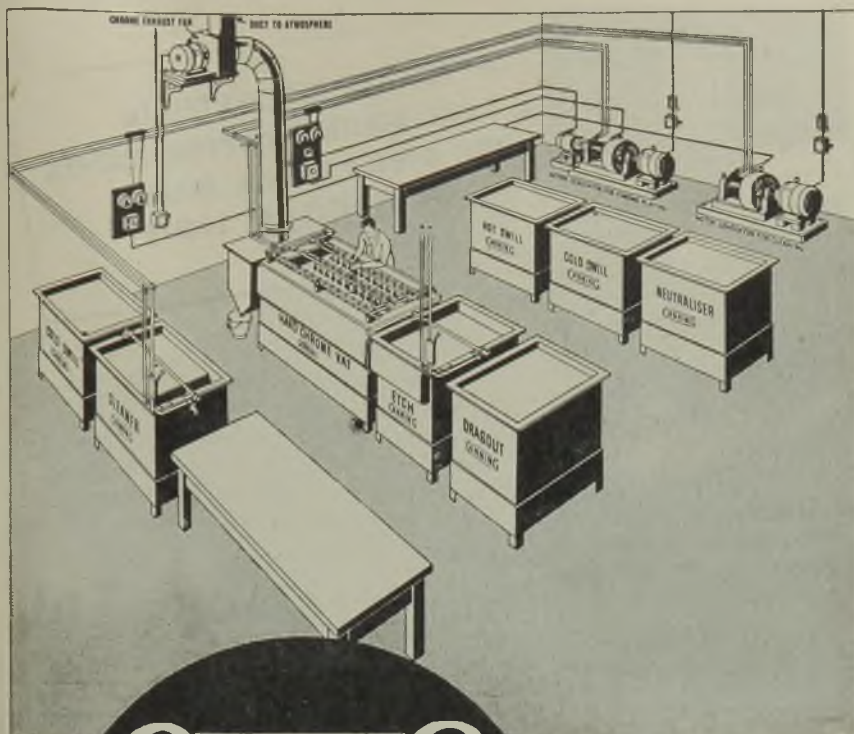
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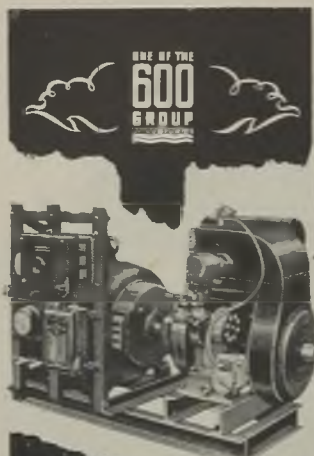
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YOU SHOULD OBTAIN DETAILS
OF THE COBORN ENGINE**

The range of application is almost unlimited. Saw-benches, Milling Machines, Pumps, Concrete Mixers, Compressors, Spraying Plant, Generators and many other types of machine may be driven by the Coborn engine. Operation on paraffin if desired.

Browett Lindley Ltd.

LETCWORTH, HERTS



**MICANITE
OF
MERIT**
in every form

- covered bars*
- washers & rings*
- machined parts*
- tubes, round & square*
- flexible & moulding sheet*
- tapes, etc*
- shapes*

GIBSON, TODD & CO. LTD
ALBERT MILLS - HOLLINWOOD
TELEGRAMS: GIBSON, TODD & CO. LONDON, ENGLAND

PUMPS FOR :
CREOSOTE PITCH
AS SUPPLIED TO
PETROLEUM
BOARD

**ROTOPLUNGE
PUMPS**

Pumps for
Petrol, Water,
Tar, Fuel Oil, etc.
Suction lifts 25ft.
without priming.
Variable stroke and Auto-
matically Reversible pumps.

ROTOPLUNGE PUMP Co. Ltd.
58 Victoria Street, S.W.1

Phone : VIC 4395

Grams : Rotoplung

**WARD
ROTARY
CONVERTERS**

Petrol Electric Generating
Plants, H.T. Generators, D.C.
Motors, Frequency Changers,
etc., up to 25 K.V.A.

CHAS. F. WARD, 37 WHITE POST LANE
Phone : Amherst 1393. HACKNEY WICK, E.9

The series of "R.E.A.L." advertisements, one of which is reproduced below, has created considerable interest and has evoked comments from many sources both at home and abroad.

In response to many requests we are therefore reproducing the series one by one with the English translation shown in each case.

ATHENS

"Athens is the heart of the world
where the spirit of the human race
finds its home and its inspiration
and its strength. It is the city
of the future and the city of the
past. It is the city of the
ancient and the modern. It is the
city of the world."

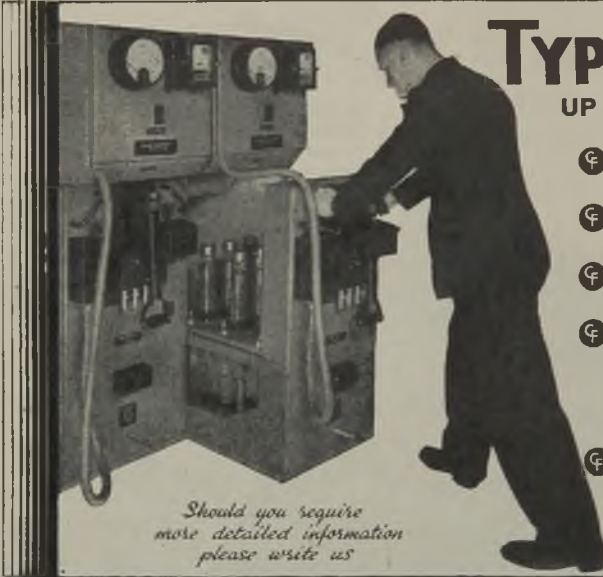
R. E. A. L.

ATHENS !

The very name of the City at once brings to every mind memories of history, both ancient and modern.

The day of your liberation, brave people of Greece, is at hand ! Once again shall you take an honoured and honourable place amongst the nations of the free and independent ! Once again shall your cities and villages be aglow with light — illumination — REALUMINATION !

Issued by Rowlands Electrical Accessories Ltd.
R.E.A.L. Works, BIRMINGHAM 18



TYPE UD UNITS

UP TO 250 MVA, 11 KV.

- ☪ AIR INSULATED
- ☪ TOTALLY ENCLOSED
- ☪ FULLY INTERLOCKED
- ☪ LOW OIL CONTENT
SINGLE BREAK OCB's
(WITH ARC CONTROL DEVICE)
- ☪ SHORT CIRCUIT TESTED

Should you require more detailed information please write us

COOKE & FERGUSON LTD.

MANCHESTER 11 & AT
40/41 KINGSWAY
LONDON W.C.2.



SIGNALLING EQUIPMENT LIMITED

Manufacturers of

Small Transformers, Heavy Duty Resistances, Plugs and Sockets, Fuse Holders, Electric Bells, Buzzers, and Switches. Also Plastic Mouldings, Coil Windings, Light Pressings, Turned Parts, and other components and accessories for the Wireless and Electrical Trades

MERIT HOUSE
SOUTHGATE ROAD, POTTERS BAR

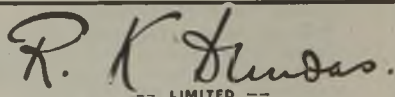
Phone : POTTERS BAR 3133
Telegrams & Cables : SEL, POTTERS BAR

REPTON ENGINEERING COMPANY

... ..

TENNANT STREET,
BIRMINGHAM, 15.

TELEPHONE: MID. 1792/3
TELEGRAMS: TONSTILE

--- LIMITED ---
TELEPHONE 74874

Experimental and Aeronautical Engineers
and Scientific Instrument Makers

Manufacturers of Precision Mechanical,
Electro-Mechanical and Thermionic Instru-
ments. Electro-Medical and Industrial
Apparatus, Time Interval Measurement and
Counters, DC Amplifiers and Recorders

Specialized Design Enquiries welcomed.

THE AIRPORT, PORTSMOUTH

"Ashton"

Cables, Flexibles
and Cords
OF ALL TYPES.
P.V.C. (Plastics)

As supplied to H.M. Government
Depts. Manufacture is strictly
laboratory controlled throughout.
Enquiries for essential
work only invited.



Made by

AERIALITE LTD

CASTLE WORKS · STALYBRIDGE · CHESHIRE

AGRO BAKELITE BLOCKS

THE ALTERNATIVE TO WOOD BLOCKS



AS SUPPLIED TO THE
AIR MINISTRY
PROMPT DELIVERY

No. 5050 Round type for one 2" or 2½" 5-ampere switch.

No. 7070 Round type for one 2" centre Ceiling Rose.

No. 8080 Oblong type for two 2" or 2½" 5-ampere switches.

BROWN BAKELITE



Marketed by

T.M.C.-HARWELL (SALES) LTD.

BRITANNIA HOUSE, 233 SHAFTESBURY AVENUE, LONDON, W.C.2

Telephone: TEMple Bar 0055 (3 lines)

Telegrams: "Arwelidite, Westcent, London"



DAY AND NIGHT
ELECTRIC SERVICE



FOR

QUICK RELIABLE REPAIRS

AND

REWINDS

THE MIDLAND DYNAMO Co. Ltd.

LEICESTER

Phone 20172 (3 lines)



THE
Sperryn
TRADE MARK

T. A. LAMPHOLDER

Suitable for Gas-filled lamps.

Will operate at 10 amps continuously.

Stands up to the hottest lamps.

Manufactured by

SPERRYN & CO. MOORSOM ST. WORKS
BIRMINGHAM

Established over 50 years

They cleared the way with **DELARON** LAMINATED PLASTIC



IN the path of the victorious Eighth Army lay thousands upon thousands of land mines sown by Rommel's fleeing Afrika Korps. But the "Eighth" was prepared and armed with—DELARON! For an essential pre-requisite of the land mine detector is that its "business end" shall be entirely non-metallic in addition to possessing other important properties. It is a significant tribute to the worth of DELARON Laminated Plastic that it was chosen as the material from which to make no fewer than 20,000 land mine detectors for the successful North Africa campaign—just one of the many ways in which DELARON is playing its part.

DELARON Laminated Plastic is a synthetic resin bonded paper or fabric, and although primarily used as an insulating material its applications are daily becoming wider both in the Mechanical as well as in the Electrical / Radio field. Full test information, samples and prices will gladly be sent on request.

DELARON

LAMINATED PLASTIC

A PRODUCT OF

De La Rue Insulation Limited
BRIGHTON ROAD · SUTTON · SURREY
TELEPHONE: VIGILANT 0033



POWER TRANSFORMERS

242,000 VOLTS.



**SUPPLIED TO THE
U.S.S.R.**

120,000 kVA., 15,700/242,000 volts, 3-phase, 50-cycle bank of single-phase Transformers on test (total weight, 492 tons). The H.V. neutral is insulated for service with an arc-suppression coil.

BTH

THE BRITISH THOMSON-HOUSTON CO., LTD.

CROWN HOUSE, ALDWYCH, LONDON, W.C.2.

A3460/2C

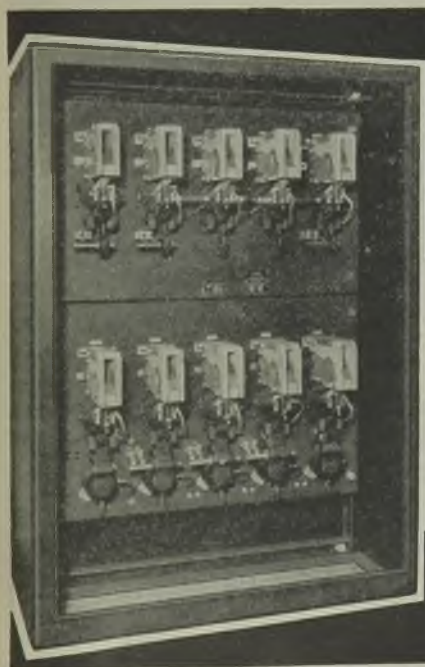


BRITANNIC CABLES



AN INDEPENDENT COMPANY, MAKERS OF E.H.T.
AND L.T. PAPER MAINS CABLES, VARNISHED CAMBRIC
C.T.S. MINING TRAILING, "IVERITE" INSULATED CABLES
AND THERMOPLASTIC CABLES (P.V.C.)

BRITANNIC ELECTRIC CABLE & CONSTRUCTION CO. LTD. IVER, BUCKS
Telephone : IVER 491 ; Telegrams : "BRITANNIC, IVER"



IGRANIC *Electric Control Gear*

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

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

IGRANIC ELECTRIC CO. LTD
BEDFORD & LONDON



this change may take several seconds



IF ONE PART of a repetition job is in light and the other in shadow, the worker's eyes must make this focussing adjustment thousands of times a day. If adjustment is slow—and with some people it may take many seconds—work slows down and its quality is endangered . . . OSRAM Fluorescent Tubes provide shadowless illumination; their cool temperate radiance is the next best thing to daylight itself. Eyes are not wearied with constant readjustment, output increases, quality of work improves . . . and incidentally current consumption goes down, because an 80-watt OSRAM Fluorescent Tube gives almost as much light as a 200-watt tungsten lamp. Proved facts in favour of the OSRAM Fluorescent Tube are so overwhelming that demand has made it necessary to restrict its application to nationally-important work. If your work is of this kind, we can discuss installation with you. But if not, you may still count upon the advice and service and long experience of G.E.C. lighting engineers to help you make the best possible use of whatever lighting system you have.

Osram

FLUORESCENT
TUBES



CLASSIFIED ADVERTISEMENTS

ADVERTISEMENTS for insertion in the following Friday's issue are accepted up to **First post on Monday**, at Dorset House, Stamford Street, London, S.E.1.

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

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

Original testimonials should not be sent with applications for employment.

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

SITUATIONS VACANT

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

SUNDERLAND EDUCATION COMMITTEE

The Technical College
(Principal: F. H. Reid, B.Sc., Wh.Ex., M.I.Mech.E.)

APPPLICATIONS are invited for the POST of LECTURER in the ELECTRICAL ENGINEERING Department, to commence duties, if possible, in September, 1944. Salary: Burnham Technical Scale, plus £52 War Bonus.

The commencing salary will include an allowance for approved industrial or professional experience (after the age of 21 years) up to seven years, or in special cases up to 10 years. An addition to the scale of £20 per annum will be paid, after 3 years' service, in respect of "special work of an advanced character."

The standard of the full-time day course is that required for an Honours degree and the evening courses are of Higher National Certificate standard.

Candidates must possess a good Honours degree in Engineering, or its equivalent, with qualifications in Electrical Machine Design, and should have had industrial and teaching experience. A knowledge of Telecommunications will be an advantage.

Forms of application and further particulars may be obtained by sending a stamped addressed envelope to The Registrar, Technical College, Sunderland. Applications should be returned to the undersigned not later than 29th July, 1944.

Education Offices,
15 John Street,
Sunderland, co. Durham.

W. THOMPSON,
Director of Education.

388

CORPORATION OF ALDERSHOT

Electricity Department

APPPLICATIONS are invited for the position of Rotary Substation Attendant for shift duty in the Corporation's Electricity Works. Applicants should have sound experience in the control of high and low pressure switchboards and in the operation of rotary converting plant.

Conditions of service and rates of pay are in accordance with District Joint Council No. 11, South Coast Area, capacity in kW's 1,001/2,000 (at present £5 2s. 4d. per week of 48 hours). The successful applicant will be required to pass a medical examination and contribute to the Council's Superannuation Scheme.

Applications, giving age, details of experience, and enclosing copies of recent testimonials, to the undersigned by not later than 28th July, 1944.

T. W. GEORGE,
Borough Electrical Engineer,

Offices and Showrooms,
87, Victoria Road,
Aldershot.

373

ELECTRICAL POWER ENGINEERS' ASSOCIATION

Vacancies for Assistant Secretaries

THE NATIONAL EXECUTIVE COUNCIL invites applications for two appointments of Assistant Secretary on the Official Staff of the Association, one for the Northern Area (location Edinburgh), to be made immediately, and the other, for the North-Western Area (location Manchester) to be made in the near future.

Applicants should have had experience in the Electricity Supply Industry, preferably on the technical side.

The duties will comprise the conduct of negotiations on behalf of members, propaganda work, etc. Salary scale (basic), £250 rising to £500, subject to the operation of Clause 33 of the National Joint Board Agreement; present commencing salary, £401.

The successful applicants will be required to pass a medical examination and to contribute to the Association's Staff Pension Scheme.

Applications, in writing, giving full particulars, including age, and endorsed "ASSISTANT SECRETARY," should be addressed to—

The General Secretary,
Electrical Power Engineers' Association,
102, St. George's Square,
London, S.W.1.

and should be received not later than Friday, the 11th August, 1944. 340

CORPORATION OF BRISTOL

Electricity Department

Appointment of Junior Charge Engineer

THE Electrical Committee of the City of Bristol have a vacancy for a JUNIOR CHARGE ENGINEER for Rotary Substation work.

The salary will be in accordance with the National Joint Board Schedule for the Electricity Supply Industry, Class "H," Grade 9a, which is at present £316 per annum.

Applications, accompanied by copies of at least three testimonials, must be received by the undersigned not later than Friday the 21st day of July, 1944, endorsed "Junior Charge Engineer."

A. J. NEWMAN, M.I.Mech.E., M.I.E.E.,
Chief Engineer and General Manager.

Dorset House,
Clifton Down,
Bristol, 8,
7th July, 1944.

392

ASSISTANT Estimating and Sales Engineer with experience of switchgear. A permanent and progressive position is offered at Birmingham works.—Box 394, c/o The Electrical Review.

BUYING Department, Manager required by manufacturing electrical engineers in Birmingham. A permanent appointment with excellent post-war prospects is offered.—Box 393, c/o The Electrical Review.

ELECTRICAL Contractors require Storekeeper, permanent situation, East London district. Send age, experience and wage required.—Box 6022, c/o The Electrical Review.

COUNTY OF THE CITY OF WORCESTER

Lady Demonstrator

APPPLICATIONS are invited for the post of **LADY DEMONSTRATOR** in the Electricity Department of the Corporation.

Applicants must hold a Diploma of Domestic Science or other approved Certificate and have had previous experience in an electricity showroom.

The salary offered is £180 per annum, rising to £200 per annum by annual increments of £10, plus a war bonus of £40 6s.

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

Applications, stating age, qualifications and experience, with copy testimonials, and endorsed "Demonstrator," must be received by the undersigned not later than 22nd July, 1944.

Canvassing in any form will be deemed a disqualification.

C. H. DIGBY SEYMOUR.

Town Clerk.

Guildhall,
Worcester.
8th July, 1944.

387

CONTROL Engineer required to operate modern E.H.T. board and D.C. switchboard at generating station in Home Counties, N.J.I.C. rate 2s. 4d. per hour. State experience, age, married or single, to—Box 382, c/o The Electrical Review.

ELECTRICAL Draughtsman required North-East Coast area. Applicants should have experience with turbo-type alternator plant and be capable of preparing complete detail and arrangement drawings for this class of machinery. Write, giving full details of experience, to—Ministry of Labour and National Service, R.0.5A(1), Ref. 27, 28, Great North Road, Newcastle-upon-Tyne, 2. 347

ELECTRICAL Wholesalers require a Clerical Assistant, conversant with trade and materials as handled.—London Electrical Co. (Blackfriars) Ltd., Blackfriars Road, S.E.1. 24

EXPERIENCED Electrical Salesmen required by electrical wholesalers, North-East Coast district. Elma lamps. Non-rising cables. Salary, expenses and commission. Write, stating age and experience—Box 6034, c/o The Electrical Review.

FACTORY Superintendent required for electric lamp factory in North London. Applicant must have had experience in handling female labour and be a good disciplinarian. Reply, stating age, experience and salary required, to—Box 384, c/o The Electrical Review.

MACHINE Shop Superintendent. Established firm requires a man to control shops containing light automatics, drillers, bench millers and presses. 250-300 operators. Experience on small accurate work essential. Post-war as well as war-time post. North London district. Write fully, stating experience, age and salary required, to—Box 385, c/o The Electrical Review.

APPOINTMENTS FILLED

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

SITUATIONS WANTED

AM.I.E.E. (30), acting as technical adviser during war, desires post-war appointment with electrical power company, manufacturer, or large scale contractor. Experienced in E.H.T. and L.T. transmission, distribution, and associated maintenance. Experience also in electro-mechanical and electro-acoustic circuits, and instruments.—Box 6003, c/o The Electrical Review.

CHARTERED Electrical Engineer seeks position as Engineer and Manager. Experienced design, manufacture, sales small electric motors (industrial, domestic, aircraft). Competent to take full control.—Box 6026, c/o The Electrical Review.

CONSTRUCTIONAL Engineer (36), holding executive position, desires change. Extensive experience supply companies, electrical contractors, in planning construction, maintenance, etc., of overhead and underground mains, office routine, etc. Supply co. preferred, but not essential.—Box 6004, c/o The Electrical Review.

CONSUMERS' Engineer (43), i/c. extensive London district, desires post-war change to country town, South or West Country, many years' experience pre-war development, excellent record and references.—Box 6033, c/o The Electrical Review.

ELECT. Engineer, Assoc.I.E.E., desires post as tech. asst., sales or maintenance charge. Cardiff or South Wales area preferred, but not essential.—Box 6006, c/o The Electrical Review.

ELECTRICAL Lieutenant-Commander, area chief of Admiralty engineering department, with 12 years' first-class commercial experience (sales/publicity), seeks directorship in concern preparing to develop in Devon/Cornwall after war. Highest references.—Box 6002, c/o The Electrical Review.

ENGINEERING Executive (30), Int. A.M.I.P.E., G.I.E.E., with design, D.O., estimating and time study experience, desires position as chief engineer or works manager in progressive electrical company, Manchester area pref. Min. salary £600.—Box 6018, c/o The Electrical Review.

EXPERIENCED Sales Engineer (exempt), with extensive connections and proved organising ability, would consider position with small and progressive electric motor manufacturers needing sales organisation.—Box 6008, c/o The Electrical Review.

MAINTENANCE Fitter and Electrician (41), 14 years present job with supply undertaking, 25 years' experience in all, desires change, free to move, used to E.H.T. gear, able to take charge.—Box 6028, c/o The Electrical Review.

SALES executive position desired with progressive concern by competent Electrical Engineer (36), fully conversant all types rotating electrical machinery, switchgear, transformers, rectifiers, but other industrial plant representation considered. Excellent education, practical training, 14 years' technical sales experience. Utmost integrity, tact and enthusiasm. Fair remuneration expected for specialised services. Qualifications and further details exchanged in confidence. Midlands or South preferred.—Box 6012, c/o The Electrical Review.

SALES Manager, age 38, present serving C.M.F., would welcome correspondence with principals interested in his services for post-war reorganisation or development. Wide and successful experience industrial sales organisation and management in diversity of trades. Also accustomed to handling own advertising and press promotion. Letters will be forwarded.—Box 6036, c/o The Electrical Review.

SUPERVISING Electrician, plant or manufacturing, over military age, permanency, post-war prospects.—Box 6024, c/o The Electrical Review.

YOUNG Man (26) desires contact progressive firm for job after war or sooner, B.Sc. physics with maths., A.Inst.P., Grad.I.E.E., and 4 years' factory experience. Keen interest in application of science and development work on own initiative and with responsibility, or technical executive position. Might invest capital or travel, French and German good.—Box 6030, c/o The Electrical Review.

FOR SALE

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

GEORGE COHEN, SONS & CO., LTD.

for

GUARANTEED ELECTRICAL

PLANT.

MOTORS, GENERATORS,

SWITCHGEAR,

etc.

WOOD LANE, LONDON, W.12.

Telephone: Shepherds Bush 2070

and

STANNINGLEY, NEAR LEEDS

Telephone: Pudsey 2241.

Established 1834.

COX & DANKS LTD.

Plant & Machinery Department (London Area)
offer the following Electric Motors from stock.

Maker.	220 volts, 2-phase, 50 cycles.		Type.	Brgs.
	H.P.	Speed.		
Higgs	20	725	S.R.	B.B.
Crompton	15	710	S.R.	B.B.
Brooks	10	750	Sq. Cage	B.B.
Above with Starters.				
Crompton	25	705	S.R.	*B.B.
Mackie	6	1,000	S.R.	R.O.
*Totally enclosed.				

D.C. Motors.

Maker.	H.P.	Speed.	Wdg.	Volts.	Type.
Ind. Elec.	14	900	—	420	R.O.
Verity	8	650	Compound	500	B.B.
B.T.H.	7½	580/1,040	Compound	460	R.O.
Higgs	7	700/1,500	Shunt	480	B.B.
Newton	7	875	Compound	460	R.O.
Electro S.	5	700	—	500	B.B.
Electro	5	900	—	500	R.O.
Crompton	5	1,200	Compound	500	R.O.
Brooks	3	900	Compound	440	R.O.

Motor Generator Sets.

(2) 7-kW Motor Generator Sets by Newton, 70 volts, compound wound, direct coupled to 15-h.p., 400-v., 3-phase, 50-cycles, 950-r.p.m. Slip Ring, R.O. bearings.

Extraction Fan.

Sturtevant No. 3, 18", 5.5-h.p., 440-v., 3-phase, 50-cycles, 2,800-r.p.m. Sq. Cage, ball bearing.

Switchgear.

800-amp. Switch Fuse, 3-pole, neutral, fitted with H.R.C. Fuses by Lucey, as new.

For full details and prices of above items apply to

COX & DANKS LTD.,

Plant & Machinery Department (London Area),
Faggs Road, Feltham, Middlesex.
Tel.: Feltham 3471.

360

WATER TUBE BOILERS IN STOCK

Three 12,000 lbs. evaporation, 200 lbs. W.P.
One 12,000 160

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

BURFORD, TAYLOR & CO. LTD.,

Boiler Specialists, Middlesbrough.

Telephone, Middlesbrough 2622.

32

ECONOMISERS IN STOCK

TWO Green's Economisers, 208 tubes, 250 lbs. W.P.
ONE Green's Economiser, 128 tubes, 185 lbs. W.P.

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

BURFORD, TAYLOR & CO. LTD.,

7, Commercial Street, Middlesbrough. Telephone 2622.

65

SCREWED BRASS AND STEEL STUDDING

USERS unable to obtain the longer lengths of B.A. and Whit. Screws are advised to use Screwed Studding. Supplied in 12" lengths in 0, 2, 4, 6, 8 and 10 B.A. sizes, and 3/16", 1/4", 5/16" and 3/8" Whit. Brass and Steel.

Ditto Nuts. Any Quantities. Immediate Delivery.

APEX SALES, 6, Leaside Road, London, E.5.
Sta. 7131.

6013

FRACTIONAL H.P. ELECTRIC MOTORS MADE TO CUSTOMERS' SPECIFIC REQUIREMENTS

MANUFACTURERS wish to contact firms requiring assistance with their main contract, or who require quantities of special driving units with reduction gear, impeller fan or pump, etc. Capacity available in up-to-date machining and coil winding shops, under personal supervision of working directors.

Write—

GENERAL REWINDS & ENGINEERING CO.,

BENTLEY HEATH, KNOWLE,
BIRMINGHAM.

6011

REBUILT MOTORS AND GENERATORS

LONG deliveries can often be avoided by purchasing rebuilt secondhand plant. We can redesign or replace surplus plant of any size.

SEND US YOUR ENQUIRIES.

OVER 1,000 RATINGS ACTUALLY IN STOCK HERE.

DYNAMO & MOTOR REPAIRS LTD.,

Wembley Park, Middlesex.

Telephone: Wembley 3121 (4 lines).

Also at Phoenix Works, Belgrave Terrace, Soho Road,
Handsworth, Birmingham.

Telephone: Northern 0898.

26

ELECTRIC MOTORS & DYNAMOS

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

For Sale or Hire. Send your enquiries to:—

BRITANNIA MANUFACTURING CO. LTD.,

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

Telephone: 5512-3 Clerkenwell.

13

ARC WELDING MACHINES FROM STOCK

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

MAX-ARC WELDERS LTD.,

190, THORNTON ROAD, CROYDON.
THORNTON Heath 4276-8.

35

BURDETTE & CO. LTD.

Stock

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

STONHOUSE STREET, CLAPHAM, S.W.4.

Day and night service.

MACaulay 4555.

17

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

5881

WANTED. 10/45-kW, 220/230-volt, compound wound D.C. Generator, speed 975 r.p.m. Must be in first-class order.—Dow & Nicholson Ltd., 180, Hardgate, Aberdeen. 4021

1 h.p., single-phase, 200/230-volt, 960 or 720-r.p.m. Motor.—Box 6007, c/o The Electrical Review.

1/10 Motor.—To 1 h.p. commutator type A.C. or A.C./D.C. control by series resistor. Suitable for variable speed Brindall, Norwich. Telephone, Brindall 70. 519

40 h.p., 440-volts D.C. Motor (comp.), 300/450 r.p.m., shaft centre to base must not exceed 15½".—Box 6029, c/o The Electrical Review.

WORK WANTED AND OFFERED

MOTOR REPAIRS

REWINDING and Repairs. Small Motors and Electric Tools rewound and repaired by firm having long experience in this work. Guaranteed work and prompt service. Large assortment of Motors available from stock.

SOUTHERN IGNITION CO., LTD.,

190, THORNTON RD.,

CROYDON.

THORNTON Heath 4276-8.

37

ELECTRICAL Engineer shortly opening workshop in Newport, South Wales, for fractional h.p. Motor Repairs-Rewinds, would welcome trade inquiries and sub-contracts for above work.—W. J. G. Burgess, 297, Romford Road, Forest Gate, London, E.7. 6027

MACHINING Work, for Centre Lathes up to 6½ in. centres and medium-sized milling (good grade work preferred).—The London Electric Firm, Croydon. Up-lands 4871. 56

SMALL Precision Turning Work wanted.—Box 6035, c/o The Electrical Review.

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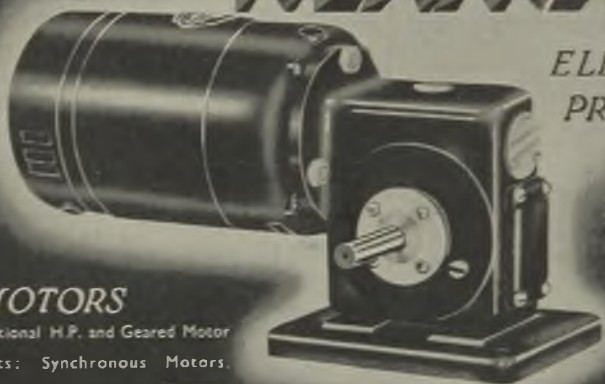
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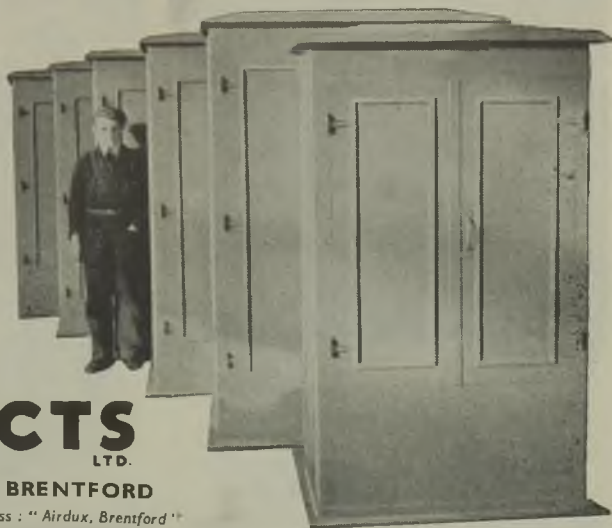
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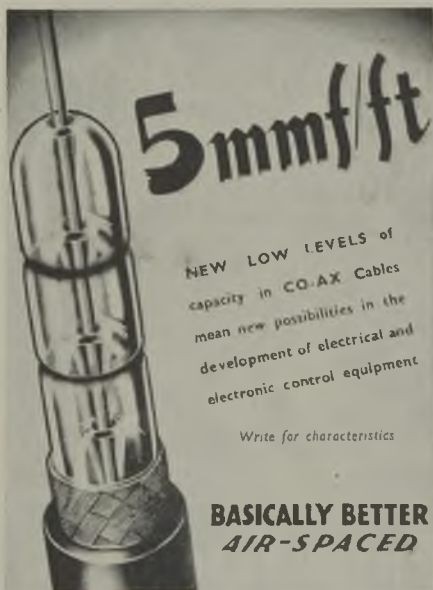
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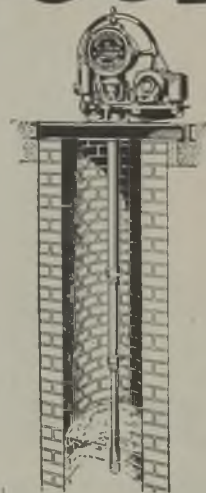
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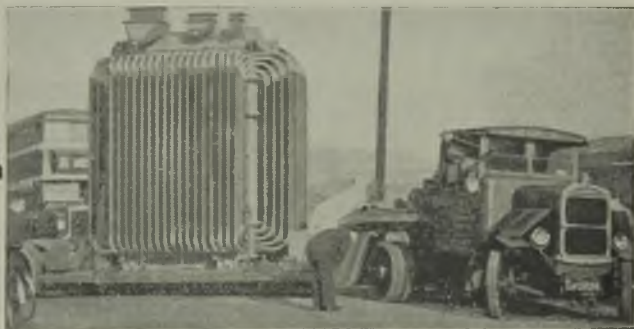
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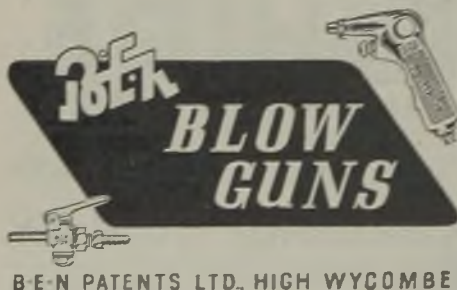
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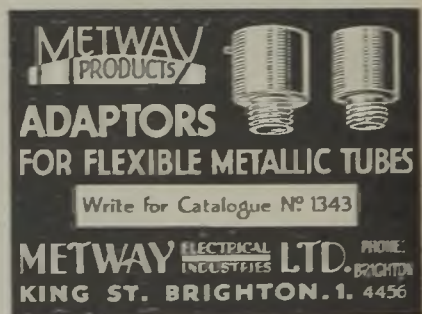


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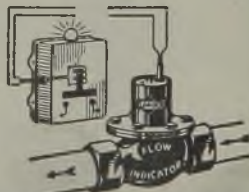
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