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**ELECTRICAL REVIEW** 



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### Motor Maintenance Points & Problems

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#### ELECTRICAL REVIEW

May 12, 1944

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#### ELECTRICAL REVIEW

May 12, 1944

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May 12, 1944

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## May 12, 1944

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May 12, 1944



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Vol. CXXXIV. No. 3468.

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MAY 12, 1944

9d. WEEKLY

# **The Home Front**

## Collaboration with Architects and Builders

**OWEVER** diversified the professional activities of electrical engineers may be, they have at least one interest in common-as consumers of electricity in their homes. If they are not designers of appliances or engaged in undertakings whose welfare depends largely upon growth of the domestic load, they have the training that enables them (with the aid of the feminine members of their households) to criticise constructively the "housekeeping tools" provided for their use. It is this duality of interest that helps to make meetings of the I.E.E. Installations Section especially full of promise for the future development of domestic electrification.

#### A Practical Survey

Against this background the paper presented by Messrs. W. N. C. Clinch and F. Lynn (see our last issue), which took stock of the present position and dealt with improvements which are reasonably to be expected as soon as circumstances permit, was commendably practical in its outlook and therefore most appropriate to the needs of the near future. In contrast to many of the discussions of bygone years that had the same general theme, no very marked differences of opinion were apparent among those who took part on Uncertainty regarding the this occasion. technical features that could best be embodied in apparatus evidently does not offer the stumbling block that it once did to production on the large scale and at low prices.

The chief cause for concern is perhaps that physical features and dimensions of

larger domestic appliances depend so much upon the plans of those not primarily concerned with the provision of electrical services, namely, architects and builders. This gives additional weight to the old plea for collaboration with them in the earliest stages of construction-a collaboration that will require to be carried very much farther than the arrangement of cable runs. Initiative is required from (and in some cases has been taken by) electrical people to indicate to others concerned their views on planned kitchens and installations generally and on the minimum conditions requisite, for example, for the use of the cabinet or the table type of cooker, the built-in refrigerator and clothes-drying cupboards.

#### **Temperature Control**

Full advantage should be taken of the inherent merits of electricity, such as the close control of temperature which it permits, implying the liberal employment of thermostats. Research is still needed to solve certain technical problems, which include the provision of the quite small amount of background heating necessary to avoid dampness, boiling-plate design, and the simmering question. As was suggested in the discussion, a consensus of opinion should be obtained on the priority of merits to be looked for in boiling plates, as a first step.

In all apparatus for use in the home the over-riding requirement is robustness, obviating as far as possible the need for maintenance. This applies more particularly to those parts (such as connectors)

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that may be handled by clumsy people, who are, moreover, often inclined to be reprehensibly careless when the apparatus is hired, and, as the paper points out, the performance of good appliances can be spoiled by failure of their accessories. On the other hand trouble-free service provides the best means of getting electricity accepted as the normal way of fulfilling the required duties, which it does, to quote the authors, to a degree unapproached by any of its predecessors.

A Wireless Jubilee LAST week's meeting of the Wireless Section of the I.E.E., the first of the four specialist technical

sections now functioning, was the 179th since its formation on February 17th, 1919. The proceedings in commemoration of the twenty-fifth anniversary, which are reported in this issue, have focused attention on the vastly enlarged scope and variety of application of radio for communication, remote control and detection. If the achievements during the last war were responsible for the establishment of the Section, how will it accommodate itself to the remarkable developments that have taken place during the present war? The efforts of the Specialist Panels set up by the Section Committee last session have produced excellent results; the range of papers obtained has been wide and has necessitated the holding of extra meetings. And a new feature has been introduced into local activities by the establishment of three local Wireless Groups which have already noticeably increased the Section membership. The success of these Groups is regarded by the Council as a promising pointer to the further development of specialist sections of the Institution.

THOUGH we may be Lighting considered guilty of a Progress too-obvious play upon words, we do not hesitate to say that Dr. C. C. Paterson's lecturedemonstration at last week's E.L.M.A. luncheon was brilliant and enlightening. As the chairman (Mr. C. F. Dickson) said, it was too much to expect Dr. Paterson to crowd forty years' experience into twenty minutes, but the swift survey must have impressed those present (Ministers, civil servants, architects and industrialists among them) with the immense amount of work, with really remarkable results,

which has been put into lighting research during this century. They must also have realised the necessity for better standards of lighting in all directions and the ability of the lamp makers and the rest of the electrical industry to meet any demands.

Staff Selection

It is sad, perhaps, that in the view of psychologists the average age of the development of native in-

telligence is no greater than fourteen years of age. Afterwards one falls back more and more on experience. Nevertheless, the assumption has its convenient aspects. It enables intelligence tests to be devised upon which decisions as to aptitude for particular tasks can be based. Those responsible for selecting engineering assistants will find much to help them in "separating the sheep from the goats" in a contribution by Messrs. R. C. Woods and A. S. MacDonald to the I.E.E. Journal for April. For carrying selection further at the present stage of what is an art rather than an exact science, a general knowledge of the world is still the chief requisite, but even the most experienced senior member of a staff will probably find some useful information in the notes on interviewing prospective candidates for a position.

STANDARDISATION is a Interabused word-in much changeability two senses. To many people it tends to convey the idea of a monotonous uniformity that is imposed in order to secure immediate economic advantages from repetition work, heedless of possible repercussions in preventing modifications that may lead to progress. As commonly practised by engineers, however, standardisation possesses very different associations. One of the most important of these implies agreement on dimensions and fixing centres with a view to securing a more ready interchangeability of components. This can be carried to considerable lengths without restricting the design and would in many ways aid development.

Technical OUR recent series of articles on the training and education of engineers has shown the necessity for the

closest collaboration between engineering concerns and technical colleges and schools. Consequently those responsible 1944

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ri-J end for works educational schemes will read with great interest the recommendations of the McNair Committee for securing an adequate supply of properly trained technical teachers. Throughout this section of the Committee's report there is repeated insistence upon the need for teachers to maintain the closest touch with modern industrial practice. In the past the inability of teachers to keep abreast of current research results, factory methods and developments has undoubtedly been a grave weakness.

Aid from generally not been the teachers' fault; there has been a lack of encourage-

ment and facilities. Educational authorities have not been anxious to release teachers from their academic duties and industrialists have not been asked to make the necessary arrangements, although all of the more enlightened would be willing to assist. Two ways of securing this assistance are suggested by the Committee. The first is for trade associations to stimulate interest among their members to the extent of arranging refresher courses for technical teachers. The other is that the professional institutions should set up standing committees for the purpose of promoting co-operation between industry and commerce and the technical and commercial colleges.

**Work on Work on Switchboards REGULATION** 18 (d) of the Electricity Regulations under the Factories Act,

1937, relating to the carrying out of work upon high-voltage switchboards, has been amended. The effect appears to be to permit the omission of the use of screens if the board is in such a position or of such construction as to be as safe as if screens were used. Moreover, if the board itself is so arranged that work upon it can be carried on without danger the prescribed precautions can be dispensed with.

IT was reported last week that lighting ten times as bright as "starlighting" is to be provided in the central area of Liverpool next autumn. Plans for the system, which will be controlled by a master switch, have been drawn up by the city electrical engineer, Mr. J. Eccles, in

conjunction with Mr. P. J. Robinson. We learn from the Ministry of Home Security that this does not indicate an alteration in general policy. The concession applies only to certain very limited areas, or streets, in special cases.

As we must drink to live, the ultimate choice Water or **Electricity**? between water and electricity, if we had to choose. would obviously be for the former. Speaking in the House of Lords debate on rural water supplies recently Lord Mottistone seems, however, to have overlooked one important point. Saying that it was "sad, mad and bad to give people in the villages electricity which they could do without, and not give them water which they could do with" he appears to forget that very many districts and individual premises would still be without plentiful supplies of water but for the availability of electricity for pumping purposes.

A Drastic Cure

HOPE for those with gastric ulcers comes in a message from Santiago, where a sufferer of many

years standing, an engineer doing some repairs in the National Radium Institution, is said to have been cured after surviving a 200,000-V shock. The report states that " scarcely had he opened the door of the high-tension room when a terrifically strong electric current dragged him to the centre of the room and held him suspended horizontally in mid-air. His hair and clothing were singed and his body was surrounded by a halo of light. On recovering consciousness an hour later he said he felt a blow at the back of the neck, but remembered nothing afterwards.' Prospective patients may, however, like to await further investigations before availing themselves of this new branch of electrical therapy.

A GLASGOW paper in a Co-ordinated "write-up" of a lady Use architect who has been to the United States to study American housing conditions (who hasn't?) says that among the ideas which she would like to see adopted in this country is the combined use of fuels. She cites as an instance "a gas cooking stove lit inside by electricity." But we saw this suggested in a gas paper long ago.

May 12, 1944

British Plant for Russia-II

656

# **Transportable Generating Plants**

A MONG the large quantity of electrical equipment which has been or is being made in this country for dispatch to Russia as an aid to her war effort and her recovery from war devastation are a number of complete steam generating plants, including the boilers, specially constructed for bulk transportation of the main components. Upon their arrival at the site where they

Upon their arrival at the site where they are required to operate all that is necessary is to place the main components on suitable foundations and make the necessary steam and water couplings and cable connections. The main components of each plant are the drum and tube boiler assembly, the boiler furnace, the boiler

assembly, the boiler furnace, the boiler auxiliaries, the self-contained turbo-alternator set, complete with its condenser and auxiliaries, a step-up transformer and a switchboard.

All the boilers are being supplied by Mitchell Engineering, Ltd., and are designed for use with low-grade fuel. Each boiler will deliver 8,500 lb. of steam at 221 lb. per sq. in. and 536 deg. F. superheat, when supplied with feed water at 100 deg. F., and in addition saturated steam for the boiler feed pump. Arrangements are also provided for the supply of 2,000 lb. per hour of saturated steam for process and heating On arrival on site all that is necessary is to place the main components on suitable foundations and make the necessary steam and water couplings and the cable connections

purposes. The boiler is a tri-drum equipment of symmetrical design, and the drum and tube assembly consists of the three drums, two main banks of 1.5-in. and two outer rows of 2-in. water tubes already expanded into the drums, superheater tubes nested in the main water-tube banks parallel to the

the main water-tube banks parallel to the drums, and a mild-steel casing almost entirely enclosing the drums and tubes.

The casing is of doubleshell construction and forms the boundary of the air circuit. By this means the boiler is cooled by air on two sides and by water on the

other two sides, thus reducing the radiation losses to the minimum and raising the temperature of air for combustion by about 120 deg. F. The air passes from one side of the boiler to the other through preheater tubes, crossing the gas outlets at the top where two suitable chimneys are connected on site. The drums are of riveted construction; they are 10.25 ft. long, the top one being 3 ft. in internal diameter and the bottom ones each 2.25 ft.

The furnace is a British Doby Stokers product with a grate area of 9 ft. by 7 ft. Two sets each of firing, clinker and riddling doors and frames are provided which.

Special Unit Construction to Simplify Carriage and Erection 12 1944

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together with the necessary bars for supporting the 108 firing-grate units, are all arranged for building into the brickwork supplied by the pur-A motor-driven forcedchasers. draught fan is situated near the rear end of the furnace, and the necessary ducting is included between the fan and the furnace plenum chamber. A tapping from the discharge ducting provides a portion of secondary air above the grate.

Suitable quadrant-type leveroperated dampers control the main and secondary air supplies, and there is also automatic operation of the air supply on movement of the firing doors. Each boiler is hand fired and will release 17,000,000 B.Th.U. per hour when burning either brown coal of 4,860 B.Th.U. per lb. calorific value and 35 per cent. and 25 per cent, moisture and ash contents; coal and anthracite culm of 9,000 B.Th.U. per

lb. and 25 per cent. and 15 per cent. moisture and ash contents; or peat and wood of 3,960 B.Th.U. per lb. and 50 per cent. and 6 per cent. moisture and ash contents. At the lowest calorific value given the gross boiler efficiency is 65 per cent.

A single-cylinder direct-acting Weir boiler feed pump takes a supply from a hotwell tank into which the turbine condensate is passed and it operates in conwith a junction Mumford feedwater regulator. For dealing with the make-up water a "Permutit" baseexchange softening plant is provided; this includes feed-

water heating equipment with one steam heating coil with clamps to take steam at 40 lb. per sq. in., reduced from 250 lb. per sq. in. saturated, and one immersion-type nozzle steam heater at the end of the coil to discharge into the hotwell.

PROCESS

The turbo-alternators are of the "transportable" type and are being supplied by several well-known British manufacturers.



They all have the same steam and electrical conditions, namely, 220 lb. per sq. in., and 400/230 V, three-phase, 50 cycles, 0.8 p.f., and they vary only in rating and construction. The British Thomson-Houston Company's machines are of their standard high-speed geared type, each with self-contained con-

denser and integral pumps, the design adapted to being the requiremeet ment that the unit shall be transportable as a whole, *i.e.*, without the necessity for disassembly and re-erection on site. Such items as steam traps, oil cooler. drain tank, etc., are accommodated in the fabricated b a s e which also provides adequate space for storing away projecting items which



The impulse type turbine has eight stages, the first stage having two rows of rotating buckets. The control gear is of the company's cam-operated multi-valve type, with steamsealed control-valve spindles. The lubricating system comprises an oil cooler, oil settling tank, main oil pump driven by a worm and

wormwheel from an extension of the main turbine shaft, and a hand - operated auxiliary oil pump with interconnecting piping and valves. The turbine "sits" directly on the condenser, a fabricated - steel support being provided for the governor end pedestal, while there is a fabricated base under the gears, alternator and exciter. Tackle is provided for raising the complete set, and this is placed permanently

The boiler drum and tube assembly consists of the three drums, two main banks and two outer rows of water tubes, superheater tubes and an overall mild-steel casing; with and without casing

in position for lifting during transport, the slings and shackles emerging at the top of the timber casing, being suitably protected when not in use. Provision is also made for hauling the packed assembly in the event of a crane not being available.

Some of the turbo-alternator sets are 500-kW "Awlinwun" equipments with Bruce Peebles alternators. The "Awlinwun" consists of a steam turbine, gear driving unit, condenser and auxiliaries, all constructed as a whole and arranged for mounting on, and control from, one floor level.

Maximum portability is attained by the adoption of a shallow surface condenser shell to reduce the height, and by mounting the turbine and steam-jet air pump on the shell. Further, the gear is arranged with the gear wheel beneath the pinion, so as to lower the centre height of the alternator. The condenser thus forms a very compact arrangement, the shell itself acting as the turbine baseplate. By means of a welded steel frame the unit can stand on a horizontal surface without dismantling the auxiliary pumps.

The turbine is of the multi-stage impulse type and is connected to the reduction gear



are removed to facilitate packing, and to protect them from damage in transit.

Each set is rated at 500 kW (625 kVA) and the speeds of the turbine and alternator are, respectively, 8,000 and 1,500 RPM. The turbine drives the alternator through doublehelical, single-reduction gearing, pressure lubricated from the turbine oiling system. The circulating-water and extraction pumps are arranged for vertical driving from the turbine shaft through worm gearing. The alternator is of the protected type with an overhung exciter. The surface condenser is of the fabricated - steel - shell pattern. with Admiralty mixture tubes. May 12, 1944

through a claw-type flexible coupling. The double-helical reduction gear is arranged with an overhead pinion drive, the low-speed shaft being fitted with a rigid halfcoupling for direct connection to the alternator. The condenser shell is ribbed externally and strutted internally to withstand both the turbine weight and atmospheric pressure, and the turbine exhaust flange bolts up directly to the condenser opening. Circulating and extraction pumps are mounted in tandem on a vertical spindle driven through bevel gearing from the high-pressure end of the main turbine shaft. The auxiliary pump shaft runs in grease-packed ball bearings.

The turbine rotor is machined from a solid mild-steel forging, and its casing is in two sections, cast-iron at the l.p. end and steel at the h.p. end. The centrifugal governor is mounted on a vertical shaft driven off the steam end of the turbine





"Round " and rectangular condensers and directly - coupled and belt-driven exciters are among the different design features of the self-contained genera-ting sets

turbine shaft through worm and bevel gearing and a flexible

shaft through a worm and wheel, and it controls a double-beat throttle valve through an oil relay. A lubrication oil reservoir with a hand oil pump is provided under the gear box, and acts as an independent baseplate for the gear box. The 500-kW alternator is of the semienclosed, revolving-field type, and is provided with a single-pedestal sleeve bearing arranged for forcedfeed lubrication, and it has a directly-coupled exciter with an end-shield bearing

Other complete 500-kW

sets are being supplied by the General Electric Co., Ltd. Each 6,500-RPM turbine is of the impulse type, having one two-row wheel, followed by single-row Rateau stages with stainless-steel blading throughout. .The Worthington-Simpson surface condenser is coupling. The reducing gear is of the David Brown double-helical "stack" type, with the pinion vertically above the gear wheel.

The lubricating-oil tank is embodied in the bedplate, and the outfit includes a suitable oil strainer, which can be cleaned whilst



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the set is in service, and a Serck oil cooler. The 1,500-RPM salient-pole type "Witton" alternator is coupled to the low-speed shaft of the reducing gear by a flexible coupling; the exciter is on top of the stator and is driven by enclosed V-belt from the main shaft.

Similar sets of rather smaller capacity are being produced by Hick, Hargreaves & Co., Ltd. Each consists of a 6,000-RPM turbine, which drives through reduction gears of the superimposed pinion type by the Power Plant Co., Ltd., a 450-kW, 1,500-RPM Mather and Platt alternator. A surface condenser is integral with the exhaust end of the turbine, and the complete equipment is mounted on a fabricated steel base of deep and rigid box section containing the turbine oil tank and the condenser circulating and extraction pumps.

The turbine is an impulse unit, the first stage being a Curtis or two-row wheel which is followed by single-row impulse stages. Transmission is first from the turbine to the gear pinion by a multi-tooth flexible coupling and from the low-speed gear wheel to the alternator by a Wellman Bibby flexible coupling. Governing is by oil relay equipment, and the normal and emergency governors are completely enclosed in an extension to the steam-end pedestal. The exciter is mounted on top of the alternator and driven by Texrope from the alternator shaft from which the condenser auxiliaries are also driven by laminated belt.

There are also a number of 350-kW sets supplied by Belliss & Morcom, Ltd. The turbine of each of these is of the compact type designed for 500 BHP (m.c.r.) at 7,500 RPM and, having its own base plate, it consists of one integral unit standing on top of the condenser from which it can be lifted off completely and replaced with minimum adjustment. The compact rectangular surface type condenser will deal with 4,600 lb. of steam per hour for the specified vacuum, using 34,000 gal. of circulating water per hour at 77 deg. F. The vertical centrifugal condensate and circulating pumps are mounted in tandem and are driven through worm gearing from the turbine tail shaft.

The alternators all run at 1,500 RPM, some of them being Lancashire Dynamo & Crypto machines which are coupled through David Brown reducing gearing, while others by Bruce Peebles & Co., Ltd., have Power Plant gearing. In each case the exciter sits on the alternator bedplate and is belt driven from the alternator shaft.

#### **Transformers and Switchgear**

Associated with each of the transportable sets for high-voltage supply are a 400/6,300-V delta-star connected transformer of suitable size, a cubicle switchboard with one exciter, one alternator and two feeder circuit-breakers for controlling the combined machine and transformer group. The transformer and the switchboard are each completely assembled for transport, and in operation they are mounted separately from the generating plant proper. Each complete assembly is provided with lifting gear so that it can be handled in one piece.

## **All-Steel House**

#### **Electrical Arrangements**

ROM the electrical point of view the prefabricated all-steel house which the Ministry of works has erected adjoining the Tate Gallery in Bulinga Street, S.W.1, is of interest not so much for what can be seen, or seen easily, but more for what can not. For some reason best known to the authorities, the two most conspicuous items of kitchen equipment, the cooker and the refrigerator, are gas-operated, though the officials do point out that "they could be electric." Incorporated, however, in the combined kitchen and bathroom unit, which, besides the cooker and refrigerator, includes the sink, cupboards, bath, and com-bined clothes washing boiler and hand washing bowl, is a thermostatically controlled immersion heater fixed in the circulating cistern to heat about 7 gal. of water for sink use when the living-room fire with its back boiler is not in use The living-room fire, incidentally, which will burn coal, coke or anthracite, also serves to provide hot air through steel ducts to warm the two bedrooms. A tubular electric heater is installed in an airing cupboard in the entrance hall.

The main service cable is brought into a small shed for bicycles, etc., at the rear and carried through to the meter, rotary type main switch and metalclad fusebox in a cupboard facing the front door. From here the wiring is taken under the floor and up along the top of the centre spine wall in a U-shaped duct, to which access is easily obtained by unscrewing panels in each room. Plug points are fitted on the centre walls at skirting level in the living-room and two bedrooms, and there is a point for an iron, etc., above a hinged table on one of the side walls of the kitchen. The positions of the lamps have been carefully thought out and in the kitchen there are fittings over the kitchen unit as well as above the table. Ceiling switches have been employed in many cases to avoid interference with the provision of the maximum cupboard space. The whole of the electrical installation can be carried out in half a day, the complete building requiring about three days

If this prototype is approved by the Government it is proposed to construct about half a million of these houses at the rate of 2,500-3,000a week. The estimated cost is £550, including refrigerator and other fittings valued at about £100. The houses are designed to have a minimum life of ten years and to fill the gap until more permanent accommodation is available. They would be owned by the Government.

Admission to the demonstration house is by ticket only, obtainable through local authorities. A similar house is to be erected in Scotland shortly.

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May 12, 1944

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ELECTRICAL REVIEW



At the Wireless Section Dinner

# I.E.E. Meetings

An Active Week

Wireless Section

Silver Jubilee

THERE was a large attendance at a meeting in London on May, 3rd to celebrate the twenty-fifth anniversary of the formation of the Wireless Section of the Institution of Electrical Engineers. A reception by Mr. T. E. Goldup (chairman of the Section), who was supported by Col. Sir A. Stanley Angwin (president, I.E.E.) and Prof. Willis Jackson (vice-chairman of the Section), preceded tea and there was a display of historical exhibits lent by the British Broadcasting Corporation, Marconi's Wire-

less Telegraph Co., Ltd., Standard Telephones & Cables, Ltd. the Science Museum, the Mullard Radio Valve Co., Ltd., and Mr. R. McV. Weston.

The lecture theatre was well filled for a series of short addresses by past-chairmen of the Wireless Section MR. GOLDUP (who presided) welcomed Lord Hankey (chairman of the Radio Industries Council) and the chairmen of the British Radio Valve Manufacturers' Association and the Radio Component Manufacturer's Federation ; also the delegates to the Commonwealth Communicacations Council and representatives of the Radio Society of Great Britain.

#### Well-Timed Inauguration

Col. SIR A. STANLEY ANGWIN, who was chairman of the Section in 1931-32, explained that it was the first of the technical sections of the Institution to be formed; this was appropriate owing to the long association of the Institution with communications, dating back to its origin in 1871 as the Society of Telegraph Engineers.

The Wireless Section was inaugurated on

February 17th, 1919, with an initial membership of 219, its first chairman being Dr. W. H. Eccles. The membership was now over 1,900 and the large number of premiums awarded for papers submitted to the Section included the premier award, the Institution Premium, on four occasions. The inauguration was well staged in point of time; it occurred when the hard thermionic valve had been brought to a high state of perfection in small sizes and a new era in wireless technique had commenced. The early years of that

period saw the initiation of broadcasting and the application of valve technique to higher powered long and medium wave telegraph trans-

mitting stations, the latter being materially assisted by the invention of the cooled anode valve. Another useful invention of that period was the thermionic cathoderay tube. The middle years of the period were notable for the development of short wave communication, and world-wide telephony assumed the aspect of a practicable possibility, the wave of development in that direction was still in progress when the last world war broke out.

The opening of the world's first public high definition broadcast television service on November 2nd, 1936, definitely gave this country a lead which had not been eclipsed elsewhere. The possibilities of this new branch of wireless, of which only the fringe had been explored, would in itself almost justify a specialist section of the Institution. The final development was the use of radio for the determination of the direction and distance of conducting or semi-conducting bodies by observation of radio echo effects, in which great pioneer work had been done by British workers.

#### **Transmitting Systems**

DR. W. H. ECCLES, F.R.S., spoke of the technical events which led to the founding of the Section, and sketched a picture of the plant used then in workaday radio. He spoke of the great variety of transmitting plant in use, employing spark discharges or continuous waves. In Germany high-frequency alternators were favoured; in Denmark and the United States the arc was preferred and in 1914 reached 200 kW. An arc of 100 kW rating was employed at the naval station at Horsea Island, and smaller arcs were frequently used in naval vessels. At the receiving end the variety of apparatus was even greater. In 1913, on merchant ships, the magnetic detector still lingered. The gassy diode was used at some fixed stations. The electrolytic detector was esteemed for its sensitiveness, but the favourite was the crystal contact rectifier which survived into the broadcasting age with its friend the "cat's whisker.

In 1913 there appeared in America a new variety of the known heterodyne method of receiving continuous waves. Previously the arc and alternator had not given as good signals as the quenched spark, but then all was changed so that their signals excelled spark signals many fold at extreme ranges. In Russia the heterodyne method was practised in a curious way and it was carried into the 1914-18 period. Thus in one way or another continuous waves sprang into universal favour, which triumph of the primitive heterodyne, however, was but a step to even greater things, for in 1913 the triode began its overwhelming advance into wireless. Around it, during the war, were woven a great many inventions and a great accumulation of theory and practice cried out for publication and discussion. It was in answer to that call that the Wireless Section was formed. Possibly historians in future centuries would say that that step forward was the most portentous in the story of man's struggle to command the forces of Nature, for it was at that instant that the mind of man succeeded in harnessing the electron.

#### Theoretical Impossibilities

PROFESSOR G. W. O. Howe, speaking on principles and theory, pointed out in amusing vein how many of the most outstanding advances had been made, not along the lines of principles and theory, but rather contrary to their indications. It was nearly forty years since Prof. Ayrton told him, with a slightly malicious twinkle in his eye, that the reason why Marconi and not Lodge was the first to transmit radio signals across the English Channel was that Lodge was so well versed in electromagnetic theory that he knew it was impossible, whereas Marconi, not knowing it was impossible, went and did it !

If in 1900 Marconi had consulted a panel of the leading scientists as to the feasibility of sending wireless signals across the Atlantic, they would have told him that the electromagnetic waves employed were of the same nature as light, and that between Cornwall and Newfoundland there was a mountain of sea water over a hundred miles high. Principles and theory were all against him, but fortunately he made the experiment and gave those versed in principles and theory the task of adjusting them to explain the facts, a task commenced by Heaviside and Kennelly in 1902 and carried on ever since by a number of scientists, with wonderful results.

The 1914-18 war intervened and little progress seemed to have been made in the principles and theory of the ionosphere until 1924 when Larmor contributed a paper to the *Philosophical Magazine* entitled "Why Wireless Electric Waves can Bend round the Earth." It was an extension of Eccles' theory, but using the electron instead of the molecular ion as the operative agent in the reduction of permittivity. Things then began to move more rapidly and the knowledge one now had of the constitution and properties of the ionosphere represented a triumph of combined operations between experimental research and principles and theory.

#### Naval Wireless

Admiral Sir Charles E. Kennedy Purvis, K.C.B., gave a brief summary of the development of wireless in the Navy. Their first contact with wireless telegraphy was through the inventiveness of Capt. H. B. Jackson, R.N., followed almost immediately by that of Marconi, who had been working independently on parallel lines. Jackson's work was carried out about 1896, but unfortunately he had to drop it on being appointed to a sea command. In 1899 a few ships were fitted with a simple Hertzian oscillator energised by an induction coil and ranges of the order of 50 miles were obtained. Receivers were of the coherer type and signals were received on a tape. By the end of 1900 forty-three ships and eight shore stations were fitted with Marconi sets, using the first tuned circuits on wave-lengths of 395 ft. and 1,150 ft. In 1903 an experimental station was started on board H.M.S. Vernon, Mr. H. A. Madge being their first civilian wireless expert.

From then on, the Navy pursued its own course and developed wireless communications along its own lines, naval officers carrying out practical experiments in parallel with mathematicians working out the theory of what they thought ought to happen.

On the transmitting side, they ran through the stage of forcing up the power of spark sets with all the troubles of finding condensers and insulating material which would stand up to the power and voltages they wanted to use. The old spark transmitter lasted right through the last war. Then the Poulsen arc opened up the whole field of continuous waves, the Navy being the greatest user, developing its own designs. The valve came and revolutionised everything and four years of war forced the art through the equivalent of many more years of peace.

Conspicuous from the beginning had been the close co-operation between the Navy and the Post Office, while from scientific institutions, commercial firms and individuals the Navy had had unstinted advice and help.

#### **Evolution of Broadcasting**

MR. H. BISHOP referred to the early transmissions from Chelmsford, Writtle and other places and the 1-kW experimental transmitter installed in Marconi House in November, 1922. He paid a tribute to the co-operation of the Post Office engineers in the transmission of high quality speech and music over land lines primarily designed for commercial communications.

communications. Progress had been most marked in the design of transmitting stations, made possible by the development of high-power valves. The B.B.C. began its Empire service in 1932 and by the use of directional arrays there was now in operation a world-wide broadcasting service from this country which, although not wholly free from fading or interference, could be heard with at least 90 per cent. intelligibility for several hours of the day. The needs of the short wave service had been one of the reasons for the steady improvement in methods of direct recording. The B.B.C. used three methods, viz., magnetic recording on steel tape; mechanical recording by cutting the opaque surface of a gelatine film on a celluloid base, leaving a transparent track ; and mechanical recording on various forms of cellulose-coated discs. Because of its advantages, the disc system was the most used; the B.B.C. made some 5,000 disc recordings per week for use in its various services. Progress made in the science of acoustics and the choice of building materials and methods of construction for improving acoustics had been disappointing.

When the new service of high definition television, which was started in November, 1936, had to be interrupted on account of the war this country held a decisive lead over all others, including America, and the extensions and improvements that were in contemplation would have increased that lead.

#### Very High Frequencies

The final address was to have been given in person by DR. R. L. SMITH-ROSE, but he was delayed in Washington on official duties. The address had been recorded by the B.B.C. and was reproduced from discs.

Dr. Smith-Rose said it seemed certain that much of the recent success in the use of very high frequencies (above 100 Mc/s) would be applied to the establishment of radio-telephone and telegraph links over distances ranging up to 100 miles or so, particularly with the objective of relieving the congestion in the bands below 30 Mc/s which were more suitable for longer distance communication. To achieve practical success in that sphere would need frequency control to at least the precision which prevailed at lower frequencies, if the most economical use of the available frequency channels was to be attained. The authority regulating the communications of the future would also have to decide which of the various modulation systems, now being used regardless of the channel space occupied, might be permitted to continue under more law-abiding conditions.

The vast increase in knowledge of ionospheric conditions obtained during the war years would undoubtedly be reflected in the more economical distribution of frequencies to suit the various services and their operating distances, times and seasons. It was further anticipated that an international network of recording stations would be established for the purpose of collecting the latest information on ionospheric conditions in all parts of the world.

In addition to revolutionary advances in the application of radio as an aid to aerial and marine navigation, with the help of special transmissions from appropriately placed beacons, it might be anticipated that the various devices known before the war as "iceberg detectors" and "collision preventers" would have reached the stage of being suitable for direct application to the navigation of civil craft both in the air and at sea.

It was no mere flight of fancy to look forward to the day when pilot-less freightcarrying aircraft would fly distances comparable with that of the North Atlantic route. Such aircraft would fly along specially selected routes under the control of land operators on each side of the ocean. The craft would be fitted with radio-operated devices which would automatically lead to evading action should another aircraft cross the route.

For aural broadcasting it was likely that the use of wider audio-frequency bands, whether for amplitude or frequency modulation, would be in greater demand in order to secure high quality reproduction, and it was to be hoped that the experience gained by broadcast receiver manufacturers in meeting military demands would facilitate the production of broadcast receivers suitable for the audio-frequency range required. The remarkable advances made recently in knowledge of the possibilities of audio-frequency modulation and detection would undoubtedly have an immediate effect on the resuscitation

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of broadcast television in Great Britain.

Finally, in a tribute to research workers, Dr. Smith-Rose said that the needs of military applications had brought to light many gaps in previous knowledge, and advances into large new portions of the radio frequency spectrum had necessitated a fresh attack on the properties of the corresponding waves, and of the means of generating and receiving them.

The meeting heard two more recorded messages of congratulation, one from SIR AMBROSE FLEMING and the other from PROFESSOR H. M. TURNER (president of the American Institute of Radio Engineers).

**PROFESSOR C. L. FORTESCUE proposed a** vote of thanks to all those who had contributed to the proceedings, and this was seconded by MAJOR B. BINYON.

#### **Commemoration Dinner**

The commemoration dinner at the Waldorf Hotel had to be limited to 200 members and distinguished guests.

SIR EDWARD WILSHAW proposed the toast of the Wireless Section, remarking that the merging of the wireless and submarine cable companies had been undertaken in anticipation of the shock of war. Wireless had done much during the war; afterwards tremendous new developments would have to be faced, but he believed the profession would rise to the occasion. No one who knew the standard of papers submitted to the Wireless Section would have any qualms about the future.

He mentioned the association between his

M ETHODS of exercising control from central positions over the switching operations on power distribution networks, by injection into the latter of currents that differ in frequency from the main supply, are reviewed in a paper by Mr. J. L. CARR

(Manchester Corporation) submitted to the Transmission Section.

Several devices employed to respond to superimposed

currents are briefly described and probable applications of this means of control are outlined. In this country street lighting is most suitable for remote switching, in which connection annual costs are tabulated in comparison with time switches which are hand set and hand wound. Extension of the system to additional functions should reduce its cost in proportion. For instance, control of storage water heaters may bring about a substantial saving in maximum demand costs, particularly when energy is purchased in bulk. That saving in one small case has been claimed to have more than covered the total cost of the installation in a very short time.

Probable developments in the use of low-

organisation and the G.P.O. and hoped that when the history of this war came to be written the contribution of the president (Sir Stanley Angwin) would be duly recorded.

Stanley Angwin) would be duly recorded. MR. T. E. GOLDUP responded with the remark that they had been looking at the past whereas he now wished them to consider the numerous problems of the future, including the education and training of young engineers. This subject must be very carefully and earnestly considered ; they had discussed it and their conclusions had been forwarded to the proper authorities. But that was not sufficient ; they, as engineers, must accept the responsibility for each of them had young men under his control about whom something must be done.

Col. Sir STANLEY ANGWIN proposed the health of the guests, mentioning representatives of Government Departments, the Services, the B.B.C. and the G.P.O., as well the radio manufacturers and associations, academic bodies and those representatives who were meeting in this country for the Commonwealth Communications Council in happy coincidence with this jubilee.

MR. D. MCVEY (Australian delegate, Commonwealth Communications Council) responded for the guests, saying he believed that wireless was destined to play a most important part in the destiny of the Empire.

MR. L. F. B. DUNCAN (chairman of the Radio Industries Council) supported the response with an expression of appreciation of the co-operation existing between the industry and the Wireless Section.

temperature heating systems may be amenable to this form of control, with further savings in supply costs. Late shop window lighting and other forms of illuminated advertisement devices are also suitable for remote control as well as double tariff meters and restricted-

> hour supplies. Among other possible uses, in some instances at least, the simultaneous resetting of maximum demand indicator mechanism might odvantageous

prove to be advantageous.

Remote Switching

Arrangements

Any system of remote switching should be capable of a plurality of control channels and of expansion within those limits as and when required. It is significant that installation has been undertaken to provide better service, not primarily for economy.

Particulars are included in the paper of remote signalling over the network of a large electricity supply undertaking, together with the reasons for the final adoption of the particular method selected. The apparatus was finally put into service in August, 1941, designed for a system with a maximum load of 200,000 kVA and capable of dealing with an increased load of 250,000 kVA. It is by far the largest installation of its kind.

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ELECTRICAL REVIEW

Data of the components employed are included and the power required is analysed for two frequencies. Tabulated operating particulars for more than two years indicate the difference between the performances of relays and apparatus, which is striking, showing the high degree of reliability of the relays.

The indicator generator is designed for 200 kVA, three-phase, at 370/590 c/s and 1,387.5/2,212 RPM. The armature coils are in semi-enclosed slots in the core, which is divided into two parts. A stationary field coil between the two half-cores surrounds the magnetic circuit of the machine; the coil is energised from a 210-V battery. The pedestals are of non-magnetic material, with the outboard pedestal insulated from the bedplate to avoid a shunting magnetic

THE paper on the design and performance of domestic electrical appliances by MESSRS. W. N. C. CLINCH and F. LYNN (see our last issue) was read at a meeting of the Installations Section on May 4th.

MISS CAROLINE HASLETT (E.A.W.), who opened the discussion, said that women in the Services and munitions factories were determined to have better homes after the war, especially in the way of properly planned kitchens. Much better trained people would be needed to initiate them into the proper use of electrical apparatus and she expressed the hope that a better name than "demonstrators" would be found for them, such as "electrical advisers." The uses and advantages of electricity should be

taught in all the schools. There was some concern

that there was no sign of the larger kitchen in the post-war

houses that were being planned, which would be specially necessary if the table cooker was to be used. All unnecessary ledges should be eliminated from cookers, and interchangeability of parts, quick servicing and quick repairs were important. Refrigerator service charges should be low to prevent the refrigerator from falling out of use. She could not agree with the authors' advocacy of the coal-electric method.

MR. D. G. W. ACWORTH (G.E.C.) said that cooker manufacturers looked for an early sign from the supply industry, whether hire would be resorted to or whether hire-purchase would be adopted. The simple hire system had stimulated the demand before the war, but it had brought limitations with regard to design and it might have a definite influence on export trade. In America the hire-purchase system was largely adopted and housewives did not expect a cooker to last for ever.

The need for interchangeability of components in this country, he said, was now engaging the attention of makers in conjunction with the supply authorities. If intercircuit and protect the bearings from circulating current. The generator is driven by a 157.5 kW motor (750 A at 210 V) that is energised from the station battery.

The rating of the earthing transformers is 18,500 kVA at 32 kV and 50 c/s and they can pass a neutral current of 1,000 A. The emission winding is designed for 3,000 V and can carry 206 A at 540 c/s on the low-voltage side for 15 minutes every two hours. Under those conditions the copper loss is 13 kW. Losses may be very largely reduced by employing capacitive instead of inductive coupling. The proportion of the power input (expended when 250 A is furnished by the ripple generator) which is absorbed by the system is lower than had been anticipated, but must be expected to vary with the system load.

changeability of oven elements was insisted upon before the manufacturing industry had had time to go into the matter more fully, post-war practice would follow pre-war design with resulting limitations in scope for development. Without larger kitchens there seemed very little prospect of the 42 in. by 20 in. cooker being used. It would be very difficult to draw up a broad specification for boiling plates ; before it could be said which type was the best for any particular job, their minds would have to be made up as to which were the most important considerations. It would be necessary to have the views of the makers, the supply authorities and the users on such matters as life, durability, ease of cleaning, speed of boiling

## Domestic Appliances of the Future

and so on. MR.J.I.BERNARD(E.D.A.) said that scaling and cor-

rosion were not serious matters in the development of water heating at the present time. The water heater under the draining board was not a good solution in all cases. It was originally developed for flats and he thought there was a greater scope for all-electric water heating than the authors suggested. No mention was made in the paper of the electric kettle. The washing-up machine, for a small family, might have inherent disadvantages, but there were ways of simplifying washing up which must be considered.

 $M_R$ . R. H. RAWLL (Birmingham) contended that different techniques must be adopted for the new houses as compared with the existing ones. In water heating, for instance, the storage heater was not necessarily the correct piece of apparatus to use in all cases. The immersion heater in conjunction with the coal boiler had a very big field. The basic heating in the home would be coal and the industry should design a combined system, making use of a thermostatically controlled water heater which would boost during the winter and take over during the summer. MR. K. J. R. C. COCKE (B.T.H.) criticised past policy of making electric cookers almost indestructible so that they could be reconditioned almost indefinitely. In America a standard height of 36 in. had been accepted for kitchen appliances ; the recently issued Scottish Housing Report recommended various heights. He did not view the first cost of refrigerators as of such great importance as did the authors ; running costs were more important. Preference was expressed for the electro-mechanical type of refrigerator as it had approximately twice the capacity of the absorption type for the same space occupied.

He disagreed with the suggested fitting of an electric heater to the washing machine and thought the money would be better spent in putting a heater into the water system so that hot water would be available for washing and for rinsing and also for all domestic purposes.

MR. E. L. E. PAWLEY (B.B.C.) said no mention was made in the paper of interference with wireless reception caused by some types of domestic electrical apparatus. That was surprising because manufacturers were fully alive to the need for reducing it so far as it could be done within economic limits.

MR. E. A. LOGAN (Erith) mentioned that the boiling-plate utensil problem had been solved by one undertaking hiring or giving utensils with every hired cooker. Others had made the hire-purchase of utensils easy. For quick heating it might be possible to use an embedded type of hot-plate with a single element over-running normal voltage by 5 or 10 per cent. That would reduce the initial heating time and an arrangement for switching over to normal voltage after about 3 minutes should not be beyond the ingenuity of designers. After the war many supply engineers would find their workshops inadequate for the improvement of service to consumers.

#### **Further Investigation Needed**

MR. J. A. FRASER (English Electric Co.) said that manufacturers believed that to have the oven at elbow height was the best, but in existing houses the vertical type of oven was the only possible one because of lack of space. Oven heating technique had not yet been fully investigated and therefore to standardise present systems would be a mistake. Thermostatically or automatically controlled ovens would be more or less standard in post-war cookers.

MR. F. C. FUKE (British Mechanical Productions, Ltd.) urged manufacturers not to be too anxious to get their new designs on to the market ; appliances should be tested by them in their own and their employees' homes in order to get genuine criticism. Any new finish to cookers should have good insulating properties. A Manchester company had developed a panel that consisted of two sheets which were passed through a press and 10

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dimpled. The two sheets were afterwards spot welded to obtain great rigidity. This had been developed for war purposes, but should find an application for electric cookers.

He suggested that the boiling plate should be cut out altogether and that the individual utensils should be fitted with elements to be plugged into sockets fitted in a row close to the oven.

#### **Central Refrigerators**

DR. L. E. C. HUGHES said he, like Miss Haslett, was horrified that the authors should recommend the coal-electric combination and thought the sooner they got rid of coal heating the better. He preferred gas-electric to coalelectric, for a better balance could be obtained by using more gas in the home for basic heating topped up by electric heating for special purposes. Dr. Hughes asked why hundreds of small refrigerators should be installed when there could be one really large one with small heat exchangers to replace them. The electric iron should have an automatic switch which switched off every ten minutes, rendering it necessary to use the switch to keep the iron active.

MR. O. W. HUMPHRIES approved the coalelectric combination to the limited extent advocated in the paper, for water heating only and not space heating. If a coke-fired boiler was used for water heating in the winter there should not be the usual builder's cylinder or tank plus an immersion heater, but a properly designed electric water heater. The ideal system would thus be obtained as electricity would be available to boost the hot water supply in the winter when necessary and take over completely in the summer. By having a hot water radiator in the living-room, background heating would be provided there as well as in the kitchen.

MR. G. DAVIDSON said that the problem of the material used for the bottoms of utensils was one for metallurgists who should provide something better after the war. A great deal of development had been going on in anodising aluminium to produce non-corrosive surfaces and in other directions. He emphasised the necessity for background heating but the cost would be prohibitive if carried out exclusively by electricity. He urged manufacturers to design in a manner to keep maintenance costs down. Finally, he suggested the possibility of designing a machine which could be used for both washing clothes and washing-up.

MR. H. BULLAS spoke of the need for liaison between electrical engineers and architects and builders. There would always be a good demand for the table top type of cooker and also the other type because of the difference in kitchen space available in different, houses and flats. The change over from castings for cookers to pressed steel called for great standardisation and heavy

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press tools so that the manufacturer could go ahead with large quantity production. Although the technical efficiency of enamelling had been greatly improved in recent years it was difficult to envisage at this stage a finish which would be comparable with vitreous enamelling. Correct design would prevent cracking and chipping. The plugging in of utensils had been tried many years ago, but he believed it failed then because it was difficult to prevent the splashing of connections and wiring, a source of danger.

MR. A. J. STILING pointed out that if energy were supplied at a sufficiently low

FUEL and mechanical power were discussed at the last of the informal meetings to be held this session.

In introducing the subject MR. J. F. FIELD expressed the view that a great deal of space could be saved in British power stations by the adoption of more compact types of generating plant. Standard types of boilers popular in British power stations appeared to have a volume of about 8 to 10 cu. ft. per kW, whereas recent American boilers, both of natural circulation and forced circulation types, achieved a figure of something less than 3 cu. ft. total bulk of boiler plant per kW of power produced. The point, both in connection with turbines and boilers, was that existing buildings could be utilised

for anything up to three or four times the kW capacity originally contemplated for them without any sacrifice of either thermal efficiency or ease of maintenance, and at a

great saving in capital cost of new buildings. The mercury-steam plant at Kearny, New Jersey, had achieved a "sent out" efficiency over an experimental run of some 37 per cent., being, so far as he could ascertain, the world's record thermal efficiency for any kind of heat engine in converting fuel to electricity. He had been trying to think of some way of achieving all the advantages of mercury without the well-known disadvantages and had discovered a principle of operation, which might satisfy the required conditions, although experimental plant had not yet been constructed.

The main feature was a method of feed heating in a nearly reversible fashion even though the bled steam might be in a highly superheated condition. It was done by the use of multi-stage compressors with interstage heat exchangers, the stages being so arranged that a small stage of adiabatic compression of the bled steam would be followed by heat rejection on the heat exchanger surface at constant pressure. By controlling this process, it was possible in theory to cause superheated steam to reject its heat to feed water with a very moderate temperature differential throughout

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price, much more apparatus would be installed. At Woolwich with electric cooking at a running charge of  $\frac{1}{2}$ d. per kWh a family of five hired a cooker at 6s. per quarter and the total bill for cooking was found to be less than it was before the adoption of electric cooking.

 $M_R$ , R. A. SHINNIE asked if it were not possible, when only a small amount of cooking was required, to have an insulated separator sheet in the oven to cut it in half. He also urged that steps should be taken to prevent the market being flooded after the war with cheap and nasty domestic appliances.

the process, thus approaching a condition of thermodynamic reversibility.

It was possible in theory by this process to cause a steam turbine with an initial inlet temperature of, say, 850 deg. F. to heat its feed water to any temperature which might be selected. For example, the feed water could, with great thermal benefit to the heat cycle, be heated to, say, 600 deg. F. or even above the critical temperature of 750 deg. F. and indeed for the steam turbine to return superheated steam. The latter course would involve the complete elimination of the ordinary fired pressure vessel type of boiler with consequential operating advantages. Heat would then be fed to the steam turbine by means of a superheater only.

Mr. Field's thermodynamic diagrams illusstrated pictorially what could happen in such a cycle and he also demonstrated a diagrammatic picture of a machine to do this

work. He explained that the process of feed heating with highly superheated steam involved a very substantial amount of compression energy, but notwithstanding that fact the overall thermal efficiency of the process was theoretically, and should be in practice, much higher than anything hitherto attempted with steam and he thought it would not be unreasonable to expect an actual "sent out" efficiency of somewhere between 35 and 38 per cent.

The negative work in this new kind of heat engine fell between the extremes of the simple Rankine cycle machine with negligible negative work and the gas turbine with about four times as much negative work as the net output. The large input of compressor work did not alter the great improvement in thermal efficiency theoretically made possible by this device, as anyone who troubled to make step by step blading and reheating calculations would quickly find out.

The opener summed up by emphasising the commercial significance of any improvement in the thermal efficiency of heat engines designed to burn almost any kind of fuel. British engineers should not be content to follow foreign practice, but should experiment along lines suggested by their own researches.

Perhaps the two outstanding features of the subsequent discussion and reply were the caution displayed by most speakers in accepting the revolutionary proposals which had been outlined and the enthusiastic determination of Mr. Field to go ahead with his ideas with an unshakeable belief that something on the lines he propounded would have to be undertaken in the future. Doubt was expressed as to tl e possibility, at the present time, of going to as high a steam temperature as 1,250 deg. F., it being stated that constructional materials at present could not be relied upon to stand much beyond 1,000 deg. F.

It was suggested that the efficiency of the scheme put forward would depend mainly on the interchanger efficiencies and that most boiler designers were nervous of going for very much increased steam temperatures and pressures. Fear was expressed that maintenance costs would show a disproportionate rise and most speakers seemed to prefer to

THE annual report of the I.E.E. Council presented at the annual general meeting in London yesterday, gives the membership as 24,558. The year's increase of 2,552 compares with the previous highest of 2,106; 4,415 applications for election and transfer were considered; the number transferred was about two and a half times the normal.

Since the outbreak of war 500 applications for relief from the payment of part of the annual subscription have been considered.

In many cases reductions have been granted for one or more years on the ground of financial hardship arising out of war conditions, the total amount waived being of the

order of £900. It is felt that this facility might be more widely known.

Average attendance at ordinary meetings in London has grown slightly to 210 and local Centre activities have been well supported. Attendance at the Wireless Section has increased appreciably, to 189, and a new feature has been the establishment of three Wireless Groups in the provinces. Their formation has resulted in a noticeable increase of Section membership, which is over 1,900, and the wide range of papers submitted has necessitated the holding of extra meetings.

The membership of the Measurements Section grew by 147 during the year to a total of 1,026 and attendance averaged 107. The Transmission Section has 1,740 members, and an attendance of 100. The Installations Section has 1,565 members and an attendance of 128, while attendance at six informal meetings averaged 132 compared with 67 in the previous session. adopt more usual methods for the present.

Mr. Field's reaction to the discussion was far from discouragement or despondency. His main point was that, although practical difficulties existed, circumstances would force action to be taken along lines similar to those he had indicated. His main object was fuel saving, and fundamentally he was not worried about the size of the plant in comparison with present equipments. He had not even troubled about capital cost, although he did not believe it would be greater. What had to be worried about was fuel consumption, and he expressed his conviction that, if this country did not adopt ideas such as he had outlined, other countries would. He also foresaw that a rising price and scarcity of coal would play an important part in future developments.

District heating was mentioned a number of times, as a means of securing a greater overall thermal efficiency, but Mr. Field claimed that the heat pump was a better proposition, and one in which there was scope for enormous progress.

Last year the Council circulated a statement on the proper role and functions of the Institution. Constructive suggestions resulting from this are receiving attention.

Over 1,600 members have been placed in work of national importance through the Electrical Engineering Section of the Central Register (Ministry of Labour), and 732 applications for technical commissions in the Forces have been dealt with. It is known that 3,494 members of all classes are on active

> service; those serving abroad or at sea may apply for their subscriptions to be reduced to half the normal rate.

The report of the Electrical Installations Committee (Directorate of Post-War Building, Ministry of Works) on "Electricity in Post-War Buildings" is expected to be published shortly. It makes recommendations for good practice in post-war electrical and telecommunication installations in houses and flats, schools, offices, departmental stores, hotels, hospitals and farms, a section being devoted to domestic appliances. This document is assisting the I.E.E. Codes of Practice Committee concerned with electrical aspects of civil engineering in public works, building and constructional work.

#### Installation Specifications

The Committee has submitted to the Ministry its views on the electrical installation work in 3,000 projected rural cottages as well as demonstration prototype houses at Northolt. In the latter case the recommendations were unacceptable because of the cost limit set upon the houses. A revised specification was accepted for the basic installations in

Annual Report the first eight houses and subsequently, in response to a further invitation, the Committee prepared recommendations for the equipment of two adjacent houses.

The Operating Theatres Electrical Committee has made recommendations for reducing risks of fire and explosion in surgical theatres and anæsthetic rooms, which are to be displayed in all civilian and emergency medical service hospitals and all Service hospitals in this country and overseas.

#### Examinations

Last year 1,114 candidates sat for associate membership examination at home and overseas, while 366 holders of National Certificates took English only; in addition 48 theses were submitted. By arrangement with the British Red Cross Society 23 candidates sat for the associate membership in prisoners of war camps in Germany and the examination was also held in four ships of H.M. Navy.

The new Joint Section A syllabus of the associate membership examination of the Institutions of Civil and Electrical Engineers will become effective in October, 1945; fresh regulations are to be issued this summer, but it has not been possible to reach complete agreement upon the compulsory and optional subjects.

In association with the Board of Education final examinations of 229 courses at colleges and schools in England and Wales last year resulted in the award or endorsement of 1,683 diplomas and certificates, and 61 in Scotland; 36 candidates were examined in Northern Ireland, but awards have not yet been announced.

Last year the I.E.E. library recorded 5,253 readers, of whom 1,267 were non-members and 3,674 books were issued to 1,589 borrowers; some 331 volumes were added to the reference and lending sections.

The Council has accepted a posthumous portrait, in oils, of the late Dr. C. H. Merz by Arnold H. Mason, A.R.A., which has been presented by a group of Dr. Merz's friends and colleagues.

#### **Measurements** Section Discussion

IN response to many requests a meeting has been arranged by the I.E.E. Measurements Section to continue discussion of "The Consumers' Supply Control Unit of the Future and its effect on the design of the Electricity Meter." The original discussion on March 31st dealt chiefly with the control unit, and it has dealt chiefly with the control unit, and it has been suggested that while further consideration of that subject would be of value, many members desire also to discuss the important and relevant questions of rating and design of the electricity meter. The meeting will be held at 3.30 p.m. on Wednesday, June 14th, following the Section Luncheon on that date.

### **Forthcoming Events**

Saturday, May 13th.—Leeds.—Griffin Hotel. I.E.E. North Midland Students' Section. Luncheon, annual general meeting and film afternoon.

Monday, May 15th.—London.—Institution of Electrical Engineers, 7 p.m. London Students'

Electrical Engineers, 7 p.m. London Students' Section. Annual general meeting. *Cardiff.*—At the South Wales Institute of Engineers, 5 p.m. I.E.E. Western Centre, "The Influence of Resistance Switching on the Design of Extra-High-Voltage Air-Blast Circuit-Breakers," by Messrs. H. E. Cox and T. W. Wilcox. This paper will be followed by a discussion on the paper "Standards of Per-formance of Generating Plant Based on Five Years' Operating Data," by Messrs. R. W. Biles and G. W. Maxfield and G. W. Maxfield.

Liverpool.—At Royal Institution, 6.30 p.m. Liverpool.—At Royal Institution, 6.30 p.m. I.E.E. Mersey and North Wales (Liverpool) Centre. Popular lecture on "Some Water Power Possibilities and Achievements," by Mr. W. A. Hatch, M.B.E.

Manchester.—At Engineers' Club, 6.30 p.m. Women's Engineering Society. "Women, War and Industry," by Mrs. A. Wilson.

Tuesday, May 16th.—London.—At Lighting Service Bureau, 2, Savoy Hill, W.C.2, 6.15 p.m. Association of Supervising Electrical Engineers. "Statutory Wiring Regulations and Registra-tion," by Mr. L. C. Penwill, director and secretary, E.C.A.

Wednesday, May 17th.—London.—Institution of Electrical Engineers, 5.30 p.m. Wireless Section (extra meeting). "High-Speed Record-ing of Radio-Telegraph Signals," by Messrs. R. B. Armstrong and J. A. Smale.

London.—At Institution of Civil Engineers, 6 p.m. Institute of Welding and Institute of the Plastics Industry. Paper, "The Welding of Plastics," by Dr. J. H. Paterson, followed by a demonstration.

Birmingham.—At University (Latin Theatre), Edmund Street, 6.30 p.m. British Institution of Radio Engineers (Midland Section), "Relaxa-tion Oscillators and Trigger Circuits," by Dr. Emrys Williams.

Friday, May 19th.—London.—Institution of Electrical Engineers, 5.30 p.m. Measurements Section. Lecture on "Foundations of Elec-trical Measurements," by Dr. L. Hartshorn. Birmingham.—Imperial Hotel, 6 p.m. Illuminating Engineering Society (Birmingham Centre). "Light as an Aid to Medicine," by Dr. L. E. Brailford

Centre). "Light as Dr. J. F. Brailsford.

Manchester.—At Engineers' Club, Albert Square, 6.30 p.m. Institute of the Plastics Industry (North-Western Section). Annual general meeting. 6.45 for 7 p.m. Dinner.

Saturday, May 20th.—Bath.—Royal Bath Lounge, 3 p.m. I.E.E. Bristol Students' Section. Annual general meeting and repeat of address, "An I.E.E. Student Sees the U.S.A.," by Mr. R. W. Adams.

Leeds .- At Hotel Metropole, 3 p.m. Association of Mining Electrical and Mechanical Engineers (Yorkshire North-West Branch). "Mercury Arc Rectifiers," by Mr. P. Butler.

Monday, May 22nd.—Nottingham.—Corpora-tion Gas Showrooms, Clare Street entrance, 6 p.m. Nottingham Society of Engineers. Films of engineering interest (ladies invited).

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## **PERSONAL** and **SOCIAL**

## News of Men and Women of the Industry

tions for the directorship. Applicants for the position should preferably be under fifty and should be free to take up the appointment at an early date. The commencing salary will be not less than £2,000 a year.

Mr. P. E. Rycroft, M.B.E., engineer and general manager of the Great Yarmouth Corporation electricity undertaking, is to retire at the end of this month and Mr. G. T. Allcock, B.Sc., deputy electrical engineer and manager at St. Helens, has been appointed as his successor. Mr. Rycroft had actually intended





Mr. P. E. Rycroft

#### Mr. G. T. Allcock

to retire in August, 1942, but at the special request of the Corporation he agreed to remain for a year, the period being subsequently extended. During that time (1942-43) he held office as chairman of the Transmission Section of the Institution of Electrical Engineers.

Mr. Rycroft was educated at the East London Technical College and received his electrical of London Electric Lighting Co. In 1903 he was appointed works manager in the Islington Borough Council undertaking where two years later he became deputy borough electrical engineer. In 1906 he took up the position of engineer and manager of the Heston and Isleworth undertaking which had com-menced operations two years earlier. From 1916 to 1919 he served as deputy technical adviser to the Controller of Coal Mines (B.O.T.) on industrial fuel economy and power station efficiency, and he originated the annual electrical statistics which were subsequently taken over by the Electricity Commissioners.

In 1919 he joined the staff of Babcock & Wilcox, Ltd., to deal with power station problems and he remained with the company until being appointed to his present position in 1930. He was a member of the original overhead Lines Association and has served as a member of the E.D.A. Council and as a member of the Consultative Committee of the C.E.B., South-East and East England.

Mr. Allcock was educated at Loughborough Grammar School and received his training as an apprentice with the Brush Electrical Fn-gineering Co., Ltd., and at Loughborough College. Between 1923 and 1926 he held the

THE British Electrical and Allied Industries repositions of draughtsman with the English Research Association is inviting applica-tions for the directorship. Applicants for position should preferably be under fifty the was then appointed technical assistant in the Durden Comparison Electricity Darage in the Dundee Corporation Electricity Depart-ment, becoming maintenance engineer in the following year. In 1929 he joined the Manchester electricity undertaking as assistant power sales engineer and held this position for nine years until taking up his present appointment in 1938. He is an associate member of the Institutions of Civil and Electrical Engineers.

Mr. H. C. Lamb, who is retiring in August, after forty-two years' service at Manchester, was born in 1877. He received his technical education at Rutherford College and the Durham College of Science and acquired practical experience with George Clarke, Ltd., marine engineers, Sunderland, and Scott & Mountain, Ltd., electrical engineers, Newcastle-on-Tyne.

Mr. Lamb's long career in the electricity supply industry began with his joining the Preston Electrical Supply Co., from which he went to Wigan. He entered the Manchester Electricity Department in 1902 as engineer in charge at generating stations and in 1913 he became resident engineer at the Stuart Street in 1919, becoming chief engineer and manager in 1925. He was due to retire in 1942 but his services were retained for a further two years.

Mr. Lamb is a member of the Institutions of Civil, Electrical and Mechanical Engineers and has read a number of papers before these and other technical institutions. He is a past-president of the Incorporated Municipal Electrical Association, past-chairman of the E.D.A. Council and of the North-Western Centre of the



Mr. H. C. Lamb

Mr. R. A. Thwaites

I.E.E. He has been chairman of the C.E.B. Technical Consultative Committee for North-West England and North Wales. We wish him a very happy retirement after his many years of activity in and on behalf of the electricity supply industry.

The appointment of Mr. R. Alan Thwaltes as chief engineer and manager of the Manchester the City Council. He has been with the Manchester undertaking since 1941 when he was appointed assistant deputy electrical engineer, becoming deputy chief engineer about a year later

Mr. Thwaites was educated at Dulwich College and the City and Guilds (Engineering) College and was then with W. H. Allen, Sons & Co., Ltd., whom he left in 1922 to join the Yorkshire Electric Power Co. Three years later he went to the North Wales Power Co., of which he became engineer and manager in 1939. He is a member of the three leading engineering in-stitutions and has been active in a number of directions-as a member of the District Joint Board and Council for the Electricity Supply Industry, of the National Consultative Com-mittee of the Central Electricity Board and of various E.D.A. committees.

A concert given on April 21st at the B.T.H. canteen, Rugby, marked the close of a second series of winter competitions open to all em-ployees of the main works. The competitions, which gave opportunity to almost every form of talent, covered music, literature, art and handicraft. Nearly 600 entries were received and the display of the art and handicraft entries contained over 450 exhibits. The concert was attended by some 900 employees and friends, the programme being provided by the winners of the vocal, instrumental and literary events.

The prizes, in the form of vouchers, were presented by Mr. H. N. Sporborg, chairman of the B.T.H. Company, after Mr. A. P. Young, manager of the main works, had referred briefly to the cultural value of the competitions and the stimulus which they had given to the profitable use of leisure time, stating that it was gratifying to note that the number of entries had increased almost three-fold as compared with the first series.

Mr. A. N. Rye has been appointed deputy-chairman of Aron Electricity Meter, Ltd., in the place of Sir P. A. Cooper, who has resigned. Mr. L. Freeman has been elected a director and appointed managing director in place of Mr. Rye.

Bournemouth Corporation Transport Com-mittee has appointed Mr. W. D. Reakes as deputy general manager and traffic superin-tendent at a salary of  $\pm 750$  per annum, rising by two annual increments of  $\pm 50$  to a maximum of  $\pm 500$  per annum. of £850 per annum.

The South African Engineer and Electrical Review reports the retirement of Mr. G. H. Swingler, M.I.E.E., M.I.Mech.E., who for twenty-six years has been city electrical engineer of Cape Town. He is succeeded by Mr. H. A. Eastman, B.Sc., A.M.I.E.E., acting city electrical engineer since June, 1940. From that date until the end of last year Mr. Swingler represented the Union Director-General of War Supplies in America, where he acted on the buying mission America, where he acted on the buying mission to purchase equipment for South Africa.

The G.E.C. Dramatic Society recently staged "Springtime for Henry," by Ben W. Levy, in the Lecture Hall at Magnet House, Kingsway, W.C.2. under the direction of Dorothy Fox. the Lecture Hall at Magnet House, Kingsway, W.C.2, under the direction of Dorothy Fox. The cast consisted of Mr. William Peacock, Mr. Robert Sutton, Miss Elsie Walbancke, and Miss Celia Ridler. Special honours go to Miss Celia Ridler, who stepped into the breach caused by the illness of Miss Pat Harding. The stage direction was by Mr. Lewis A. Ecster The stage direction was by Mr. Lewis A. Foster.

The proceeds (well over £100) were handed over to the Hon. Mrs. Leslie Gamage for the Red Cross Prisoners of War Fund.

Wolverhampton Town Council on Monday approved the appointment of Mr. F. J. Elliott, M.I.E.E., at present deputy, as chief engineer and manager of the Electricity Department in succession to Mr. T. A. G. Margary, M.I.E.E who is retiring on July 11th.



Mr. T. A. G. Margary

Mr. F. J. Elliott

Mr. Margary is a Londoner by birth and was educated at Gresham's School, Holt, Norfolk, and King's College, London. Following workshop training with the Oxford Engineering Co., London, he joined the Islington Electricity Department in 1898 and remained there for 14 years-the last 71 as distribution superintendent. Then, in 1912, he went to Callender's with whom he was in charge of large cable contracts in the south of England. During the last war he was with the Ministry of Munitions, engaged in the manufacture of high explosives, becoming chief electrical engineer at the Craigleith T.N.T. Factory, Edinburgh, in 1918.

Mr. Margary returned to the electricity supply industry in the following year, when he was appointed distribution engineer at Wolverhampton. Eleven years later he became chief engineer and manager there. Since he has been at Wol-verhampton the number of consumers has risen from 2,791 to 45,667 and the total staff of the department from 37 to 430. A native of Bristol, Mr. Elliott was educated at the Merchant Venturers' Technical College

and University Technical College in that city, and received his training as a pupil under the late Mr. H. Faraday Proctor in the Corporation Electricity Department. Afterwards he remained with the undertaking, holding various positions concerned with substations, generating stations and mains, from 1910 to 1930, when he took up his present appointment at Wolverhampton. While at Bristol he was associated with the change-over from the 93 c/s, single-phase system to the standard system, three-phase four-wire, carried out at a cost of £1,000,000, and at Wolverhampton he has been responsible with the chief engineer for the development of 100 sq. miles of rural area. He has on a number of occasions contributed articles to the *Electrical* Review, dealing mostly with tariff questions.

Mr. C. H. Neale, formerly of the Chloride Electrical Storage Co., Ltd. (Bombay and Calcutta), and Drake & Gorham, Ltd., has been elected a director of Johnson & Tanner (proprietors: Tanjon (Newcastle), Ltd.). Mr. Neale is at present engaged in reorganising the

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company's shipping and industrial interests in the North of England.

Mr. W. J. Jefferson, A.M.I.E.E., district mains engineer at Carlisle, has been appointed distribution assistant with the Chesterfield Corporation Electricity Department.

As the first member of Hoover, Ltd., to earn the distinction of a 25-year badge, Mr. W. M. Tribute was on April 28th presented by the directors with a handsome silver salver. He also received a bowl of red roses from his departmental staff.

Mr. S. M. Gibson, of Nottingham, has retired from the office of president of the Engineer Surveyors' Association, which he has occupied for the past three years. He is succeeded by Mr. L. L. Fullerton, Associate I.E.E., of Cardiff. Mr. Fullerton, who is well known in musical as well as engineering circles in South Wales, has represented the British Engine Boiler and Electrical Insurance Co., Ltd., for twenty-four years in that area, as engineer surveyor, electrical department.

Mr. H. W. Puttick, M.I.E.E., M.I.Mech.E., chief electrical engineer of the N.W. Railway (India) has recently arrived home on leave and will be in England until September. His address is 17, Aubrey House, Maida Avenue, London, W.2 (telephone: Paddington 4165).

Mr. G. N. Green, M.I.E.E., distribution superintendent to the Croydon Corporation Electricity Department, has been appointed deputy city electrical engineer and manager at Peterborough. Mr. Green was formerly with the St. Helens Corporation Electricity Department, and later held two appointments on the technical staff of British Insulated Cables, Ltd., before going to Croydon in 1937. Whilst at Croydon he has carried out some important development schemes for the Electricity Department and other departments of the Corporation.

On the joint recommendation of the Presidents of the Royal Society and the Institution of Civil Engineers, the Council of the Institution of Civil Engineers has awarded the James Alfred Ewing Medal for 1943 to Group Captain Frank Whittle, C.B.E., R.A.F. The medal is awarded annually for specially meritorious contributions to the science of engineering in the field of research.

Mr. W. Kidd (chief constructional engineer, Manchester Electricity Department) has been nominated for the chairmanship of the North-Western Centre of the Institution of Electrical Engineers.

Mr. I. F. Watt (Birmingham Central Technical College) has been nominated as chairman of the I.E.E. South Midland Students' Section for the next session.

## **Obituary**

Professor W. M. Thornton.—We regret to announce the death in a Newcastle-on-Tyne Hospital on May 4th of Emeritus Professor William Mundell Thornton, D.Sc., who from 1898 until his retirement in 1937 was head of the electrical engineering department at the Armstrong College (now King's College), Newcastleon-Tyne. Born in Liverpool in 1870, Professor Thornton was educated at Liverpool Institute. After eight years of works experience he studied at University College, Liverpool, where he obtained honours in School Physics and Engineering (Victoria) and in 1895 became University Scholar in Physics. A year later he was appointed senior lecturer in engineering at University College, where he remained until taking up his position at Newcastle.

Apart from his reputation as a lecturer—he gave the Faraday Lecture in 1931—Professor Thornton will be remembered for his research work, particularly in connection with the ignition of gases and the safe use of electricity in mines. In recognition of this part of his activities he was awarded the Kelvin Premium for Research in 1931 and the Greenwell Gold Medal of the North of England Institute of Mining and Mechanical Engineers, while his gas detecting miners' safety lamp won him a

share in the first prize at the Northern Exhibition of Inventions in 1935. Other subjects on which he did a considerable amount of experimental work included dielectrics and high-voltage measurement. In the last war he directed his attention to electrical methods for detecting the presence of submarines.

After serving as chairman of the Newcastle Centre of the Institution of Electrical Engineers in 1905-6 and again in The late Professor

The late Professor W. M. Thornton

1921-2, he was elected president of the I.E.E. for 1934-5. He was president of the Association of Mining Electrical Engineers in 1921. He prepared about seventy papers covering various aspects of his work for the Royal Society and other scientific and engineering bodies. He received the M.B.E. in 1920.

Col. T. C. Ekin.—The death occurred on May 1st, in his eighty-second year, of Col. Tom Charles Ekin, who was chief engineering inspector to the Electricity Commission from its inception in 1920 until his retirement in 1930. In this capacity he conducted a great many inquiries into generating station extensions, Special Orders, etc. Before joining the Electricity Commission he served for nine years as engineering inspector to the Local Government Board of the Ministry of Health. He was a member of the Institution of Civil Engineers.

#### **Fuel Economisers**

A NEW Fuel Efficiency Bulletin (No 30)' obtainable free from the Ministry of Fuel and Power, discusses the uses (mainly unorthodox) that can be made of economisers, giving numerous examples with illustrations. Other matters discussed include cures for water hammer due to high feed temperature and condensation due to cold feed water. Another section concerns the problem of the feed pump that will not handle water above a certain temperature and gives a rough guide to the requisite height of a feed tank above the pump suction.

## Recent Introductions Toroidal Potentiometers

THE range of potentiometers offered by P. X. Fox, LTD., Hawksworth Road, Horsforth, Yorks, are substantially built up of metal. They are toroidal, the resistance coil being neatly wound on a ceramic ring with flat sides

"PXF" potentiometers

and bevel edges so as to be continuously variable by means of a spring-contact finger.

Four sizes are available, of from 8,000 to 30,000 ohms, which are rated at 25, 50, 100 and 200 W; all can be supplied with graded windings while the two intermediate sizes can be arranged for one-hole fixing. Individual potentiometers of different sizes can be made up into gangs with spindle lengths to suit users' requirements. Totally enclosed as well as protected ventilated models are obtainable.

#### **Car-Engine** Heater

A device, energised from ordinary AC mains, for keeping the engines of motor vehicles warm, is offered by RUNBAKEN PRODUCTS, 71, Oxford Road, Manchester 1. It is of the electro-mag-



Magnetic car-engine heater

netic variety, being arranged to generate heat by inducing eddy currents in the cylinder head of the engine to which it is attached without itself becoming overheated. Sufficient temperature rise is obtainable in this way to warm the water in the cooling jacket, so causing it to circulate through the engine and radiator, it is claimed, even if the vehicle is left out of doors. One advantage of the device is that, being electromagnetic, it will "stick" to the engine or crank case in any convenient position. It is rated at 200 W and a pilot light is provided as well as two degrees of heat regulation.

## Labour's Fuel Policy

#### Power Companies' Comments

AST week we referred to a report prepared by the National Executive of the Labour Party setting out a post-war policy for the fuel and power industries. In this the establishment of a National Coal and Power Corporation and separate boards for the control of coal, gas and electricity was proposed.

The report has called forth a reply from the Incorporated Association of Electric Power Companies which says that the document is composed of vague generalisations and is not a serious challenge. It is said that the supply industry will answer at any time any clearly stated concrete argument advocating its metamorphosis, but it cannot reply to a report which fails to present one single fact or one piece of genuine evidence in proof of its assertions. It is considered that the public would be well advised to read the McGowan Report to which the National Executive refers and not accept the imputations and interpretations given to it in the document.

The Association denies that the power companies have only considered the benefit of their shareholders. All their efforts have been directed towards serving their consumers. The State could only transform the present free enterprise of the electricity supply industry into a gargantuan monopoly (embracing coal and gas) at an appalling cost to the public.

a garganetian inclupory (clinitating cost and gas) at an appalling cost to the public. Nobody denies that the Government should keep a watchful eye on all forms of industry and legislate where necessary in the interests of greater efficiency and improved service. But to secure efficiency, direction and management on the one hand and political pressure on the other should be divorced.

The Association says that to substitute boards for the present executives would not be for the public good. "The consumer does not figure in the picture. Apparently he is merely there to do as he is told, and may not be allowed the choice of either gas or electricity, taking one or the other as, when and how he is ordered." The responsible leaders of the industry are to

The responsible leaders of the industry are to be dispensed with for others who, it appears, will have to be taken on trust. The plan set out in the report is to create a State monopoly which can and will ruin the electricity supply industry. Public ownership cannot guarantee public profit. "If profit is made by free enterprise that fact alone justifies the principle. There is nothing inherently wrong in profit. It only becomes wrong when the profit is out of proportion to the service rendered."

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# **COMMERCE** and **INDUSTRY**

## Appliance Production in Canada. Fluorescent Lighting Case.

#### **Railway Electrification**

W HEN the House of Commons considered the estimates for the Ministry of War Transport last week Sir Joseph Nall, Mr. E. Shinwell and other members advocated the electrification of the main-line railways as soon as possible after the war. Mr. Shinwell said that if the railway companies could not finance it the money must be found by the State which should exercise control.

Sir Herbert Williams pointed out that although electrification had great advantages as regards passenger traffic there were limitations in the handling of goods traffic. Electrification did not involve any new legislation; the companies could proceed at any time where they had running rights. Sir Herbert also said that there would be no difficulty in raising the necessary money for an enterprise which would be self supporting.

Replying to the debate, Mr. P. Noel-Baker, Parliamentary Secretary to the Ministry, said that detailed plans for the electrification of many miles of suburban and main-line railways had been or were being prepared. How far it would be possible to go and how soon depended on many things. He wished that he could tell them that a master plan for the reorganisation of transport was being set forth, but the Ministry was engaged in war problems. It was hoped at some later time to present a White Paper on the subject.

#### **Plastics Joint Industrial Council**

The plastics materials industry has set up a Joint Industrial Council to deal with wage rates and conditions of employment of labour. The membership of the Council is made up of representatives of the employers and employees, the chairman being elected annually from either side alternately. The Plastics J.I.C. functions in relation to the main J.I.C. for the chemical industry. It includes representatives of the unions involved and selected representative firms in the plastics materials industry which is allied to the chemical industry. Thus rates of wages and conditions of employment in the firms represented on the Council are controlled by national agreements. The chairman for 1944 is Mr. H. V. Potter, B.Sc., managing director of Bakelite, Ltd.

#### **Canadian Domestic Apparatus**

The Wartime Prices and Trade Board has announced that a limited number of electric stoves, "rangettes" and grills will be available on the Canadian market in the coming year. Mr. M. C. Lowe, Administrator of Electrical Apparatus, Equipment and Supplies, says it may be "some time yet" before production is started. Permission has, however, been granted for the manufacture in the next twelve months of up to 40 per cent. of the 1940 output of electric stoves and 60 per cent. of the 1940 output of "rangettes" and cooking plates or grills. Essentiality certificates, previously required from all buyers of these products, have been abolished, but manufacturers' production schedules must be approved by the administration to ensure output of the proper proportion of equipment in the lower prices classes. There is no restriction on the output of repair and maintenance parts.

#### Limitation of Supplies

The Board of Trade has issued an Order (S.R. & O. 1944 No. 432, Stationery Office price 1d.) requiring every person whose name was at January 31st, 1944. entered in the Home Trade Register for controlled goods of certain classes, including Class 9b (lighting fittings) to make a return on Form Misc./19, showing, *inter alia*, the value of controlled goods supplied by bim during the standard period (June 1st, 1939, to May 31st, 1940), and during the restriction period (August 1st, 1943, to January 31st, 1944). A copy of the form is being sent to each person concerned, but any trader who has not yet received his copy should apply to the Chief Accountant, Board of Trade (Miscellaneous Section), North Gate, Prince Albert Road, London, N.W.8.

#### Lighting Reconstruction

The first three of a series of "Lighting Reconstruction Pamphlets" now being issued by the Illuminating Engineering Society have come to hand. Illustrated by thumbnail sketches, they state in simple terms the essentials of good lighting. It is hoped that they will prove of service to Government Departments, local authorities, borough engineers, architects, and others whose task it is to prepare now for the vast lighting problems of the period of post-war reconstruction. The pamphlets (price ls. each, 9s. a dozen or £3 a hundred) deal respectively with "Principles of Good Lighting," "The Lighting of Public Buildings" and "The Lighting of Schools."

#### **Extension of Patent Refused**

In the Chancery Division last week Mr. Justice Simonds had before him a petition by a Swedish firm for the prolongation of Von Kantzow's letters patent No. 298,408 for improvements in fire-resistant alloys with high electrical resistance, on the ground of loss sustained due to hostilities.

In a reserved judgment his Lordship said that the application presented many new features. The legal owner of the patent was Swedish and its object was the production of an alloy. The exploitation of the patent was begun in 1931 by the Swedish firm and in 1932 there was an agreement with a Manchester firm for promoting the sale of the alloy in this country. The evidence satisfied him that the sale of the article was interfered with by the outbreak of the war so far as the British patent went, and if that stood alone there was reason for an extension. But in this case the Swedish patent had expired. The patent was manufactured and developed abroad and exploited in this country by a selling agency.

His Lordship said it would seem that in regard to the expiry of foreign patents a more indulgent attitude to extension had been adopted by his 141

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predecessors where the application was by originating summons under sub-section 6, just as exclusive manufacture abroad was less seriously regarded for the same purpose. Giving some weight to these facts but much greater weight to the fact that, through no fault of their own, the applicants were unable to give the Court information which he regarded as essential, he thought it right to exercise his discretion in this case by refusing the application for an extension, the Comptroller's costs to be paid by the applicants.

#### A.S.E.E. Guide Supplement

The Association of Supervising Electrical Engineers has issued a supplement to its Guide to the I.E.E. Wiring Regulations. This supplement, which contains alterations made in the revised eleventh edition of the Regulations as they affect the Guide, is included with copies of the Guide as now sold at 1s. 9d. (paper covered) and 3s. (cloth covered), post free, or it can be obtained separately for 3d. post free from the general secretary of the A.S.E.E. at Aldwych House, London, W.C.2.

#### **Cable Planning Organisation Moves**

The Cable Planning Organisation of the Ministry of Supply moved to a new address on May 8th. All communications should now be addressed to :--Ministry of Supply, Cable Planning Organisation, Berkeley Court (S.E. Wing), Glentworth Street, London, N.W.1 (telephone: Welbeck 6677; telegraphic address: "Elcaplan, Norwest, London").

#### **Manufacture of Accessories**

We are informed by Elkington & Co., Ltd., manufacturing silversmiths, electroplaters and cutlers, of Birmingham, that they have acquired a number of patents and patent applications relating to electrical plugs and sockets, connectors, etc. These will in due course be manufactured at the company's works under the direction of the original designer, Mr. H. J. Modrey, and will be marketed under the trademark of "Elclip."

#### Non-Ferrous Smelters' Association

The formation is announced of the British Non-Ferrous Smelters' Association, comprising the British smelters of the primary ores of aluminium, antimony, magnesium, tin, zinc and the precious metals. The object of the Association is the "consideration and furtherance of the common interests in the maintenance and development of the non-ferrous smelting industry in Britain."

#### Fused-pin Plugs

How a fuse has been incorporated in a household socket outlet without enlarging its size (the fuse constituting one of the three pins of the plug as indicated in the *Electrical Review*, of October 29th, 1943) is fully described in a 22-page illustrated booklet issued by Dorman & Smith, Ltd., Ordsal Works, Salford, Manchester. 5 The first few pages are concerned with ring mains in post-war houses, facts and figures against up-rating existing plugs and the case against placing the fuse in the socket.

The new plug is described in some detail;

its body measures  $1\frac{1}{2}$  in. by  $1\frac{1}{2}$  in. wide by  $1\frac{1}{2}$  in. deep and the fuse rating is 3 kW at 230 V with a reasonable overload capacity making it quite safe for 15 A. It is of the high rupturing capacity type; oscillograms are given with data of short-circuit tests carried out at the N.P.L. and by Salford and Manchester Corporations. Terminals of improved form will accommodate 7/029 cables as well as smaller wires, while a surface socket outlet for mounting on the skirting has been specially designed for easy wiring with three-core p.v.c. flat cable.

#### Rubber After the War

A memorandum has been sent to the Board of Trade by the British Rubber Federation on the return of the British rubber industry to normal trading conditions after the war. Among the points brought out in this is that the Federation recognises the necessity for the continuance of Government Control, as natural rubber will not be freely available, but suggests that allocations should be made in co-operation with representatives of the Federation.

On the question of surplus stocks, the Federation says that it is prepared to consider the formation of a repurchasing company to act for the entire industry. Each section of the rubber manufacturing industry, acting through the Federation, should be given the opportunity of repurchasing the goods supplied by its members and eventually regarded as surplus to post-war requirements.

The Federation says that, given the required materials and labour, the rubber manufacturing industry will be able to resume peacetime production without any considerable delay.

#### Unlicensed Fluorescent Lighting

What was said to be the first prosecution to be brought under the Discharge Lamp Lighting (Control) (No. 1) Order, 1943, was heard at Selkirk Sheriff Court on April 28th. William Brown, Sons & Co., Ltd., Wilderbank Mill, Galashiels, and Fraser & Allin, electrical contractors, Galashiels, were each fined  $\pm 25$  for a breach of the Order. The Procurator Eiscal said that in October

The Procurator Fiscal said that in October last Messrs. Brown applied to the Ministry of Works for a licence to install twenty-five fluorescent lamps in their mills. An inspector from the Ministry visited the premises and found that the lighting was required to replace old gas fittings and some ordinary electric lamps. He recommended the refusal of a licence on the ground that improvement could be effected by the proper distribution of ordinary standard factory lighting. Consequently the Ministry declined to grant a licence.

In February the inspector called again and found that twenty-five fluorescent lamps had been installed. He pointed out that the company had been refused a licence and was told that some faulty wiring had been renewed by Messrs. Fraser & Allin who had had some fluorescent lamps in stock and had installed them. Later the company wrote to the Ministry stating that Fraser & Allin had offered to supply lamps of a type which did not require a licence and they were allowed to install them. The company further said that the reason for having the work done was that the Factory Inspector had pointed out that the existing lighting was inadequate. The Procurator Fiscal said that the Factory Inspector had denied that she had told the company that it would have to install fluorescent lighting.

The defendant company's advocate submitted that this was merely a technical offence. The mistake had been due to the unintentional misleading of his clients. Messrs. Fraser & Allin had been advised by a

Fraser & Allin had been advised by a wholesaler that series condensers for use in a discharge lighting circuit could be supplied without licence. The Order prohibited not supply but installation.

prohibited not supply but installation. An advocate for Messrs. Fraser & Allin said that the offence was due to a misunderstanding. An Order made by the Minister of Supply in April, 1943, prohibited manufacturers from supplying apparatus including static condensers for power factor correction. The Order under which his clients were charged was made by the Minister of Works and prohibited installation or use of apparatus including chokes, condensers and discharge lamps. His clients had gone to considerable trouble to get details but they did not stress that Messrs. Brown had had apparatus of this kind installed on previous occasions and that his clients had laid in considerable stocks of these fittings. The wholesalers had quite erroneously told his clients that the supplying of series T.T. condensers was not prohibited vehic under the earlier Order. He argued that it was not in the national interest to "freeze" stocks of these fittings already in

to "freeze" stocks of these fittings already in hand. Moreover, the installation of fluorescent lighting resulted in considerable economy in electricity.

The Sheriff Substitute said that the defendants were not entitled to install the apparatus whatever they had been told. He would impose the small fine of  $\pounds 25$  in each case.

#### Wiring Rental Action : Application for Rehearing

At Ilford County Court recently the Registrar gave reserved judgment in favour of the Ilford Corporation in its action against a local resident, Mr. R. Dalziel, for 32s. said to be due under an agreement for the hiring of an electrical installation (*Electrical Review*, April 28th). Last week in the same Court an application was made to the Judge by Mr. S. A. Jewers for a rehearing. Mr. R. Brooke represented the Corporation. His Honour said it would have to be put in some day when the list was not very full, which might be some time ahcad. It was not necessary for Mr. Jewers to go into the application; he would deal with the application and the actual case at the same time.

#### Electric Goods Vehicles

The Government is still apparently investigating the potentialities of the electric vehicle for transport purposes and recently Mr. Philip Noel-Baker, M.P., Parliamentary Secretary to the Ministry of Transport, inspected one of the latest types of 24-ton commercial goods lorries that the Q Vehicle Co., Ltd., has produced. He was accompanied by Mr. F. G. Smith, Director of Alternative Fuels, and Mr. G. F. Stedman, Principal Assistant Secretary to the

Ministry of War Transport. The company's joint managing directors, Mr. E. C. Kny and Mr. Eric Steel, were present to point out special features of the vehicle, which include two series wound ventilated motors specially developed for traction purposes; a handoperated drum controller fitted with one



Mr. P. Noel-Baker, M.P., inspecting the 21-ton electric vehicle. With him is Mr. E. Steel, director of the Q Vehicle Co., Ltd.

mechanically operated main contactor and including a brake interlock system, four-point control and progressive acceleration on low speeds; rheostatic braking; and two standard batteries, each of 40 cells and 200 Ah capacity, which can be easily removed.

#### **Changes of Names**

Brook & Bohm (Dry Batteries), Ltd., have changed their name to Globelite Batteries, Ltd. The name of the Alexander Radio Co., Ltd.,

The name of the Alexander Radio Co., Ltd., Devonshire Chambers, 146, Bishopsgate, E.C.2, has been changed to J. Bull (Ruislip), Ltd.

## TRADE MARK APPLICATIONS

THE following applications have been received for British trade marks. Objections may be entered withm a month from May 3rd:---

month from May 3rd:— BRIVAC. No. 626,859, Class 7. Washing machines. Also No. 626,860, Class 9. Electric vacuum cleaning apparatus.—British Vacuum Cleaner & Engineering Co., Ltd., Goblin Works, Ermyn Way, Leatherhead, Surrey.

Works, Ermyn Way, Leatherhead, Surrey. TELEMET. No. 627,514, Class 9. Electrical measuring instruments; meteorological instruments; apparatus for detecting the presence of explosive gases and for measuring the percentage of explosive gas present.—Pilot Engineers, Ltd., Ford Street Works, Ford Street, Chestergate, Stockport.

RADIAN and VORTIC. Nos. 627,576 and 627,577 respectively, Class 9. Electrodes for electric arc welding.—Quasi-Arc Co., Ltd., Grosvenor House, Park Lane, London, W.I.

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# **Future of Lighting**

## E.L.M.A. Luncheon and Demonstration

LORD WOOLTON, Minister of Reconstruction, was the principal guest at a luncheon arranged by the Electric Lamp Manufacturers' Association at the Savoy Hotel, London, on May 3rd. The company also included Lord Portal, Minister of Works, Major G. Lloyd George, Minister of Fuel and Power, and many prominent Government officials, architects and electrical engineers. Mr. C. F. DICKSON (Crompton Parkinson), chairman of the Association, presided, and after luncheon introduced Dr. C. C. PATERSON, O.B.E., F.R.S. (General Electric Co., Ltd.), who gave a lecturedemonstration on "Electric Lighting in Post-War Recontruction."

Dr. Paterson began his talk with a reference to the carbon-filament lamp of forty years ago and demonstrated the rather dim results in a representation of a sitting room of the period. After a reference to the improved tantalum lamp, the lecturer came to the tungsten filament vacuum lamp, the gas-filled lamp and the coiled-coil lamp, and the effects were contrasted with those of the carbon lamp in an adjacent sitting-room "set-up." The need for correctly-designed fittings was demonstrated.

Fluorescent lighting was then dealt with in a most effective fashion. Dr. Paterson explained that the war had held up development here and the United States had been able to go further in this direction. At present in this country the use of the fluorescent lamp had been practically confined to war factories; after the war it would take a large part in the lighting of factories and large buildings and would eventually be used in the home.

Emphasis was laid on the great advance in efficiency brought about during the last forty years, and Dr. Paterson envisaged the use of fluorescent lamps to supplement daylight in badly-placed buildings as well as to provide lighting at night.

lighting at night. Thanking Dr. Paterson for a remarkable demonstration, Mr. Dickson said that lighting was one of the "tools" which Lord Woolton would have to assist him in carrying out his task.

#### Lamp Industry's Work

During the war the resources of the electric lamp industry had been placed at the disposal of the Government. As an indication of the extent to which electric lamps were used for wartime purposes, Mr. Dickson mentioned that a battleship had upwards of 14,000 lamps of an incredible variety of types; in an aircraft there were over 100 lamps of about a dozen types; and a tank had about twenty lamps. Thousands of special types had been evolved for ground installations, aerodromes and other purposes.

In co-operation with the Electricity Commissioners, supply authorities, architects and electrical contractors the lamp manufacturers had assisted in the equipment of numerous factories with new or replacement installations of higher efficiency. There still remained much to do in the way of raising the standard in many other factories. In addition to this work there would be five million new homes to be lighted, four million old premises to be brought up to date, a million retail premises and 50,000 miles of streets to be lighted.

It was their job, in co-operation with other associations in the industry, to ensure that all houses and other buildings were lighted to



Lord Woolton greeted by Mr. C. F. Dickson at the E.L.M.A. luncheon

the high standards made possible by modern equipment. The Electricity Commissioners could play a supreme part in advancing the standardisation of electricity supply, which would simplify the lamp makers' problem; before the war they were making 13,000 different ratings of lamps.

Mr. Dickson referred to the Ministry of Works Lighting Study Committee under the chairmanship of Dr. Paterson and to the work of the Ministry of Fuel and Power. He said that the Lighting Service Bureau had played a great part during the war and had formulated post-war activities on an ambitious scale in its work of giving advice and encouraging the better use of light.

LORD WOOLTON, in the course of an effective speech, referred to the "subsidiary trades" of the lamp makers including the electricity supply industry which was supplying less and less energy for more and more light; it seemed that the question might eventually arise whether electricity was necessary at all. Referring to the new pre-fabricated houses Lord Woolton said that the part electricity would play in these would be determined by the skill and enterprise of each section of the industry.

There was certainly a necessity for the standardisation of domestic electrical equipment; everyone was in agreement with that provided his standard was adopted. He urged greater efforts in this direction, in the standardisation of voltage and in securing more uniform tariffs. He looked forward to electricity being available in every house and on every farm in the country. Light was the enemy of dirt and electricity should be the killer of drudgery.

The electrical industry had served the nation well during the war; it must continue during the peace to reduce costs and by expanding provide more work. Technical leeway would be made up and this would help to expand our export trade.

Mr. H. A. LINGARD (B.T.H.), vice-chairman of E.L.M.A., thanked Lord Woolton for his speech, and SIR ROBERT RENWICK, Bt., Director of Communications Equipment, gave the toast of "Our Chairman and Hosts," to which Mr. Dickson briefly replied.

## Factory Regulations Draft Addition and Amendment

THE Minister of Labour and National Service has issued in draft form the Electricity (Factories Act) Special Regulations, 1944, extending and amending the Regulations made in 1908, referred to in the new Order as "the principal Regulations." It is provided that "the principal Regulations shall extend and apply to the generation, transformation, conversion, switching, con-

It is provided that "the principal Regulations shall extend and apply to the generation, transformation, conversion, switching, controlling, regulating, distribution and use of electrical energy in any factory and in any premises, place, process, operation or work to which the provisions of Part IV of the Factories Act, 1937, with respect to special regulations for safety and health are applied by that Act."

To the list of exemptions from the principal Regulations is added the following:-"8. Nothing in these Regulations shall apply to apparatus, other than portable apparatus, forming part of the permanent electrical installation of a building, structure, ship or place by reason only that the apparatus, or the installation of which it forms part, is used for the lighting of any building operation or work of engineering construction or work in a ship to which the provisions of Section 105 (2) or Section 106 of the Factories Act, 1937, apply or for the supply of electrical energy for the purposes of any such operation or work." Paragraph (d) of No. 18 of the principal

Paragraph (d) of No. 18 of the principal Regulations (which relates to switchboards for high pressure or extra high pressure) is replaced by the following:—"(d) When any work is done on any switchboard for high pressure or extra high pressure the switchboard shall be made dead unless—(1) the section of the switchboard on which the work is done (hereinafter referred to as 'the relevant section') is made dead and every other section which is live is either (i) so separated from the relevant section by permanent or removable divisions or screens as not to be a source of danger to persons working on the relevant section, or (ii) in such a position or of such construction as to be safe as if so separated as aforesaid; or (2) the switchboard itself is so arranged as to secure that the work is done without danger without taking any of the precautions aforesaid."

## A Life of Ferranti

**F**ROM Longmans Green & Co. we have received a copy of "S. Z. de Ferranti" by W. L. Randell. (Pp. 29; figs. 7. Price 1s.)

The British Council has done well to commission this account of the life and work of a great engineer and the author has been happy in his treatment of the subject. Justice is done not only to Ferranti's immense inventive capacity, but also to his extraordinarily comprehensive grasp of engineering principles that gave direction to his practical work. Thus he early realised the need for commercial electricity distribution to be on a big scale and for generation to be carried out in large strategically sited stations. This view was based on a wider conception of the benefits of every kind that would accrue to a country that was all-electric electrification, of which Ferranti was a pioneer.

The Deptford scheme, which was a pioner, The Deptford scheme, which was put into service in 1891, provided a signal example of the combination of practical aptitude with the prevision that shaped its ends. In order to make feasible the high-voltage transmission required for bis purpose, he had to design or construct most of the main components including alternators, transformers, the first cables for any voltage approaching 10,000, joints, cables, meters, and even steam-pipe bends. Crompton, described Deptford as "undoubtedly the forerunner of all the great power stations of the kingdom, if not of the world," and added, "Ferranti himself, like all great men, always minimised his own achievements "- a characteristic which with other personal qualities is discussed in this book.

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In the section allocated to speeches and addresses appears a good summary of that inspiring address which Ferranti gave in 1911 as President of the Institution of Electrical Engineers, in which he advocated the conversion into electricity of the whole of the coal used for heat and power, and also of his Faraday Lecture of 1928, in which he emphasised that the important thing was not the BThU in a given quantity of fuel, but the eventual result produced in service. Ferranti's ideas and their results are so essentially embodied in modern electricity supply that this little book is as much a setting out of underlying principles that govern its progress as a historical record of a most interesting epoch of development.

#### Star-Delta Starter

In our reference last week to a description of a new form of star-delta starter appearing in the *I.E.E. Journal* one of the initials of the author was omitted. He is Mr. G. A. Wauchope. May 12, 1944

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# **Technical Teachers**

## Supply, Training and Remuneration

WHAT is described as the opening up of a comparatively new field of inquiry

occurs in the report, issued last week, of the Committee appointed by the President of the Board of Education to consider the supply, recruitment and training of teachers

and youth leaders (Stationery Office, 2s.). The good technical teacher, says the Committee, is no mere technician ; he is also an interpreter of the modern world. Technical teachers, regarded collectively, constitute a key group in that industrial development upon which the future prosperity of this country depends, but they have not yet received proper recognition from industrialists. Technical education is considered to include commercial

subjects and, moreover, it extends to the instruction of men and women in arts unconnected with their paid occupations.

In 1938 a million and a quarter students

in England and Wales were pursuing parttime education, predominantly vocational in character. Of these 41,500 were released from industry for attendance at day classes. In addition, there were 43,000 full-time students at technical and commercial colleges and schools. The number of full-time teachers in these institutions was about 4,000 and about 160 new teachers were required each year. The number of parttime instructors ran into tens of thousands.

It is estimated that, with compulsory parttime education, the increased demand for teachers of certain subjects, the lightening of the teaching burden and arrangements for the return of teachers to industry and commerce for limited periods, more than double the present number of full-time teachers will be required and that the annual replenishment rate will be not less than 400 to 500. The employment of more parttime teachers from industry and commerce is advocated.

In general there are two types of teacherthe "technical subjects" teacher for definite vocational instruction and the "general subjects" teacher who deals with studies such as mathematics, physics, chemistry, English, etc., which are found in all types of schools, but which in a technical college are frequently taught with direct relevance to more strictly vocational subjects. The Committee deals mainly with the former class.

Some of the best teachers are found in technical and commercial colleges, but it is

evident that a large number of them are out of contact with industry. On the other hand many lecturers and instructors lack the art of teaching from the beginning. Ideally, every teacher should have a general education which fits him to be a teaching member of . an institution and makes him an acceptable colleague; a high standard of knowledge of his subject or skill in his craft; the ability to teach; an appreciation of the relation of his own subject to other realms of knowledge; and, the technical teacher particularly, an intimate acquaintance with his subject in its industrial or commercial setting.

Among the factors which affect the supply of teachers are conditions of work and

Closer contact with industry and better pay and conditions to attract and retain the right type of teachers for technical institutions are recommended by the Committee presided over by Sir Arnold McNair, of which Dr. A. P. M. Fleming is a member service. In this connection the Committee refers to the low standard of buildings and equipment. It is said that teachers should be able to keep their knowledge up to date and to pursue their own investigations

by being allowed facilities to attend meetings of scientific societies, make frequent visits to works and commercial undertakings, and carry out research. It is pointed out that the regulations of the Board of Education already make it possible for responsible teachers to attend an approved course of instruction, which includes a return to industry, up to a period of three months in any one year. This, arranged in conjunction with the long vacation, might give a teacher five continuous months.

#### Assistance from Professional Institutions

As regards the necessity for the co-operation of industry and commerce with technical education, the Committee thinks that the services of the professional institutions might be enlisted. They could help by the establishment of small study centres to secure this co-operation and, particularly, to facilitate arrangements for the periodic return of technical teachers to industry and commerce.

Help by industrial associations could take the form of stimulating their less progressive members to take a more active interest in providing technical teachers with opportunities for practical experience, and they could encourage larger firms to arrange refresher courses for selected teachers and to contribute up-to-date equipment to colleges. They might also encourage groups of smaller firms to provide facilities for training.

The Committee says it should be the normal thing for a technical teacher to be given from

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time to time a period on full pay, extending over a term or more, for a return to industry, and it is considered that the whole cost, *i.e.*, the teacher's full salary, should be borne by the Board of Education. Travelling fellowships for technical teachers, it is thought, might be provided by some of the more influential industrial associations and professional institutions.

Reference is made in the report to the interest taken by the technical Press in technical education and the provision of technical teachers, and the Committee says that none of the schemes outlined could be fully successful unless the technical Press continued its good offices in this respect.

Passing on to the training of technical teachers, the Committee asserts that the time is now ripe for selected technical and commercial colleges and schools, in association with teacher-training institutions, to experiment with the training of technical teachers systematically and on a compre-hensive scale. It is important that the training should not be isolated from that of other teachers, and the Committee therefore recommends that it should be undertaken by the area training authorities which it proposes should be set up. For this purpose each area training authority should include representatives of technical and commercial education and should appoint a director of technical training to organise courses of training and promote systematic inquiry into the problems of training technical teachers,

#### Remuneration

The question of salaries is dealt with on broad principles, those technical schools which will become part of the secondary school system being excluded from consideration. The Committee recommends that the salaries of teachers in technical colleges should be related to those of people with similar qualifications and experience in industry and commerce, in the Services and in Government Departments. The general scale should be based on the organisation of departments and the distribution of grades of staff within each, and there should be more than one grade of department.

Salaries of heads of the most important departments should be on the professorial level, it being pointed out that the head of a large department does work and has responsibilities comparable with those of a university professor. The salaries of principals should be determined separately from those of the rest of the staff and should be based on grades corresponding to the importance of the college. Obviously the principal of a college should receive a higher salary than any head of a department in that college, although the principals of some colleges would receive less than the heads of departments in other colleges.

## **Grants to Staff**

A TOWN Council on May 3rd decided not to enter into negotiations with the Central Electricity Board concerning grants to the borough electrical engineer and his staff for extra work on power station extensions, thus reversing the decision reached by its General Purposes Committee.

A councillor said it had been the established principle of the Council that officials should not have a claim on fees paid for professional services. It was a good principle. The special work was at the instigation of the Central Electricity Board. The Council would also be told thousands of pounds which might have gone to a consultant had been saved. but he doubted if it could be claimed that anything had been saved. Another authority had made a grant to its engineer in similar circumstances, but this official had his salary reduced by 20 per cent. during the time he was so engaged. The Council would set a dangerous precedent if an official receiving full salary could undertake work for an outside authority and still be remunerated. Recently, the salary of the electrical engineer was increased from £1,400 a year to £1,600.

Another councillor said that if the allowance suggested was £5,000 it would equal three years' salary. If the engineer had put in three years' extra work on the extensions, he must be a superman. In reply it was said that the recent increase to the engineer was because of his increased responsibility at the electricity works. The extensions had cost over £1,000,000, and it was always understood some payment would be made to the engineer and his staff for their extra work in planning.

The chairman of the Electricity Committee said that the town was getting  $\pm 40,000$  a year in rates from the electricity works. But for the engineer, all this would have been lost. By planning and supervising, the engineer had saved  $\pm 40,000$  which would have been paid to a consultant. Any extras would not come from local ratepayers or consumers, but from the consumers as a whole. As to the amount,  $\pm 10,000$ was wide of the mark. He asked it not to be said that the Central Electricity Board was prepared to give money to the Corporation staff and the Council would not let them have it

#### **Controlling and Recording Instruments**

THE Institution of Chemical Engineers and the Institute of Physics announce a joint conference on instruments for the automatic controlling and recording of chemical and other processes. Provisional arrangements have been made for the conference to take place in London on September 22nd and 23rd. Its purpose is to promote the interchange of knowledge and experience between those employing automatic controllers and recorders in different fields and to encourage collaboration between physicists and chemical engineers. The conference will be open to all interested without charge, whether members of the organising bodies or not. Further particulars will be sent, in August, to those sending a request for them to the Organising Secretary, c/o the Institution of Chemical Engineers, 56, Victoria Street, S.W.1. Mar 12 19-

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## **ELECTRICITY SUPPLY**

## Grimsby Post-War Plan. Purchase Rights Extensions.

Birkenberd, --LOAN FOR APPARATUS. --The Electricity Committee is seeking sanction to horrow £2,000 for consumers' apparents.

Blackhum, —CONSUMERS' VIEWS INVITED.— Mr. R. H. Harral, borough electrical engineer, has issued a questionnaire to ascertain from local householders the type of house and equipment they would prefer after the war. The circular contains over a dozen questions dealing with labour-saving kitchems and various domestic arguments.

**Blackpool** — PAYMENTS FOR WIRING WORK.— The Electricity Committee has refused to grant an application by Electrical Facilities, Ltd., that the Council should collect on its behalf money in respect of witting work carried out by the company in certain houses in the borough.

Bolton --STREET LIGHTING. --Referring to the paragraph in our April 28th issue, Mr. J. H. Morrison, superintendent of the Corporation Lighting Department, points out that the Council's annual estimates provide £12,799 more for street lighting. The total amount estimated for the current year is £25,231, the increase being accounted for by a provision for normal lighting should the occasion arise.

Bechanick - Extension of The. - The Bechanic Commissioners have made an Order, the Bournemouth Poole and Christchurch Electrony (Extension of Time) Order, subsituating August 6th, 1945, for August 6th, 1942, in Section 3 and in Subsection 4 of the Boarnemouth, Poole and Christchurch Electricity Act, 1932.

Cardiff. – PHOTEST AGAINST I. M. E.A. DECISION. – Last week the Electricity Committee maximumously adopted a resolution protesting against the decision of the Incorporated Manicipal Electrical Association to reverse the Association's previous rejection of Part III of the joint memorandum on post-was electricity supply.

Contrentians — Concer Marries. — The Bearricity Committee has agreed to pay half the cost. £195. of the installation by the S.W. & S. Power Co. of five check meters at the Hesters Way substation.

Oversen Divez - Sanction has been obtained to the erection of overhead lines to supply Stock well Farm and Hill Barn. Cowkey.

Glasgow, ELECTRACTTY FOR COTTAGES. - The Corporation Sub-Committee on Farms has agreed to the installation of electricity in workers' houses at Robroyston Mains Farm. at a cost of £320.

Grimsby. — Post-WAR PROSPECTS. — All authorised electricity undertakings have been been asked to furnish the Electricity Commissioners with an estimated pro-tailing of requirements during the five years following the end of the war. Details of the report which Mr. G. W. Parker, borough electrical engineer of Grimsby has prepared on given at a meeting of the Electricity Committee last each Parker with the considered in desirable that the program estimate induce additional lines to

link up existing rural lines in order to give an alternative means of supply and to cover new areas. He thought that the value of an indertaking would be assessed largely upon the services it gave in rural areas, and as Grimsby wished to survive as a separate entity the indertaining hould extend its services wherever community multile. He visualised some upmentation of new industries. To provide showroom facilities he suggested lowering of the present windows of the office building and the construction of a showroom window on the South St. Mary's Gate frontage. Replying to a question about features about the proposal to have highting at kerb level, while sardinghts shown that there were undesirable and even dangerous features about the proposal to have highting at kerb level, while sardinghts shining on to clouds were not very practical.

Hall.—FEED PUMP.—The Electricity Committee has obtained senction to borrow £2,363 for the replacement of a steam feed pump at the power startion.

Mansfield. — CHANGE-OVER.—The Electricity Committee has interviewed Mr. Mothey New, Electricity Cohamissioner, with regard to the standard of voitage and has decided to make formal application to change the voitage in areas at present supplied at 250 V to a declared standard of 250 V.

standard of 230 V. North-East Coast.—PURCEASE RIGHTS.—A conference of local antinormies was held at Sunderland on May 4th to coasider the South Shields Rural Electric Lighting Order, 1903, and the Sunderland District Order, 1904, under which local antinormies have purchase rights over parts of the North Eastern Electric Supply Co.'s undertaking. The conference decided, in view of war conditions, to apply for an extension of the time in which they can exercise their rights of punchase. The authorities affected are South Shields, Sundarland and Jarrow Corporations, Bokkon, Felling, Hebburn, Hetton, Houghton-le-Spring and Washington Urban District Councils; and Durham, Eastington, Sunderland and South Shields Rural District Coursels.

Neveral --SUSPENSION OF METER RENTS.--The Town Council has continued a recommendation from the Electricity Consultate that the meter rents charged to consumers shall be suspended until further notice. The borough treasurer said that the concession would cost about 500 a year.

Rawtenstall.—RATE AD OPPOSED.—At the lass meeting of the Towa Council Aid. C. Kenyon expressed the opinion that the Council should avoid taking sums from the transport and electricity undertakings' profits for the relief of the rates. Referring to the buses, he said that they had to meet large increases in costs and he did not think it right that another £1,000 should be taken for the rates. Coun. G. H. Lupton consended that some concerns were making so much moviey that they did not know what to do with it, yet they were not paying one-commin as much rates as the bas and electricity undertakings. Now was the time to press for derating to be withdrawn and assessments increased. Coun. J. R. Ashworth considered that too much was taken out of the profits to relieve rates instead of handing the money to the consumer in the form of cheaper electricity and lower fares.

Severn Estuary.—BARRAGE INVESTIGATIONS.— In the House of Commons last week Mr. Ellis Smith asked the Minister of Fuel and Power if the investigation into the Severn Estuary Barrage Scheme was being treated as a matter of urgency; when he expected to receive the report; and if he would ask the Committee to consider further schemes or appoint another committee to give consideration to methods and the best sites for utilising the power of the tides.

Major Lloyd George replied that the investigation was being treated as a matter of urgency, and he hoped to receive a report within the next two or three months. Until he had been able to consider the report, he did not think he would be justified in initiating investigations into tidal power schemes elsewhere.

Swindon.—ATTENDANCE AT DAY CLASSES.— The Electricity Committee has arranged that boys, including apprentices, engaged in the department, up to the age of eighteen, shall be released from work, without loss of wages, on one day per week to attend day classes for 1

the purpose of receiving further general education and training.

Worthing,—FIVE-YEAR PLAN.—The Electricity Committee has prepared a five-year plan for extensions at a cost of £302,750.

#### Overseas

Eire.—ELECTRICITY RESTRICTIONS.—In our issue of April 28th we published a press agency report that as from May 1st electricity in Eire was to be used for lighting purposes only. We learn from our Dublin correspondent, however, that the new restrictions which came into operation on that date only prohibit all forms of space heating by electricity; consumption of electricity for other domestic purposes is governed by the restrictions which came into force on April 1st (*Electrical Review*, April 14th). In the case of motive power and process heating, consumption is limited to 85 per cent. of the 1943 amount instead of 90 per cent. of that used in 1941. Industrial consumers have been warned by the Electricity Supply Board that this new restriction will be rigorously imposed and that the supply will be cut off in case of any failure to comply with it. The Board, on the direction of the Minister of Supplies, has exempted certain industries from this obligation. In the case of traction supplies, as with industrial power, the basic period has been changed from 1941 to 1943.

## FINANCIAL SECTION

Company News. Stock Exchange Activities.

## **Reports and Dividends**

Brush Electrical Engineering Co., Ltd.—In their report for 1943 the directors state that the plant, machinery, etc., have been re-valued at the equivalent of the Inland Revenue valuation and £40,000 has been transferred from the reserve for depreciation and renewals to reduce the gross value. In future the income tax wear and tear allowance will be written off annually and amounts will be transferred from net profits to obsolescence reserve. As we have already reported the company's net profit for 1943 was £175,002 (against £118,130), the ordinary dividend for the year being raised from 8 to 9 per cent.

Sanzamo Weston, Ltd., record a trading profit of £118,798 for the year 1943, as against £140,390 for the previous year. Interest, etc., brings the total available to £120,897 (£142,422). After deducting depreciation £26,587 (£26,052), A.R.P. £3,725 (£4,483), written-off patents £462 (same), fees £1,873 (£1,925), tax provision £54,121 (£69,756), interest £69 (£230) and provision for deferred repairs £3,500 (£4,000), there is a net profit of £30,560 (£35,494). To this is added £118,090 brought in, and after paying a first and final dividend of 15 per cent. £136,837 is carried forward.

W. Canning & Co., Ltd., show a trading profit of  $\pounds74,856$  for 1943, which compares with  $\pounds74,629$  for 1942. Adding  $\pounds662$  ( $\pounds358$ ) income from other sources, there is  $\pounds75,518$  ( $\pounds74,987$ ) available, from which is deducted directors' fees and depreciation, leaving a net profit of £68,498 (£67,501). The amount transferred to general reserve is increased from £10,000 to £25,000 and the dividend is maintained at 22½ per cent. by a final dividend of 5 per cent. and a bonus of 12½ per cent. The carry-forward is raised from £47,823 to £52,571. In a statement accompanying the report, the chairman, Sir Ernest R. Canning, says that production of standard lines is being fully maintained and this should enable the change-over from wartime conditions to be carried out with the minimum of disturbance. This year the company celebrates its silver jubilee.

The British Oxygen Co., Ltd., reports a gross profit for 1943 (after provision for E.P.T.) of  $\pounds$ 932,165, as compared with  $\pounds$ 943,465 in the previous year. From this is deducted  $\pounds$ 498,234 ( $\pounds$ 536,080) for income tax,  $\pounds$ 2,600 (same) for directors' fees and  $\pounds$ 46,804 ( $\pounds$ 42,586) is allocated to staff and works pension fund, leaving a net profit of  $\pounds$ 384,527 ( $\pounds$ 362,199). The final dividend of 8 per cent. again makes 15 per cent. for the year; a sum of  $\pounds$ 100,000 (nil) is transferred to general reserve and  $\pounds$ 87,471 ( $\pounds$ 113,804) is carried forward.

Ransomes & Rapier, Ltd., from a net profit of  $\pounds 25,187$  (against  $\pounds 26,008$ ) are repeating their final dividend of 4 per cent., free of tax, again making 6 per cent., free of tax, for the past year.

Babcock & Wilcox, Ltd., announce the payment of a final ordinary dividend of 6 per cent. and a bonus of 1 per cent., again making 11 per cent. for the year. The profit of £638,583, May 12, 1944 ELECTRICAL REVIEW

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before providing for taxation, compares with £594,943 for 1942 which figure was arrived at after deducting N.D.C.

The United River Plate Telephone Co., which is controlled by the I.T. & T. Corporation, reports gross earnings for 1943 of £5,115,994, as compared with £4,641,771 for 1942, and net earnings of £1,496,906 (against £1,418,221). After deducting general and debenture interest the net income was £1,028,703 ( $\pm$ 953,010). The number of telephone stations at December 31st last was 477,518, an increase of 16,073.

E. K. Cole, Ltd.—The directors announce that the company has so far acquired over 294,500 of the ordinary shares of Ensign Lamps, Ltd., out of a total of 300,000. The time limit of the offer has been extended to June 27th.

The West London & Provincial Electric & General Trust, Ltd., reports a net profit of  $\pounds 12,383$  for 1943-44, as compared with  $\pounds 10,553$ . The final dividend is 4 per cent. (against  $3\frac{1}{2}$  per cent.), making 6 per cent. for the year (against  $5\frac{1}{2}$  per cent.).

**Pinchin, Johnson & Co., Ltd.,** invite holders of fifteen  $6\frac{1}{2}$  per cent. cumulative first preference £1 shares or less to sell their holdings at 33s. 3d. per share, free of charges. The offer remains open until May 26th.

The Pressed Steel Co., Ltd., is again paying a final dividend of 171 per cent., making 271 per cent. for the year.

The Metropolitan Cable & Construction Co., Ltd., is again paying a final dividend of 5 per cent. to make a total of  $7\frac{1}{2}$  per cent. for the year.

The Ascot District Gas & Electricity Co., is to pay a final dividend of  $3\frac{1}{2}$  per cent., making 6 per cent. for the year.

Tecalemit, Ltd., is maintaining its interim dividend at 6 per cent.

Richard Johnson & Nephew, Ltd., are maintaining their first and final dividend at 9 per cent.

#### **New Companies**

Power Jets (Research and Development), Ltd.— Private company. Registered April 22nd. Capital, £200,000. Objects: To acquire the business of Power Jets, Ltd., to promote the advancement of knowledge of the methods of making and using gas turbine engines and mechanisms of every description, whether for use in aircraft, ships, locomotives or other means of transport by air, sea or land, or for use in power or generating stations or elsewhere as a means of generating or transforming power, etc. Subscribers: W. A. H. Druith and H. H. Longfield, Treasury Solicitors' Department, Storey's Gate, St. James' Park, S.W.1.

Werthy Electrical Engineers, Ltd.—Private company. Registered April 29th. Capital, £100. Objects: To carry on the business of electrical engineers, etc. Subscribers: Florence E. Davies, 67, Manor Way, Whitchurch, Glam, and I. Wertheim, 41. Compayne Gardens, N.W.6, electrician. Secretary: A. Davies. Registered office: 19, Dumfries Place, Cardiff.

D. M. R., Ltd.—Private company. Registered April 29th. Capital, £200. Objects: To carry on the business of manufacturers of, and dealers in, dynamos, motors, machinery, electrical plant, etc. Subscribers: J. V. Rushton and Mrs. Florence Rushton, both of Whitehall, Kingswinford, Staffs. Florence Rushton is the first director. Registered office: Whitehall, Kingswinford.

Wireless Hire, Ltd.—Private company. Registered April 28th. Capital, £6,000. Objects: To carry on the business of hirers and manufacturers of, and dealers in, wireless sets, electrical apparatus, etc. Directors: E. Kemp, 22. Victoria Road, and Nellie Dales, 1, New Street, both of Louth, Lincs. Registered office: Canford Chambers, St. Peters Road, Bournemouth.

F. I. Rice (Electrical Contractors), Ltd.— Private company. Registered April 25th. Capital, £4,000. Objects: To acquire the business of an electrical engineer and contractor carried on by Frank I. Rice at 39, Glena Avenue, Knowle, Bristol 4; also to carry on the business of wireless and general engineers, etc. Directors: F. I. Rice and Mrs. R. M. Rice, both of 39, Glena Avenue, Knowle, Bristol, which is the registered office.

## Companies' Returns Statements of Capital

Vince's Dry Batteries, Ltd.—Capital, £58,000 in 500,000 10 per cent. participating preferred ordinary shares of 2s. and 160,000 ordinary shares of 1s. Return dated December 31st. All shares taken up. £50,002 paid on 500,000 preferred ordinary and 40 ordinary shares. £7,998 considered as paid on 159,960 ordinary shares. Mortgages and charges: Nil.

Walker Bros. (Electrical Engineers), Ltd.— Capital. £10,000 in £1 shares (4,000 ordinary and 6,000 preference). Return dated December 31st (filed February 8th). 3,003 ordinary and 6,000 preference shares taken up. £3 paid. £9,000 considered as paid. Mortgages and charges: Nil.

Husbands, Hart & Warburton, Ltd.— Capital, £3,000 in £1 shares. Return dated April 23rd, 1943 (filed January 3rd, 1944). 1,503 shares taken up. £1,503 paid. Mortgages and charges: Nil.

Dynamo, Lighting & Ignition, Ltd.—Capital, £250 in 1s. shares. Return dated January 14th. 2,000 shares taken up. £100 paid. Mortgages and charges: Nil.

#### **Increases of Capital**

Hill, Upton & Co., Ltd.—The nominal capital has been increased by the addition of  $\pounds$ 3,000 in  $\pounds$ 1 ordinary shares beyond the registered capital of  $\pounds$ 9,000.

#### Mortgages and Charges

J. & J. Couch, Ltd.—Mortgage dated April 14th to secure all moneys due or to become due from the company to Midland Bank, Ltd., charged on 19-20, Chapel Street, St. Ives.

Hilbert & Whitwam, Ltd.—Assignment on April 24th, of proceeds of contracts, to secure all moneys due or to become due from the company to Martins Bank, Ltd.

#### **Receiver** Released

Combi Electric Co., Ltd.—J. L. Harper, Milton House, 35, Surrey Street, W.C.2, ceased to act as receiver and manager on April 18th.

## STOCKS AND SHARES

#### TUESDAY EVENING.

"HE outstanding feature of the Stock Exchange markets is the rising tendency shown by prices of all the best class industrials. Anticipation had been inclined to look for a slowing down of activity as the time of the invasion drew nearer. But, instead of this, the exact opposite has come about. A good deal of money was distributed on May Day in connection with the repayment of the 5 per cent. Conversion Loan by the Government, and some of this cash undoubtedly has found its way into ordinary shares of front rank industrial companies, such, for instance, as those dealing with electrical equipment and manufacture. The prices of these, while they show comparatively little quotable change, are. nevertheless, so firm that buyers frequently complain that they have to pay the top prices, instead of being able to get in at something lower.

#### Home Railways

The price of London Passenger Transpori "C" stock is a point higher at 71, and the Board's prior-charge issues are in demand. The 5 per cent. "A" stock has risen to 1304 and the 5 per cent. "B" is up 2 to 121 $\frac{1}{2}$ . Explanation of the demand for these stocks may be found in the dates of redemption. The 5 per cent. "A" and the 4 $\frac{1}{2}$  per cent. "A" are dated 1985—2023, and the 5 per cent. "B" stock 1965—2023. In these days, when investment shows a strong partiality for stocks bearing definite dates of repayment, the longer-dated issues that carry reasonable rates of interest are in particular request. It may be added, as a matter of slightly ironical interest, that the Board's "C" stock bears date "1956 or after." Southern Railway 5 per cent. preference at 120 $\frac{1}{2}$  has put on  $3\frac{1}{2}$ points, reflecting investment of money released by the repayment of Conversion Loan. Southern preferred at 78 is 10s. up.

#### The Rising Tide

British Insulated and Callender's Cable have risen  $\frac{1}{16}$  to  $5\frac{1}{15}$  and  $5\frac{1}{2}$  respectively. General Electrics, for which the time for announcement of the annual dividend is coming into sight, are better at 93s. Ever Ready ordinary advanced further to 41s. Murex put on 2s. 6d., rising to  $5\frac{1}{2}$  bid. Amongst shares to score smaller improvements are Associated Electrical ordinary 53s. English Electric 50s., Revo 42s. 6d., Ericssons 55s., Telegraph Constructions 52s. 6d. and Tube Investments 97s. A steady demand for British Vacuum Cleaner 5s. shares lifted the price to 30s. De la Rue, after narrow fluctuations, settled down to  $8\frac{5}{8}$ .

Globe Telegraph & Trust ordinary are again 6d. better at 39s. 6d. Cable & Wireless ordinary recovered to 81<sup>1</sup>/<sub>2</sub>. Politics account 201

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for 1s. rise to 25s. in Anglo-Portuguese Telephones. Marconi Marines are similarly better at 34s., post-war prospects being the main attraction to the purchasers. In the Transport group, B.E.T. deferred at 1155 shows a gain of 20 points. Prices keep steady in this section. Bristol Trams are 1s. up, with a rise to 56s. 6d.; other tramway shares are without quotable change. United River Plate Telephone  $5\frac{1}{2}$  per cent. redeemable preference remain at 22s. The net income of the company, which is controlled by the International Telephone & Telegraph Corporation, shows an increase of £75,693 over that for the previous year.

#### Shares on Offer

Investment has been taking the shares of the Southern Areas Electric Corporation, the price of which, at 23s. 3d. ex dividend, affords a yield on the money of £4 6s. per cent. The dividend is paid once a year. This also is the case with the dividend on Mid-Cheshire ordinary shares, of which 1,000 are obtainable in the market at 39s. 6d., to yield £4 1s. per cent. The Palestine Electric distributes its dividends once a year. Of the "A" ordinary shares in this company, 2,000 have come on offer at 41s. 6d., at which the return, on the basis of the last-paid pividend of 5 per cent. tax free, is £2 8s. per cent., free of tax, equal to £4 16s. per cent. with tax at 10s. in the £. The dividend is usually declared in June. For 1941 it was 4 per cent. tax free, and in 1940 the shares temporarily fell out of the dividend list owing to war conditions.

#### Television

Side by side with the demand for investment shares, there has sprung up active inquiry for others of more speculative type, that depend upon post-war prospects. Stock Exchange markets are busy. Although affording but a very rough guide, the official Stock Exchange record of transactions effected in a single day attained a higher point last week than had been reached for more than a year. Public imagination has been captured by the prospects of television after the war. In order to take practical interest in what is expected to be one of the chief new developments when peace comes, people are buying shares in the companies that will be early in the field. Amongst these are Electrical & Musical Industries, E. K. Cole, A. C. Cossor, Philco and Scophony, in all of whose shares a fairly active market prevails. Whether the postwar prospects of these companies may not be already discounted in the prices to which the shares have been raised, it must be left (platitudinously) for the future to decide. Meanwhile, speculation busies itself with hopes that after the war the present low yields obtainable from share purchases made to-day

(Continued on page 686)
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# **ELECTRICAL INVESTMENTS**

# Prices, Dividends and Yields

|                     | Dividend       |                 | Middle   |                    |        | 371.1.3     |    | 1                         | Dividend      |                | Middle            | )                  |          |             |             |
|---------------------|----------------|-----------------|----------|--------------------|--------|-------------|----|---------------------------|---------------|----------------|-------------------|--------------------|----------|-------------|-------------|
| Company             | Pre-<br>vious  | Last            | May<br>9 | Rise<br>or<br>Fall |        | p.c<br>7.16 | 10 | Company                   | Pre-<br>vious | Last           | Price<br>May<br>9 | Rise<br>or<br>Fall |          | Yiel<br>p.c | ld<br>•     |
| Hom                 | e Elect        | ricity (        | Companie | :5                 |        |             |    |                           | Publ          | ic Boar        | rds               |                    |          |             | 87 ~18 k.48 |
| Pourpamouth and     |                |                 |          |                    | £      | s.          | d. | Claude at Till and at the |               |                |                   |                    | £        | s.          | d.          |
| Doole Doole         | 191            | 101             | 017      |                    |        | 0           | 0  | Central Electricity       |               |                |                   |                    |          |             |             |
| British Power and   | 120            | 128             | 01/-     | ~                  | 4      | 2           | 0  | 1955~60 (CIVII            | 0             | 0              | 100               |                    |          | 0           | 0           |
| Light               | 7              | 7               | 23/_     |                    | 1      | .1          | 10 | 1955_75                   | ວ<br>ຮ        | 3<br>5         | 111               |                    | 3        | -0          | 0           |
| City of London      | 7              | 51              | 27/6     |                    | 1<br>1 | - 1         | 10 | 1951-73                   | 0<br>41       | 0              | 114               | 27                 | 4        | 7           | - 9         |
| Clyde Valley        | 8              | 8               | 41/6     |                    | 3      | 17          | 0  | 1963_93                   | 12            | 14 2<br>0 1    | 1021-1            |                    | 4        | 4           | L           |
| County of London    | 8              | 8               | 40/6     | +6d                | 3      | 19          | 0  | 1974-94                   | 22<br>21      | 21             | 105684            |                    | 00       | 6           | 0           |
| Edmundsons :        |                | 0               | 1010     | 1 000              | 0      | 10          | 0  | London Elec Trans         | 0 <u>f</u>    | υÆ             | 100               |                    | 0        | i)          | U           |
| 7% Pref.            | 7              | 7               | 34/6     |                    | 4      | 1           | 4  | Ltd.                      | 1.0           | 21             | 07                |                    | 9        | 11          | 2           |
| Ord                 | 6              | 6               | 29/-     |                    | 4      | 2           | 9  | London & Home             | . 2           | 4 2            | 5.4               | ~ .                | 2        | 11          | 0           |
| Elec.Dis.Yorkshire  | 9              | 9               | 45/-     |                    | 4      | 0           | 0  | Counties1955-75           | 11            | 41             | 113               |                    | 3        | 19          | 8           |
| Elec. Fin. and Se-  |                |                 | '        |                    |        |             |    | Lond.Pass.Trans.:         |               | ~ 2            |                   |                    | 0        |             | 0           |
| curities            | 12호            | 12 <del>]</del> | 55/-     |                    | 4      | 11          | 0  | A                         | 16            | 43             | 1211              |                    | 3        | 14          | 1           |
| Elec. Supply Cor-   |                |                 |          |                    |        |             |    | В                         | 5             | 5              | 1211              | +2                 | 4        | 2           | 4           |
| poration            | 10             | 10              | 46/-     |                    | 4      | 7           | 0  | 0                         | 3             | 31             | 72                | +1                 | 4        | 10          | 3           |
| Isle of Thanet      | Nil            | Nil             | 18/-     |                    |        | —           |    | WestMidlandsJ.E.A.        |               |                |                   |                    |          |             |             |
| Lancs. Light and    |                |                 |          |                    |        |             |    | 1948-68 5                 | 5             | 5              | 1081              | 1.0                | 4        | 12          | 4           |
| Power               | 7 <u>k</u>     | 7글              | 36/-     |                    | 4      | 3           | 4  |                           |               |                |                   |                    |          |             |             |
| Lianelly Elec       | 6              | 6               | 26/-     |                    | 4      | 12          | 4  | Teleg                     | graph         | and To         | elephana          |                    |          |             |             |
| Lond.Assoc.Electric | : 3            | 4               | 23/-     | 4.4                | 3      | 9           | 7  | Angio-Am. Tel. :          |               |                | 100               |                    |          |             |             |
| London Electric     | 6              | 6               | 28/-     |                    | 4      | 5           | 9  | Def                       | 5<br>1 1      | 6              | 120               | +2                 | 5        | 0           | 0           |
| LondonPowerRed.     | ~              | ~               |          |                    |        |             |    | Anglo Portuguese          | L 😳<br>D      | 18             | 30<br>05.10       |                    | 0        | 0           | 0           |
| Deb                 | ð              | 5               | 103      |                    | 4      | 14          | 7  | Cable & Wireless          | 8             | a              | 20/0              | +1/-               | 0        | 9           |             |
| Metropontan E.S.    | 8              | 8               | 40/-     |                    | 4      | 0           | 0  | 54 Pref                   | 51            | 51             | 1121              |                    | л        | 17          | 0           |
| Mid Floo Domos      | 8              | 8               | 40/6     |                    | 3      | 19          | 0  | Ord                       | 1             | 1              | 811               | 11                 | å.       | 10          | 0           |
| Nomenatio Floo      | บ              | 9               | 44/0     | 3.4                | 4      | 10          | 9  | Canadian Marcouis1 N      | Ett           | 4 ets          | 9/6               | T 2                | .6       | 10          | 2           |
| North Eastern Floo  | . ·            | 4               | 30/6     |                    | 4      | 12          | 0  | Globe Tel. & Tel. :       |               | 10005          | 0/0               |                    |          |             |             |
| Ordinary            | 7              | 7               | 23/6     |                    | 4      | 9           | 7  | Ord 8                     | 32.0          | 5*             | 39/6              | +6d.               | 2        | 10          | 8           |
| 7% Prof             | 2              | 7               | 35/-     |                    | 4      | 0           | 6  | Pref 6                    | 3             | 6              | 30/-              | -                  | 4        | 0           | 0           |
| Northampton         | 10             | าก่             | 48/_     |                    | 4      | 3           | 4  | GreatNorthernTel.         |               |                |                   |                    |          |             |             |
| Notting Hill 6%     | 20             | 10              | 101      |                    | 4      | u           | *  | (£10) Ni                  | îl            | Nil            | 20불               |                    |          |             |             |
| Pref. (£10)         | 6              | Nil             | 11       |                    |        |             |    | Inter. Tel. & Tel. Ni     | il            | Nil            | 16                |                    |          |             |             |
| Northmet Power :    |                |                 |          |                    |        |             |    | Marconi-Marine 7          | *             | $7\frac{1}{2}$ | 34/-              | +1/-               | 4        | 8           | 3           |
| Ordinary            | 7              | 7               | 38/6     |                    | 3      | 12          | 9  | Oriental Tel. Ord. 16     |               | 10             | 44/-              | 1.0                | 1.1      | _           |             |
| 6% Pref.            | 6              | 6               | 30/6     |                    | 3      | 18          | 8  | Telephone Props. 6        |               | Nil            | 17/-              |                    | -        | _           |             |
| Richmond Elec.      | 6              | 6               | 25/6     |                    | 4      | 14          | 1  | Tele. Rentals (5/-) 10    |               | 10             | 11/6              | 1.4                | 4        | 7           | 0           |
| Scottish Power      | 8              | 8               | 40/-     |                    | 4      | 0           | 0  | Trac                      | tion -        | nd Tr          | menoré            |                    |          |             |             |
| Southern Areas      | 5              | 5               | 23/-     |                    | 4      | 7           | 0  | Anglo-Arg Trans           | tinti 9       | ind in         | msport            |                    |          |             |             |
| South London        | 7              | 7               | 27/6     |                    | 5      | 1           | 10 | First Pref. (£5) Ni       | 1             | Nil            | 2/6               |                    |          | _           |             |
| West Devon          | 5              | 5               | 24/-     | * *                | 4      | 3           | 4  | 4% Inc. Ni                | i             | Nil            | 6                 | 12                 |          |             |             |
| West Glos.          | 41             | 37              | 24/6     |                    | 2      | 17          | 4  | Brit.Elec.Traction:       |               |                |                   |                    |          |             |             |
| Yorkshire Elec      | . 8            | 8               | 43/      | **                 | อ      | 14          | Э  | Def. Ord. 45              |               | 45 1           | 155               | +20                | 3 3      | 8           | 0           |
| Querse              | as Elec        | tricity         | Compani  | es                 |        |             |    | Pref. Ord 8               |               | 8              | 175               |                    | 4 3      | 1           | 5           |
| Atlas Elec.         | Nil            | Nil             | 6/-      | — 3d.              |        |             |    | Bristol Trams 10          |               | 10             | 56/6              | +1/-               | 3 3      | 10 1        | 10          |
| Calcutta Elec       | 79             | 6*              | 37/6     | +6d.               | 3      | 4           | 0  | Brazil Traction \$1       |               | \$13           | 261               | -1                 | 6 3      | 3           | 4           |
| Cawnpore Elec       | 10             | 10              | 35/-     | 1.1                | 5      | 14          | 3  | Calcutta Trams 5          | 2<br>2        | 6 <u>}</u>     | 37/6              |                    | 3        | 9           | 6           |
| East African Power  | 7              | 7               | 33/      |                    | 4      | 4           | 10 | Cape Elec. Trams 5        |               | 6              | 26/-              |                    | 4 ]      | 2           | 4           |
| Jerusalem Elec      | 7              | 5               | 28/6     |                    | 3      | 10          | 2  | Lancs. Transport 10       |               | 10             | 45/6              |                    | 4        | 8           | 0           |
| Kalgoorlie (10/-)   | 5              | 5               | 10/-     | 5.5                | 5      | 0           | 0  | mexican Light :           |               | -              | 1001              |                    |          |             |             |
| Madras Elec.        | 4*             | Nil             | 23/-     | 22                 |        | 10          | 0  | Die 50/ Dende             |               | 9<br>5         | 102               |                    | 4 ]      | .7          | 7           |
| Montreal Power      | $1\frac{1}{2}$ | 11              | 22       | + 2                | 0      | 10          | 0  | Southern Plan             |               | 9              | 100\$             |                    | 4 ]      | 4           | 9           |
| PalestineElec."A"   | 4 <sup>#</sup> | 5%              | 41/-     |                    | 2      | 8           | 9  | 59/ Profd 6               |               | 5              | 70                | . 1                |          | ~           |             |
| Perak Hydro-elec.   | 6              | DOate           | 10/-     |                    |        |             |    | 5% Pref. 5                |               | 5              | 10                | 1 21               | Di di    | 8           | 0           |
| ShawiniganPower     | agets.         | ancra-          | 15       |                    |        |             |    | T. Tilling 10             |               | 10             | 50/               | + 38               | ±<br>n   | 3           | U           |
| Tokyo Elec. 6%      | 5              | 15              | 44       |                    | 3      | 12          | 7  | West Riding 10            |               | 10             | 44/6              |                    | 0<br>4 3 | 0           | U           |
| Victoria FallsPower | TO             | 6               | 23/6     |                    | 5      | 2           | 2  | (Conta                    | inned         | on ner         | 1 2200            | · · ·              | * 1      | 0           | 0           |
| whitehalliny, Pret. |                | U               | 2010     |                    | -      | -           |    | (00///                    |               | - node         | (nuge)            |                    |          |             |             |

" Dividends are paid free of Income Tax.

|  | Divid         | lend            | Middle<br>Price | Rise            | - | 7 iel | d  |                     | Divi            | lend            | Middle<br>Price | Rise       | 1 | Yiel | d  |
|--|---------------|-----------------|-----------------|-----------------|---|-------|----|---------------------|-----------------|-----------------|-----------------|------------|---|------|----|
| Company  | Pre-<br>vious | Last            | May<br>9        | or<br>Fell      |   | p.c   |    | Company             | Pre-<br>vious   | Last            | May<br>9        | or<br>Fall |   | p.c. |    |
| Equip  |               |                 |                 |                 |   | £     | 8. | d,                  |                 |                 |                 |            |   |      |    |
|  |               |                 |                 |                 | £ | в.    | d. | General Cable (5/-) | 15              | 15              | 1ő/—            | · •        | 5 | 0    | 0  |
| Aron.Elec.Ord                                    | 10            | 15              | 60/-            | 1.4             | 5 | 0     | 0  | Greenwood&Batley    | 15              | 15              | 41/3            | - i -      | 7 | 5    | 9  |
| Assoc. Elec. :                                   |               |                 |                 |                 |   |       |    | HallTelephone(10/-  | )121            | $12\frac{1}{2}$ | 29/-            |            | 4 | 6    | 2  |
| Ord  | 10            | 10              | 52/-            | +6d.            | 3 | 17    | 0  | Henley's (5/-)      | 20              | 20              | 26/9            |            | 3 | 14   | 9  |
| Pref.  | 8             | 8               | 39/6            | 1.4             | 4 | 1     | 0  | 4½% Pref            | 41              | 41/2            | 24/-            | · •        | 3 | 15   | 0  |
| AutomaticTel.&Tel.                               | 121           | $12\frac{1}{2}$ | 64/-            |                 | 3 | 18    | 2  | Hopkinsons          | 15              | 178             | 66/3            | • 1        | 5 | 5    | 8  |
| Babcock & Wilcox                                 | 11            | 11              | 50/9            | +3d.            | 4 | 6     | 8  | India Rubber Pref.  | $5\frac{1}{2}$  | 51              | 23/6            | 14         | 4 | 13   | 9  |
| British Aluminium                                | 10            | 10              | 47/6            |                 | 4 | 4     | 1  | Intl. Combustion    | 30              | 30              | 63              |            | 4 | 14   | 0  |
| British Insul.Ord.                               | 20            | 20              | 513             | $+\frac{1}{16}$ | 3 | 14    | 0  | Johnson & Phillips  | 15              | 15              | 74/6            | +1/-       | 4 | 1    | 1  |
| British Thermostat                               |               |                 |                 |                 |   |       |    | LancashireDynamo    | 221             | 22불             | 92/-            | 100        | 4 | 17   | 10 |
| (5/-)  | 181           | $18\frac{1}{2}$ | 19/6            |                 | 4 | 14    | 10 | Laurence,Scott(5/-) | $12\frac{1}{2}$ | 121             | 13/-            |            | 4 | 16   | 2  |
| British Vac. Cleaner                             |               |                 |                 |                 |   |       |    | London Elec. Wire   | $7\frac{1}{2}$  | 7 <del>1</del>  | 39/             |            | 3 | 17   | 0  |
| (5/-)  | 15            | 30              | 30/-            | +6d.            | 5 | 0     | 0  | Mather & Platt      | 10              | 10              | 52/6            | - 1        | 3 | 16   | 2  |
| Brush Ord. (5/-)                                 | 8             | 9               | 9/-xd           |                 | 5 | 0     | 0  | Metal Industries(B) | 5               | 8               | 47/6            |            | 3 | 7    | 6  |
| Burco (5/-)                                      | 15            | 171             | 15/6            |                 | 5 | 13    | 0  | Met.Elec.CablePref. | 51              | 51              | 21/3            |            | 5 | 3    | 6  |
| Callender's                                      | 15            | 20              | 51              | + 1             | 3 | 16    | 0  | Murex               | 20              | 20              | 105/9           | + 1        | 3 | 15   | 6  |
| ChlorideElec.Storag                              | e15           | 15              | 80/-            |                 | 3 | 15    | 0  | Pye Deferred (5/-)  | 25              | 25              | 27/-            | 12         | 4 | 12   | 7  |
| Cole, E. K. (5/-)                                | 10            | 15              | 30/-            | +2/6            | 2 | 10    | 0  | Revo (10/-)         | 173             | 17              | 42/6            | +6d.       | 4 | 2    | 4  |
| ConsolidatedSignal                               | 24            | 271             | 6               |                 | 4 | 11    | 6  | Revrolle            | 121             | 121             | 68/9            |            | 3 | 12   | 8  |
| Cossor, A. C. (5/-)                              | 71*           | 10*             | 27/-            | +2/-            | 1 | 17    | 0  | Siemens Ord         | 73              | 71              | 33/-            |            | 4 | 11   | 0  |
| Crabtree (10/-)                                  | 171           | 171             | 37/9            |                 | 4 | 12    | 9  | Strand Elec. (5/-)  | 71              | 10              | 7/9             |            | 6 | 9    | 0  |
| Crompton Parkinson                               | 1             | ~               | · ·             |                 |   |       |    | Switchgear & Cow-   | ~               |                 |                 |            |   |      |    |
| Ord. (5/-)                                       | 20            | 221             | 29/6            |                 | 3 | 16    | 3  | ans (5/)            | 20              | 20              | 18/6            |            | 5 | 8    | 1  |
| E.M.I. (10/-)                                    | 6             | 8               | 31/3            |                 | 2 | 11    | 2  | T.C.C. (10/-)       | 5               | 71              | 20/-            |            | 3 | 15   | 0  |
| Elec. Construction                               | 10            | 121             | 52/-            |                 | 4 | 16    | 2  | T.C. & M.           | 10              | 10              | 52/6            | +6d.       | 3 | 16   | 0  |
| Enfield Cable Ord.                               | 124           | 121             | 57/6            |                 | 4 | 7     | 0  | TelephoneMfg.(5/-)  | 9               | 9               | 11/-            |            | 4 | 1    | 10 |
| English Electric                                 | 10            | 10              | 50/-            | +6d.            | 4 | 0     | Ő  | Thorn Elec. (5/-)   | 20              | 20              | 23/9            |            | 4 | 4    | 2  |
| EnsignLamps (5/-)                                | 25            | 15              | 21/3            |                 | 3 | 10    | 8  | Tube Investments    | 20              | 20              | 97/-            | +6d.       | 4 | 2    | 4  |
| Ericsson Tel. (5/-)                              | 22*           | 20*             | 55/-            | +6d.            | 1 | 16    | 6  | Vactric (5)-)       | Nil             | Nil             | 14/6            |            |   |      | -  |
| Ever Beady (5/-)                                 | 40            | 40              | 41/-            | +60.            | 4 | 17    | 7  | Veritys (5/-)       | 71              | 71              | 7/6             |            | 5 | 0    | 0  |
| Falk Stadelmann                                  | 71            | 71              | 33/6            | , our           | â | Â.    | 7  | WalsallConduits(4)  | -)55            | 55              | 48/6            |            | å | 10   | 7  |
| Ferranti Pref.                                   | 7             | 7               | 30/~            |                 | 4 | 13    | 4  | Ward & Goldstone    | )00             | 00              | 10/0            |            | - | 10   |    |
| G.E.C.   |               |                 | 00,             |                 | - | 20    | -  | (5/-)               | 20              | 20              | 26/6            |            | 3 | 15   | 6  |
| Pref.  | 61            | 61              | 34/-            |                 | 3 | 16    | 6  | WestinghouseBroke   | 121             | 14              | 73/-            |            | 3 | 16   | 9  |
| Ord.   | 171           | 171             | 93/-            | +6d             | 3 | 15    | 1  | West, Allen (5/-)   | 71              | 71              | 7/3×4           |            | 5 | 3    | 5  |
| $\bullet$ Dividends are paid free of Income Tax. |               |                 |                 |                 |   |       |    |                     |                 |                 |                 |            |   |      |    |

## Stocks and Shares (Continued from page 684)

will be forgotten in the generous increase in dividends that is expected to take place.

## Johnson & Phillips

Johnson & Phillips shares at 74s. 6d. are 1s. higher, and now give a yield of  $4\frac{1}{16}$  per cent. on the money. This is a measure of the confidence which shareholders in the company place in the security of their shares. The company's gross profit for the year ended December 31st, 1943, was £510,000, about £2,400 better than that of the previous year, but the net profit as stated in last week's Electrical Review, was £28,000 higher owing to reduction in the taxation provision. The company's profits have gone ahead by leaps and bounds during the past ten years. For 1934 the trading profit was £128,848, and the dividend  $7\frac{1}{2}$  per cent. The latter was raised to 10 per cent. in 1935. In 1939 it was advanced to 15 per cent., which is the rate at present being distributed. The company's issued share capital is £800,000. There is £368,000 in 41 per cent. debenture stock, redeemable at 100 in 1976 or at 102 on any earlier interest date after July 1st this year

upon six months' notice. Johnson & Phillips control various small undertakings connected with the business, and are represented in most parts of the world.

### Foreign Issues

Prices of issues in foreign companies have The Mexican Light & been recovering. Power Co. has made so considerable an improvement in its earnings that the 6 per cent. income stock, which some time ago was hardly saleable at 5, has risen to 45. The company's 5 per cent. first mortgage bonds, the price of which fell below 100 earlier this year, are now  $102\frac{1}{2}$ . In the European list, Barcelona Traction 6½ per cent. prior lien bonds have risen 5 points, to  $57\frac{1}{2}$ , in consequence of the new understanding established with Spain. There is a disposition to pick up the fl ordinary shares, quoted at about 10s. 3d., of Whitehall Electric Investments, on the impression that the air in Greece is beginning to clear, and that, when Greece becomes free once more, the Athens undertaking of the company will again be of value. Brazilian Tractions still fail to respond to the recent increase in the company's dividend, and at  $26\frac{1}{4}$  are  $\frac{1}{2}$  lower.

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# **NEW PATENTS**

# Electrical Specifications Recently Published

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

KTIEBOLAGET Ljussignaler, and G. G. A Ericsson.—" Recording apparatus."

Akt.-Ges. Brown, Boveri & Cie.---" Com-pressed air drive for electric circuit-breakers with air damping." 2902 43. February 20th,

1942. (560742.) Automatic Telephone & Electric Co., Ltd., C. Gillings and L. J. Murray.—"Telephone

C. Gillings and L. J. Murray.—" Telephone or like systems employing crossbar switches." 18581. December 31st, 1942. (560732.) Automatic Telephone & Electric Co., Ltd., C. Gillings, C. E. Beale and T. B. D. Terroni. —" Telephone or like systems." 14466. October 15th, 1942. (560794.) " Telephone or like systems." 3044:44. October 15th, 1942. Divided out of 560794. (560807.) A. H. Blue, R. D. Wood and H. P. Bridge.— " Sound and like recording and electron glow lamps thereof." 1271. January 31st, 1941. (560746.)

(560746.)

J. E. Boast and S. W. G. Beard.—" Electric control circuits of hydraulically - operated variable - pitch propellers." 15032. October 26th, 1942. (560836.)

British Insulated Cables, Ltd., G. H. Walton, J. C. Quayle and P. Jones.—" Automatic control of temperature in heating by highfrequency current." 14399. October 14th, 1942. (560791.)

1942. (560/791.)
British Thomson-Houston Co., Ltd.—" Flash lamps." 705 43. January 21st, 1942. (560737.)
"Means for use in adjusting vehicle head-lamps." 14999 42. October 28th. 1941. (560797.) "Cathodes for electrical discharge devices." 9466 42. July 12th, 1941. (560844.) British Thomson-Houston Co., Ltd. (General Electric Co.).—" Methods of conditioning anodes for X-ray generating apparatus." 7636. June 4th, 1942. (560815.)
British Thomson-Houston Co., Ltd., and

British Thomson-Houston Co., Ltd., and E. R. Edinborough.—" Electric lighting fittings." 16232. November 17th. 1942. (360805.) C. C. Browne.—" Adjustable reactances." 4569. April 5th, 1941. (560711.) Dudd Ladurting Lighting Lighting Lighting.

Budd Induction Heating, Inc.—" Induction heating apparatus." 12589 43. March 21st, 1941. Divided out of 560630. (560837.)

Callender's Cable & Construction Co., Ltd., and S. J. Bryce.—" Cleat or clamp for electric conductors." 1513. January 29th, 1943. (560740.)

J. Cartner and A. L. Stuchbery .--- Methods

J. Carther and A. L. Stochory. — Methody, of and apparatus for electric resistance welding. 16490. November 21st. 1942. (560726.) P. F. Clark.— Apparatus for the laying of underground cables or the like. — 11196/42. August 5th, 1943. (560820.) Hazeltine Corporation.— Devices for pro-ducing interlayed scanning in television

ducing interlaced scanning in television apparatus." 3538/42. April 25rd, 1941. apparatus." (560749.)

C. M. Jarvis .- " Electric motor control

systems for electric winches and the like." 11275. August 12th, 1942. (560821.)

Marconi's Wireless Telegraph Co., Ltd.— "Methods of making hermetic glass-to-metal seals." 14125 42. October 8th, 1941. (560717.) "Methods of and apparatus for heating an electric conductor employing high-frequency electric currents." 9630/42. July 10th, 1941. (560755.)

Philips Lamps, I.td., and J. H. de Boer.-Flashlight lamps." 6305 41. July 15th, 1942. (560776.)

Platers & Stampers, Ltd. (E. Katzinger Co.).—"Flashlights." 12651. September 8th, 1942. (560763.)

Revo Electric Co., Ltd., and F. H. Reeves.— "Fluorescent tubular discharge lamp fittings." 15442. November 3rd, 1942. (560725.)

15442. November 3rd, 1942. (560725.)
"Fluorescent tubular discharge lamp fittings."
15449. November 3rd, 1942. (560802.)
A. Reyrolle & Co., Ltd., A. T. Robertson and I. J. S. A. Crawshaw.—"Time-lag or delay action devices." 11263. August 12th, 1942. (560760.)
M. P. Rubert.—"Electrically-heated soldering irons." 622. January 13th, 1943. (560806.)
Sodeco Soc. des Compteurs de Geneve.—"Coin-testing mechanism for prepaying apparatus." 9855 42. July 26th, 1941. (560756.)

apparatus.' (560756.)

Stevens (Electronic Laboratories, A. H.

A. H. Stevens (Electronic Laboratories, Inc.).-" Electric circuit interrupting systems."
 6876. May 20th, 1942. (560752.)
 J. Swinney and Metropolitan-Vickers Electrical Co., Ltd.-" Liquid-immersed elec-trical switchgear." 17605. December 10th, 1942. (560728.)

Telephone Manufacturing Co., Ltd., and L. H. Paddle.—" Thermionic oscillation gene-rators." 11338. August 13th, 1942. (560780.) N. H. Thomas and London Passenger Trans-

port Board.—" Arc-quenching device for use with current collectors." 14187. October 9th, 1942. (560769.) "Arc-quenching device for use with current collectors." 15240. October 30th, 1942. (560772.)

Westinghouse Electric International Co.-"Method of producing compositions for activating metal and alloy metal surfaces to improve the process of forming corrosion resistant coatings thereon." 14471 42. October 25th, 1941. (560847.) "Production of phosphate coatings on the surfaces of metals and alloys." 14472 42. October 25th, 1941. (560848.) S. Y. White.—" Sockets for radio valves." 9430 42. July 7th, 1941. (560779.)

## Coventry Club "Brains Trust"

THE May meeting of the Coventry Electric Club took the form of a "Brains Trust," the members of which were Dr. Hanney and Messrs. F. W. Godden, W. J. Bird, J. W. Dainty and G. S. Nott, with Mr. J. Sherwin as question-master. A series of interesting questions were put forward and the replies, besides being illuminating, were sometimes the attendance was a record for the amusing. The attendance was a record for the Club.

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# **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.

Birkenhead.—May 15th. Electricity Department. Cables and meters. (May 5th.)

Plymouth.—May 20th. Electricity Department. Supply and delivery of portable filtration plant for electrical insulating oils, and one outdoor type three-phase auto-transformer. (April 28th.)

# **Orders Placed**

**Bootle.** — Health Committee. Accepted. Wireless installation at sanatorium (£78).— Rushworth & Dreaper.

Durham.—County Council Emergency Committee. Accepted. Electric lighting at 29 shelters (£352).—W. T. Purvis, Whitburn.

Ilford and Barking.—Joint Sewerage Committee. Accepted. Switchgear for pumping station (£1,555).—Metropolitan-Vickers.

London.—METROPOLITAN WATER BOARD. Accepted. Two electrically driven centrifugal pumps at western area station (£4,776).— Worthington-Simpson. Two electrically driven borehole pumps for Kent area (£2,025).— Hathorn Davey & Co.

Manchester. — Electricity Committee. Accepted. Static transformers for twelve months.—Ferranti. Replating of batteries.— Young Accumulator Co. Three 10-cwt. electric vans.—A. E. Morrison & Sons.

Transport Committee. Accepted. Cadmium copper trolley wire.—Richard Johnson & Nephew.

Health Committee. Accepted. Potatopeeling machine for Booth Hall Hospital.— Peerless Electrical Mfg. Co.

Salford.—Light, Heat and Power Committee. Accepted. 1,000-kVA switch cubicle (£397).—A. Reyrolle & Co.

Wallasey. — Development Committee. Recommended. Improved stage lighting at the Floral Hall (£99).—Strand Electric & Engineering Co.

Worthing.—Electricity Committee. Accepted. Paper-insulated cable for twelve months.— Britannic Cable & Construction Co.

# **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.

Bolton.—Works additions, Holland Street; Phillipson & Co., Ltd.

Brentwood.—Fire station for N.F.S.; surveyor, Urban Council Offices.

**Cambridgeshire.** — Additions at Grammar School, Soham; county architect, Cambridge.

Canterbury.—Senior girls' school. near Municipal Hospital : city engineer. Chippenham. — Recreation centre ( $\pounds 5,000$ ), between Lowden and Spanbourne Avenue; borough engineer.

Collyhurst.—Works additions, Sand Street; J. Wilcox, junior, 53, Polefield Road, Blackley.

Esher.—Technical training institutes, Lovelace estate; surveyor, Urban Council Offices, Esher, Surrey.

Gateshead.—Canteen at the North East Trading Estate; H. E. Pitt, Ltd., Leopold Street, Millfield, Sunderland.

Gloucestershire.—Kitchen and dining room-Kingswood High Street Council School, near Bristol (£1,388); W. & D. Malpass, contractors, Mangotsfield Road, Staple Hill, Bristol.

Hereford.—Warehouse additions: West Midland Egg Packers, Ltd., Hereford Egg Packing Station.

Hull.—School sculleries, Fifth Avenue and Endyke Lane (£2,398) and part reconstruction. Hopewell Road school (£5,000); city architect.

Hopewell Road school (£5,000); city architect. Three experimental houses, Oak Road: Tarran Industries, Ltd.

Ilkeston.—Works, : G. R. Wilkins & Co. Ltd., builders, Lyon House, Richmond, Surrey

Leeds.—Extensions to St. James's Hospital. Beckett Road; borough engineer.

Middleton. — Crematorium. Boarshaw Cemetery; borough engineer.

Newcastle.—Proposed conversion of empty shops and larger houses into flats: R. G. Roberts, housing architect, 18, Cloth Market.

Oxford.—Kitchen dining room blocks at Garsington, Great Haseley, Henley Church Senior and Witney Church Junior Schools: county architect, Oxford.

Patricroft. — Works additions: Mitchell. Shackleton & Co., Ltd., Vulcan Works.

Pickering.—Works extensions; H. S. Burgess. Beckside, Thornton-le-Dale.

Plawsworth (County Durham).—Miners' hostel: Cackett, Burns Dick & McKellar, Ellison Place, Newcastle-on-Tyne.

Reading.—Demonstration houses : borough engineer.

Rotherham. — Works additions, Fullerton Road: Wagon Repairs, Ltd.

Sandwich (Kent).—Additions and alterations to laundry premises, Woodnesborough Road; Sandwich Model Laundry.

South Shields.—Extension of the Maternity Hospital and provision of a wartime nursety: N. G. Richardson, borough engineer, Town Hall, South Shields.

Urmston.—Cottage Hospital (£10,000); J. E. Ratcliffe, hon. architect, 7, Cheapside, Manchester.

West Riding.—Experimental country school, Sowerby Bridge area; county architect, County Hall, Wakefield.

Wigan. — Convalescent Home, Knowsley Road, Southport; Governors, Royal Albert Edward Infirmary.

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Secure Tufnol firmly against the die face until the punch enters. Punch must be parallel, smooth and only just enter the die.

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May 12, 1944



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In the modern cable factory, mile upon mile of cables and wires of all types flow from the machines, but these machines have to be designed, maintained and controlled by highly skilled workers. Turning to the finished product, strict specifications and high standards of performance call for precision and close scientific control, also making imperative a competent staff of highly skilled workers.

Henley's, therefore, by giving due attention to matters of personnel as well as to all materials and methods employed in manufacturing processes, are maintaining the pre-eminent position in the

cable-making industry which they have held for over a hundred years.





Manufacturers of Electric Cables and Wires of all types, with Insulations of Cotton, Silk, Enamel, Rubber Substitutes, Thermoplastic (P.V.C. etc.) Materials, Bitumen, Paper, Varnished Cambric, etc.

also of Ironclad and Insulated Service Fuses, Joint Boxes. Distribution Pillars and Panels, Underground Disconnecting Boxes, Jointing Materials and Cable Accessories of every description.

Wire Drawers and Manufacturers of all types of Aerial Conductors.

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD. MILTON COURT · WESTCOTT · DORKING · SURREY



# at the service of the Empire

G.E.C. Switchgear is serving public utility and industrial electric undertakings in all parts of the world. The familiar G.E.C. trade mark can be seen on many Switchboards of the highest capacity now in service.

In wholehearted devotion to the war effort, the entire G.E.C. technical and manufacturing resources have been geared to national demands, and in surmounting the urgent and numerous problems that have arisen, the Company has made important technical advances in all applications of electricity, including electronics, that will be of great value to all concerned with reconstruction schemes after the war.

# Electrification Schemes

Electrification G.E.C. Schemes have heen applied to all industries. including: Aircraft Factories: Chemical Works; Collieries; Food Factories; Gold Mines; Iron, Steel and Copper Works; Locomotive and Railway Carriage and Wagon Works; Motor Car Works; Ships and Shipyards; Textile Mills, etc., etc.

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

S.E.C. always in the forefront of electrical progress

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May 12, 1944

ELECTRICAL REVIEW



# The PHILOSOPHER'S STONE

THE ancient alchemist sought the easy way to conversion in the Philosopher's Stone.

For centuries he searched in his ebullitions of frogs' legs and star dust for the magic talisman that woeld by simple touch effect miraculous change.

Electricity is the modern Philosopher's Stone,

manifested in the HEWITTIC RECTIFIER as the simplest of all means of conversion — changing alternating into direct current for every D.C. application.



Hewittic Rectifiers

HEWITTIC ELECTRIC CO. LTD. WALTON - ON - THAMES — SURREY Telephone : Walton-on-Thames 760 (8 lines)

Telephone : Walton-on-Thames 760 (8 lines Telegrams : "Hewittic, Walton-on-Thames"



# Something NEW in Switchgear!

Sordoviso produce a new Plug-in Contactor Here's some news ! Sordoviso Engineers have produced a new design in Switchgear featuring plugged-in relays and contactors which allow immediate accessibility to the mercury switch itself without the need of detaching a single screw. The coil unit (supplied with fuse and spare fuse) immediately accessible and interchangeable. The main contact is in an entirely separate compartment from the coil contact, so that the highest possible degree of insulation between the two is obtained, together with a most compact unit. Every part of this newly-designed instrument is, in fact, immediately accessible and can be dismantled and rebuilt in a few seconds! Available in three different ratings of 5, 10 and 15 amps, with a wide range of voltages up to 500 volts A.C.

(British & Foreign Patents). For full information write:



#### SORDOVISO SWITCHGEAR LTD.

220 The Vale, Golders Green, N W II 'Phone: Gladstone 6611-2 Contractors to Air Ministry, Ministry of A reraft Production, Ministry of Supply, Admiralty, War Office, Department of Petroleum Warfare, G.P O., I.C.I.-All Departments.



Times shown are those for the London area,

> Let the lengthening days of May, with more daylight in the factories, encourage and spur us to greater production efforts !

> There are still, however, 24-hour shifts to be worked, and in permanently blackedout factories artificial lighting has to be

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relied upon all the time. To maintain output, to lessen the strain on workers, lighting must be adequate.

Wherever you find high standards of lighting, designed with an eye to the well-being of workers to secure improved output, there you will find OSRAM.



Adm. of The General Electric Co. Led., Magna House, Kingstory, Louis, W.C.s.



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### ELECTRICAL REVIEW

"CLASSIFIED **ADVERTISEMENTS**.

ADVERTISEMENTS for insertion in the following Finday's issue are accepted up to First post on Monday, at Dorset House, Stamford Street, London, or Whitsun see notice below.)

S.E.I. this is a consider 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 Box Nuraber there is 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 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 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, Stam-ford Street, London, S.E.I. Cheques and Postal Orders should be made payable to ELECTRICAL REVIEW LTD, and crossed REVIEW LTD, and crossed.

Original testimonials should not be sent with applications for employment.

4983

# WHITSUN

Classified Advertisements for our issue of June 2 should reach us by first post on FRIDAY, May 26

## SITUATIONS VACANT

#### COUNTY BOROUGH OF NEWPORT

**Electricity Department** 

Appointment of Substations Charge Engineer

THE Newport Corporation invite applications for the position of Substations Charge Engineer. Candidates must be preferably not less than 30 years of age, and must have had a thorough technical training and experience in the operation of large rotary substations. The appointment will be in Class H. Grade 9a. of the National Joint Board Schedule (present net salary £316

per annum)

per annum). Candidates, before appointment, will be required to pass a medical examination, and, if appointed, to contribute to the Corporation's superannuation scheme. Applications must be made only on the official form, to be obtained from the undersigned, and requests for forms must be accompanied by stamped addressed envelopes. Applications, with copies of not more than three recent references, must be delivered to the undersigned not later than 10 a.m. on Monday, 22nd May, 1944. T. H. WOOD

T. H. WOOD. Borough Electrical Engineer and Manager.

Electric House. 191/2 Dock Street, Newport, Mon. 1st May, 1944.

х.

SHIPLEY URBAN DISTRICT COUNCIL

#### **Electricity Department**

### Appointment of Substation Attendant

A PPLICATIONS are invited for the position of Sub-station Attendant for shift duties in the Council's Dockfield Works. Applicants should have had sound experience in the control of high and low pressure switch-boards and the operation of rotary converting plant.

Conditions of service and rates of pay (at present £5 4s. per average week of 48 hours) are in accordance with the District Joint Industrial Council, No. 2 Area. The position is superannuated and the successful candidate will be required to pass a medical examination and contribute to the superannuation fund.

Applications, giving age, details of training and ex-perience, present position concerning service with H.M. Forces, and accompanied by copies of two recent testi-monials, should be delivered to the undersigned on or before Friday, 19th May. 1944.

# NIGEL L. DUNCAN. Engineer and Manager.

Electricity Dept. Dockfield, Shipley, Yorks.

4982

#### BOROUGH OF LUTON

#### Electricity Undertaking

A PPLICATIONS are invited for the position of Switchboard Attendant.

Applicants must have sound experience in the control of high and low pressure switchboards and the operation and maintenance of rotary converting plant.

and maintenance of rotary converting plant. Conditions of service and rate of pay will be in accord-ance with the National Joint Board Schedule, Class G. Crade 9 (a) (present salary £297 per annum). The successful candidate will be required to pass a medical examination and to contribute to the Corpora-tion's Superannuation Scheme. Applications, giving age, details of training and experi-ence, present position regarding service with H.M. Forces, and accompanied by copies of two recent testimonials, must be delivered not later than Thursday, 1st June, 1944 to -1944. to:

C. T. Melling, M.Sc. (Tech.), M.I.E.E., A.M.I.Mech.E., Borough Electrical Engineer, Electricity Offices, St. Mary's Read, Luton, Beds, Canvassing directly or indirectly, will disqualify. W. H. ROBINSON, W. H. ROBINSON,

Town Hall. Town Clerk Luton. 5th May, 1944.

#### CITY OF NOTTINGHAM ELECTRICITY DEPARTMENT

101

A PPLICATIONS are invited for the appointment of JUNIOR SWITCHBOARD ATTENDANT for NORTH WILFORD GENERATING STATION, NOT TINGHAM.

The appointment will be permanent, subject to satis-

The appointment will be permanent, subject to satis-factory service. Applicants must have taken a recognised course of practical and technical training and have experience in the operation of Switchgear in a large Generating Station. Preference will be given to Student or Graduate of the Institution of Electrical Engineers. Salary will be in accordance with the N.J.B. Schedule, Class H, Grade 10, at present £285 per annum. The successful candidate will be required to pass a medical examination, as the appointment is subject to the provisions of the Local Government Superannuation Act. 1997.

Applications, containing full details of age, training and experience, accompanied by copies of recent testimonials and endorsed "Junior Switchboard Attendant." must be received by the undersigned not later than first post on Friday, MAY 26th, 1944.

|                               | J. 16. 1 | RICHARDS,   |
|-------------------------------|----------|-------------|
| Juildhall.                    |          | Town Clerk. |
| Nottingham.<br>May 5th, 1944. |          | 107         |

A N Electrical Contractor's Manager required by Eastern Counties firm at present engaged on work of national importance. Must be a "live," capable man with sound knowledge estimating, buying, labour control and up-to-date business methods. Permanent post with excellent post war prospects. Replies treated in strict confidence. State experience, age and commencing salary.—Box 5841, c/o The Electrical Review.

5

### B. E. A. I. R. A.

THE Council of the above Association are making an THE Council of the above Association are making an early appointment of a new Director. Age preferably not exceeding 50 years. Commencing salary not less than \$2,000 per annum (with Superannuation F.S.S.U.). If desirable that the new Director should be able to take up the appointment at an early date. Applications, with supporting particulars, should be sent under personal cover to the Chairman of the Council, The British Electrical and Allied Industries Research Association, 15, Savoy Street, London, W.C.2. 4987

London, W.C.2. 4987 DEPUTY Chief Engineer. Location, City of Man-fully qualified electrical engineers with administrative ex-perience (preferably in a large electricity undertaking). They must possess a wide knowledge of electrical and mechanical engineering practice, have held a position of high responsibility and must be Corporate Members of the Institution of Electrical Engineers. The appointment will be subject to the City Council's Superannustion Scheme, and the successful applicant will be required to pass a medical examination. Copies of testimonials are required. Applicants should write, quoting D.834XA, to the-Ministry of Labour and National Service, Room 432, Alex-andra House, Kingsway, London, W.C.2., for the neces-sary forms which should be returned completed on or before 31st May, 194. Defision fully and the the denical, required by pro-gressive firm in the Midlands, manufacturers of all types of regulators, resistances and heating elements. Good practical knowledge and drawing experience essential. Write stating full particulars, qualifications, etc., and salary required. Box 4991, c/o The Electrical Review. DRAUGHTSMAN. Part time draughtsman required with knowledge of resistances, potentiometers, rheo-stats, etc. Midland area.—Box 5864, c/o The Electrical Review.

state, etc. Midland area.—Box 5864, c/o The Electrican Review. **D**LECTRICAL Engineers (London) require Man for office. Must be able to type. Discharged soldier or exempt.—Box 5868. c/o The Electrical Review. **D**LECTRICAL Manufacturers require Lighting Repre-sentatives for Soctland. North-East Coast, Yorkshire. West Country with South Wales, London. Electrical and lighting knowledge desirable. Ex-Service men preferred, age limit 36. Reasonable remuneration with sound post-war prospects. Details of education, areas known. National Service position, and if car driver, to—Box 4986, c/o The Electrical Review. **D**LECTRICAL Wholesalers require a Clerical Assistant. Conversant with trade and materials as handled.— **Box 24.** c/o The Electrical Review. **D**NSTALLATION Contracts Manager for established con-

INSTALLATION Contracts Manager for established con-

Box 24. c/o The Electrical Review. INSTALLATION Contracts Manager for established con-tractors having pre-war activities throughout Great and the present of the required to control branch office in large Midland town and have necessary qualifica-tions to negotiate large contracts, mainly new construction works, and preferably wide experience of consulting engineers' and architects' requirements. The position envisages post-war developments and is not for the duration of the war. Replies, giving detailed previous experience and remuneration required, will be treated in strictest confidence by principal only.—Box 4956, c/o The Elec-trical Review. EVER Brothers & Unilever Limited announce that after treinstatement of the large number of their technical staff who have been employed on national service they will still have vacancies in their research departments and them is to these appointments will be invited. An appreciable proportion of the positions available will be suitable for scientists capable of controlling research sections, and applicants will require to be in the 30/40 age group. The maining posts will required appresent, if intending applicants would like further information regarding these outs they should apply to the Personnel Department. Lever Brothers & Unilever Limited, Unilever House, Black-firars, London, E.C.4. 468 Sattes Correspondent and Estimator to handle enquiries and orders for A.C. Electric Motors. Full marticulars

Triars, London, E.C.4. 4468 GALES Correspondent and Estimator to handle enquiries and orders for A.C. Electric Motors. Full particulars of age, education, training, experience and salary required, to-Box No. 226. Reid Walker, Field House, E.C.4. 4985 STOREMAN required by London office of wholesale dis-tributors. Please write, stating experience, age, salary required, etc., to-Box 4974, c/o The Electrical Determined States and States Review

TRAVELLER for Potteries wanted, E.L.M.A. Lamps, experienced, must have reliable connection. and expenses.—Box 4975, c/o The Electrical Review. Salary SHIFT Charge Engineer required for large Municipal

Shifts Charge Engineer required for large Municipal optimized of the present salary of versions of the local semiconduction of the present of the present

## APPOINTMENTS FILLED

Dissatisfaction having been so often expressed that un-successful 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.

PETERBOROUGH Corporation-Deputy Electrical Engineer and Manager

## SITUATIONS WANTED

A B.Sc. (Eng.). 20 years production. design. development

A B.Sc. (Eng.). 20 years production, design, development and management, seeks substantial post, £850 p.a. Works, technical-selse or general management.—Box 5820. C/o The Electrical Review. COMMUNICATIONS Engineer (30), exempt, requires permanent responsible post. Certificates; ten years experience with G.E.C., B.B.C., G.P.O., Ericssons, in-cluding survey, installation, staff control.—Box 5860, c/o The Electrical Review. ELECTRIC Heating. Electrical Engineer (50), ex-perienced in design and sales of space and water heating equipment, cooking and domestic appliances, wishes to contact manufacturer. London and Southern area. Con-tacts with Government departments & supply authorities. —Box 5834, c/o The Electrical Review. ELECTRICAL Engineer, responsible for works main-tenance and installation, etc., commercial adminis-tration, organisation, planning and aircraft experience, age 49 years, free immediately.—Box 5845, c/o The Elec-trical Review. ELECTRICAL Engineer (34), with a wide range of

age 49 years, free immediately.—Box 5845, c/o The Elec-frical Review. **ELECTRICAL Engineer** (34), with a wide range of experience in installation work, contracts up to \$60,000, and of proved husiness ability, seeks appoint-ment abroad.—Box 5819, c/o The Electrical Review. **ELECTRICAL Supervising Engineer seeks position elec-trical contractors**. 25 years' experience in control of contracts, office routine, labour, store control. Free.— Box 5863, c/o The Electrical Review. **ENGINEER**, Mechanical and Electrical, seeks position manager and superintendent. Long practical expreience on electrical instruments and similar precision apparatus, including tool and mould design, planning, rate fixing, estimating, conversant with modern machine tools, metals and alloys. Used to all classes of labour and training of same to get best results. Over 40 years of age. Salary \$1,000 n.a.—Ray 5822, c/o The Electrical Review. **R EPERESENTATIVE**, well connected West of England. seeks position with manufacturer electrical supplies.— Box 5858, c/o The Electrical Review.

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# FOR SALE

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

## GENERATING PLANT

Diesel Generating Sets, Blackstone engines driving 200-y. D.C. dynamos; (one) model 55.1. 32 h.p., 250 r.p.m., 19 kW; (two) models of the set of the physical set of the omprising four tasks with inlet and outlet connec-tions from the set of the physical set of the omprising four tasks with inlet and outlet connec-tions, renewed (January, 1944) 2,000-gall, fuel task, complete switchboard and voltmeters, ammeters, mains bores, busbars, equaliser gear and theostats. Both engines reconditioned by Blackstone 1.1d, in January of this year, and have only been used since for keeping the engines from depreciating two men. These engines cost, pre-war, including the dynamos and cooling system, 31.550. The condition through is a good as new. 2800 complete, or near offer.

#### NORMAN REEVES (MOTORS) LTD.,

WINDSOR ROAD, SLOUGH, BUCKS. Telephone: Slough 22337/8.

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#### ENGINES

45-b.h.p. vertical single-cylinder PETTER Atomic Diesel Engine, new 1932, 375 r.p.m., cold start, complete

Engine, new 1932, 375 r.p.m., cold start, complete with accessories. 374/42-h.p. vertical single-cylinder CROSSLEY enclosed Diesel Engine, No. 103235, new 1935, 500 r.p.m., cold start, complete with accessories. 43/49-h.p. CROSSLEY horizontal single-cylinder solid injection cold start Diesel Engine, No. 91399 (1925). 250 r.p.m., complete with accessories. 27/30 h.p. NATIONAL vertical 3-cylinder high-speed Diesel Engine, type "3D." No. 42710, new 1939, 1.000 r.p.m., hand or compressed air starting, complete with accessories

11.0... und treatment of the completence of accessories. 26-h.p. CROSSLEY horizontal single-cylinder Diesel Engine, type H.D.E.8, No. 118040, new 1935, 340 r.p.m., cold starting, complete with accessories.

We can offer generators with any of the above.

NEWMAN INDUSTRIES LIMITED. YATE, BRISTOL 4996

#### WATER TUBE BOILERS IN STOCK

| Three | 12.000 | lbs. | evaporation, | 200 | lbs. | W.P. |
|-------|--------|------|--------------|-----|------|------|
| One   | 12.000 |      |              | 160 | 1.0  |      |
| Опе   | 4,000  |      |              | 160 |      | 1.4  |

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.

MODINSTAL ELECTRIC COMPANY, LIMITED INDUSTRIAL INFRA-RED APPARATUS FOR PAINT DRJING. COMPLETE EQUIPMENTS OR SINGLE UNITS PROVIDED. GUARANTEED HEAT GENERATORS. OLDHAM WORKS, OLDHAM TERRACE, ACTON. W.3, LONDON. Telephone: Acom 3504/5. M.E.C. APPARATUS. DULL EMITTER SYSTEM. GEORGE COHEN, SONS & CO., LTD.

SUPPLIERS OF SECONDHAND GUARANTEED ELECTRICAL PLANT.

### SHOWROOMS AT : WOOD LANE.

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Telephone: Shepherds Bush 2070.

#### STANNINGLEY, NEAR LEEDS.

Telephone: Pudsey 2241.

LICENCES IN PRACTICE

(No. 1) Order, 1943, Ministry of Supply, Control of Industrial Elec. Equipm.

Our daily experience when selling

ELECTRIC MOTORS \* GENERATORS TRANSFORMERS \* GENERAT.-SETS etc.

makes us familiar with the ruling of this Order, thus enabling us to minimise inconvenience and delay for purchasers.

Ask :

J. GERBER & CO. LTD., Wembley, Middx. Phone, Wembley 3691. Grams, Powaguide (Phone), London.

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100 b.h.p., 600 r.p.m., 400-volt, 3-phase, 50-cycle Slip-ring Motor. Makers, Mavor & Coulson.
100-b.h.p., 585-r.p.m., 400-volt, 3-phase, 50-cycle Slipring Motor. Makers, B.T.H.
6-b.h.p., 930-r.p.m., 350/400-volt, 3-phase, 50-cycle. Maker. Parkinson.
3-b.h.p., 1.400-r.p.m., 400-volt, 3-phase, 50-cycle, S.C. Maker, Parkinson.

Enquiries Invited.

ELECTRAWINDS LIMITED.

270. ATTERCLIFFE ROAD. SHEFFIELD, 4. 4932

# TAPS FOR BULLET PROOF STEEL. COPPER, BRASS, ALUMINIUM AND BAKELITE

FIRST quality, oil hardened. Relief and Flute Ground. EQUAL IN HARDNESS to HIGH SPEED (58/60 Rockwell). All BA sizes and BSF and Whit. up to HAND. MACHINE, NUT RUN-OVER; also DIES. Any quantity, prompt delivery.

GERALD SUMMERS LTD., 67, HATTON GARDEN, LONDON, E.C.1, Phone, HOL. 4849. Send sample order and be convinced. 5835

ECONOMISERS IN STOCK

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

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

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## REBUILT MOTORS AND GENERATORS

 $L^{\rm ONG}$  deliveries can often be avoided by purchasing rebuilt second and plant. We can redesign or replace surplus plant of any size.

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OVER 1,000 RATINGS ACTUALLY IN STOCK HERE.

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

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TENDERS are invited for the purchase of the whole or a parts of a 13-panel switchbcard: 6,600-volts, 3-phase. 150 mVA duplicate busbar, metal clad, compound filled. draw-out isolation. shaft operated, comprising two × 1,200-ampere and ten × 800-ampere feeder units and one × 1,200-ampere non-automatic bus coupling switch. together with control board and accessories. Inspection can be arranged by appointment. Address enquiries to—The Engineer and Manager,

Walsall Corporation, Electric Supply Department, Upper Bridge Street, Walsall, Staffs. 112

#### ELECTRIC MOTORS & DYNAMOS

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

For Sale or Hire. Send your enquiries to :-

BRITANNIA MANUFACTURING CO., LTD., 22-23 BRITANNIA STREET. CITY ROAD, LONDON, N.1. Telephone: 5512-3 Clerkenwell.

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London Stocks. Enquiries Welcomed. Small or Large Quantities Supplied.

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JOHN JOHN THOMPSON SELF CONTAINED SUPER ECONOMIC BOILER, new 1940 (worked for 18 months only), 8<sup>1</sup>/<sub>2</sub> ft. dia. × 14 ft. long, 8.000 lbs. per hour evaporation, 180 lbs. pressure. Complete with triumph stokers, induced draught fan, coal elevator and motors.

Inspection near London.

NEWMAN INDUSTRIES LIMITED, YATE, BRISTOL 1998

A large stock of Winches of our self-sustaining types. A also Searchlights (sale or hire), Mirrors, Lenses, A.I.D. Turnbuckles, etc., also surplus Carbon Rods, Ebonite and Fibre. Hundreds of thousands supplied during the last 40 years to Government departments, corporations and in numerable traders.—London Electric Firm, Croydon. 72 A.C. and D.C. Motors, all sizes, large stocks, fully guaranteed.—Milo Engineering Works. Milo Road. East Dulwich, S.E.22 (Forest Hill 4422). 5631

## 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.

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