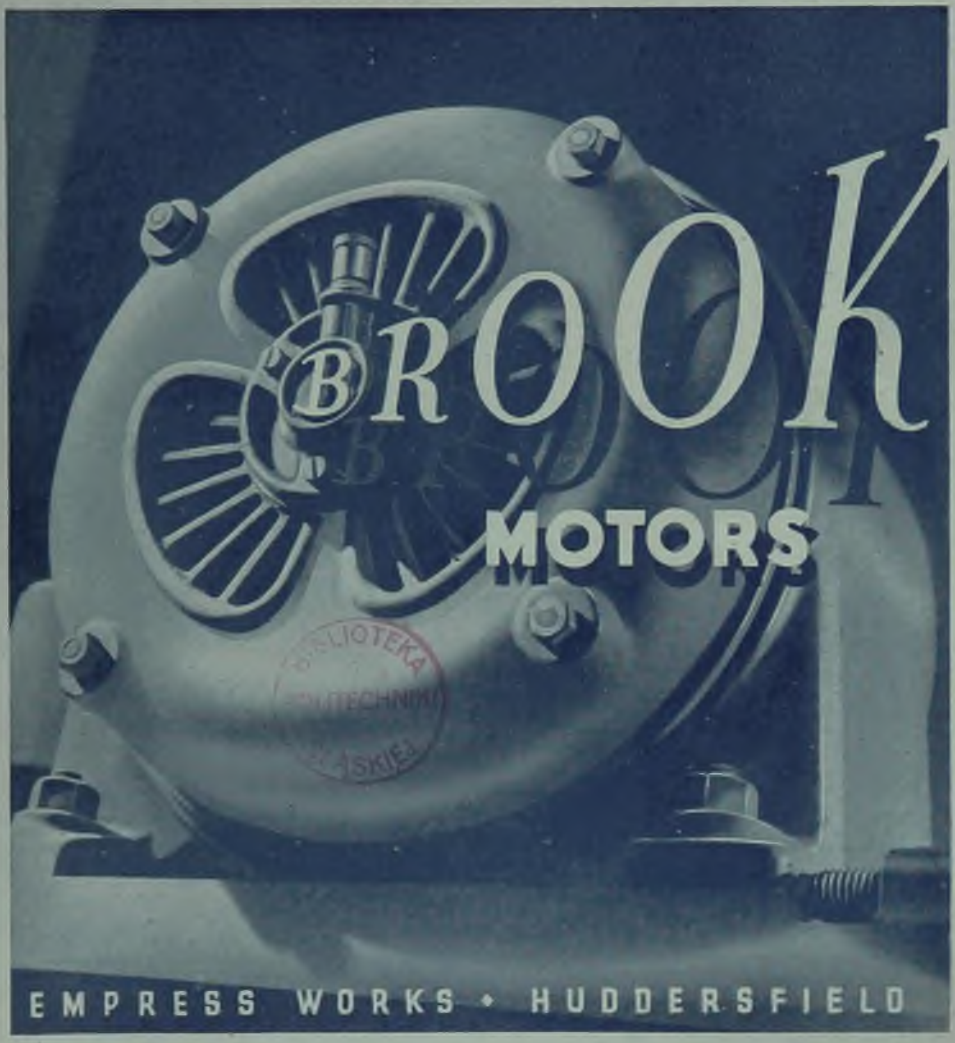
ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXXV. No. 3480 AUGUST 4, 1944 9d. WEEKLY



MELTING POINTS of conventional solders

● FUSIBLE SOLDERS

Alloy	° C	° F
No. 2	70-71.5	158-160
No. 7	91.5	196.7
No. 9	95	203
No. 11	102.5	216.5
No. 14	102.5-227	216.5-440
No. 15	124	255
No. 17	138	281
No. 18	141	291
No. 21	177	351

2-3 oz. sticks.
Blowpipe strips.
Ingots.

● TIN-LEAD SOLDERS

Grade	° C	° F
K	184	363
A	186	367
B	205	401
F	210	410
M	217	423
G	233	451
C	238	460
D	252	486
N	278	532

Tinman's sticks.
Blowpipe strips.
Solid wire.
Cored wire.
Soldertape and strip.
Solder cream.
Solder washers.
Ingots.

● High Temperature SOLDERS

Grade	° C	° F
H.T.3	236-243	457-469
L.S.4	298	568
L.S.2	305	581
L.S.1	305-310	581-590

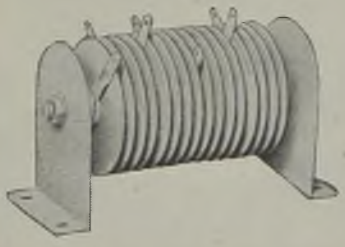
Tinman's sticks.
Blowpipe strips.
Ingots.

● SILVER SOLDERS

Grade	° C	° F
F.E.F.	630	1166
Grade A	735	1355
Grade B	775	1427
Standard	780	1436

Strips $\frac{1}{8}$ *in.* × .040 *in.*
Wire $\frac{1}{16}$ *in. and* $\frac{1}{32}$ *in.*

Serving with the AIR-SEA RESCUE SERVICE

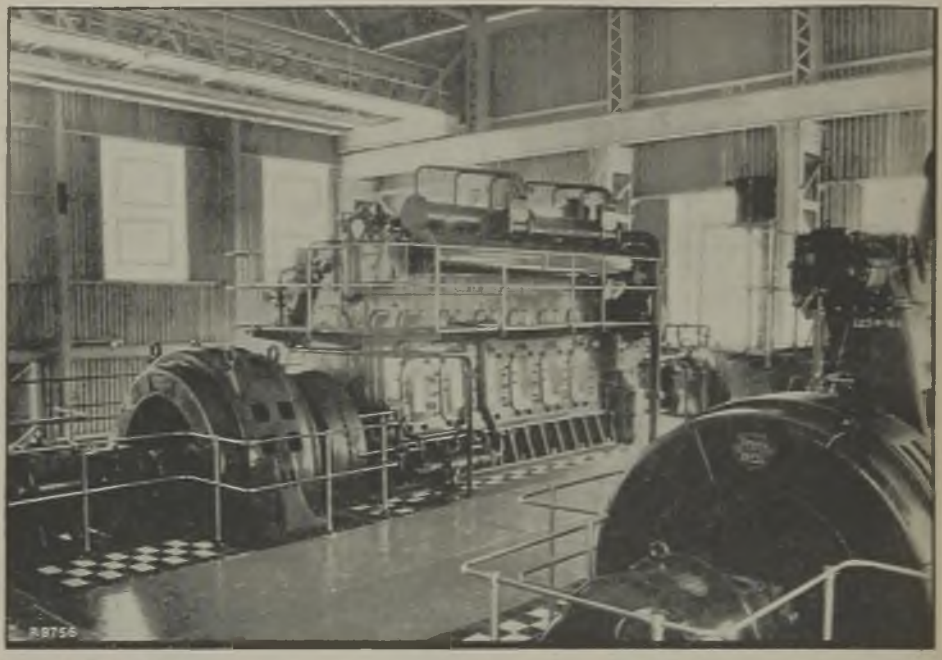


HIGH-SPEED rescue launches . . . Lifeboats carried by aeroplanes . . . lifeboats dropped into the sea by parachutes . . . wonders will never cease! We are proud to know that STC Selenium Rectifiers are playing their part in this Service. They are just as dependable whether used at sea, on the ground, at great altitudes, or in arctic or tropical temperatures. They need no maintenance; are light, have no moving parts and are therefore free from noisy contacts. Dust, moisture, shock or vibration leave their performance unimpaired.

Selenium Rectifiers

Rectifier Sales Department:
STANDARD TELEPHONES AND CABLES LIMITED, NEW SOUTHGATE, N.11

● RUSTON OIL ENGINE—6 VLBX Pressure Charged — generating 800 kw. at an Electricity Station in the Bahamas.



Ruston in the Bahamas

Electricity is generated for this important West Indies area by the Ruston 6-cylinder Vertical Oil Engine illustrated. This is the first of three Ruston Engines to be installed in this station—two similar prime movers are on order. Ruston Engines are providing the cheapest source of power and electrical energy in all parts of the world.

RUSTON LINCOLN · ENGLAND

RUSTON & HORNSBY LTD., LINCOLN & LONDON

They take so much for granted...

. . . safety . . . happiness . . . the smoothly ordered routine of their lives . . . and to secure these for every child is an integral part of any plan for the post-war world. Taking things for granted is almost synonymous, also, with ownership of Ellison Switchgear and it is in order that you may continue to enjoy this prerogative that we have instituted a special service. One of our engineers can be sent by appointment to report upon the condition of your switchgear. His visit need cause only the minimum interruption and his competent advice will save you from any possibility of worry in the days that lie ahead.

GEORGE ELLISON
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ELECTRICAL REVIEW

August 4, 1944

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EDITORIAL, ADVERTISING & PUBLISHING OFFICES : Dorset House, Stamford St., London, S.E.1
Telegraphic Address : "Ageekay, Sedist, London." Code : ABC. Telephone No. : Waterloo 3333 (35 lines).
Registered at G.P.O. as a Newspaper and Canadian Magazine rate of postage. Entered as Second Class Matter at the New York, U.S.A., Post Office.

Annual Subscription, Post free : British Isles, £2 7s. 8d. ; Canada, £2 3s. 4d. ; Elsewhere, £2 5s. 6d.

Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW LTD., and crossed "Lloyds Bank."

ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXV. No. 3380. AUGUST 4, 1944 9d. WEEKLY

Registration of Contractors

N.R.E.I.C. Considers Compulsion

THE decision of the National Register of Electrical Installation Contractors to consider, with other interested bodies, the question of the compulsory registration of electrical contractors and their employees seems to be a belated recognition of the fact that voluntary registration has not yielded the results which were hoped for when it was established about twenty years ago.

That is not to say that it has been an entire failure. The number of contractors on the Register may be considerably smaller than those who are not, but their standing and possible influence are in much better proportion. A little leaven leaveneth the whole lump and the registered contractors form an enlightened section in an industry which is attractive to many doubtful operators.

Attitude of the E.C.A.

It has been claimed by the Electrical Contractors' Association that without the support of its members the Register would cease to exist, which, we suppose, is only one step removed from saying that the Association and the Register are just different aspects of the same thing. The distinction is that the Association is avowedly a trade organisation whereas, by virtue of its representation of all sections, the Registration Board is ostensibly an independent body. But can a voluntary system which necessarily relies so much for its existence on the goodwill of the party which it was formed to regulate be really effective?

The E.C.A. may fairly claim that the qualifications which it requires applicants for membership to possess are at least as great as those demanded by the Register and it certainly provides more for the applicant's money—even if he has to find more money. It has favourable trading relations with manufacturers, it keeps members informed of all matters affecting them and its sign is quite as well known to the public as that of the Register—which perhaps is not saying much.

A Protective Measure

It can be well understood, therefore, that, having given the Register a long trial, E.C.A. members feel that there is little gain in continuing, in effect, to pay two subscriptions for the same objects: (*a*) recognition as qualified practitioners in installation work and (*b*) protection against the unqualified both for themselves and for the public. Membership of the E.C.A. gives them the first, but neither the Register nor the E.C.A. has achieved the second. They accordingly turn their thoughts towards compulsory registration which they feel would justify the payment of a fee by keeping incompetents and cheapjacks out of the business. For similar reasons the Electrical Trades Union is in favour of the compulsory registration of operatives.

The demand for compulsion could succeed only if it were proved to the Government's satisfaction that unregulated installation work is a real danger to life and property. A statement of evidence produced before the war by the committee formed to consider this subject purported

to show that improperly executed installations were a real menace, but it did not convince everybody—least of all the I.E.E. Sub-Committee dealing with post-war electrical installations.

Does the rest of the electrical industry support the demand for compulsory registration? We have seen few signs of actual enthusiasm although there has been some rather vague lip service paid to the idea. There is certainly no public demand—but to this the advocates will reply that the public always has to be protected in spite of itself. Be that as it may, we think that politicians would hesitate to include compulsory registration of contractors and operatives in their programmes.

Installations and Appliances

IT must be remembered that compulsory registration has to be accompanied by penalties against the execution of electrical work by unregistered persons. To be absolutely safe and certain this should mean that householders must be prohibited from interfering with their installations. But accidents are not caused solely by "installations" in the narrower sense. It is probably true to say that defective appliances are responsible for far more trouble. This raises again the subject of appliance approval which, in itself, is another question raising wide issues.

Public Lighting

REGRETTABLE pessimism seems to have been displayed by the Ministry of Home Security in telling the London and Home Counties J.E.A. that the Authority's proposals for the co-ordination of arrangements for the resumption of street lighting in the London Electricity District will be considered "at the appropriate time." Does the Ministry contemplate another two or three years of "black-out?" If not, it should agree with the authority that now is the appropriate time to start tackling the question.

Reconstruction and Compensation

COMMENTING upon the Town and Country Planning Bill, 1944, Mr. Leslie Gordon, clerk and solicitor to the London and Home Counties J.E.A., points out that it does not deal with what might become a very serious question, namely, compensation for assets rendered useless by a scheme of reconstruction. He no doubt has in mind the distribution systems of electricity supply undertakings, large sections of which may have to be abandoned under schemes of reconstruction or improvement. While it may be possible to recover and re-use much of the equipment, a great deal will be useless or its recovery will be too costly to justify any such action. We recall that this matter was raised at last year's meeting of the I.M.E.A. by engineers from "blitzed" areas. The point is one which merits attention.

Air Conditioning

VARIOUS meanings have been loosely assigned to the expression "air conditioning." The correct definition is given by the Institution of Mechanical Engineers in its Report on Mechanical Installations referred to last week. The Committee recommends that the term should be used only to denote the complete control within pre-determined limits of the temperature, humidity, cleanliness and movement of air in buildings. Clear understanding of this is important in view of the extension of air conditioning to be expected in the future on hygienic grounds as well as for its value in certain industrial processes.

Ever Upward

A PERIODICAL rise in the price of coal has become so much of a commonplace that it creates but little stir. As from August 1st another four shillings was imposed on the ton to meet the cost of the higher wages granted to miners in recent months. It had been hoped by the Minister of Fuel and Power that increased individual output would largely offset the effect of wages increases, but it is still the unfortunate case that output and wages travel in opposite directions. Industries dependent upon coal may protest but we fear that this will have little effect. They must strive for ever greater economy but this is difficult in the face of their inability to secure the grades of coal they need.

Industrial India

ONE result of the war has been the conversion of India from a country indebted to the United Kingdom into a creditor of formidable dimensions. The effect of this upon Anglo-Indian trade remains to be seen; in theory it should lead to a flow of goods (or gold) from this country to meet the service of our debt. But at the same time the war

has speeded up the industrialisation of India, tending to create that state of industrial self-sufficiency which, unfortunately for exporting countries, appears to be the universal trend. It seems that after the war India's principal demand will be for capital, not consumer, goods. In other words there should be a good market for the heavier classes of electrical equipment although imports of smaller appliances may fall off considerably. In the Commons debate on India last Friday Mr. Amery said that the country was on the eve of a great industrial advance. The Government of India had included in its plans for post-war reconstruction a great increase in hydro-electric development; 90 per cent. of India's ascertained sources of power were still unutilised.

Electro-Deposition

ALTHOUGH the deposition of thick metal electrolytically is generally similar to electroplating, it calls for more technical knowledge—more than is always possessed by those undertaking the work. Nickel is shown to have several advantages over chromium, but it entails greater difficulties in operation and fewer concerns are experienced in its application. To disappointment in the results that have sometimes been obtained the Armament Research Department attributes some reluctance on the part of manufacturers to take advantage of this process, but the information given by the Ministry of Supply in ARD Memoranda Nos. 1 & 2 should be of assistance in reducing wastage due to over-machining of parts, which varies from 1 to as much as 10 per cent. in practice.

Mathematics

ENGINEERS use mathematics mainly as a convenient means of expressing principles quantitatively and of solving specific problems. In this their outlook is in contrast to that of "pure" mathematicians, whose interest is in the subject as such. On the other hand their approach is not so far removed from that of physicists, from which it differs in degree rather than in kind, attaching similar importance to mathematics as a tool rather than as a cultural asset and coming to appreciate, say, the principles of mechanics most readily from an experimental angle. Both engineers and physicists should have a general knowledge of what techniques are available and most likely to suit any given purpose. A report on the teaching of mathematics to physicists which has been published by the Institute of Physics is therefore of some engineering interest.

Atoms into Power

ALTHOUGH considerably the largest of some twenty cyclotrons so far constructed in the United States, the new one at Washington, referred to in this issue, is considerably less powerful than that under construction for California University. With its 184-in. diameter accelerating chamber, the latter is expected to have a penetrating power in air of 140 ft. as compared with the 5 ft. or so of prototypes existing three years ago and to go to the nucleus of the atom instead of only breaking off particles. It is to be used in investigations of the unique chain reactions in the isotope of uranium known as "U235," which are expected to permit automatic conversions of atoms into power.

Photo-Electric Cells

LIGHT-SENSITIVE devices are so increasingly coming into general use that it is unfortunate that the popular term "photo-electric cell" should mean a different thing to different people. To some it implies any means by which the action of light brings about changes in an electric circuit. The chief effects are electronic emission across a vacuum or a gaseous space, change in resistance of a circuit (*e.g.* selenium type) and self-generation of current. There is more to be said for the practice of restricting the expression "photo-electric" to the first or else to define it as photo-emissive and to refer to the others as photo-conductive and rectifier cells.

A Fiery Stream

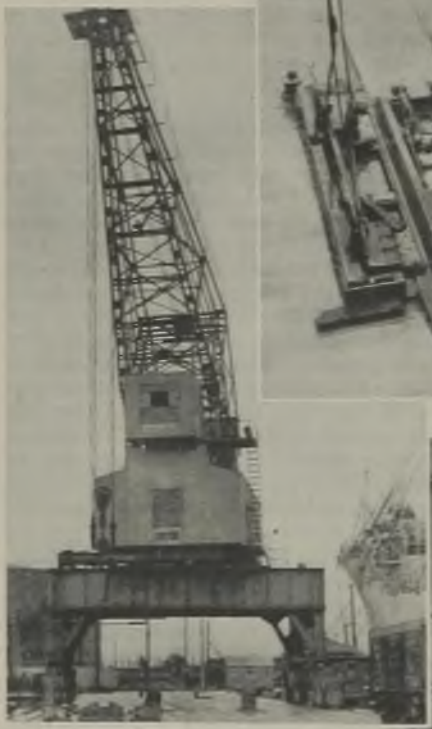
IN reproducing Mr. G. A. Maunsell's recent *Electrical Review* article on "Tidal Power," *Electrical News and Engineering* (Toronto) quotes him as saying, in connection with the Severn project, "the Ministry of Transport scheme selected as a site for the barrage a place called English Stones . . . where the width and *conflagration* of the channel were such as to provide the best kind of rock foundation." Our contemporary should surely know that it is the Thames, not the Severn, which is usually regarded as inflammable.

Coal Handling

New Quayside Travelling Cranes

WE recently had the opportunity of seeing two new electric travelling cranes of outstanding interest which have been installed for the Greenock Harbour Trust at a port in this country. They have been designed and built by George Russell & Co., Ltd., to pass coal directly from railway trucks into ships' holds. The trucks pass along the quayside line normally to each crane, and each truck in turn takes up a position on a section of the track about which the cradle "sits" on a base, the truck first running up a ramp into the cradle. The crane lifts the cradle and with it the complete truck which is slewed and finally tipped by means of an auxiliary block with two ropes, one to each end of the cradle. The crane will lift a total load of 35 tons, and with the cradle attached it will handle up to 16-ton wagons. The cradle is completely automatic in action, and has safety locking features which ensure that the "axle gripping" hooks are held in positive engagement so long as the cradle is lifted clear of its base.

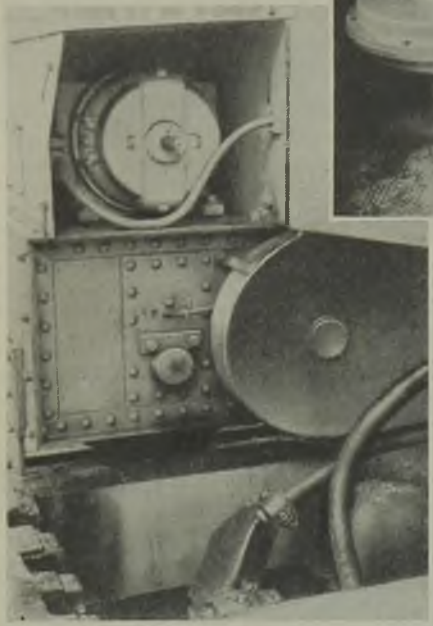
The crane has a portal carriage with a span of about



Top: Each crane has been designed to pass coal directly from railway trucks into ships' holds
Left: The cradle "sits" on a base about the railway track and the truck runs up a ramp into the cradle
Right: The crane lifts the cradle and with it the complete truck which is tipped by an auxiliary block with two ropes

40 ft., there being adequate clearance in the portal for three full-gauge railway tracks. The carriage is borne by sixteen large travelling wheels, eight per side, and each wheel has double RS tyres with central flanges, suitable for running on double rails, the wheels being mounted in pairs on eight compensated bogies.

The steel section and plate superstructure revolves on the carriage about a forged ingot steel centre pin, and by means of 64 forged steel rollers it rides on a roller path, 21 ft. 9 in. in diameter, which is built in twelve segments bolted to the carriage.

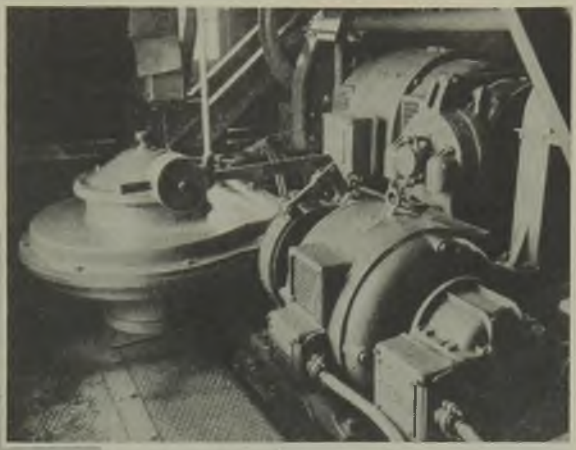


Each of the corner bogies is equipped with a 12½-HP motor which drives both wheels

It incorporates a mild-steel tank for accommodating the tail ballast, as well as a particularly spacious machinery house in which there is ample room around the machinery for access and maintenance. A 5-ton overhead travelling crane runs the full length of the machinery house. The driver's cabin overhangs from the front top of the superstructure, and is thereby immediately below the main jib members; thus the driver has excellent observation of all the operations.

The jib is fixed at about an angle of 55 deg. from the horizontal, and all lifting is carried out at 60-ft. radius. The jib head pulleys are 87 ft. 6 in. above the rails, and the clear height of the lifting hook above rail level is 70 ft. The hook can be lowered to 30 ft. below rail level. With the cradle in the tipped position the maximum lift is 50 ft. from rail level to the underside of the cradle.

The travelling speed is 72 ft. per min. and



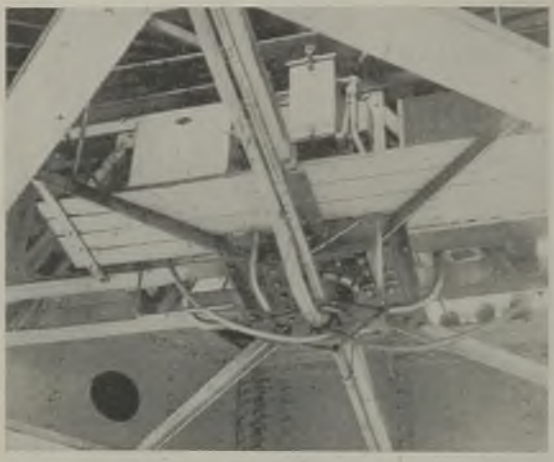
The 60-HP slewing and 90-HP tipping motors are housed in a machinery room

individual drive is arranged to the pair of wheels on the bogie at each corner of the carriage. Each of these four bogies is a complete unit and is fitted with a Crompton Parkinson totally enclosed 12½-HP 565-RPM one-hour rated, slip-ring motor which drives both wheels through four reductions of cast-steel, machine-cut spur gearing. This form of driving represents the tendency to eliminate much of the shafting and gearing required when a single motor drives both sides of the travelling crane.

A solenoid brake for holding purposes is placed on one drive at each side of the crane. The travelling motors are controlled from the driver's cabin by means of a single 60-HP manual drum controller and resistances by George Ellison, the resistances being five-minute rated and arranged to be cut out in balanced steps.

An interesting problem was presented by the need for a simple form of control combined with efficient apportioning of the load and protection for the individual motors of this long travel drive, and the need to avoid a large number of collector rings. The four 12½-HP motors are treated as one motor, except that the stators are individually fed through overload relay coils before being paralleled to the collector rings. The rotor leads are each fed through a permanently connected rotor resistance of suitable value to prevent the circulation of currents between the respective motors should the motors be out of step.

After being fed through these resistances the rotors are placed in parallel and supplied through three sliprings to the main controller. If, therefore, the latter should cut out all external resistance, there is still enough resistance in each individual rotor circuit to ensure the necessary pull-out torque of the motor when it is stalled. The resistance required in these permanent banks is so low that it barely affects the travelling speed.



The protective panel for the travelling circuits is fitted near the centre-pin on top of the carriage; note also rotor resistance banks and lighting transformer (photographed looking up from ground)

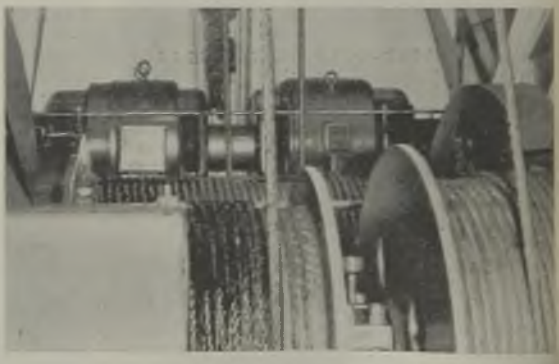
The Igranic crane protective panel for the individual travelling circuits is fitted on a platform below the roller path, close to the centre pin, where there are also some of the permanent rotor resistance banks and a 10-kVA transformer, with an isolating switch, for the heating and lighting circuits. Access to this equipment is gained through a trap-door on the top of the carriage platform.

Slewing is carried out at 450 ft. per min. at the jib head, with full load, power being provided by a C.P. 60-HP, 580-RPM screen-protected, one-hour rated, s.r. motor controlled by Ellison equipment with five-minute-rated resistances. The slewing gear first reduction is by a forged-steel machine-cut worm and a phosphor bronze worm wheel, the final reduction being by means of a cast-steel pinion engaging with a large diameter cast-steel race wheel. The worm wheel transmits through a friction device, to protect the gearing from the possibility of sudden shocks. A foot-operated brake controls this motion.

In the driver's cabin is a two-motor main crane protective panel which serves for both the 60-HP slewing motor and the total of 50 HP of travelling motors. This protective panel and the one already referred to for the individual travelling circuits operate as one equipment and are jointly controlled by an " on " and " off " push-button station conveniently near the driver. All the overload movements are of the automatic resetting type, so that, after a trip has occurred it is only necessary for the crane operator to reset the panels by pressing the " on " button.

The full-load hoisting speed is 56 ft. per min., and the maximum lowering speed, with field weakening, is 80 ft. per min. The hoisting motor is a C.P. 180-HP shunt-wound separately-excited screen-protected one-hour-rated, 250-V, DC motor which is controlled on the Ward-Leonard system, to provide a speed variation range of 500 0 500 RPM, 800 RPM being achieved when lowering with field weakening. The hoist gear comprises two reductions of steel gear with double helical, machine-cut teeth. The hoist barrel rope centres are 3 ft. 6 in.

A 30-in. Igranic type " M " brake acts on a drum which forms part of the motor coupling, and a large additional emergency brake, arranged for foot operation from the driver's cabin, is fitted to the second shaft.



The m.g. set is mounted on a raised platform at the rear of the machinery house and behind main hoist, compensating and tipping barrels

The main barrel spur wheel engages with another spur wheel of equal size, which drives a second " compensating " barrel of equal diameter through a dog clutch. One end of the tipping rope is attached to the

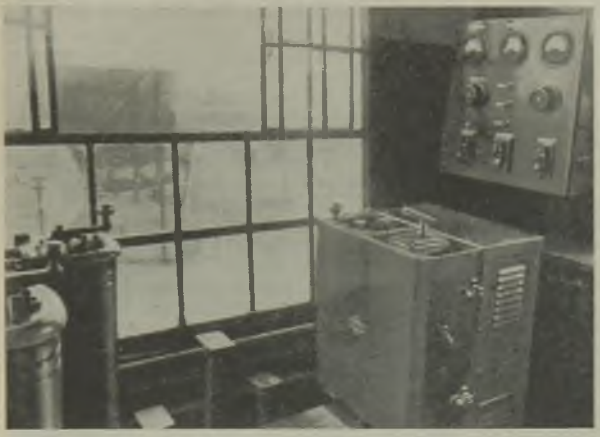
"compensating" barrel, thence over the jib-head pulleys to a return block, and back to the tipping barrel. The main hoist barrel is grooved right and left to receive the respective ends of the hoist rope. Two main pulleys and a single doubling pulley are fitted at the point of the jib, so that the load is lifted on four parts of the rope. The arrangement is, therefore, such that with the clutch engaged the main return block and the tipping return block maintain their relative positions when hoisting or lowering.

An Igranic type 450/141 limit switch is provided for interrupting the circuit to prevent over-hoisting and over-lowering. This limit switch is provided with additional contacts for "switching in" the synchronising circuit at the appropriate height of the lift. The mechanical efficiency of the hoist gear when lifting the test load of 43¾ tons was 83 per cent.

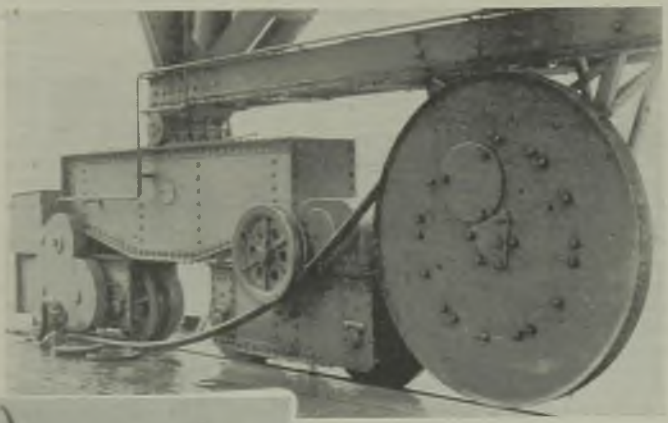
The tipping speed is 50 ft. per min. The C.P. motor is a 90-HP shunt-wound, separately-excited, screen-protected, one-hour-rated, 250-V, DC unit which is also Ward-Leonard controlled to effect a speed-variation range of 600 0 600 RPM.

The tipping gear comprises two reductions of steel gear with double helical, machine-cut teeth. The tipping barrel rope centres are 3 ft. A 24-in. Igranic type "M" brake acts on a drum forming part of the motor coupling, and a foot-operated emergency brake is also fitted.

When the crane is required for service with a hook, the cradle is disconnected and both return blocks are hoisted, until a signal light indicator shows that a suitable pre-selected height has been reached. The hoist gear is then declutched, which action simultaneously also applies braking to the now released compensating barrel and holds it stationary. The main return



In the driver's cabin is the Ward-Leonard control panel (top right), the master drum controller and selector switch for hoisting and tipping (bottom right), and travelling and slewing controllers (left)



Supply to the crane is by means of plug and socket units and switches in pits along the quayside. A cable drum on one side of the bogie (above) is driven from one of the rail wheels

block can now be lowered to the ground and the hook fitted for operation as an ordinary crane.

When the crane is again required for coaling, the hook is removed and the main return block is hoisted to the exact position at which declutching previously took place, when the clutch is re-engaged. The exact position for " clutching in " is indicated by signal lights operated by an Igranic synchronising switch designed for this purpose.

An Igranic 450/140-A limit switch is mechanically operated from the clutch lever, so that when declutched the tipping motor control circuit is interrupted and simultaneously a second contact completes the signal light indicator circuit. A similar limit switch is provided for interrupting the circuit to prevent overtipping or overlowering the cradle, and additional contacts are provided to introduce a slow-down feature, which reduces the speeds, immediately before th " cut-out " positions.

The Ward-Leonard motor-generator set is mounted on a raised platform at the rear of the machinery house. The hoisting, tipping and slewing motors are also housed in the machinery room. The m.g. set is continuously rated and consists of a 230-HP auto-synchronous motor directly coupled to a 148-kW separately excited 250/0/250 generator. On the same bed-plate there is also mounted a compound-wound generator which acts as a constant-voltage (250) exciter for supplying the DC required for the various brake magnets, contactor coils and field circuits of the rotating machinery. The exciter of the auto-synchronous motor is spigoted on the end-shield of the motor.

The starter for the m.g. set (Igranic 1080 type) is situated in the machinery house and operated either by push-button from the instrument panel in the driver's cabin, or from a push-button station mounted on the starter itself. An additional panel with sensitive over- and under-frequency relays is provided for the purpose of preventing overspeeding when lowering a heavy load and fading-frequency effect when running light.

Protective Methods

A Ward-Leonard contactor panel provides various protective functions, including discrimination against overload for the hoist and tipping motors, and automatic features which prevent abuse and provide for the majority of the braking effort to be absorbed electrically through the generator and thus to relieve the mechanical braking of much wear and tear. The near handle is of a selector switch for selecting which driving motor (180 HP hoist or 90 HP tip) shall be coupled to the Ward-Leonard generator *via* the contactor panel. Electrical interlocking is provided, so that the change-over can only be effected when the motors are at rest.

A Ward-Leonard control panel is equipped with a voltmeter for the exciter which supplies the constant-voltage circuits, an associated regulator, an ammeter with central zero, showing the current circulating in the main W.L. loop, three indicating lights which duplicate the action of another indicator in the machinery house below and show the position of the main and tip hoists in relation to each other for synchronisation purposes, an ammeter which shows the DC self-excitation of the auto-synchronous motor, an associated regulator, a push-button which provides " on " and " off " control for the protective panels serving the AC motor circuits, slew and travel, an emergency push-button for " on " and " off " control of the W.L. circuits, and a push-button which is also the means of starting and stopping the auto-synchronous motor *via* the Igranic automatic stator and rotor control panel.

Feeding Arrangements

Electricity is supplied to the crane at 440 V, three-phase, 50 cycles, by means of eight Johnson and Phillips plug and socket boxes in pits at suitable intervals along the jetty and t.r.s. trailing cable. A cable drum is mounted on one side of the portal and is driven from one of the rail wheels, the winding mechanism being so arranged that the rotation of the friction clutch is unidirectional, irrespective of direction of the crane motion. It winds somewhat faster than is required to take up the cable at the minimum reel diameter, receives power through a friction clutch, and is thus able to pay out as well as take up cable when a crane is on either side or travelling in either direction.

In a pit adjacent to each plug and socket pit is a switch and disconnecting link box. The switch is operated through holes in the pit cover by means of a foot-operated rod. The switch is interlocked with the plug unit so that the plug cannot be inserted with the switch " on." The trailing cable from the plug is 646/·029 three-core t.r.s. and from the drum on the carriage it passes to slip-rings. Supply is thence by another cable, through a hole in the centre pin to the main slip-rings in the machinery house.

In addition to the six rings required for the collection of current from the stator and rotor circuits of the travelling motors, there are two control circuit rings which are common to all the overload trip circuits in series on the crane protective panel.

The main switch, which is a 500-A t.p. oil-immersed, free-handle " Klad " circuit-breaker, is situated at the entrance to the machinery house, so that it is convenient for the driver to " close-in " on his way up to the driver's cabin. A Crompton Parkinson AC instrument panel comprising an ammeter, voltmeter and power factor meter is fitted in the driver's cabin.

Organisations of the Industry—VII

British Standards Institution

By C. Le Maistre,
C.B.E., F.C.G.I.
Former Chairman of the Executive Committee of the General Council

THE national movement for industrial standardisation commenced in this country in 1901 with the setting up of a small committee of eight prominent engineers to standardise steel sections, and at the same time to reduce the tremendous variety of sizes which had to be kept in stock involving a large amount of unremunerative capital. It has now developed into an organisation consisting of about 1,500 committees (technical committees, sub-committees and panels) with an aggregate membership of over 13,000.

One of the first electrical subjects to be studied was the question of defining the rating of an electric motor, and a sub-committee, of which the late Colonel R. E. Crompton was the chairman, was formed to investigate the possibilities of general agreement on a solution of the problem. There was considerable confusion at that time as to how the rating should be defined, and there was, moreover, no means of ascertaining the views of industry other than by a questionnaire addressed to individuals.

Colonel Crompton's committee had not been very long in existence, however, before the late D. N. Dunlop approached the committee, having succeeded in bringing the electrical manufacturers together into a single trade association (now B.E.A.M.A.) to whom the standardisation movement owes a great deal. It was then possible to substitute the method of gathering the views of individual manufacturers, with the subsequent difficulties inevitable in such a method, by inviting representation of the manufacturers' organisation on the committee, and through them obtaining the consensus of opinion of the electrical industry as a whole. Many difficulties were thus overcome, and the team instinct so inherent in the British character came fully into play, with the result that the progress of standardisation in the electrical field was rapid.

Sir Percy Ashley, K.B.E., C.B., chairman of the General Council

Mr. Percy Good, C.B.E., Director and Secretary of the Institution

At the same time much useful information was gained from the records of the American Institute of Electrical Engineers, for a committee of the Institute, under the chairmanship of Dr. F. B. Crocker, had been studying the same subject and had issued its first report in 1889. Germany also was working along the same lines, the Verband Deutscher Elektrotechniker being responsible for the work.

Origin of the I.E.C.

In 1904 the work of Colonel Crompton's committee had sufficiently advanced for him to be able to present a paper on standardisation to the Electrical Congress held that year at St. Louis, U.S.A. Messrs. Crompton (Great Britain), Gonsalez (Spain), Lombardi (Italy) and Ryan (U.S.A.) were appointed as the committee of the Chamber of Delegates to consider and report on the question of international standardisation. As a result of their deliberations the Chamber, as one of its recommendations, proposed " that steps should be taken to secure the co-operation of the technical societies of the world by the appointment of a representative commission to consider the question of standardisation of the nomenclature and ratings of electrical apparatus and machinery." The delegates were asked to report to their respective technical societies who would communicate with Colonel Crompton as to whether they were prepared to co-operate.

Thus Colonel Crompton was the father of the International Electrotechnical Commission, which was officially constituted in London in 1906. Dr. Elihu Thomson was president, and Dr. A. E. Kennelly was secretary of the Chamber of Delegates when this resolution was adopted. Moreover, Professor Lombardi, who was elected president of the I.E.C. in 1938, was a member of the Chamber as an Italian delegate, and thus took a prominent part in initiating this international movement.

The work of preparing British proposals for submission to the Commission was originally undertaken by the Institution of Electrical Engineers, which set up a committee to act as the British National Committee of the I.E.C. In 1911, however, the whole of this work was handed over to the Engineering Standards Committee, and the personnel of the British National Committee of the I.E.C. and of the Electrical Industry Committee of the British Standards Institution became identical, though the members act in a dual capacity.

Electrical Predominance

A glance at the numerical list of the British Standard Specifications will show that a large proportion of the specifications prepared in the early days were for electrical materials and appliances. This will be appreciated from the following list of specifications, it being borne in mind that the numerical order of the specifications is an indication of the date sequence of the original issues: B.S.2, Tramway Rails and Fishplates; B.S.7, Electric Cables; B.S.8, Tramway Poles; B.S.16, Telegraph Material; B.S.17, Electrical Machinery (now superseded by several later specifications); B.S.23, Trolley Wire for Tramways; B.S.31, Conduits and Fittings for Electrical Wiring; B.S.33, Carbon Filament for Electric Lamps; B.S.37, Electricity Meters; B.S.42, Steam Engines for Electrical Purposes; B.S. 52, Bayonet Lamp Caps; B.S.67, Ceiling Roses.

The list could be extended. There are at the present time about 1,500 current B.S. Specifications, nearly 200 of which are of direct interest to the electrical industry.

Enlargement of Scope

The Engineering Standards Committee was incorporated in 1918 as the British Engineering Standards Association and received a Royal Charter in 1929. In 1931, with the agreement of the founders, its scope was enlarged to cover industries other than engineering and the title was changed to British Standards Institution. The Institution is an entirely independent body, receiving Government support, both by means of a financial grant and by co-operation of technical officers on the B.S.I. Committees, but it is entirely free from any Government control. The work is supported also by technical institutions, trade associations, public authorities, public utility companies, manufacturers and professional engineers. Many of these, besides being contributing members, co-operate directly in the work of drawing up the Standard Specifications by nominating representatives to serve on the committees.

The objects of the B.S.I. are, as its name implies, to draw up industrial standards, and these may be in the form of specifications, test codes, glossaries, codes of practice and the like. The aims of national standardisation are well known to those engaged in the electrical industry, but it may perhaps not be out of place to summarise them briefly as follows:—

Reduction in the time and expense involved in preparing inquiries for quotations.

Establishment of a uniform basis for tenders, thus rendering them more easily comparable.

Possibility of larger production with consequent reduction in cost.

Securing of a greater degree of continuity in employment because stocks can be produced in slack times.

Quicker delivery (both of complete articles and replacements).

Reduction in cost of replacements.

Uniformity in methods of sampling and testing.

Greater uniformity in quality and performance of material supplied, making possible reductions in cost due to :—

(*a*) More accurate design of apparatus and machinery;

(*b*) The economic use of a cheaper grade of material, and

(*c*) The use of a lower factor of safety.

Reduction in the number of misunderstandings and disputes.

The B.S.I. co-operates in international standardisation and there is a close liaison between the B.S.I. and the British National Committee of the International Commission on Illumination.

Structure of the B.S.I.

The immense field of activity now covered by the B.S.I. can be appreciated to a certain extent from the following review of the principal committees. In the first place there is the General Council, the present chairman of which is Sir Percy Ashley, K.B.E., C.B. Under the General Council there are three Divisional Councils, namely, the Building, Chemical and Engineering Divisional Councils, and a fourth, namely, the Textile Divisional Council, is now being constituted.

In general terms it may be said that the Engineering Divisional Council is responsible for the field of activity previously covered by the British Engineering Standards Association. It is, however, impossible to draw hard and fast lines between the various sections of industry and there is a certain amount of elasticity in the allocation of specific items of work to a particular Divisional Council.

The Divisional Councils work through representative Industry Committees, which cover the following subjects: Aircraft; chemical engineering; cinematography; colliery requisites; electrical engineering; gas engineering; illumination; iron and steel; mechanical engineering; non-ferrous metals; oil and petroleum; road engineering; solid fuel;

photography; plastics; rubber; welding; paper; glass; personal safety equipment; timber; and cement, lime and concrete.

The officials of the Institution do not themselves initiate standardisation projects. A request for standardisation must come from some responsible section of industry, such as a technical or trade organisation or a Government Department. On the receipt of such a request it is the normal practice for the Industry Committee to authorise the convening of a conference of the interests directly concerned so as to ascertain whether there is a consensus of opinion that a useful purpose would be served by undertaking the proposed work. In the event of this conference deciding that the work shall proceed, a Technical Committee is set up and, if necessary, sub-committees and panels are formed.

In setting up these committees care is taken to ensure that an equitable balance is maintained between the manufacturer and user interests, and when a draft specification has been prepared it is circulated to all the interested bodies in this country of whom the B.S.I. has knowledge, and is also sent to the national standardising bodies in the British Empire (Australia, Canada, New Zealand and South Africa) as well as to local committees in many other countries. A period of about six months is normally allowed for the submission of comments. All comments received are carefully reviewed and no specification is ever issued as a British Standard in the face of well-founded opposition from any recognised section of industry, standardisation by general consent being the basic principle underlying the whole of the work.

The Imperial Economic Conferences have given a great stimulus to the co-ordination of all standardisation under one central body in each part of the British Commonwealth. The Government having endorsed this policy, the B.S.I. is endeavouring to give effect to it in this country and is prepared to issue as British Standards any nationally-agreed specifications or codes of practice.

Four Million Specifications Distributed

With regard to the achievements of the Institution, mere statistics do not convey an adequate picture. It has already been mentioned that there are about 1,500 current British Standards available. During last year 200,000 copies of British Standard Specifications were distributed, the total number of specifications distributed by the Institution to date being about 4,000,000. At the present time some 500 different subjects are under active review and it is significant that much of this work consists of the revision of existing Specifications. One of the fundamentals in the policy of the Institution is to bring the Standard Specifications up to date, so as to keep pace with developments in industry. To make a change in a standard merely for the sake of a change is to be deprecated since it weakens confidence in the standard. On the other hand, stagnation in development must at all costs be avoided and, so far as the electrical industry is concerned, quite a large proportion of the work in hand consists of the revision of existing Specifications.

Enough has been said to draw attention to the large part played by the electrical industry of this country in the work of national standardisation.

Power Station Sites

Durham Alderman's Defence

ALTHOUGH a public inquiry has been promised by the Minister of Town and Country Planning, protests are still being made against the proposal of the North-Eastern Electric Supply Co. to erect a large power station at Kepier Haughs on the River Wear just over a mile from Durham City. On the other side, a statement was made last week by Alderman J. W. Foster, chairman of the Finance Committee of the Durham County Council. He described the protests as purely destructive criticism of a project which would create employment and provide an improved and adequate supply of power and, in consequence, would be a primary factor in inducing further industrial development in mid-Durham. The criticism that the station would mar the view of the Cathedral and Castle was contrary to the views of those who drafted the scheme. Durham had been a " distressed area " but it seemed that the conscience of the nation, and indeed of the Church, was more easily stirred by the prospect that a view might be marred than it was by the poverty and despair which before the war ruined the lives of this country's inhabitants and which the project would do something to redress.

Alderman Foster agreed that if it were practicable an alternative site might be adopted. If, however, the proposed site was in the opinion of the experts the only one possible, the Council should take every step to ensure that the powerful opposition was answered by a body of opinion of equal or greater weight, prepared to put the claims of the people to a life of economic security above the claims of ill-informed critics.

The Lincoln Proposal

At the annual meeting of the Friends of Lincoln Cathedral, as reported in *The Times*, the Dean (the Very Rev. R. A. Mitchell) referred to the Corporation's proposal to extend the St. Swithin's station. He said he thought that it would be deplorable if the issue came to be regarded as one between cathedral and city. There was nothing in the proposal which threatened to injure the cathedral or to disturb the tranquillity of those who dwelt around it. The sole objection was that the scheme might seriously ruin and obstruct a peculiarly beautiful distant view of the city, not the cathedral alone.

Sir Clement Newsum moved a resolution calling upon the Minister of Town and Country Planning not to permit the proposal to be proceeded with until a public inquiry had been held. This was seconded by the Bishop of Lincoln and adopted by the meeting.

Control Systems

Relays or Time Switches?

By S. A. Daines, A.M.I.E.E.

AUTOMATIC control of street lighting, shop window illumination and floodlighting, as well as such other restricted-hour loads as water heating and soil or greenhouse heating, depends upon some mechanical contrivance which is operated at specific times of the day or night, important either to the public, the consumer, or the electricity undertaking. Those loads in the lighting category are usually switched on at dusk and off between 11 p.m. and midnight, or at dawn. The heating loads, generally at cheap rates, are required to be on during those periods when the valleys occur in the generating station's load curve and, conversely, to be off during peak-load periods.

This kind of time-load control has been efficiently carried out, and still is in some cases, by time switches, but as experience with superimposed current systems is gained, so do the advantages of the latter method of control tend to outweigh what was thought to be perfection with the time switch. The "Rythmatic" system of control, described in relation to service experience in the *Electrical Review*, of August 6th, 1943, is one such method. In the light of post-war requirements what are the pros and cons of the old and the new ways?

In the matter of public lighting control, the relay (Fig. 1) measuring overall 4¼ by 8½ by 4 11/16 in. of 5-A capacity, can be housed in the base of individual street lamp standards or can, by the fitting of 15-A mercury switches, be installed in a section pillar for block control; or, again, can be fitted in a substation together with a larger capacity contactor for the switching of an area. With a relay costing £3 15s.0d., lamp standards at 50 yd. intervals and an extra 1s. per yard for the addition of two switch wires to the cost of a four-core cable, substation control is advantageous financially.

Fig. 1.—Standard type of "Rythmatic" control switch

All this, of course, can be operated by time switch, but a relay will require less attention, especially if the switch-clock is hand-wound as many thousands still are; also, there are less mechanical parts in the relay to be a potential source of trouble due to corrosion, gumming of oil, dirt and atmospheric conditions. Being a less complicated mechanism, the relay can be more quickly overhauled and reserviced. Even allowing for electrically wound time switches in fairly modern installations, there is the continuous loss of, say, 2 W per synchronous motor per time switch, which, taken on the basis of 1,000 clocks, amounts to 17,520 kWh per year.

The last point may seem of small moment, but considering the importance of the reduction of mains losses in other apparatus, it is not to be overlooked. Against this there is (*a*) the transmission of the signals; allowing for 12 per day, lasting one minute each, and necessitating the running of a 20 HP motor (15 kW), the annual consumption during transmission will be 1,095 kWh; and (*b*) the continuous loss per 1,000 relays,

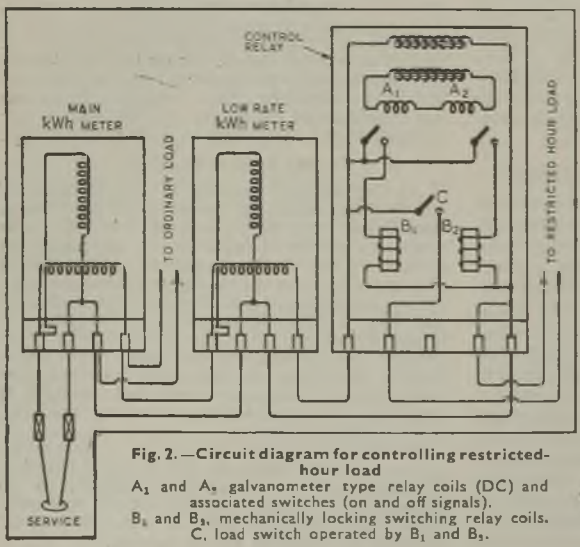


Fig. 2.—Circuit diagram for controlling restricted-hour load

A_1 and A_2 galvanometer type relay coils (DC) and associated switches (on and off signals).
B_1 and B_2, mechanically locking switching relay coils.
C, load switch operated by B_1 and B_2.

approximately 0·2 W each, amounting to 1,752 kWh per annum, giving a total of 2,847 kWh per year. The balance is well in favour of the relay method.

With restricted-hour loads, a typical diagram of connections being shown in Fig. 2, there is the over-riding importance of being able to ensure that the load is switched off from the power station at the vital times. This flexibility will allow the supply authority to take the minimum risk of low-rate load overlapping existing peaks, and will at the same time afford the consumer the maximum availability of supply for all purposes from day to day.

Some restricted-hour tariffs define three off periods per day at, say, 8 to 9.30 a.m., 11.30 a.m. to 12.30 p.m., 4.30 to 6 p.m. and with several makes of time switch three pairs of arms are cumbersome to fit and have a tendency to interlock the levers owing to the nearness of the arms on a small twenty-four hour dial.

Thus, with relay control, such "off" periods could be stated as the maximum, but would allow a tolerance for the control engineer to leave the load on, even in such periods, if danger of a new peak were not imminent. No such flexibility is possible with time-switch control and throughout a winter much revenue could be lost.

No disadvantage occurs in the change-over to relay control for shop window lighting and floodlighting; in fact, the score of lower maintenance costs stated above applies equally well in these two cases.

Cooker Design

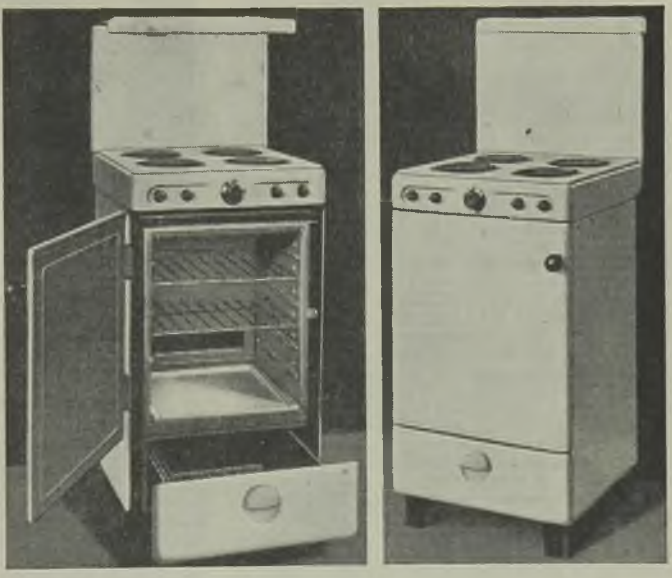
Post-War Gas Model

WHAT is said to be the "first shot in the attack on the post-war cooker" is described in the *Gas Times* of July 22nd. In view of the discussions on cooker design proceeding in the electrical industry and because electric cooker makers and others should know what is going on in the gas industry, we think it worth while reproducing illustrations of the new gas cooker which has been produced by Cannon Iron Foundries, Ltd.

The picture of the exterior shows the cooker to be designed on clean, simple lines—and not easily distinguishable from an electric cooker. The taps might easily be switches and the covered-in boiling rings add to the similarity. It is claimed that a ring is capable of boiling 3 pints of water (49 deg. F.) in 7¼ minutes — an efficiency 48·5 per cent. The residual heat in the cover plate is said to be sufficient to keep liquid at boiling point for five minutes. The drawer in the base is not a hot-cupboard but it receives sufficient heat for the warming of plates and dishes.

The oven size can be altered by the use of an adjustable dome which, in its lowest position, forms a grilling chamber, the grill pan being inserted between the dome and the enamelled oven base.

It will be noticed that a side-opening door is favoured. The front frame which carries the door is fixed to the oven linings; this eliminates the usual sealed jointing, thus reducing heat conduction and allowing freedom for expansion. The hotter the oven, the tighter the sealing.



Two views of the new Cannon gas cooker

The cooker is of cast-iron construction and finished in white, cream or mottled grey enamel.

Automatic Telephony in London

The last manual exchange in the Central area of London, the Museum exchange, was replaced by an automatic exchange on Saturday, when 5,000 lines were changed.

Institution Sections

Chairmen for the 1944-45 Session

TO fill the office of chairman for the session commencing next October the Installations Section of the Institution of Electrical Engineers has elected **Mr. G. O. Watson,** principal electrical engineer surveyor with Lloyd's Register of Shipping. From 1941 to 1943 he was president of the Institution of Engineering Inspection, and

Mr. G. O. Watson
(Installations)

Mr. H. W. Grimmitt
(Transmission)

he is also a member of the Institute of Marine Engineers as well as of the B.S.I. Electrical Industry Committee and various panels.

A Londoner by birth, Mr. Watson received his education and training at the Battersea Polytechnic and with the British Thomson-Houston Co., Rugby. From 1911 to 1933 he held various positions with the B.T.H. Co., first on control gear design and from 1921 on the design and installation of propulsion gear in ships, including the liners *Viceroy of India, Strathnaver* and *Strathaird.* He joined Lloyd's Register of Shipping in 1933 and was appointed to his present position in 1936.

Mr. H. W. Grimmitt is the new chairman of the Transmission Section. Mr. Grimmitt is a Leeds man, forty-seven years old, and was educated at the Borough Polytechnic and the Northampton Institute of which he holds the diploma. From 1914 to 1919 he served in the ranks of the Royal Engineers and later the Royal Flying Corps. He was with Siemens Bros. & Co. from 1924 to 1930 as technical assistant and in the latter year joined the service of the Electricity Commission as engineering inspector, a position which he still holds. He is an associate member of the Institution of Mechanical Engineers.

Mr. Grimmitt has been particularly associated with rural electrical development and has contributed many ideas on the subject. Some of these were put forward in an article published in the *Electrical Review* of June 7th, 1940, entitled "Farm Electrification: Wartime Possibilities." He was a member of the Council of the Overhead Lines Association from which the Transmission Section sprang.

The new chairman of the Measurements Section, **Dr. W. G. Radley,** was educated at Leeds Modern School and Faraday House, and holds the degree of Ph.D. (Eng.), London. From 1920 to date he has been engaged on work with the Research Branch of the Engineer-in-Chief's Office, G.P.O., and is at present staff engineer-in-charge at the Dollis Hill Research Station. Dr. Radley has presented a number of papers to the I.E.E. on interference between power and communication systems and in 1942 was awarded the Fahie Premium. He has represented the G.P.O. at several meetings of the International Committee on Long-Distance Telephony, C.C.I.F. On two occasions he has visited America and the Bell Telephone Laboratories, and is the author of a paper on the corrosion of cable sheaths submitted to the American Institute of Electrical Engineers.

Research is also the concern of **Mr. H. L. Kirke,** chairman of the Radio Section for next session. He was born in London and after a secondary school education received training with the Signal Service between 1914 and 1920. He then obtained an appointment with Marconi's Wireless Telegraph Co. In 1924 he

Dr. W. G. Radley
(Measurements)

Mr. H. L. Kirke
(Radio)

joined the British Broadcasting Corporation and in the following year was appointed to his present position of head of the Research Department.

Government Bulk Buying

IN a recent review of markets the British Federation of Commodity and Allied Trade Associations advocated the earliest possible relaxation of Government control of materials. The subject was referred to by Mr. Harcourt Johnstone, Secretary to the Department of Overseas Trade, when he was addressing a meeting of the Federation. He pointed out that in view of the possible world shortages of certain foodstuffs and raw materials, control was the only alternative to mal-distribution and extravagant prices and its removal would have to be gradual, commodity by commodity.

He agreed that bulk purchasing by the Government would cease as soon as adequate supplies became available, for foreign produce could be obtained more cheaply and in greater variety through the operation of the commodity markets than by any Government purchasing system.

PERSONAL and SOCIAL

News of Men and Women of the Industry

AT a luncheon arranged by the West Midlands J.E.A. resolutions of appreciation engrossed on vellum were presented to **Mr. T. A. G. Margary** who has just retired from the position of borough electrical engineer of Wolverhampton, and **Mr. W. Weygood**, who is retiring from the post of chief engineer to the Midland Electric Corporation. Proposing the principal toast, Mr. C. Heathcock, chairman of the Authority, thanked Messrs. Margary and Weygood for the way in which they had placed their experience at the Authority's disposal. He reviewed the progress which had been made and said that post-war schemes by the Authority and its constituents would involve an estimated expenditure of £10,000,000.

Mr. F. B. Leonard, A.M.I.E.E., deputy chief electrical engineer of St. Marylebone, is retiring this month on superannuation. He has been in the Borough Council's service for thirty-nine years.

The Swansea Electricity Department is inviting applications, by August 19th, for the post of generation engineer which becomes vacant upon the retirement of **Mr. A. Rees** in December. The salary offered is in accordance with the N.J.B. Schedule—£802 rising to £842 per annum.

Mr. Leslie Gordon, clerk and solicitor to the London and Home Counties Joint Electricity Authority, will shortly attain retiring age under the Authority's superannuation scheme. The General Purposes Committee considers it desirable in existing circumstances to retain Mr. Gordon's services for the time being and a recommendation to this effect, with Mr. Gordon's assent, was to be placed before the Authority at its meeting yesterday (Thursday).

Following a report to the Public Utilities Committee by the borough electrical engineer and manager (Mr. H. Pryce-Jones), the Brighton Town Council has increased the maximum salary of the deputy electrical engineer and manager, **Mr. C. C. Hill**, from £933 per annum to £1,150 per annum.

Mr. H. L. Saunders has been appointed Comptroller-General of Patents, Designs and Trade Marks in succession to **Sir Frank Lindley** who is retiring at the end of this month.

After over 42 years' service, for 30 of them manager of the British Aluminium Company at Foyers, **Mr. H. A. Skelton** has retired.

Sir James Devonshire has resigned from the board of Electrical Finance & Securities, Ltd., on account of ill-health.

In our last week's report of the new appointments of **Mr. E. McCabe** and **Mr. P. L. Lutte** the reference to the Wessex Company should have been to the parent company, Edmundsons Electricity Corporation, Ltd.

Alderman George Dixon has been elected chairman of the Transport and Electricity Committee of the Newcastle-on-Tyne City Council. He succeeds Alderman R. Mayne who was chairman for twenty-nine years.

Dt

Mr. F. Samuel, branch manager of the Ipswich office of British Insulated Cables, Ltd., has been transferred to their London office staff and is succeeded by **Mr. F. Driessen**. **Mr. J. Anderson**, manager of the company's Manchester branch office, has taken up an appointment on the head office staff at Prescot and is succeeded at Manchester by **Mr. E. A. Sayers**, formerly sales engineer attached to the London office.

Mr. Thomas W. F. Brown, D.Sc., M.I.Mech.E., has been appointed director of research of the Parsons and Marine Engineering Turbine Research and Development Association and will take up his duties on September 1st.

As announced last week **Mr. P. W. Cash**, a chief assistant operation engineer, head office, Central Electricity Board, has been appointed operation engineer for the Central England Area in succession to **Mr. C. Sykes** who is retiring for health reasons. We now reproduce Mr. Cash's portrait.

Mr. P. W. Cash

The new president of the Association of Mining Electrical and Mechanical Engineers, **Mr. E. R. Hudson**, was for many years directly connected with the mining electrical industry, serving for thirty years as the honorary secretary of the Midland Branch of the Association. Largely due to his untiring efforts, this branch has grown considerably in membership, and is now the second largest in the Association. Mr. Hudson is attached to the staff of Crompton Parkinson, Ltd. (Derby Cables, Ltd.)

Councillor J. P. D. Lacey has been elected chairman of the Portsmouth Electricity Committee in succession to Alderman W. J. Lewis.

Mr. F. J. Brown, of Wolverhampton, has been appointed technical assistant to the Warrington Corporation electricity undertaking.

Obituary

Sub-Lt. A. N. Clinch.—We very much regret to report the death on active service of Sub-Lt. A. N. (Tony) Clinch, R.N.V.R., Fleet Air Arm, second son of Mr. W. N. C. Clinch, who is general manager of the Northmet Power Co. Sub-Lt. Clinch was twenty-one years old. He was educated at Brighton College and the Brighton Technical College and joined the Fleet Air Arm in 1942.

Mr. C. C. Coote.—The death has occurred suddenly at his home in Newcastle of Mr. Charles Chevenix Coote, A.R.P. officer to the North-Eastern Electric Supply Co., Ltd.

Mr. F. J. Mortimer.—The death is announced of Mr. F. J. Mortimer, as a result of shock arising from injuries caused through enemy action. Mr. Mortimer received the C.B.E. in

the Birthday Honours of June, 1942, for his magnificent record of achievement in photographic art. He had edited the *Amateur Photographer* (which is published from Dorset House) and *Photograms of the Year* for nearly forty years. He was a past president and honorary fellow of the Royal Photographic Society.

Mr. T. M. Colson.—We record with regret the death of Mr. Thomas Morland Colson, A.M.I.E.E., which occurred at Maidenhead Hospital on July 27th. Mr. Colson was educated at Weymouth College, afterwards attending King's College, London. He joined the Immisch concern, pioneers in the manufacture of electric motors, as a pupil, and later went to the Yorkshire coalfields where he installed their coal cutting apparatus. He was also, at various periods, in charge of electric launch charging stations at Hampton, Bray and Henley on the Thames, at Southampton and at Bembridge, Isle of Wight.

Joining the Woolwich electricity undertaking (then privately owned) as assistant engineer, Mr. Colson had risen to the position of chief at the end of the company's tenure. In 1902 he went to Hamilton, Lanarkshire, as engineer and manager and was in charge of the undertaking right from its initiation. During part of his time at Hamilton he was lecturer on electricity and magnetism to evening students at the Hamilton Academy. In 1910 his health made it necessary for him to go south, and he took up the duties of engineer and manager of the Surbiton electricity supply undertaking, and continued there until January, 1930, when he retired owing to ill-health. He was seventy-three.

Señor J. Frikart.—Argentina has recently lost one of its leading electrical engineers by the death at the age of sixty-nine of Señor J. Frikart, of Cordoba, one of the founders, and a past-president of the Argentine Association of Electrical Engineers. Of Swiss origin, he went to Argentina at an early age and became one of the pioneers of electrical development in the Republic. For some years he was in charge of the work of installing electrical equipment in the vessels of the Argentine Navy.

Mr. R. Chamberlain who died recently at the age of seventy-one at Vancouver, was a prominent figure in electrical circles in British Columbia. He was born at Dartmouth, Devon, and went to Canada at the age of seventeen, joining the Canadian General Electric Co. He subsequently designed and installed electrical plant for a number of mining companies in the Dominion.

Professor Theodore Parker, head of the Department of Civil Engineering, Massachusetts Institute of Technology, and formerly chief engineer to the Tennessee Valley Authority died on April 27th at the age of fifty-five.

Insulation Tester

AN instrument that is intended mainly for measuring the insulation resistance of electrical equipment at the manufacturing stage, or wherever AC is available for energising the test set is announced by the BOWTHORPE ELECTRIC CO., LTD., Goodtric Works, Brewer Street, Oxford.

This instrument named the "Testometer," has an input transformer with means for adjusting the output voltage to a constant value over a range of input voltage of from 200 to 250 V. The transformer output is rectified and smoothed by a bridge-connected metal rectifier system, the DC voltage from which is applied to the test terminals through a sensitive moving-coil meter with a suitable series resistance.

Mains energised insulation tester

Two push-buttons are provided, one for voltage adjustment and the other for making the reading. Voltage adjustment can be instantly checked at any time whether the test terminals are connected or not.

When the voltage test button is pressed the supply voltage is connected through the rectifier directly across the moving-coil meter working as a voltmeter. The regulating knob at the side of the instrument is then moved until the meter gives full scale deflection. When this adjustment has been made the DC voltage at the test terminals is 500 V $\pm$ 10 per cent. for test resistances between infinity and 3 megohms. The other button connects the supply voltage through the rectifier to the resistance measuring circuit. The test terminals are dead when the buttons are not pressed.

The instrument weighs 4½ lb. and its overall dimensions are 7⅛ by 4¾ by 3¾ in.

Swedish Broadcasting Plans

THE *Anglo-Swedish Review* reports that plans have been drawn up to increase the efficiency of Swedish radio. It is proposed, among other things, to install two 100-kW short-wave transmitters in place of those of 12 kW at the Hörby station. It is unlikely that this can be done before the end of the war, but it is recommended that the project shall be presented to the Riksdag this year.

CORRESPONDENCE

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

Technical Writing

WITH reference to the leading article on this subject in your issue of July 7th, I thought you might like to see a little booklet that I got some years ago which was written by the editor of an American journal entitled *Electric Light and Power* which I used to receive in more normal times. Possibly this little booklet may have been brought to your notice before but if not I think you will find it rather interesting reading.

There is no doubt that a lot of interesting matter could find its way into technical journals if those who could supply it were not nervous about their writing capabilities and would only realise that the editorial staff of most technical journals will lick the matter into proper shape for them.

Boston, Lincs. H. PAYN,
Engineer & Manager.
Boston & District Electric Supply Co., Ltd.

[The booklet referred to sets out the requirements extremely well. The writer is asked to visualise his "audience" which consists largely of men in responsible posts who are engineers always anxious to learn of the experiences and ideas of others in the industry. They wish to hear about practices that have worked on one property and may suggest a solution of the problem on another; trends in design, construction, operation and business; engineering developments and research work in the electric power or closely related fields; novel or especially successful applications of equipment; planning and personnel organisation in the various departments of a utility; methods of holding present business and getting more load; and means of improving public relations and combating attacks.

Other advice is that there should not be too much preamble or introduction and that when the story is told the article should stop; appropriate illustrations are always welcome. We find ourselves in agreement with most of the ideas expressed in the booklet.—Editors, *Electrical Review*.]

Grain Drying

ABSENCE from London delayed my noting the letters from Mr. Wild and Mr. Allwood on this subject in your issues of June 16th and 30th. There will be general agreement with what they say on the subject, and I need hardly add that the E.R.A. is giving the matter due attention; indeed, I hope in due course to make personal contact with the writers of these letters and with anyone else having constructively critical ideas on the subject.

My main purpose in writing now is to correct a misapprehension about the credit for the design of the "Essex" mill. This machine was designed by Messrs. Christy & Norris of Chelmsford and not by the E.R.A. It is, of course, true that the machine was designed only after experimental work by the E.R.A. on the technique of using a small machine, carried out on a crude basic plant, had shown that the principle was sound. Further progressive designs, developed in discussion with the E.R.A., were used as the means of further investigation of the technique of using small automatic hammer mills, until the present stage of a commercial model was reached.

While, therefore, it may be true to say that the E.R.A. was largely responsible for the development of the small automatic hammer mill, it was not responsible, apart from progress consultations, for the design of the "Essex" mill. It is unlikely, however, that, without the activities of the E.R.A. and its responsible committee members, such a machine would yet have been thought of here. This activity was particularly necessary during the critical period when the agricultural engineering industry offered heavy opposition to the whole idea. It is refreshing to find that one firm was progressive enough to ignore the obstructors. It was also satisfactory that the early work of the E.R.A. on this subject should have received such an encouraging response, and offers of help, from the leading agricultural institutes and colleges, notably Rothamsted, Reading, West of Scotland, and the Midland.

London, W.C.2. C. A. CAMERON BROWN.

Apprenticeship Scheme

WE notice that from time to time you review apprenticeship schemes of electrical engineering firms. After a break caused by wartime conditions we are recommencing our scheme for engineer apprentices, introducing some detail improvements as a result of past experience. A booklet describing the scheme is enclosed for your information.

On the academic side, the student who applies himself should, at the end of his course, possess the Ordinary National Certificate in Electrical Engineering (by way of the part-time day course) and be within a year of Higher National if he has decided to continue his studies in that direction. By evening class instruction in telecommunications he should have the Intermediate Grouped Course Certificate of the City and Guilds of London Institute and be within a year of the Final Grouped Course Certificate. Thus by either means he should be able to claim exemption from the associate membership examination

of the Institution of Electrical Engineers within a year of completing apprenticeship and can apply for transfer from student to graduate member, if he so desires. As before, latitude in the third year is given so that students may follow their natural bent.

Instead of the sliding scale of pay and merit bonus of the pre-war scheme we are to pay the appropriate standard rate of wages and national bonus prevailing, so that variations in rates and cost of living index over a period will not create anomalies.

The scope and membership of the Apprentice and Training Committee has been extended and closer control of the nature of instruction in the various departments will be achieved, so that the general level of tuition should be improved for all and those with less aggressive personality will not be at a disadvantage in the production departments. We shall also have the benefit of the teaching facilities afforded by our Training Department, which was not in existence in pre-war days. Trade apprenticeships will be introduced later. We have mentioned electrical engineering but mechanical engineering may be taken as an alternative.

ERICSSON TELEPHONES, LTD.
Beeston, Notts. A. BROOKES.

[The booklet sent with this letter deals with the selection of entrants, the payment of fees for attendance at University College, Nottingham, or at local technical colleges, the probationary period, indentures, programme of training, rates of pay, prizes and recreational facilities.—Editors, *Electrical Review*.]

Intensive Engineering Courses

A NEW intensive course in electrical engineering, which will be the tenth of the series arranged under the Hankey Scheme, will commence at the Borough Polytechnic on Monday, October 2nd, and the second course in radio engineering on Monday, September 25th.

Once more I should be extremely grateful if you would draw the attention of your readers to these courses. I have on previous occasions stated the conditions of admission to the course but perhaps I might remind you that the general standard of attainment of prospective students should be that of the Ordinary National Certificate in Electrical Engineering or Radio Engineering or some equivalent qualification.

*London, S.E.*1. W. C. S. PHILLIPS,
Borough Polytechnic.

Registration of Contractors

WITH reference to Mr. T. Cooper's letter in your issue of July 14th on the above subject: as he rightly points out, registration will not put a stop to amateurs carrying out installations, such as he has described, and which are without doubt very numerous.

Surely the way to stop much of this undesirable effort is to limit the retailing of all electric cable and accessories to people who can prove they are qualified installation engineers. This would appear to make necessary the introduction of compulsory registration of journeymen as well as electrical contractors.

Litherland. B. H. LAMBERT.

Socket Outlets

THE editorial reference to this subject in your issue of July 21st, makes one wonder why a relatively costly socket of 3-kW rating is proposed when the main object of the discussion is to *reduce the cost* of outlets so that they can be provided in greater numbers in the humblest homes.

It seems a pity that the voice of the "working" contractor is not audible in this connection for, having to depend for his livelihood on ability to eliminate refinements and provide an adequate and sound job at the keenest possible price, he is probably better qualified than most of us to define the "minimum requirements" we should be seeking.

I believe he would claim that, although the wiring needs cheapening, the problem of the socket had, in 1939, been solved by the simple expedient of using unswitched sockets in their simplest (albeit most dependable) flanged form, fitting a 15-A unit where a portable fire might be wanted and 2-A units for all other purposes. I doubt whether he would, given a free choice, abandon that combination for a system of relatively expensive 10 to 15-A outlets throughout. Indeed, if he did, he might quickly find he was losing all his business to competitors adhering to the B.S. 546 patterns and that he was, in self-defence, compelled to revert to that type which he knew, from experience, was perfectly satisfactory.

Will he have that "free choice"? Presumably he will, for there appears to be no question of revoking B.S. 546. To do so would be tantamount to scrapping a wealth of excellent equipment already installed and would, from the point of view of standardisation, send us back to the 1920 scratch line. If that were our fate we should have to battle through years of chaos worse than the confusion that followed the last war. So, if B.S. 546 is to remain current, what shall we profit by adding yet another size to a range which, by including too many sizes, has already given us so much trouble?

In practice the 5-A outlet has been a "dead number" for years; rule it out officially and the remaining 2-A and 15-A sizes give all that is required, *i.e.* cheapness, dependability, positive fuse protection, and, above all, continuity of standardisation.

This idea of a 3-kW standard probably

originated in a very proper attempt to reduce the cost of the *wiring* and then developed into a series of complications in some such way as this:—A ring-main will halve the copper; since a ring-main will carry the total house load, 30-A fuses are needed; 30-A fuses give inadequate protection to small appliances, so smaller fuses must be inserted at each outlet; if 100 per cent. interchangeability is required, every outlet must be rated at the heaviest load and capable of accommodating a fuse of that rating.

Thus we arrive at an out-size unit of elaborated design bringing with it uncertain protection and a demand for ever more expensive h.r.c. fuses, all increasing the cost and off-setting the saving secured by this form of wiring. Moreover, technical problems arise, not least of which is the serious, unsolved problem of how to ensure that the public will fit a smaller fuse for a bed blanket than they use for a 3-kW fire.

Where have we gone wrong? Obviously, the ring-main principle is sound and may offer advantages when used as a feeder from the S.P. to the individual rooms; but we exaggerate its merits if we view it as a means of providing 100 per cent. interchangeability for that is a separate physical problem.

It is neither necessary nor wise to enable a fire to be placed anywhere but in its safest position. Furthermore, we must consider this question of interchangeability in its broadest sense, that is, not merely as from room to room but also from house to house. For example, a worker, changing his job, moves into a post-war house and changes the plugs on his appliances to suit the "new standard" sockets; later, he moves to another district and occupies a pre-war house only to find that he has to buy another set of B.S. 546 plugs. When it is remembered that workers will have to be more mobile in future and if, for a worker, we substitute 100,000 workers moving annually, we get some idea of the formidable volume of consumer indignation we shall engender; and that at a time when we shall be making strenuous efforts and spending large sums of money to convince the public of the convenience electricity offers.

Oxshott, Surrey. L. NEWTON DAVEY.

Permanent Magnets

THE article in the *Electrical Review* of June 30th on permanent magnets is an illustration of the value of the "Methods in Invention," on which subject I have been writing during the past forty years, first to the local section of the I.E.E., later in an informal paper in London and, more recently, in articles in *Distribution*. The "Methods" enable one to provide useful ideas, even if they do not enable one to get them put into use, but that will come in time. The day will come when the I.E.E. and other institutions will have sections to study methods by which invention can be forwarded.

The subject of magnetism was dealt with in a series of papers published by the Institute of Physics in 1938, and Mr. D. A. Oliver, M.Sc., has a paper on permanent magnets which gives their history. Tungsten steel was known in 1880, but not much progress was made for many years. "Methods in Invention," however, suggest at once that if tungsten gives good results, then search should be made for the effects of other materials used for alloys.

Mr. Oliver states that tool steels of iron, nickel and aluminium were in use without anyone thinking of trying them magnetically until the Japanese investigated them and in 1934 they changed the whole outlook on permanent magnets. Certainly it seemed unlikely that a material containing 29 per cent. nickel, 13·5 per cent. aluminium and the rest iron would make a good permanent magnet, but it did. Progress often comes from unlikely experiments; probably most people thought Faraday foolish when he tried the effect of magnetism on glass and wood. The Germans have made good magnets containing 60 per cent. copper, 20 per cent. nickel and the rest iron.

On considering the matter by my "Methods" I came to the conclusion some time ago that the magnets were probably weakened by veins of iron which short-circuited the magnetic lines inside the magnet and prevented them from reaching the outside field. I then thought that this defect would be reduced if the magnet had heat treatment under the control of a strong field, as the veins of iron inside the magnet would be magnetised and they would hold their magnetism subsequently. As your contributor has shown this method led to an enormous improvement in permanent magnets and their utility will doubtless be greatly extended in the future.

I did not publish my ideas at the time as I have not found that experts take much interest in suggestions from outsiders. I have, however, had so many instances of such ideas which have come into practice that I desire to record how they may work. Some ideas which I have deduced by the "Methods" have made lucrative patents, many of them foreign.

Tynemouth. C. TURNBULL, M.I.E.E.

North-Western Students' Visit

THE Committee of the North-Western Students' Section of the I.E.E. has arranged a visit to the C.E.B. and Mid-Cheshire Company's sub-stations at Knutsford to be followed by a tea-dance. The charge, exclusive of transport, will be 5s. 6d. and members wishing to join in are asked to notify Mr. F. W. Cox, hon. assistant secretary, 551, King's Road, Stretford, by August 9th.

COMMERCE and INDUSTRY

Women's Wages Negotiations. I.C.I. to Endow Research.

Women Engineering Workers

FOLLOWING upon proposals by the National Arbitration Tribunal a meeting is to be held in London next Wednesday of representatives of the Engineering Employers' Federation and the trade unions concerned to discuss increased wages for women employed in the engineering industry.

It is understood that the Tribunal's proposals if adopted would give increases in the time rates, including bonuses, ranging according to ages from 6s. to 7s. 6d. a week and that the minimum piece rates for women of 21 or over would be increased by 7s. 11d. a week. The piece-work rates are to be such as to enable a worker of average ability to earn at least 27½ per cent. over the new basic time rates instead of 25 per cent.

Cable Makers' Wages

The Joint Industrial Council for the electrical cable-making industry, on July 19th, adopted the following overtime payments for work done on Saturday and Sunday nights, the rates to be operative from the date of their adoption :—*Night Shift :—Saturday Night.* From starting time up to midnight, time and a half for first two hours, time and four-fifths afterwards; from midnight to finishing-time on Sunday, double time. *Sunday Night.* From starting time up to midnight on Sunday, double time; from midnight to finishing time on Monday, time and a half for first two hours and time and four-fifths afterwards. *Three-Shift System :—Saturday Night.* 10 p.m. to midnight, time and a half; midnight to finishing time on Sunday, double time. *Sunday Night.* 10 p.m. to midnight, double time; midnight to finishing time on Monday, time and a half for first two hours, time and four-fifths afterwards.

The Council has also issued a notice giving the proportionate amounts of advances in wages for time and piece workers under adult age, following upon the recent additions to adult workers' wages.

I.C.I. Research Fellowships

The directors of Imperial Chemical Industries Ltd., have made an offer to provide at nine universities in Great Britain fellowships to be held by senior workers in certain sciences. The scheme is announced to operate for an initial period of seven years. The fellowships will be of the average value of £600 per annum, though the universities will have power to determine the emoluments for each particular appointment. The directors have described on broad lines the subjects in which the fellowships are to be held, but the administration of the scheme rests wholly with the universities, which will select and appoint the fellows.

The subjects laid down are physics, chemistry and the sciences dependent thereon, including chemotherapy: that is to say, any branch of physics or chemistry may be included as well as applied sciences such as metallurgy and engineering. The universities to which the offer has been made are the larger metropolitan universities and those with a close geographical relation to I.C.I.'s main sources of production. Thus, Oxford, Cambridge and London have been each offered twelve fellowships; Glasgow, Edinburgh, Liverpool, Manchester and Birmingham eight; and the University of Durham, four.

A New Cyclotron

The cyclotron which has recently been put into commission at the Carnegie Institute of Washington is rated at 100 kVA and is designed to produce 15 million electron volts, operating at a frequency of 10 megacycles per second. According to *Science*, it weighs more than 225 tons and is 12 ft. high (overall) by 30 ft. long by 20 ft. wide. It took four years to build and the total cost, including a three-storey building and associated equipment, was $500,000. The magnet surrounding the 60-in. diameter accelerating chamber is made up of four castings, of which the largest weighs over 50 tons, and is housed 10 ft. below ground to guard against injurious radiations. Mice exposed to radiations of lower intensities than are now produced have been killed.

N.R.E.I.C. Considers Compulsion

At a meeting of the Registration Board of the National Register of Electrical Installation Contractors on Wednesday last week, under the chairmanship of Mr. P. V. Hunter, the question of compulsory registration in all its aspects was discussed. It was agreed that consideration should be given to the compulsory registration of electrical installation contractors and operatives and members were nominated to consider the matter with other interested bodies and report to the Registration Board.

Export Licences

The Board of Trade announces that applications for licences previously sent to the Export Licensing Department, Bank Buildings, Princes Street, London, E.C., should in future be sent to Stafford House, King William Street, London, E.C.4. It will be of considerable assistance to the Department if for the present applicants will restrict their applications to urgent cases. As arrangements have been made with the Customs under which any licences produced to them with a period of validity expiring in July and August, 1944, will be regarded as automatically extended until August 31st, 1944, application for renewal is unnecessary.

Supply of Lighting Fittings

The Limitation of Supplies (Miscellaneous) (No. 23) Order, 1944 (S.R. & O. 1944 No. 835, Stationery Office, price 4d.), which came into operation on August 1st, continues for the restriction period August 1st to January 31st next, the existing control on the supply of, *inter alia*, goods in Class 9b (lighting fittings). The quota remains at 12½ per cent. The general

licences which have permitted the supply of certain goods outside quota to privileged consumers during the restriction period ended on July 31st, continue in force. A revised copy of the home trade register will not be published during this restriction period, and persons whose names were on the register on March 1st, 1944, are still to be considered registered persons for the purpose of analysing standard period sales.

A trader who was carrying on business in partnership on December 1st, 1941, is not thereby entitled to supply controlled goods manufactured by him on his own account in addition to the supplies which may be made by the firm. An unregistered firm is not affected in carrying on its business when any partner dies or leaves it, but if a new partner is taken in, application must be made for a licence permitting the business to continue.

The Order requires persons who, on July 31st, 1944, are registered for goods controlled by the Limitation of Supplies (Miscellaneous) (No. 22) Order, 1944, to complete a form of return (Misc. 21) showing the value of such goods supplied by them during the standard period (June 1st, 1939, to May 31st, 1940), and during the restriction period (February 1st, 1944, to July 31st, 1944), and to return it before October 11th, 1944, to the Assistant Chief Accountant, Board of Trade (Miscellaneous Section), North Gate, Prince Albert Road, London, N.W.8. Any trader who has not received a copy of the form by September 11th, should apply to the above address; application should not be made before that date.

Brush Holidays-at-Home Week

For this year's holidays-at-home week (July 29th-August 7th) the Committee set up by the Brush Electrical Engineering Co., Ltd., and its subsidiaries under the chairmanship of Mr. Alan P. Good, the managing director, has organised another outstanding programme of entertainment for the employees and Loughborough generally. So far there have been athletic contests, cricket matches, tennis, bowls and darts tournaments, and an anglers' outing, as well as concerts, variety shows and dances. To-night there is a variety show as well as a ball, while to-morrow there are a cricket match and another variety entertainment. The London Philharmonic Orchestra will give a performance on Sunday with Cyril Smith as solo pianist. A further cricket match will take place on Monday.

Rubber Research in South Africa

Dr. H. J. van der Bijl, Director-General of Supplies, South Africa, has stated that further research work in the production of rubber from euphorbia trees in the Union has been abandoned owing to the poor results obtained. Experimental tapping was carried out in the Umgeni Valley near Camperdown, Natal. The decision to suspend operations does not apply to work in connection with the production of raw rubber from landolphia vines in Zululand, which, states the *South African Engineer and Electrical Review*, gives better promise of success.

Fluorescent Lighting in a Foundry

The accompanying photograph illustrates a "Mazda" lighting installation in the main foundry of the Wycliffe Foundry & Engineering Co., Ltd. It consists of sixteen "Mazdalux" roof laylights each housing six "Mazda" 80-W, 5 ft. fluorescent lamps and was carried out by the Electric Equipment Co., Ltd., Leicester. The average intensity obtained is approximately 6 ft.-candles and the spacing, 20 ft. centres laterally and 28 ft. longitudinally.

A foundry lighted by "Mazda" fluorescent lamps

Mobile Paper-Economy Exhibition

To bring home to factory staffs and workers the importance of paper to the war effort the Waste Paper Recovery Association has arranged for a mobile exhibition to tour industrial centres from which more than half the recovered paper comes. In addition to photographs of war scenes the display includes actual examples of equipment requiring paper. In connection with cable insulation it is pointed out that up to 2 tons of paper is needed for every mile length.

Fatalities

Boy Killed Climbing Pylon.—An inquest was held recently by the Cambridgeshire coroner on an eleven-year-old boy who met his death when he climbed a pylon. The resident engineer of the Beds, Cambs and Hunts Electricity Co., said that the overhead lines at that point operated at 11,000 V, and police evidence showed that the pylons had barbed wire round them about 10 ft. from the ground and a danger notice. A lorry driver said he saw the boy among the terminals about 30 ft. from the ground. The coroner returned a verdict that the cause of death was shock by electrocution.

Shock from Radio Earth.—While playing in a garden at Fleetwood, Brenda Fitzgerald, aged nine, apparently grasped the earth wire of a radio set and was killed. At the inquest it was stated that the aerial wire had become jammed in

the house against a wire from which the insulation had worn off, causing the aerial to become "alive." The coroner said that the danger lay in wires charged with electricity being improperly earthed; the public could be assured that in themselves radio sets were not dangerous. A verdict of "death by misadventure" was recorded.

Electrical Uses of Lithium

An article in the *South African Mining and Engineering Journal* deals with the increasing number of uses being found to-day for lithium, the lightest metal known, and its minerals. The sources from which it is obtained include the silicate mineral lepidolite, growing quantities of which are being used in the production of bulbs for the electrical industry. Considerable amounts of manufactured lithium salts are used in the manufacture of alkaline accumulators and as welding fluxes, and small quantities of lithium chloride and lithium fluoride in welding rod coatings are said to give an exceptionally fine finish to the weld. Small quantities of lithium hydroxide are used in batteries employed mainly in mine locomotives. Increasing applications are also being found for lithium alloys; for instance, the use of lithium as a 50–50 Ca-Li alloy for the deoxidation of high-conductivity copper castings more than doubled in 1941 as compared with 1940. According to "Mineral Resources of the Union of South Africa," the only potential source of supply at present known in the Union is the pegmatites in the Namaqualand area, where spodumene, pale mauve, pale green, white or grey in colour, occurs in a number of localities in appreciable quantities.

Telephone Mechanics' Rates of Pay

Agreement has been reached between the Post Office and the Post Office Engineering Union for an improvement in the pay of telephone mechanics, as from April 1st last. Time rates are increased by a penny per hour, existing piece-work prices are to be raised by 7½ per cent., and new prices will be fixed so as to enable an average workman to earn 22½ per cent. profit on time rates as compared with 20 per cent. previously.

Prices of Lamps in India

A notification under the Hoarding and Profiteering Prevention Ordinance published in the *Gazette of India Extraordinary* states that the Indian Government has fixed maximum retail prices which may be charged for electric lamps by a dealer or producer. The maximum prices of imported lamps are 1s. 10½d. for 15- and 30-W vacuum lamps in Calcutta (1s. 11¾d. elsewhere); 2s. 0¾d. for 40-W vacuum lamps (2s. 1¾d.); and from 2s. 3d. for a 40-W gas-filled lamp to 12s. 7¼d. for one of 300 W (2s. 5¼d. to 13s. 3¾d.). Other maxima are fixed for locally produced lamps.

Trade Announcements

Wingrove & Rogers, Ltd., and British N.S.F. Co., Ltd., announce that the existing arrangement between the two companies for handling the sales of N.S.F. products has been terminated as from July 31st. Due to the rapid growth and projected further expansion of its business the latter company has created an independent sales organisation with headquarters at its London office, 24-25, Manchester Square, W.1 (Welbeck 9248). Wingrove & Rogers, Ltd., will continue with the sale of their "Polar" products as before, from their head office in Liverpool and their London office at Broadway Court, Broadway, S.W.1 (Abbey 2272).

The Bishop Sound & Electrical Co., Ltd., has moved to 108, Beverley Way, London, S.W.20.

Higgs Motors, Ltd., have moved their London office to Kingsway Corner Buildings, 109, Kingsway, London, W.C.2 (telephone: Chancery 6316-7-8).

While their offices and administration will continue to function from Great Eastern Street, London, E.C.2, Brown Brothers, Ltd., are now supplying traders north of the Thames from The Vale, Acton, W.3 (telephone: Shepherds Bush 5511) and those south of the Thames from Cherry Orchard Road, Croydon (telephone: Croydon 4411).

Part-Time Employees

In response to a request from the National Association of Local Government Officers, the General Purposes Committee of the London and Home Counties J.E.A. recommends that the conditions under which part-time employees in the Authority's service are engaged shall be improved to bring them more into line with those of full-time employees.

Trade Publications

Machine Shop Equipment, Ltd., Allington House, 136 Victoria Street, London, S.W.1.—Illustrated leaflet (No. 501) describing an electrically illuminated shop type microscope for surface examination.

Higgs Motors, Ltd., Witton, Birmingham, 6.—Illustrated leaflet (Sec. 126/1) dealing with the application of electric motors to farm machinery.

Glenfield & Kennedy, Ltd., Kilmarnock.—Illustrated publication (No. 101) containing technical and dimensional data on hydraulic control valves, including electrically-actuated types and typical circuit diagrams.

Romac Industries, Ltd., The Hyde, Hendon, London, N.W.9.—Retail and trade price list of motor-car and cycle electrical accessories and general outfit replacements.

Copies of these publications can be obtained by bona fide trade inquirers.

Change of Name

The Accrometer Manufacturing Co., Ltd., 527, Grand Buildings, London, W.C.2, has changed its name to Lum-Arc Manufacturing Co., Ltd.

TRADE MARK APPLICATIONS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within one month of July 26th:—

TELECHRON. Class 7. No. 628504. Electric motors (not for land vehicles).—Warren Telechron Co. Inc., Ashland, Mass., U.S.A. Address for service: c/o Charles H. Burgess, Crown House, Aldwych, W.C.2.

FRIJACE. Class 11. No. 628,700. Refrigerators; parts thereof and fittings therefor (none being included in other classes).—Universal Refrigerators, Ltd., 48, High Street, Kingston-on-Thames, Surrey.

Permanent-Magnet Design

Products of New Lines of Thought

By Alun Edwards, B.Sc., Ph.D., *and* Kurt Hoselitz, Ph.D., F.Inst.P.

IN a previous article the rapid advance made in permanent magnet alloys during the past thirty years was described.* It is no less important that magnets made from these alloys should be efficiently designed and their operating characteristics thoroughly understood.

If two coils are wound, one over the other, on a non-magnetic core, a current in one coil will produce a flux linkage with the other coil. This space-flux linkage is proportional to the current, and has no upper limit. If the windings enclose a ring-core of magnetisable material there is an additional flux due to the magnetisation of the material, the total flux linkage being the sum of the space flux and the flux due to the magnetised core. This is expressed by the equation $B = H + 4\pi J$, where B is the measured induction, H the space component, and $4\pi J$ the ferromagnetic component.† The space component of induction can increase without limit, but the ferromagnetic component $4\pi J$ reaches a saturation value in a very strong field.

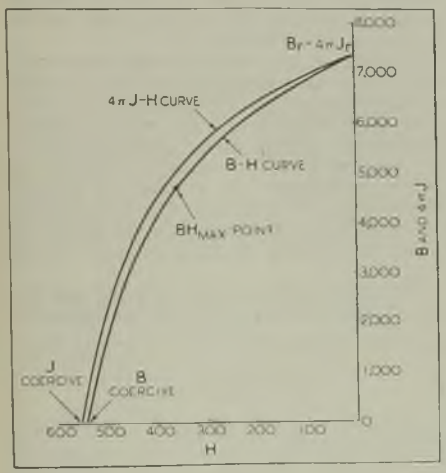


Fig. 1.—Demagnetisation curves of Alnico

If H decreases from the saturation point, $4\pi J$ also decreases, and when the magnetising field is completely removed, a remanent magnetisation $4\pi J_r$ or B_r will remain in the core. It is necessary to apply a demagnetising field in order to reduce the remanent magnetisation to zero. The point on the curve where the magnetisation is zero is called the coercive point. The part of the curve between the remanence and the coercive points is called the demagnetisation curve. It must be emphasised that the demagnetising field in practical applications of permanent magnets is not solely due to a coil, but is always at least in part due to the free magnetic poles produced on the surfaces of the magnet.

The equation $B = H + 4\pi J$ is a vector equation, and in practice the demagnetising field arising from coils or free poles is not always directly opposed to the direction of J. The advantage of measurements on a ring specimen is that in the demagnetisation portion of the curve, H is directly opposed to J, and the equation may be treated as a scalar equation in which H is a negative quantity. The value of B, the induction, is therefore less than the value of the ferromagnetic magnetisation $4\pi J$. Two demagnetisation curves may be drawn, one corresponding to B measurements and the other to $4\pi J$ measurements. They intersect at the remanence point where the applied field is zero, and differ elsewhere, the J coercive being greater than the B coercive (Fig. 1). The curves of the products BH and $4\pi JH$ differ in a similar manner. Both these products attain maximum values at points between the remanence and coercive points, $4\pi JH_{max}$ being greater than BH_{max}. It may be shown that the externally available energy associated with a permanent magnet is proportional to the product of the volume and BH, not the product of volume and $4\pi JH$, at the working point. The magnet, if working under static magnetic conditions, should be proportioned to work as far as possible at the point where BH is a maximum.

For normal alloys, the difference between BH_{max} and $4\pi JH_{max}$ is not very great, amounting at most to 10 per cent. of the value of BH_{max}, so that the available energy may be estimated from the $4\pi JH_{max}$ value without serious error. The value of $4\pi JH_{max}$ does become misleading in the case of some extremely high coercive alloys. For example, a cobalt-platinum alloy has recently been discovered with a $4\pi JH_{max}$ value of 14 mega-gauss-oersteds ($4\pi J$ being measured in gauss and H in oersteds). This value is so high that the alloy was thought to

* *Electrical Review*, June 30th, 1944.

† J, the intensity of magnetisation, is often expressed by the symbol I, but as the quantity $4\pi I$ often occurs in magnetic equations where I is a current, the ferromagnetic component is expressed as $4\pi J$ in order to avoid confusion.

be useful for certain special applications in spite of its price. However, the BH_{max} value is only 5 m.g.o., which is of the same order of magnitude as very much cheaper alloys, so the cobalt-platinum alloy is of no commercial interest at present. Similar

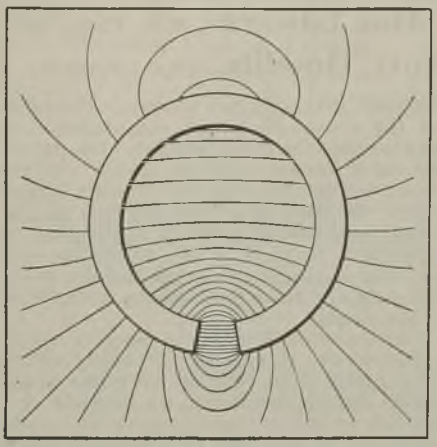


Fig. 2.—External magnetic field of ring in which a gap has been cut

remarks apply to the Heusler alloys, which have an interesting $4\pi JH_{max}$ but quite negligible BH_{max}.

Permeance Lines

The flux-MMF curve obtained from a ring specimen is usually reduced to the standard B-H form by dividing the total flux by the cross-section of the ring, and the total MMF by the length of the ring. The curve as plotted then refers to a centimetre cube of the magnet material, and curves derived from magnets of various sizes are readily compared. If a magnet ring whose B-H curve is known is magnetised to saturation and the magnetising field is removed, the flux density throughout the ring is equal to the remanence, but the magnet produces no external field, and shows no external sign of being magnetised. If a gap is cut in the ring (Fig. 2), polarity appears on the surface of the magnet, principally near the gap faces, an external magnetic field is evident (which is another way of saying the same thing) and the energy of this field corresponds to the demagnetisation of the magnet.

The flux density at either gap face may be measured by a search coil and galvanometer. A point may be found on the demagnetisation curve which corresponds to the same flux density. This is the "working point" of the gap faces of the magnet, and is shown as G in Fig. 3, OG′ being the flux density as measured by a search coil. Join G to the origin O. Then the line GO is called a permeance line. Every point on the line GO has a constant ratio of B to H, and this ratio is the permeance of the gap as it is seen from a centimetre cube of magnet material.

Permeance is the reciprocal of reluctance, but it is more convenient to measure permeances than reluctances, for the permeances of parallel gaps may be added directly, whereas their reluctances must be added reciprocally. The use of a permeance line is that it allows us to predict the effect on performance if the material specification of a magnet is changed without altering its dimensions. The line GO intersects the demagnetisation curve of the new alloy at some point, from which the new working flux density may be read off.

To determine the slope of the permeance line from the dimensions of the gap, we must calculate the effective permeance as "looked at" from one centimetre cube of magnet material, using the formula $P = \frac{L_m . S_g}{L_g . S_m}$ where L_m and S_m are the length and section of the magnet, L_g and S_g the length and section of the gap. The formula is only approximate, as L_g and S_g are the effective length and section of the gap, which cannot be accurately estimated.

If B and H are plotted on the same scale, the slope of the permeance line, tan θ, is equal to the value of the gap permeance as seen from each centimetre cube of the magnet. Usually H is plotted on ten times the scale of B. This effective permeance is called the "unit permeance" as it refers to a centimetre cube, and if the gap flux is considered as useful flux the permeance value may be called the "useful unit permeance" of the magnet.

If a search coil is moved from one gap face of a magnet to the crown of the magnet, it

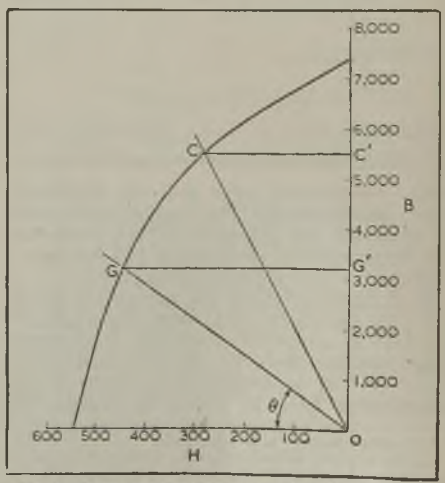


Fig. 3—Demagnetisation curve showing working points of gap faces (G) and crown (C)

cuts all the leakage flux of the magnet, as is evident from Fig. 2. The flux density at the crown consists of the useful flux density, OG′, plus the flux density due to all the leakage flux. The working point of the crown is shown as point C in Fig. 3. At a position in the magnet between the crown and one end the total flux density is OG′, which is constant throughout the magnet, plus a flux density due to a part of the leakage flux. This leakage flux density component varies with the position of the point selected, being zero at the gap faces, and a maximum at the crown. The leakage flux density at the crown is G′ C′. The magnet as a whole works over the range GC.

The less the amount of leakage, the more nearly will the working range of the magnet approximate to a point, which should be the BH_{max} point of the magnet for best results. The formula given previously shows that a magnet may be made to work higher up its demagnetisation curve, *i.e.*, into a greater unit permeance, by either increasing its

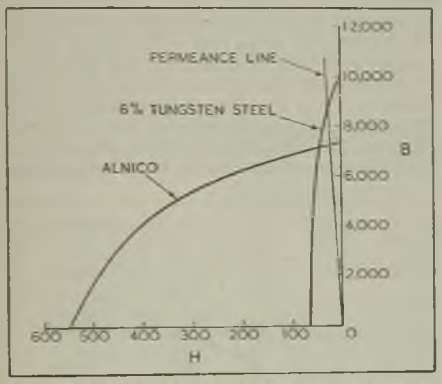


Fig. 4—Typical demagnetisation curves for tungsten steel and Alnico

length or reducing its section. Fig. 4 shows typical demagnetisation curves for tungsten steel and Alnico. Suppose that in a particular design the dimensions of the magnet are such as to make the permeance line very steep, as may happen if the magnet also serves as a case or structural component, and is consequently longer than would be desirable from purely magnetic considerations. It may then occur, as Fig. 4 shows, that the permeance line intersects the tungsten steel curve at a higher flux density than the Alnico curve, and in such a case it is more advantageous to use tungsten steel, for the design does not allow the development of the higher energy of Alnico.

Variation of Useful Permeance

In some magnet applications, *e.g.*, a moving-coil loudspeaker magnet, the useful permeance remains fairly constant, and the

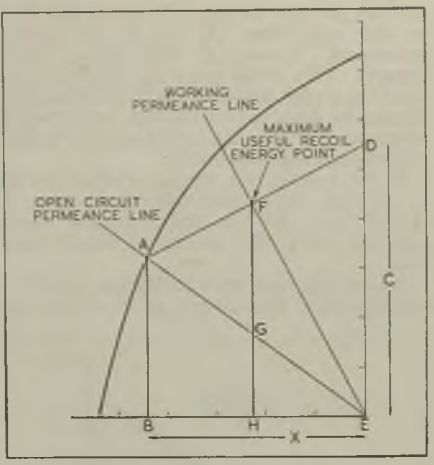


Fig. 5.—Curve showing maximum useful recoil energy point

simple treatment that has been described is sufficient. In other applications, such as a lifting magnet or a generator magnet, the useful permeance varies as the magnet approaches its load or as the armature rotates. In these more complex instances the magnet may be said to work under dynamic magnetic conditions.

We cannot immediately consider the magnet as a whole, but must first study the conditions in some typical element of volume. The method is most easily understood for a lifting magnet. Only that flux which passes into the load can be called useful flux, and when the load is well removed from the magnet the flux in the element of volume under consideration is all leakage flux. This gives the slope of the leakage unit permeance line, which should be plotted first. As the magnet approaches its load, the leakage flux density is reduced, and a useful flux density appears. The total flux density increases, not along the demagnetisation curve, but along a " recoil line " which may be considered to be straight (Fig. 5). The magnet is then working inside the demagnetisation curve. In a typical case, the useful flux density may be FG, and the leakage flux density GH. When the circuit is perfectly closed, all the flux is useful and there is no leakage flux. (The magnet may " drive positive " at its ends on perfect closed circuit, and leakage flux may reappear for this reason, but this secondary effect may be ignored.)

The useful energy at the intermediate point is proportional to FG × HE. This useful energy should be as great as possible, and it is easily shown that this happens when F is midway between A and D. The maximum useful recoil energy is proportional to the product of the volume and $\frac{CX}{4}$. Each recoil

line has its own values of C and X, but there is one recoil line on which the greatest maximum, known as the CX_{max} point, occurs. This is the point at which magnets working under dynamic magnetic conditions should be designed to operate, and it will be observed that both the useful and the leakage permeances require control.

If the leakage permeance is either too low or too high, the magnet will recoil along the wrong line, and the working point cannot coincide with the maximum recoil energy peak.

Since these facts were realised, a number of magnets have been improved by deliberately

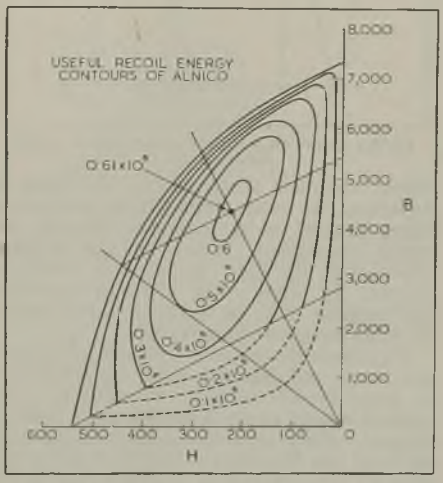


Fig. 6.—Useful recoil energy contours of Alnico

increasing their open-circuit leakage, which is heresy by the old rule of designing for BH_{max} and keeping leakage to a minimum. It may be shown that these recoil conditions also apply to a generator, provided that the demagnetising field of the windings arises only from the current produced by the generator itself, and not from any external source.

Fig. 6 above gives the useful recoil energy contours of Alnico, and if the slope of the critical leakage unit permeance line is measured, allowing for the difference of scale between B and H, it is found to be 7. The slope of the critical total unit permeance line is 19, so the slope of the critical useful unit permeance line is 12.

As previously explained, a magnet cannot work at one point, but must work over a range, and different parts of the magnet will recoil along different lines, as shown in Fig. 7. By means of suitable design the leakage permeance in the different parts of the magnet may be adjusted in such a manner that the whole magnet works in a region where the useful recoil energy varies only a little. Alnico has a very satisfactory latitude in this respect.

Permanent Magnet *v.* Electromagnet

Permanent magnets are now replacing electromagnets in many applications, and it is interesting to consider just where they can challenge them. Polarised iron may be regarded as equivalent to a permanent magnet material, but with remanence, energy and coercive properties dependent on the excitation in ampere-turns. Assuming some constant value of excitation, we can compare the magnetic properties of polarised iron with those of any other magnet material.

To make this comparison, the magnetisation curve of the iron should be plotted with its zero displaced to the left by an amount equal to the magnetising field of the windings. The hysteresis of the iron will have a very small effect on the curve, and may be neglected. Fig. 8 compares Alnico with dynamo iron polarised by a field of 200 oersteds. We may look on iron under these conditions as a permanent magnet material with a remanence of 19,500, a BH_{max} of 2·8 m.g.o. and a coercive of 200. Comparing the two curves it will be seen that the electromagnet is more effective when the circuit permeance is high, but Alnico is much better for low permeance circuits. Consequently, Alnico magnets can beat electromagnets chiefly when long air-gaps

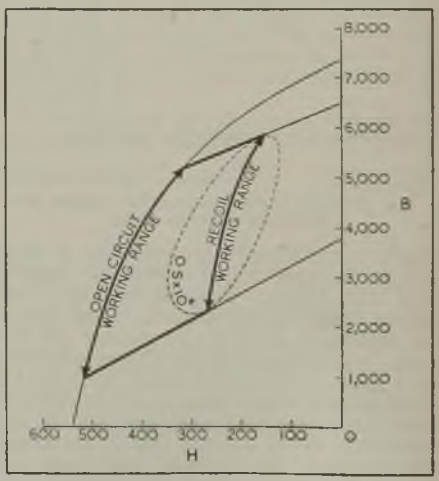


Fig. 7.—Open circuit and recoil working ranges

are required, as for instance in magnetic separators.

The comparison is more favourable to the permanent magnet than the diagram would suggest, for a given volume may be entirely filled by permanent magnet alloy, but if an electromagnet is used, some space has to be

reserved for windings. This, if the windings are taken to be part of the magnet, can be considered to reduce the flux per unit cross-sectional area of magnet, *i.e.*, the flux density, according to the dotted line of Fig. 8, which assumes that 50 per cent. of the cross-section is reserved for windings. The performance of the permanent magnet is then as good as that of the electromagnet under most conditions.

In a dynamic magnetic application, a permanent magnet will recoil along a straight recoil line, but the recoil line of an electromagnet will approximately coincide with its demagnetisation curve, and this gives the electromagnet an advantage in certain cases.

There is, of course, no limit to the remanence, energy and coercive of soft iron if polarised by a sufficiently strong field, but as the degree of polarisation is increased, the proportion of space occupied by windings increases also, and corresponding allowance must be made.

Alcomax permanent magnets have a BH_{max} of 3·5 m.g.o., and if an electromagnet having 50 per cent. winding section is to compete with this performance, the BH_{max} of the iron must be at least 7·0 m.g.o. This requires a polarising field of about 450 oersteds, and as a general statement this is the limit to which permanent magnets can compete with electromagnets in certain applications at present.

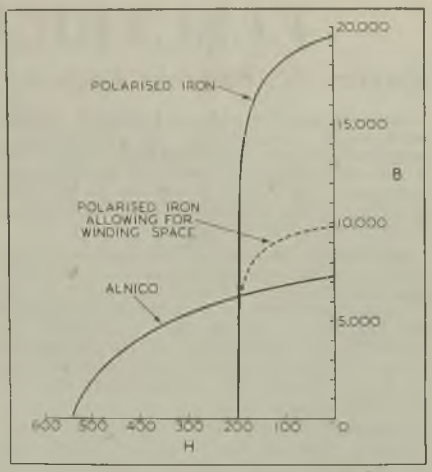


Fig. 8.—Alnico compared with dynamo iron polarised by a field of 200 oersteds

Undertakings' Accounts

Suggestions for Wartime and After

By J. H. Burton,
F.I.M.T.A., A.S.A.A.

POSTPONEMENT of the issue of a full printed set of accounts, even for a few years, tends to destroy continuity. Especially is this so in the case of municipally-owned electricity undertakings where, until the prohibition on publication, full accounts and statistical statements were issued. When publication can be resumed, the task of catching up arrears by way of preparation of a volume in respect of each year missed will, in some cases, be a big one, falling to be done when the time may be wanted for other work.

To preserve continuity with the minimum of trouble and expense and with economy in paper and labour, the following practical method should be adopted. Draft accounts should be prepared in the office as before, *i.e.*, in the same detail as in pre-war days. The form should be as hitherto (or subject to such variations as may seem desirable for publication in the post-war period), but in either circumstance, it should be on wider paper which would allow space for six or so additional columns on each side for the figures of each of the "non-publication" years. Each year's figures should be written in the appropriate column as they are prepared. Then, when the war and restrictions are over and the re-issue of full printed accounts can start, a single volume can be published showing in columnar form the information relative to each of the war years, costing little more than a single year's volume.

The foregoing are not the only advantages. Directions and requests will have been properly respected and the work of preparing back-period accounts in the early peace years reduced to the minimum. The draft accounts prepared as recommended can be photographed at the expense of a few shillings on micro-film and put in a place of comparative safety. If anything should then happen to the original draft accounts and/or the books, records and accounts of the undertaking, there will remain a photographic copy of the final accounts from which prints can be made.

The Institute of Municipal Treasurers and Accountants at its conference in London on June 15th, reported that its council had submitted proposals to the Electricity Commissioners for a revised form of standard accounts for electricity undertakings owned by local authorities and that such proposals were receiving the consideration of the Commissioners. The adoption of a new form need not affect suggestions. Indeed the information available will be such that the new form can most readily be instituted.

ELECTRICITY SUPPLY

Veteran St. Pancras Boilers. *Company's Extension Opposed.*

Accrington.—CONTROL OF LIGHTING DEPARTMENT.—The Corporation is considering a suggestion that the Lighting Department should be brought under the control of the Electricity Committee, the electrical engineer to be placed in charge of the administration. The proposal has been approved in principle.

Cambridge.—REPORT ON PURCHASE OF UNDERTAKING.—The General Purposes Committee has recommended the Council to refer to the Finance Committee for consideration and report the question of the possible acquisition next year of the undertaking of the Cambridge Electric Supply Co., and also the agreement now in force between the Corporation and the company.

Cornwall.—PROPOSED PURCHASE OF UNDERTAKING.—The *St. Austell Gazette* reports that, in connection with post-war planning, the Fowey Borough and St. Austell Urban and Rural District Councils are jointly making efforts to acquire the local electricity supply undertaking (St. Austell & District Electric Lighting & Power Co., Ltd.). Cornish M.P.'s are to be asked to support the purchasing rights vested in local authorities.

Cupar.—CHOICE BETWEEN GAS AND ELECTRICITY.—When the gas *v.* electric street lighting discussion was resumed at the last meeting of the Town Council the majority appeared to favour electricity, but it was agreed to get details of cost from the local gas company. The treasurer pointed out that it had practically been decided before the war that they should get estimates from the gas company and the electricity company and the cost was definitely in favour of electricity.

Depwade.—RURAL SUPPLIES.—At a meeting of the Rural District Council Mr. B. G. Drummond, general manager of the East Anglian Electric Supply Co., informed the members that the company's post-war proposals provided for a supply to all villages in the area with 20 premises and over, as well as all farms on the route of the mains. The scheme would bring electricity to 2,700 out of about 3,000 premises.

Edinburgh.—SURPLUS SET ASIDE FOR DEVELOPMENT.—The Public Utilities Committee at its last meeting agreed that the surplus on the past year's working of the electricity undertaking should be placed to the credit of the Department's post-war development fund. It was stated that electricity charges would remain unchanged except in a number of minor instances.

Fife.—ELECTRICITY FOR COOKING.—The County Council on July 25th considered a minute of the Catering Committee reporting that the Fife Electric Power Co. had stated that, in order to make concessions possible, gas would require to be excluded from the Committee's kitchens. The company had agreed, however, to gas being used as a standby, subject to instructions being issued to the staff that gas was only to be used in the event of electricity failing. The convener of the Committee pointed out that the catering adviser had told the Committee that the single gas units being supplied were inadequate, and after going fully into the matter it had been decided that gas should be excluded.

One representative remarked that a big monopoly concern was saying in effect, "if you want to get terms you must cut out all opposition." No one would think of supplying gas on the condition that it was only to be used if electricity failed. Brigadier-General J. D. Crosbie, chairman, pointed out that the Catering Committee had taken advantage of granting that monopoly to reach specially favourable terms for the temporary use of electricity. The Council approved of the Committee's minute.

Fort William.—FUEL ECONOMY AND WATER POWER.—In reply to a letter from the Council regarding the limiting of the maximum demand on the undertaking at peak load periods, the Electricity Commissioners pointed out that, in the case of an undertaking operating by water power, the main relevance of the restriction was to secure a maximum economy in labour and material in connection with new supplies. When the installation was there, it was desirable that electricity should be used in preference to other forms of fuel. If this involved more than the maximum supply, an increased supply might be arranged. At a meeting of the Council, the burgh electrical engineer spoke of the effect of wireless sets on the load. He said that on "D Day" at one o'clock, when the load normally went down, he was forced to put on another transformer.

Liverpool.—NEW LIGHTING INSPECTED.—The "Moonlight" street lighting system devised by the city electrical engineer, Mr. J. Eccles, in collaboration with his predecessor, Mr. P. J. Robinson, was inspected last week by officials of the Ministry of Home Security. Before the tour one of the officials said that the system had, in effect, been approved by the Ministry, and the purpose was really to see whether any modifications were necessary.

London.—BOILERS TO BE SCRAPPED.—The St. Pancras Electricity and Public Lighting Committee reports that Nos. 1 and 2 (Niclausse) boilers, which were installed in 1918 and 1920 respectively, have reached the end of their useful life. They have given very good service, the Committee states, particularly during the first few years when they were required to carry a large proportion of the load, but in recent years it has only been possible to keep them in commission by constant repair. The Committee therefore proposes that the boilers shall be scrapped and their cost, £33,691, written off. The Finance and General Purposes Committee, to which the borough treasurer reported that the original loan for the purchase of the plant had been fully repaid, concurs in this action.

USE OF CANAL WATER.—Negotiations have been proceeding for some time between the chief electrical engineer and manager of St. Pancras and the Grand Union Canal Co. for the renewal of the agreement for the use of the company's water for condensing purposes. The agreement was originally made with the Regent's Canal & Dock Co. in 1919 for a period

of 25 years, the terms being a rental of £150 per annum in respect of the use of water for condensing purposes for steam engines or turbines of 1,200 HP and 1s. per annum for each additional horse-power. The average cost over the past twelve years has been £1,939. On behalf of the Council it has been pointed out that at the time of the agreement the power station was operated independently and continuous use was made of the company's water, but a substantial alteration in the conditions of working has taken place since 1934 with the station operated under the direction of the C.E.B., and it is contended that an equitable basis of charge would be the energy actually generated. The company, however, has maintained that the present time is not opportune for a revision of the existing arrangement, and the Electricity and Public Lighting Committee accordingly recommends the Council to agree to a continuance of the expiring agreement, subject to a war surcharge of 15 per cent., as a temporary arrangement.

PURCHASE OF COOKERS.—Approval has been given by the St. Pancras Contracts and Libraries Committee for the purchase of 100 Revo R.20 cookers (exclusive of grill pan and drip pan) from West Ham Corporation at a price of £5 each.

EFFECTS OF INFERIOR COAL.—Hackney Electricity Committee reports that a new air heater is to be installed at the power station at a cost of £3,600, this replacement being due to corrosion of the old plant and the formation of acid through the inferior quality of coal now being supplied.

Mansfield.—COMPANY'S EXTENSION SCHEME OPPOSED.—Speaking at a meeting of the Town Council last week, Councillor J. H. Williamson, chairman of the Electricity Committee, referred to the suggested scheme under which the Derbyshire and Nottinghamshire Electric Power Company sought to add to its area of distribution parts of the urban district of Staveley and rural districts of Worksop, Blackwell, Chesterfield and Clowne, immediately adjacent to the area of the Mansfield, Worksop, Chesterfield and Bolsover undertakings. He described the proposed action as a serious menace to any future extension of the areas of supply of the four authorities. The Mansfield Council, together with two of the other authorities concerned, had lodged objections, Mansfield having proposed that the present time was inopportune to promote an Order of this character, when the whole question of electricity distribution was under active consideration by the Government.

Nottinghamshire.—ELECTRICITY FOR SCHOOL KITCHENS.—The County Education Committee has made arrangements for electricity supply to the kitchen of Bilsthorpe school by the Stanton Ironworks Co., the committee to pay a minimum sum of £40 per annum for 5 years in addition to 1d. per kWh consumed, and to the central kitchen at Bingham school by the Derbyshire & Notts Electric Power Co. at a quarterly fixed charge of £15 and ¾d. per kWh for all electricity consumed.

Poole.—HOSPITAL HEATING.—After a discussion about the heating system in the central block of the Alderney Hospital, the Town Council has decided to proceed forthwith with the installation of electric tubular heating. The existing system is by gas, and the cost of conversion will be about £400.

Rutherglen.—ALL-ELECTRIC HOUSES.—A leading article in the *Rutherglen Reformer* congratulates the Council of the royal burgh on its recent decision to adopt all-electric equipment in its houses now being built at Berelands. Before arriving at its decision the Council received representatives of the Strathclyde Electricity Supply Co., Ltd. (a subsidiary of the Clyde Valley Electrical Power Co.) and the Glasgow Corporation Gas Department.

Southampton.—OWNERSHIP OF GENERATING STATIONS.—A recommendation of the Electricity Committee authorising the borough electrical engineer (Mr. W. G. Turner) to vote against any change in the ownership of generating stations and the adoption of a standard national bulk supply tariff at a conference of municipal selected station owners was challenged at a meeting of the Town Council. Councillor W. Greenaway moved an amendment the whole point of which, he said, was to reverse the policy laid down by the Committee's recommendation. He contended that it was generally agreed that national ownership of generating stations was desirable from the point of view of the industry as a whole. It was suggested that Southampton might not obtain electricity as cheaply under a nationally owned system as at present, but he was not prepared to accept that. Councillor J. H. J. Matthews seconded the amendment, saying that the Labour group objected strongly to the decision of the Electricity Committee. The debate was adjourned until the September meeting of the Council.

Southend-on-Sea.—PROPOSED REVISION OF TARIFFS.—Further consideration has been given by the Electricity Committee to a report prepared by the borough electrical engineer on the revision of tariffs. Submission of the report to the Council has been deferred until the observations of the Electricity Commissioners on the proposals have been obtained.

Tunbridge Wells.—CONCESSION WITHDRAWN.—At last week's meeting of the Town Council it was stated that in view of the 4s. per ton increase in the price of coal the Electricity Committee had had to withdraw the proposed 5 per cent. discount on all charges which was to have taken effect as from the September quarter. The Committee was prepared to lose £5,800 per annum on the discount, but it now had to meet an additional coal cost of £4,926.

Worthing.—SUBSTATION MAINTENANCE.—In a report on substation maintenance the borough electrical engineer (Mr. M. J. Mortimer) makes special reference to the Swandean, Ham Manor East and Willowhayne North stations, the e.h.v. switchgear of which is equipped with directional overload protective features. This protective equipment has been in operation since 1938 and continuity of supply in the outlying areas has been noticeably improved. Since the commissioning in that year of the Swandean substation, which was the prototype of the standard brick built substations, no expense, other than periodic cleaning, has been incurred in maintenance, nor has any defect occurred in any of the plant and equipment therein. The maintenance of the sheet-steel kiosk transformer substations, however, has been rather higher than for similar plant located further inland and along the maritime plain, in the western area of supply, the corrosive action to which the plant is subject is very noticeable.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Thomas de la Rue, Ltd., record a trading profit of £275,372 for the year ended April 1st, which compares with £321,627 for the previous fifteen months. To this are added £60,000 (£34,742) income from investments in subsidiaries and £1,098 (£1,117) miscellaneous income, making £336,470 (£357,486). Depreciation, debenture and bank interest, fees, etc., take £24,841 (against £49,008 for fifteen months), leaving a net profit of £311,629 (£308,478 for fifteen months). Taxes require £185,000 (£191,289) and allocation to reserve £50,000 (same). A dividend of 40 per cent. (35 per cent. for fifteen months) is to be paid, leaving £75,387 (£68,158) to be carried forward. The report states that business in the past year has continued to expand and the outlook for the current year is satisfactory. The policy of creating subsidiary companies for the effective management of the plastics and stationery interests has been amply justified by results.

In a statement accompanying the balance sheet Mr. B. C. Westall, chairman and managing director, says that the process of reorganisation and consolidation of their subsidiary, De la Rue Plastics, Ltd., has been continued and this company purchased Hammans Industries, Ltd., and its associated concerns, combining them with the laminated section to form De la Rue Insulation, Ltd. The growth of this section of the business has been very rapid and this form of plastics manufacture is like to have very considerable application in peacetime. The policy of enlarging the research and development departments has been continued.

Palestine Electric Corporation, Ltd.—At the annual meeting on July 28th the chairman (Viscount Samuel) presented his statement which said that during the past year further additions had been made to the distribution system which now included 1,362 km. of h.v. lines and cables and 1,241 km. of l.v. distributors. The increase in gross revenue had been largely offset by higher operating costs, due partly to cost-of-living grants to the staff. Lord Samuel said that it was proposed to set up a Pinhas Rutenberg Trust for charitable purposes to which the company would contribute an annual sum of £2,500 for seven years.

Veritys, Ltd., announce that it is not yet possible to issue the report and accounts for the past year as certain questions arising from war conditions are still under discussion with Government Departments. As soon as these matters are settled the accounts will be issued with as little delay as possible.

Christy Bros. & Co., Ltd., record a net trading profit for the year ended March 31st last of £45,317, as compared with £58,872 in the previous year. To this is added £19,848 (£19,793) gross dividends and interest, and £19,312 (£25,759) brought in. Income tax and E.P.T. take £21,497 (£32,140), interest on loans £382 (£1,097), superannuation £2,000 (same), general reserve £5,000 (£10,000), directors' and employees' bonuses £18,750 (£11,250), and preference dividend £2,250 (same). An ordinary dividend of 17½ per cent. (12½ per cent.) is to be paid and £21,473 is carried forward. No provision is made for reserve for future taxation, whereas in the previous year a sum of £17,000 was set aside for that purpose.

Hick, Hargreaves & Co., Ltd.—Speaking at the annual general meeting on July 25th Mr. W. D'Arcy Madden, chairman and managing director, said that one of the immediate post-war problems would be the considerable re-equipment which would be necessary, particularly in the machine shops. There could be no doubt that under the conditions with which the industry would be faced success would depend on maximum efficiency both in design and production. This meant that the training of their young men must be the best that they could devise and that their skilled workpeople would have to be provided only with the best and latest equipment.

Philco Radio & Television Corporation of Gt. Britain, Ltd.—At an extraordinary general meeting held on July 24th, resolutions were unanimously passed increasing the capital of the company to £700,000 by the creation of 150,000 further 6 per cent. cumulative redeemable preference shares of £1 each and 1,000,000 further ordinary shares of 2s. each, and further increasing the borrowing powers of the directors to a total of £750,000. At a separate meeting of the holders of the cumulative redeemable preference shares, the issue of the further preference shares was approved.

Ultra Electric (Holdings), Ltd.—Mr. E. E. Rosen (chairman) stated at the annual general meeting last week that during the present year it was expected that the company would produce its quota of wartime radio receivers. These, however, would not carry their trade mark, but he hoped that soon after the end of hostilities in Europe the manufacture of "thoroughbred" Ultra receivers could be resumed, both for home and export markets. The company's experience in the design and construction of television receivers before the war should be of great value when television transmissions recommenced.

W. & T. Avery, Ltd.—Support for research was announced by Mr. Walford H. Turner, chairman, at the general meeting held on July 25th. The board is arranging for the company to subscribe under covenant a total sum of £25,000 payable over seven years, less income tax, towards the University of Birmingham's scheme for encouraging research and technical training, which includes the expansion of the mechanical and electrical engineering departments.

The British Thermostat Co., Ltd., is paying a final dividend of 11 per cent., again making 18½ per cent. for the year.

Simms Motor Units, Ltd., are redeeming at 102½ per cent. on February 1st the 5 per cent. first mortgage convertible debentures outstand-

ing at August 1st for which no notice of conversion into ordinary shares at par has been received.

The Globe Telegraph & Trust Co., Ltd., is paying a final dividend of 2 per cent., tax free, again making 5 per cent., tax free, for the year.

The Kalgoorlie Electric Power & Light Corporation, Ltd., has declared a dividend of 5 per cent. in respect of the past year (same.)

Metal Industries, Ltd., is paying a final dividend of 6 per cent. (against 5½ per cent.), raising the year's distribution from 8 to 8½ per cent.

Crossley-Premier Engines, Ltd., are again paying a first and final dividend of 10 per cent.

The Metropolitan Electric Supply Co., Ltd., is maintaining its interim dividend at 3 per cent.

New Companies

F. H. Wheeler (Sheffield), Ltd.—Private company. Registered July 26th. Capital, £2,000. Objects: To carry on the business of electrical, motor and general engineers, etc. Directors: F. H. Wheeler, Hazel Cottage, Sutton Place, Abinger, Surrey, director of F. H. Wheeler & Co., Ltd.; H. Caddick, 44, York Road, Birkdale, Southport, director of William Neill, Ltd.; H. M. W. Royce, Appleby Lodge, Wilmslow Road, Manchester, director of F. H. Wheeler & Co., Ltd.; W. Killingbeck, Monk's Croft, Barrow-in-Furness, director of Barrow Hæmatite Steel Co., Ltd. Registered office: 68, Queen Street, Sheffield.

F. Taylor (Electro) Ltd.—Private company. Registered July 24th. Capital £10,000. Objects, to acquire the business of radio and electrical engineers carried on by Frank Taylor at Upperhead Row, Huddersfield. Directors: A. Buckley, 124, Savile Park Road, Halifax; J. F. Buckley, 7, Vine Terrace, Halifax; and W. H. Buckley, 86, Dudwell Lane, Halifax (all directors of Wholesale Electro (Halifax) Ltd.). Registered office: Upperhead Mills, Upperhead Row, Huddersfield.

B.C.I. Electronics, Ltd.—Private company. Registered July 21st. Capital, £500. Objects: To carry on the business of electricians, electrical and radio engineers, manufacturers of, and dealers in, scientific and surgical instruments, etc. Directors: R. G. Kennedy, 14, Kirkby Avenue, Sale, Cheshire, and C. A. Jay, Moss Lodge, Manchester Road, Ashton-under-Lyne. Registered office: Ethylex Works, Prestwich Clough, Prestwich, Manchester.

Darwin's Magnetic & Radio Alloys, Ltd.—Private company. Registered July 25th. Capital, £100. Objects: To carry on the business of manufacturers of, and dealers in, magnetic and radio alloys, miners, metallurgists, metal workers, etc. Directors: W. J. Wigney, Nether Hall, Sheffield, managing director, Darwins, Ltd., and four others. Registered office: Fitzwilliam Works, Sheffield.

Companies to be Struck Off the Register

Unless cause is shown to the contrary, the following companies will be struck off the Register at the expiration of three months from July 21st :—B. & S. Radio (London), Ltd.; and Drying Cabinets, Ltd.

Companies' Returns

Mortgages and Charges

Lan-Elec, Ltd.—Charge on moneys under contracts, dated July 14th, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Power Specialities, Ltd.—Assignment on July 18th, of proceeds of contract, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd., not exceeding £25,000.

V. & E. Friedland, Ltd.—Charge on freehold property in Derby Street, Macclesfield, formerly known as "Billiards Hall," dated July 6th, to secure all moneys due or to become due from the company to Westminster Bank, Ltd.

Receiver Released

Hellyar & Sons, Ltd.—S. A. V. Wood, Brook House, Brook Green Road, Hammersmith, W.6, ceased to act as receiver and manager on July 11th.

Liquidations

John Lilley & Son, Ltd.—Meeting August 30th at the New Quay, North Shields, to receive an account of the winding up by the liquidator, Mr. J. W. Gillie.

Springvale Electrical Co., Ltd.—First dividend of 6d. in the £ payable August 1st at the office of the Official Receiver and Liquidator, Columbia House, Aldwych, London, W.C.2.

Bankruptcies

Irene F. Berners and **C. J. Berners (Major Manufacturing Co.)**, battery manufacturers, 98, Great Tower Street, London, E.C.—These bankrupts, who failed in August, 1941, applied on July 25th, to Mr. Registrar Kean at the London Bankruptcy Court for orders of discharge. Mr. H. H. Gaine, Official Receiver, reported that the liabilities amounted to £2,966 and the assets were valued at £2,473. The trustee had received £1,174 and had commenced proceedings for the recovery of other assets, as the result of which he hoped to pay a dividend of about 6s. in the £ to the creditors. The business was started in February, 1940, and mainly consisted of the purchase of exhausted salvage batteries from various corporations or firms and extracting therefrom the useful parts, which were sold to battery manufacturers. The failure was attributed to delay in carrying out necessary work at the factory and to enemy action damage. The Official Receiver opposed the application on statutory grounds. The bankrupts were also charged with culpable neglect of their business affairs, and it transpired that neither of them had anything to do with the conduct of the business, which was left entirely in the hands of a manager. His Honour upheld the Official Receiver's report and imposed in each case a suspension of 15 months.

H. C. Casselden, radio and electrical dealer, trading as Edward & Son, 67, London Road, Brighton.—Second and final dividend of 8s. in the £ (making 20s. in the £), payable August 15th at the office of Mr. A. E. Orbell, 6 and 7, Old Steine, Brighton.

STOCKS AND SHARES

TUESDAY EVENING.

PRICES in most markets of the Stock Exchange are well maintained. Our price lists show many advances in spite of the fact that quotations are already high; in spite, too. of a disposition to take profits on the part of holders who bought their stocks considerably cheaper. Speculation in radio shares has eased off, although a diminution in the number of flying-bomb attacks helped to restore confidence and cheerfulness. The opening of the Home Railway dividend season led to no fresh animation in the stocks, nor to any noteworthy change in their prices. London Passenger Transport has repeated its interim dividend on the "C" stock of 1½ per cent., and the Southern Railway again pays a half yearly 2½ per cent., on its 5 per cent. preferred ordinary.

Electricity and Coal

In the normal course of events, a rise in the price of coal would cause a prompt reaction in the quotations for shares of companies dependent in any way upon their consumption of coal. Last week's rise of 4s. per ton is likely to make a formidable addition to costs, but Stock Exchange markets have now got into that state in which nothing detrimental seems to cause disturbance in the minds of stockholders, or to check investment of capital which is unceasingly on the lookout for employment. They say in the market that there is a pronounced scarcity of stock, and this, to the prospective buyer, is constantly confirmed by the difficulty which is found in meeting his requirements.

Electricity Supply Shares

Price movements amongst the Home electricity supply shares afford the best evidence of the composure with which the companies' proprietors view the outlook. Rises of 6d. and 1s. have occurred in a number of cases, London, provincial and Scottish. London Electrics are 1s. 6d. harder at 31s. Metropolitan ordinary strengthened to 42s.: the company has declared the usual interim dividend of 3 per cent. The shares in both the Yorkshire companies recovered the dividends recently deducted from the prices. Of the overseas shares, Calcutta Electrics hold their last week's rise to 49s. 6d. Perak Hydro-Electrics came in for speculative attention. The price rose to 13s. 6d. and Tokyo Electric sixes, on the American successes against the Japanese, advanced 2 points to 24.

One-Way Price Traffic

A score of rises in the equipment and manufacturing group is fresh testimony to the absorptive capacity of capital. There seems to be no end to the purchasing power of investment. British Insulated are 2s. 6d. up at 117s. 6d. and Enfield Cables at 64s. 6d. show a similar gain. Callender's at 5⅝, General Electrics at 98s. and Henley's at 28s. 3d. are all better on the week. Crabtrees added ⅛. rising to 41s. 3d., Walsall Conduits at 51s. are 1s. 6d. higher. Allen Wests rose 3d. to 9s., at which the yield is £4 3s. 4d. per cent. on the basis of the 7½ per. cent. dividend which the company has paid annually for some years past. Johnson & Phillips, 77s., Reyrolle, 71s., Hall Telephones, 31s. 6d., Crompton Parkinsons, 32s. 6d., Burco, 16s. 6d., are some of the others which have moved up.

Metal Industries "B" shares advanced 2s. 9d., to 53s. 9d. Mather & Platt at 55s. 9d. have gained the pence. Babcock & Wilcox are easier at 54s. 6d. De la Rue shares shot up to 9⅞ upon publication of a very encouraging report.

Radio Shares

Philco Radio & Television new ordinary and preference are now being dealt in, leave having been given by the Stock Exchange Committee. The new ordinary, offered to stockholders at 10s. 6d., are quoted at 13s. and the preference, issued at 20s. 6d., are 22s. The old shares stand at 13s. 6d. ex rights. Electric & Musical are the outstanding feature with a rise of 1s. 6d. to 36s. 6d. Pye deferred gained ⅛ at 35s., following upon the chairman's statement. J. & F. Stone Lighting & Radio are better at 8s. 6d. McMichaels at 10s. are also firmer. A shilling advance made Marconi Marine 36s.

Pye

The chairman of the Pye Company, Sir Thomas Polson, took a wide view of the post-war outlook when he addressed the shareholders at the annual meeting. He stressed the need for the radio manufacturing industry to be allowed freedom of action after the war. He declared that an increase in prices would be inevitable were control to be continued, with its consequent delays and absence of flexibility. He struck the right note in stating that the essence of the radio industry has been enterprise-stimulating competition. Sir Thomas took the opportunity of pointing out the danger which can arise from the disposal of surplus stocks of Government material. If this is to be disposed of at low prices, irresponsible firms will come into existence, to the detriment of the trade as a whole.

Miscellaneous Matters

Some of the earlier buyers of Calcutta Trams decided to take their handsome profits, the result being a reaction of 1s. 6d. in the price, to 73s. 6d. Cape Electric Trams have

(*Continued on page* 176)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend Previous	Dividend Last	Middle Price Aug. 1	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies					
Bournemouth and Poole	12½	12½	62/–	+1/–	4 0 8
British Power and Light	7	7	33/–	..	4 4 10
City of London	7	5½	29/6	..	3 14 7
Clyde Valley	8	8	42/–	+6d.	3 16 0
County of London	8	8	42/–	..	3 16 0
Edmundsons:					
7% Pref.	7	7	34/6	..	4 1 4
Ord.	6	6	31/–	+6d.	3 17 5
Elec.Dis.Yorkshire	9	9	45/6xd	..	3 19 6
Elec. Fin. and Securities	12½	13½	59/–	+6d.	4 11 4
Elec. Supply Corporation	10	10	47/–	..	4 5 0
Isle of Thanet	Nil	Nil	18/–	..	—
Lancs. Light and Power	7½	7½	36/6	+6d.	4 2 4
Llanelly Elec.	6	6	25/–	..	4 12 4
Lond.Assoc.Electric	3	4	26/6	+1/–	3 0 6
London Electric	6	6	31/–	+1/6	3 17 5
LondonPowerRed. Deb.	5	5	105½	+1	4 14 7
Metropolitan E.S.	8	8	42/–	+6d.	3 16 0
Midland Counties	8	8	41/6	+6d.	3 17 0
Mid. Elec. Power	9	9	44/–	..	4 1 9
Newcastle Elec.	7	7	31/–	..	4 10 4
North Eastern Elec.:					
Ordinary	7	7	35/–	..	4 0 0
7% Pref.	7	7	35/–	..	4 0 0
Northampton	10	10	49/6	..	4 0 6
Notting Hill 6% Pref. (£10)	6	Nil	11	..	—
Northmet Power:					
Ordinary	7	7	40/–	+6d.	3 10 0
6% Pref.	6	6	30/6	..	3 18 8
Richmond Elec.	6	6	25/6	..	4 14 1
Scottish Power	8	8	41/–	..	3 8 0
Southern Areas	5	5	23/–	..	4 7 0
South London	7	7	28/–	..	5 0 0
West Devon	5	5	23/6	..	4 5 1
West Glos.	4½	3½	25/–	+6d.	2 16 0
Yorkshire Elec.	8	8	43/–xd	..	3 14 5
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	7/6	..	—
Calcutta Elec.	6*	6*	49/6	..	2 8 6
Cawnpore Elec.	10	7	38/9	..	3 12 1
East African Power	7	7	34/–	..	4 2 4
Jerusalem Elec.	7	5	29/6	..	3 8 0
Kalgoorlie (10/–)	5	5	11/–	+6d.	4 11 0
Madras Elec.	4*	Nil	33/6	..	—
Montreal Power	1½	1½	23	..	6 7 8
PalestineElec."A"	4*	5*	40/6xd	..	2 10 0
Perak Hydro-elec.	6	7	13/6	+6d.	—
ShawiniganPower	83cts.	90cts.	16½	+½	—
Tokyo Elec. 6%	6	6	24	+2	—
VictoriaFallsPower	15	15	4½	..	3 12 7
WhitehallInv.Pref.	—	6	24/6	..	4 18 0

Company	Dividend Previous	Dividend Last	Middle Price Aug. 1	Rise or Fall	Yield p.c. £ s. d.
Public Boards					
Central Electricity:					
1955–60 (Civil Defence)	3	3	100	..	3 0 0
1955–75	5	5	115	..	4 7 0
1951–73	4½	4½	107	..	4 4 1
1963–93	3½	3½	103½	..	3 7 8
1974–94	3½	3½	101	..	3 4 4
London Elec. Trans. Ltd.	2½	2½	97½	..	2 11 3
London & Home Counties1955–75	4½	4½	111	..	4 1 1
Lond.Pass.Trans.:					
A	4½	4½	121½	..	3 14 1
B	5	5	121½	..	4 2 4
C	3	3½	71½xd	..	4 11 3
WestMidlandsJ.E.A. 1948–68	5	5	108½	..	4 12 4
Telegragh and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	120½	..	4 19 7
Def.	1½	1½	30	..	5 0 0
Anglo-Portuguese	8	8	27/–	..	3 18 6
Cable & Wireless:					
5½% Pref.	5½	5½	114½	..	4 16 1
Ord.	4	4	79½	..	5 0 8
CanadianMarconi$1	Nil	4cts.	10/–	−6d.	—
Globe Tel. & Tel.:					
Ord.	8½*	5*	40/6	+6d.	2 9 4
Pref.	6	6	30/–	..	4 0 0
GreatNorthernTel. (£10)	Nil	Nil	24½	..	—
Inter. Tel. & Tel.	Nil	Nil	21½	−1	—
Marconi-Marine	7½	7½	36/–	+1/–	4 3 4
Oriental Tel. Ord.	16	10	49/–	..	—
Telephone Props.	6	Nil	18/6	+6d.	—
Tele.Rentals (5/–)	10	10	12/–	..	4 3 4
Traction and Transport					
Anglo-Arg. Trans.:					
First Pref. (£5)	Nil	Nil	2/6	..	—
4% Inc.	Nil	Nil	6	+1	—
Brit.Elec.Traction:					
Def. Ord.	45	45	1305	+30	3 9 0
Pref. Ord.	8	8	180	..	4 9 0
Bristol Trams	10	10	56/6	..	3 10 10
Brazil Traction	$1	$1⅓	26⅞	−¾	6 10 10
Calcutta Trams	5½	6½	73/6	−1/6	1 15 4
Cape Elec. Trams	5	6	25/6	−1/6	4 14 1
Lancs. Transport	10	10	45/6	..	4 8 0
Mexican Light:					
1st Bonds	5	5	104½	..	4 15 7
Rio 5% Bonds	5	5	105½	..	4 14 9
Southern Rly.:					
5% Prefd.	5	5	76xd	..	6 11 7
5% Pref.	5	5	118½	..	4 4 9
T. Tilling	10	10	60/–	+6d.	3 6 8
West Riding	10	10	46/–	+6d.	4 7 0

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price Aug. 1	Rise or Fall	Yield p.c. £ s. d.
Equipment and Manufacturing					
Aron. Elec. Ord. ..	10	15	61/–	..	4 18 4
Assoc. Elec. :					
Ord.	10	10	56/6	..	3 10 9
Pref.	8	8	40/6	..	3 19 0
AutomaticTel.&Tel.	12½	12½	64/–	..	3 18 2
Babcock & Wilcox	11	11	54/6	–6d.	4 0 9
British Aluminium	10	10	51/–	..	3 18 5
British Insul. Ord.	20	20	5⅞	+⅛	3 8 0
British Thermostat (5/–)	18½	18½	21/3	..	4 7 0
British Vac. Cleaner (5/–)	15	30	30/–	..	5 0 0
Brush Ord. (5/–)	8	9	11/–	..	4 1 10
Burco (5/–) ..	15	17½	16/6	+6d.	5 9 5
Callender's ..	15	20	5⅝	+⅛	3 11 2
ChlorideElec.Storage	15	15	85/–	..	3 10 7
Cole, E. K. (5/–)	10	15	34/6	–6d.	2 3 6
ConsolidatedSignal	24	27½	6⅝	..	4 3 10
Cossor, A. C. (5/–)	7½*	10*	27/–	+6d.	1 17 0
Crabtree (10/–) ..	17½	17½	41/3	+⅛	4 5 6
Crompton Parkinson Ord. (5/–) ..	20	22½	32/6	+1/–	3 9 3
E.M.I. (10/–) ..	6	8	36/6	+1/6	2 3 9
Elec. Construction	10	12½	55/–	..	4 11 0
Enfield Cable Ord.	12½	12½	64/6	+⅛	3 17 6
English Electric	10	10	53/3	..	3 15 2
Ensign Lamps (5/–)	25	15	21/3	..	3 10 8
Ericsson Tel. (5/–)	22*	20*	56/3	..	1 15 7
Ever Ready (5/–)	40	40	45/3	..	4 8 6
Falk Stadelmann	7½	7½	35/–	..	4 5 9
Ferranti Pref. ..	7	7	31/3	..	4 9 7
G.E.C. : Pref.	6½	6½	34/–	..	3 16 6
Ord.	17½	17½	98/–xd	+6d.	3 11 6
General Cable (5/–)	15	15	15/–	..	5 0 0
Greenwood&Batley	15	15	46/–	+1/–	6 10 4
HallTelephone(10/–)	12½	12½	31/6	+1/–	3 19 4
Henley's (5/–) ..	20	20	28/3	+3d.	3 11 0
4½% Pref. ..	4½	4½	24/–	..	3 15 0
Hopkinsons ..	15	17½	71/3	..	4 18 4
India Rubber Pref.	5½	5½	23/6	..	4 13 9
Intl. Combustion	30	30	6⅝	..	4 10 8
Johnson & Phillips	15	15	77/6	+6d.	3 17 4
LancashireDynamo	22½	22½	98/9	..	4 11 2
Laurence,Scott(5/–)	12½	12½	13/6	+3d.	4 12 7
London Elec. Wire	7½	7½	39/–	..	3 17 0
Mather & Platt ..	10	10	55/9	+9d.	3 12 0
Metal Industries(B)	5	8	53/9	+2/9	2 16 4
Met. Elec. CablePref.	5½	5½	21/3	..	5 3 6
Murex	20	20	105/9	..	3 15 6
Pye Deferred (5/–)	25	25	35/–	+⅛	3 11 5
Revo (10/–) ..	17½	17½	43/–	..	4 1 4
Reyrolle ..	12½	12½	71/–	+1/–	3 10 5
Siemens Ord. ..	7½	7½	36/–	..	4 3 4
Strand Elec. (5/–)	7½	10	8/–	..	6 5 0
Switchgear & Cowans (5/–) ..	20	20	19/–	..	5 5 1
T.C.C. (10/–) ..	5	7½	22/6	..	3 6 8
T.C. & M. ..	10	10	54/6	..	3 13 6
TelephoneMfg.(5/–)	9	9	11/9	..	3 16 8
Thorn Elec. (5/–)	20	20	26/–	..	3 17 0
Tube Investments	20	20	101/–	..	3 19 4
Vactric (5/–) ..	Nil	Nil	17/–	..	—
Veritys (5/–) ..	7½	7½	8/3	..	4 11 0
WalsallConduits(1/–)	55	55	51/–	+1/6	4 6 3
Ward & Goldstone (5/–)	20	20	28/9	..	3 13 6
WestinghouseBrake	12½	14	75/–	..	3 14 9
West, Allen (5/–)	7½	7½	9/–	+3d.	4 13 4

* Dividends are paid free of Income Tax.

Stocks and Shares (*Continued from page* 174)

gone back to 25s. 6d. With a rise of 30 points, British Electric Traction deferred mounted above £1,300. West Riding shares at 46s. and Thomas Tilling at £3 are both 6d. higher. Dollar stocks are mostly dull. New York Exchange operators professed to take fright at the possibility of an early peace and its sequelæ. Brazilian Tractions went back ¾ and Canadian Marconis are 6d. down. Gilt-edged stocks continue firm. Comparison of the yields offered by purely gilt-edged securities and those obtainable from the ordinary shares of front rank Home industrials, makes an interesting study. Our own price lists supply suggestive examples.

Shares on Offer

Amongst the shares on offer—perhaps it would be safer to say the shares that were on offer at the time that this was being written—are 5,000 Telephone & General Trust £1 ordinary. The company has paid an annual 8 per cent. dividend for some years past and at 36s. 6d., at which shares are obtainable, the return comes to £4 7s. 8d., income tax being deducted, however, at 7s. 9d. in the £. This relief raises the yield substantially. Telephone Rentals 5s. shares can be bought at 11s. 9d. to pay 4¼ per cent. on the basis of the 10 per cent. dividend which has been distributed annually for the past few years. A line of London Electric Wire Co. & Smiths £1 shares is on offer at 39s. 6d. The company has been paying 7½ per cent. per annum and at the price quoted the return on this basis is £3 16s. per cent. Laurence, Scott & Electromotors "A" and "B" shares are both on offer at 13s. 9d. to yield £4 11s. per cent. on the basis of the 12½ per cent. dividends of which both classes of shares are in receipt.

Investment Opportunities

A few hundred Switchgear & Cowans 5s. shares can be bought at 19s. 6d. to pay £5 2s. 7d. per cent. Henley's Telegraph Works ordinary, on offer at 28s. 6d., pay 3½ per cent. on the money. About 1,000 Ericsson Telephones came in at 57s. 6d., the yield here being £1 15s. 1d. per cent., free of tax, equivalent to 3½ per cent. with tax at 10s. in the £. Enfield Cable shares are scarce, but 2,000 Enfield Rolling Mills are on offer at 23s., yielding £4 7s. per cent.

NEW PATENTS

Electrical Specifications Recently Published

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

AKT.-GES. Brown, Boveri, & Cie.—" Multi-break gas-blast circuit-breaker installation." 4953/43. May 6th, 1942. (562729.)

Automatic Telephone & Electric Co., Ltd., and J. R. Cannon.—" Negative feedback amplifiers." 235. January 6th, 1943. (562655.)

Babcock & Wilcox, Ltd.—" Tubulous vapour generators." 547/43. January 20th, 1942. (562793.)

Babcock & Wilcox, Ltd. (Babcock & Wilcox Co.).—" Centrifugal vapour and liquid separators."—20141. January 12th, 1943. (Divided out of 562793) (562806.)

British Electrical & Allied Industries Research Association, A. Butterworth and A. Turner.—" Measurements of magnetic fields." 5064. March 29th, 1943. (562735.)

British Insulated Cables, Ltd., J. C. Quayle, E. O. Jones and F. Moores.—" Electric condensers." 4221. March 15th, 1943. (562667.)

British Thomson-Houston Co., Ltd.—" Frequency changer set." 5147/43. April 1st, 1942. (562741.) " Tap changing switches." 5150/43. April 3rd, 1942. (562742.) " Apparatus for electrically testing hermetically sealed envelopes." 487/43. January 21st, 1942. (562792.)

J. Collard.—" Means for preventing or reducing the escape of high-frequency energy." (Cognate applications 11693/41 and 748/42.) September 12th, 1941. (562674.)

J. Collard and H. E. Holman.—" High-frequency electrical transmission lines." 980. January 23rd, 1942. (562,676.)

L. Fuller and E. W. Sudlow.—" Electric torches and like lamps." 17478. December 8th, 1942. (562689.)

General Electric Co., Ltd., D. C. Espley and J. W. Ryde.—" Electrical apparatus adapted to operate at very high frequencies." 16038. November 4th, 1940. (562672.)

B. M. Hadfield.—" Electric impulse generation or regeneration of predetermined duration and amplitude." 18268. December 23rd, 1942. (562791.)

A. Haefelfinger.—" Automatic electric circuit-breaking devices." 5250. April 1st, 1943. (562745.)

J. S. Hall and Metropolitan-Vickers Electrical Co., Ltd.—" Turbine installations." 5054. March 29th, 1943. (562734.)

Marconi's Wireless Telegraph Co., Ltd.—" Receivers for receiving angular velocity-modulated carrier wave signals." 360/43. October 25th, 1941. (562702). " Stable electric-oscillation generator and angular-velocity modulator." 4939/43. March 27th, 1942. (562728.) " Radio receivers." 535/43. September 12th, 1941. (562779.)

Marconi's Wireless Telegraph Co., Ltd. (Radio Corporation of America).—" Electrical synchronising and phasing circuit arrangements." 4864. March 25th, 1943. (562726.)

Middlesex Oil & Chemical Works, Ltd., and J. W. Thom.—" Cable impregnating and filling media." 15092. October 27th, 1942. (562646.) " Electrical insulation material." (Cognate applications 14303/42 and 15091/42.) October 12th, 1942. (562766.)

H. N. Negretti, P. E. Negretti and E. F. Greening.—"Relays for amplifying small forces." 14217. October 9th, 1942. (562645.)

W. H. Norris.—" Wireless communication systems or control systems." 11496. August 17th, 1942. (562764.)

Philco Radio & Television Corporation.—" Apparatus for reducing echo effects in picture transmission systems." 390/43. March 6th, 1942. (562707.) " Apparatus for reducing echo effects in picture transmission systems." 558/43. March 19, 1942. (562794.)

Philips Lamps, Ltd. (Naamlooze Vennootschap Philips' Gloeilampenfabrieken).—" Regulating apparatus for alternating current voltages in connection with the charging of batteries." 11554. September 9th, 1941. (562673.)

Platers & Stampers, Ltd. (E. Katzinger Co.).—" Switch assemblies for flashlights." 12652. September 8th, 1942. (562680.)

A. Rakos and Technotherm, Ltd.—" Methods of and apparatus for soldering or joining by fusion, wires, strips and the like." 17542. December 9th, 1942. (562690.)

A. Reyrolle & Co., Ltd., H. Mordue, and A. R. Miller.—" Electric resistors." 345. January 7th, 1943. (562701.)

A. G. Rose and Rose Bros. (Gainsborough), Ltd.—" Hand-operated electrical appliances." 469. January 9th, 1943. (562661.)

J. Sankey & Sons, Ltd., L. W. Law and A. E. Pugh.—" Production of electrical sheets and/or strip of silicon iron alloy." 4453. March 19th, 1943. (562669.)

A. Schumann.—" Electrical gramophone pick-ups." 1542. January 29th, 1943. (562803.)

Standard Telephones & Cables, Ltd., P. K. Chatterjea and C. T. Scully.—" Negative resistance devices for generating oscillations or reducing damping." 377. January 8th, 1943. (562705.)

C. B. Taylor.—" Electric fires." 367. January 8th, 1943. (562703.)

W. W. Triggs. (Seymour Corporation of Delaware).—" Mounting means and gearing mechanism for magneto-electric machines." 9020. June 30th, 1942. (562713.)

Westinghouse Electric International Co.—" System for controlling the supply of power to a load through electric discharge apparatus." 11094/42. August 13th, 1941. (562640.) " Fluid-blast electric circuit-breakers." 5177/43. March 31st, 1942. (562744.)

H. D. Wheeler and P. A. H. Mossay.—" Speed control of electric motors supplied on the variable voltage system." 729. January 14th, 1943. (562781.)

Amended Specifications Published

546976. Automatic Telephone & Electric Co., Ltd.—" Alternating current rectification arrangements."

556484. Londex, Ltd., and another.—" Electrically operated devices for liquid level regulation."

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.

Plymouth.—August 19th. Electricity Supply Department. Boiler water control and heat recovery equipment. (July 28th.)

West Midlands.—August 25th. Joint Electricity Authority. Travelling crane. (July 28th.)

Orders Placed

Greenock.—Corporation. Accepted. Electrical work at 200 houses (£5,234).—J. Stuart Denholm.

Hastings.—Electricity Committee. Accepted. Switchgear alterations, etc., at power station (£603).—Ferguson, Pailin.

Isle of Wight.—Health Committee. Recommended. X-ray apparatus (£2,500).—Watson & Sons.

London.—ST. MARYLEBONE.—Electricity Committee. Accepted. Meters for twelve months. —Chamberlain & Hookham and Ferranti.

ST. PANCRAS.—Contracts and Libraries Committee. Cable (contracts extended for twelve months).—Metropolitan Electric Cable & Construction Co.; Standard Telephones & Cables.

HAMMERSMITH. — Switchgear (£783). — J. G. Statter & Co.

Manchester.—Health Committee. Accepted. Reconstruction of service lift at Withington Hospital.—Etchells, Congdon & Muir.

Rivers Committee. Accepted. Works in connection with electricity supply to premises at Northenden.—Albert E. Sudlow & Co.

Newcastle-on-Tyne.—Education Committee. Accepted. Electrical installation at Bath Lane School of Building (£469).—Sleigh & Wood.

Northumberland.—County Council. Accepted. Electric lighting installation at central kitchen, Longbenton (£95).—Gray Brothers.

Warrington.—Water Committee. Accepted. Electric cables for waterworks.—B.I. Cables.

Contracts in Prospect

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

Bradford.—Hut, Grange High School (£1,850); city architect.

Brighton.—Waterworks (£1,967), with electrical plant; borough engineer.

Cheshire.—Additions to hospitals, Clatterbridge (£2,700) and Ashby (£1,250); county architect, Chester.

Dunfermline.—Proposed crematorium; Town Clerk's Office, City Chambers.

Durham.—School improvements (£35,000) and additions to training centre, Stockton (£4,950); county architect.

Fife.—Dining hall and kitchen annexe at Queen Anne Secondary School, Dunfermline; county architect, County Buildings, Cupar.

Isle of Wight.—Additions, Newport Secondary School (£2,820); C. H. Williams & Sons.

Additions, East Cowes Junior School (£1,797); H. E. Day & Sons.

Kent.—Residential nurseries (£10,000); youth centres (£3,805); nurses' accommodation (£4,222), and maternity accommodation (£9,047) at Dartford County Hospital; dispensary, Park Road, Bromley (£1,700); additions, Willesborough Hospital (£1,260); hut at Sittingbourne Girls' School (£1,750); and additions to Chatham Technical School for Girls (£3,600); county architect, Maidstone.

Leicestershire.—Additions, Stretton Hall Hospital, Rutland (£1,550); county architect.

Luton.—Extensions to Modern and High Schools, Old Bedford Road (£6,000); clerk to governors.

Mansfield.—Maternity unit, County Hospital (£3,726); Greenwoods (Mansfield), Ltd.

Middlesbrough.—Canteens and kitchens at schools; education architect, Woodlands Road.

Middlesex.—Temporary school, Frogmore Farm, Hayes (£5,000), additions, Vaughan Road School, Harrow (£1,100), additions, Bishopshalt School, Hillingdon (£1,600) and school canteens (£14,550); county architect.

Morayshire.—Twelve houses for Moray and Nairn County Councils; John Findlay, county architect, Elgin.

Newcastle-on-Tyne.—Rebuilding of the Fleming Memorial Hospital for Children, North Road, Jesmond, Newcastle; J. B. Cairncross, secretary.

Northumberland.—Canteen kitchens at various schools; W. Tully & Son, builders, Belford; J. W. Urpeth, builder, Bedlington; M. Hogarth & Son, builders, Corbridge; J. M. Reid, builder, Seaton Delaval.

Nottinghamshire.—Maternity hospital, Basford (£18,400); county architect.

Salford.—Nursery, Summerville Road (£2,427); Palatine Construction Co., Ltd., Preston.

Southend-on-Sea.—Dining room, Dowsett Avenue; R. G. Baxter, borough engineer, Municipal Buildings.

Staffordshire.—Central kitchen for school meals, Lower Sandford Street, Lichfield; C. M. Coombs, county architect, County Buildings, Stafford.

Stockton-on-Tees.—School kitchens in Green Lane and Ragworth Road, and dining rooms and sculleries in Grangefield Road, Headlam Street and Billingham Road; borough architect.

Tynemouth. — Factories, Chirton. trading estate, for two firms; town clerk, Northumberland Square, North Shields.

Worthing.—Proposed maternity hospital; P. E. Harvey, borough engineer, Town Hall.

V=IR

Upon this formula has been built the science of Electrical Engineering. From the days of Ohm to the present time, electrical science and industry have a continuous record of unparalleled achievement. But this progress can only be maintained by use of the most up-to-date methods and materials.

Distrene (Regd.) insulating material is the result of elaborate research, and the brief data set out below will give some idea of what has been achieved.

Write to us for working samples and remember: Distrene is made in sheets, rods and tubes, and in powder form for injection moulding.

BX DISTRENE (Regd.)

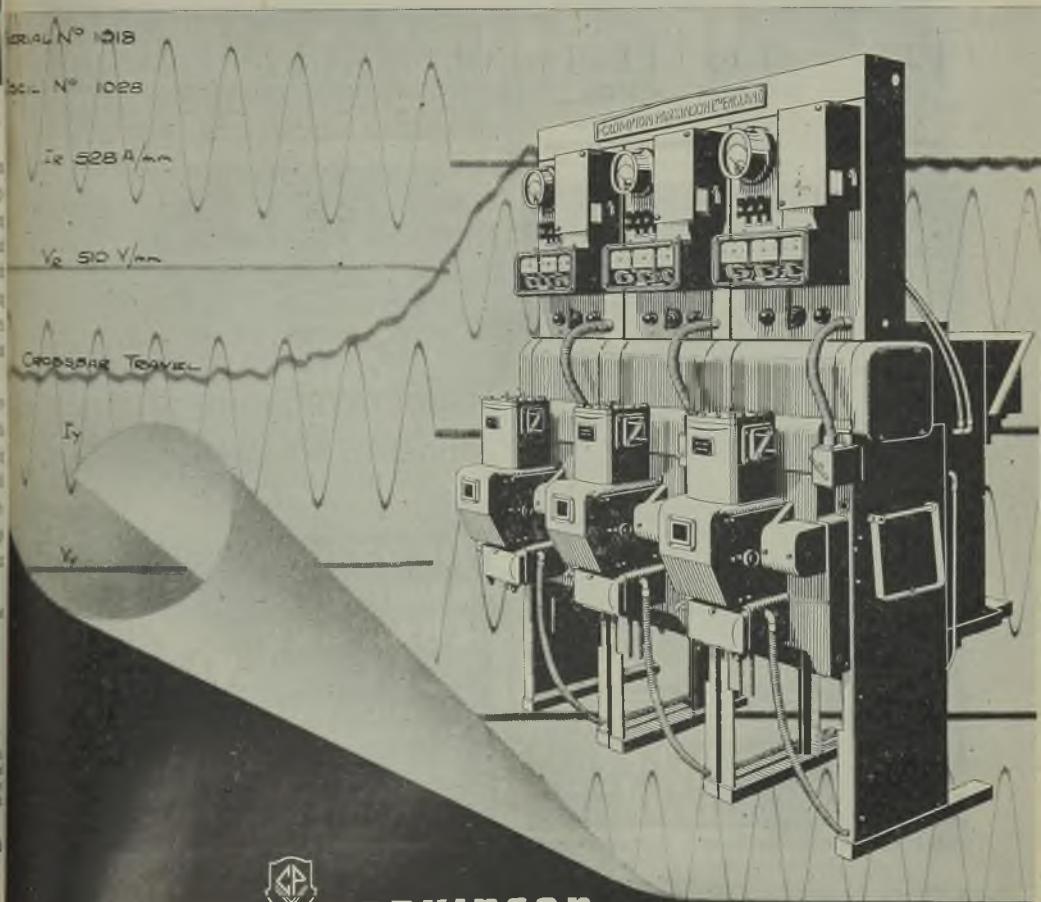
COMPRESSION STRENGTH	7 tons per sq. in.
SPECIFIC GRAVITY	1·06
WATER ABSORPTION	Nil
COEFFICIENT OF LINEAR EXPANSION	·0001
SURFACE RESISTIVITY (24 hours in water)	3×10^4 megohms
DIELECTRIC CONSTANT 60—10^6 CYCLES	2·60—2·70
POWER FACTOR UP TO 100 MEGACYCLES	·0002—·0003

★ ★ ★

BX PLASTICS LTD., LARKSWOOD WORKS, LONDON E.4

LH/BX225

BASED ON EXACT DATA. Crompton Switchgear is proved in the Crompton Short-Circuit Testing Station where complete testing facilities exist for making and breaking; thermal rating when carrying the rated symmetrical short-circuit current; and for mechanical endurance.



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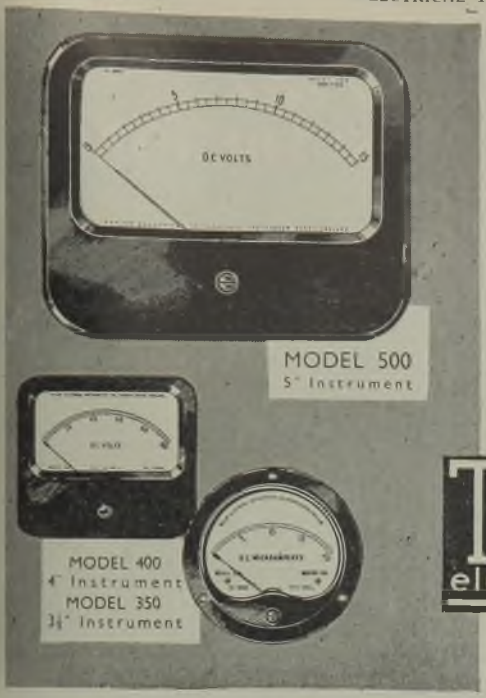


Sensitive Instruments

We specialise in the manufacture of sensitive Moving Coil and Rectifier instruments. We are regularly supplying these with sensitivities of as low as 20μA full scale in both Moving Coil and Rectifier types. These instruments are also available as Thermocouple types as low as 1·25 mA full scale. Mirror Scales and illuminated dials are also available if required in Model 400 and 500 Instruments.

We also manufacture the following instruments :—

MODEL 200. 2" instrument with either round or square covers.

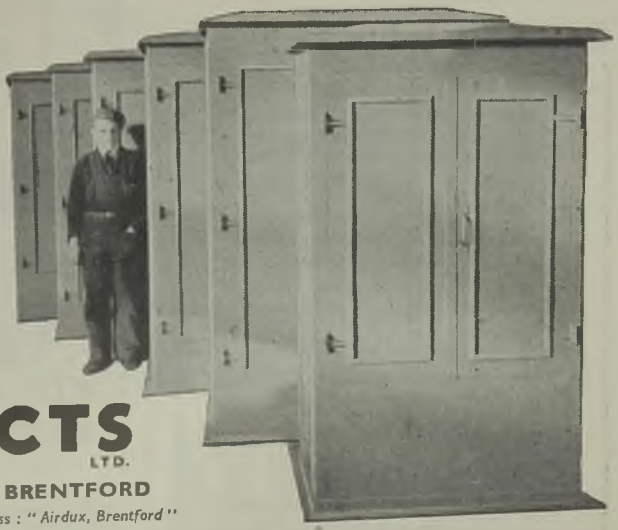
MODEL 250. 2½" instrument for flush or projecting mounting.

Taylor electrical instruments ltd.

Send your enquiries to :—
TAYLOR ELECTRICAL INSTRUMENTS LTD.
419-424 Montrose Avenue, Slough, Bucks.
Tel.: Slough 21381 (4 lines). Grams: "Taylins, Slough."

Frames and Cases for Electrical Equipment

FEEDER PILLARS, CUBICLE AND TELEPHONE BOXES, BUSBAR CHAMBERS, CONNECTION BOXES, INSTRUMENT PANELS



AIR DUCTS LTD.

GREAT WEST ROAD, BRENTFORD

Phone : Ealing 6655. Telegraphic Address : "Airdux, Brentford"

AIR BREAK COMBINED

STATOR ROTOR

SLIPRING MOTOR STARTERS

★ ROBUST CONSTRUCTION
★ FOOL PROOF
★ LIBERALLY RATED
★ CONTACTS EASILY RENEWABLE

AIREDALE ELECTRICAL & MFG. CO. LIMITED

Quick despatch for Urgent Requirements

MACTA WORKS, LOW MOOR, BRADFORD. TEL.: LOW MOOR 703-4. GRAMS: "SWITCH, LOW MOOR"

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MARCONI

● MARCONI'S WIRELESS TELEGRAPH COMPANY LIMITED
THE MARCONI INTERNATIONAL MARINE COMMUNICATION CO. LTD.
ELECTRA HOUSE, VICTORIA EMBANKMENT, LONDON, W.C.2.

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. (*For August* 11 *issue see notice below.*)
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.

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

Original testimonials should not be sent with applications for employment.

AUGUST 11th ISSUE

Classified Advertisements for the above issue closed for press **first post on FRIDAY, AUGUST 4**

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.*

BOROUGH OF SCUNTHORPE

Lady Demonstrator

APPLICATIONS are invited for the post of TEMPORARY LADY DEMONSTRATOR in the Electricity Department of the Corporation from persons over 41 years of age. The person appointed will be required for the time being to take charge of the Electricity and Gas Showrooms of the Corporation. The post will be readvertised after the termination of hostilities and a permanent appointment made.

Preference will be given to applicants who hold a Diploma of Domestic Science or other approved Certificate, and who have had practical experience in the demonstration of electrical domestic appliances. The salary will be fixed according to experience and qualifications of the successful applicant.

Applications, stating age, qualifications and experience, and accompanied by copies of two recent testimonials, should be delivered to the undersigned not later than 9th August, 1944.

W. P. ERRINGTON,
Town Clerk.

Municipal Offices,
34, High Street,
Scunthorpe.
19th July, 1944. 459

COUNTY BOROUGH OF PRESTON

Lady Cookery Demonstrator

APPLICATIONS are invited for the post of Temporary LADY COOKERY DEMONSTRATOR in the Electricity Undertaking. Applicants must hold a Diploma of Domestic Science or other approved qualification, and have had previous experience in demonstration work and assisting in an Electricity Showroom. Salary £250 per annum, plus a War Addition at present amounting to £40 6s. per annum.

Applications, stating age, qualifications and experience, with copies of two testimonials, and endorsed "Demonstrator," must be received by the Borough Electrical Engineer, 40/42, Lune Street, Preston, not later than 31st August, 1944.

HERBERT E. NUTTER, Town Clerk.
450

COUNTY BOROUGH OF SWANSEA

Electricity Department

Appointment of Generation Engineeer

APPLICATIONS are invited from qualified Engineers, not over 45 years of age, for the position of "Generation Engineer."

Applicants must have had a thorough mechanical and electrical engineering training, preferably including experience in a manufacturing engineering works; possess a degree or equivalent technical qualifications admitting to Corporate Membership of the Institution of Mechanical Engineers, and have held a similar appointment in a large Power Station operating under the direction of the Central Electricity Board.

The successful candidate will be required to take charge of the operation and maintenance of the Department's Generating Station with any extensions or modifications thereto and to devote the whole of his time to the duties of his office.

The salary will be in accordance with Grade 2, Class J, of the N.J.B. Schedule of Salaries, which, at the present time, is £802 rising to £842 per annum.

The appointment will be subject to the provisions of the Local Government and Other Officers' Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Applications, which must be made on a prescribed form obtainable from the Borough Electrical Engineer and Manager, Guildhall, Swansea, together with copies of not more than three recent testimonials, must be delivered to the undersigned not later than Saturday, the 19th August, 1944.

Canvassing, either directly or indirectly, is prohibited and will be a disqualification.

T. B. BOWEN,
Guildhall, Town Clerk.
Swansea.
21st July, 1944. 446

BOROUGH OF BECKENHAM

Electricity Department

Appointment of Charge Engineer

APPLICATIONS are invited for the position of Charge Engineer.

Candidates should have experience in boiler house control, operation of steam-raising plant and switchboard work.

The salary will be in accordance with the National Joint Board Schedule, at present Class D, Grade 8.

The successful candidate will be required to pass a medical examination by the Medical Officer of Health or an independent Medical Referee appointed by the Council, and contribute to the Superannuation Scheme.

Applications must be made on the prescribed form, which is obtainable from the Borough Electrical Engineer and Manager at the Town Hall, Beckenham. The form, when completed, to be enclosed in an endorsed envelope and delivered at the Electrical Engineer's Office not later than twelve o'clock noon, 11th August, 1944.

Canvassing in any form will disqualify.

C. ERIC STADDON,
Town Hall, Town Clerk.
Beckenham, Kent.
29th July, 1944. 474

ELECTRICAL and Hydraulic Engineers in Birmingham district require a young man to train under Electrical Engineer and Designer for responsible work. State technical and any works training, age, experience and salary required.—Box No. 152, Haddons Advertising Offices, 159, Great Charles Street, Birmingham, 3. 468

ELECTRICAL Engineer required by the Tanganyika Territory Government Labour Department for one tour of 24 to 36 months with prospect of permanency. Salary £450 p.a., rising to £840 and possibly to £1,000. A higher commencing salary may be offered to a well-qualified candidate. Cost of living allowance for married men according to salary and dependants. Free quarters and passages. Candidates should be corporate members of the Institution of Electrical Engineers and have had experience on work connected with the generation, transmission, transformation and distribution of electrical energy, and in particular hydro-electric generation, long distance high voltage transmission, township electrical services and the application of electricity to industrial, agricultural and institutional purposes. Applicants should write, quoting D.904A, to the Ministry of Labour and National Service, Room 432, Alexandra House, Kingsway, London, W.C.2, for the necessary forms, which should be returned completed on or before 14th August, 1944. 465

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

HEAD Foreman for small concern in North London area manufacturing and repairing Accumulators. Must possess initiative and experience.—Box 473, c/o The Electrical Review.

MACHINE Shop Superintendent. Established firm require 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 472, c/o The Electrical Review.

RESEARCH Engineer. Manager required for department engaged on research work in connection with the design, development and application of small D.C. and A.C. motors and generators. Applicants should be 30 to 45 years of age and must have had university training to at least an Engineering Honours Degree. Production and administrative experience desirable. Permanent appointment near London on urgent work of national importance. Salary up to £1,000 per annum. Applications, giving particulars of age, education, qualifications and experience, to—Box 469, c/o The Electrical Review.

SALES Representative. Permanent progressive position for man with knowledge of power application of A.C. and D.C. motors. Apply—Higgs Motors, Kingsway, W.C.2, or Birmingham, 6. 456

SALES Representative required for illuminating engineering department of Lamp Manufacturers. Experience in planning industrial lighting essential. Write, with details of age, experience and salary required, to—Box C.D.6, c/o 5 New Bridge Street, London, E.C.4. 463

TRAVELLER required for North and North West London by electrical wholesale distributors. Must have knowledge of wiring supplies and general factory requirements.—Wm. Pryor & Co. Ltd., 3, Kingsland High Street, Dalston Junction, London, E.8. 6076

APPOINTMENTS FILLED

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

SITUATIONS WANTED

ADVERTISER, A.M.I.E.E., college/works trained, 25 years' practical experience, 17 years in Spain, fluent Spanish, fair French and Portuguese, seeks post abroad. Modest salary.—Box 6043, c/o The Electrical Review.

B.Sc. (37), exempted, designer of Transformers, Motors, Rheostats, free. Write—Box 6101, c/o The Electrical Review.

CHARTERED Secretary (39), extensive supply authority experience, now assistant secretary to company manufacturing steel and light alloy products, desires position as secretary of company making electrical products. Salary £750.—Box 6042, c/o The Electrical Review.

ELECTRIC Lighting Industry. Production Executive of good personality, sound mechanical training, linguist with Continental manufacturing experience, desires change of position.—Box 6091, c/o The Electrical Review.

ELECTRICAL and Mechanical Engineer, disengaged, age 45, requires appointment, South Yorkshire. Business management, supervision, mains distribution, overhead and underground, internal wiring and general engineering.—Box 6093, c/o The Electrical Review.

ELECTRICAL and Mechanical Engineer, 37, desires change. Experienced in medium and heavy engineering, jig and machine tool work, plant maintenance and layout.—Box 6077, c/o The Electrical Review.

ELECTRICAL and Mechanical Engineer (46), A.M.I.E.E. desires change with a view to post-war permanency. Administration large factory, maintenance, manufacturing, generating, heating and ventilating experience. Free at short notice. Present salary £700.—Box 6066, c/o The Electrical Review.

ELECTRICAL Engineer, age 52, seeks supervising position or charge of factory plant, long experience with D.C. and A.C. layouts for power and lighting, highest testimonials.—Box 6044, c/o The Electrical Review.

ELECTRICAL Engineer (Grad. I.E.E., age 26), experienced in overhauling, testing and maintenance of electrical machinery, seeks position in Midlands, preferably Birmingham area.—Box 6095, c/o The Electrical Review.

ELECTRICAL Engineer (32), free shortly, with installation, maintenance and contract office experience, seeks semi-outdoor occupation as inspector or contractor's assistant.—Box 6088, c/o The Electrical Review.

ELECTRICAL Engineer (45), disengaged, seeks position in control of works maintenance staff and plant. Long experience all classes elec. and mech. plant, installation, buying and supervision of labour. Salary level, £520 p.a. —Box 6071, c/o The Electrical Review.

ELECTRICAL Supervisor, holding electrical engineering diploma, age 36, free, possesses initiative and drive.—Box 6096, c/o The Electrical Review.

ELECTRICAL Supervisor (38) requires position, 24 years' experience contracting, planning, construction, labour organising.—Box 6090, c/o The Electrical Review.

LEADING Manufacturers' Technical Sales Representative desires substantial progressive post. 10 years Eastern Counties and Midlands, genuine connection Government departments, traders and wholesalers, own car.—Box 6059, c/o The Electrical Review.

MAINTENANCE and Plant Manager, A.M.I.E.E., desires change, anywhere.—W., 17, Avondale Park Gardens, W.11. 6064

WORKS Electrical Maintenance Engineer. Would also cover mechanical, age 45, release available. Details to interested parties.—Box 6099, 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.

POWER STATION PLANT FOR SALE

ONE Diesel-driven GENERATING SET, 165 kVA, comprising 200-b.h.p., four-cylinder, horizontally opposed Diesel Engine by Brush, of the four-stroke cold starting solid injection pattern; 440 r.p.m.; manufactured 1936; totally enclosed, with forced lubrication; electric light type flywheel; stream-lined oil filter; daily service fuel tank and exhaust box; arranged to drive by means of vee ropes from the flywheel to Brush Alternator, 165 kVA, .8 power factor, 1,000 r.p.m.; 400 volts, three-phase, 50 cycles; complete with direct coupled exciter, 72 volts, 21 amps.; also generator switch panel with airbreak circuit breaker and ammeter.

One ditto, exactly similar.

One ditto, exactly similar.

One ditto, but comprising 400-b.h.p. Brush eight-cylinder Engine running at 428 r.p.m.; manufactured 1938; direct coupled to Brush Alternator, 515 kVA, 400 volts, three-phase, 50 cycles; with vee-belt-driven exciter, 136 volts, 47 amps.; engine is complete with daily service fuel tank, silencer, stream-lined oil filter and circulating pump; switchboard available bearing airbreak circuit breaker and ammeter.

GEORGE COHEN, SONS & CO. LTD.
WOOD LANE, LONDON, W.12. 471

REBUILT MOTORS AND GENERATORS

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

SEND US YOUR ENQUIRIES.

OVER 1,000 RATINGS ACTUALLY IN STOCK HERE.

DYNAMO & MOTOR REPAIRS LTD.,
Wembley Park, Middlesex.
Telephone: Wembley 3121 (4 lines).

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

WATER TUBE BOILERS IN STOCK

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

ONE MOTOR GENERATOR SET by E.C.C. Input, 440-volts, 3-phase, 50-cycles, 230-h.p., 730-r.p.m. Slip-ring Motor. Output, 162-kW, 440-volts D.C. Compound Interpole Generator. Direct coupled on cast-iron base-plate.

ONE REVERSIBLE BOOSTER SET by E.C.C., comprising Motor, 65 h.p., 440 volts D.C., 1,000 r.p.m., direct coupled to a 300-amp. 0/160-volt, 1,000-r.p.m. Generator, with exciter, 2 amps., 250 volts, 1,000 r.p.m. All mounted on cast-iron baseplate.
NEWMAN INDUSTRIES LIMITED, YATE, BRISTOL
460

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

FOR SALE

ONE 175 h.p., D.C., 440 volts, 545 r.p.m., roller bearings (Metro Vick), with Brookhirst starter.

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