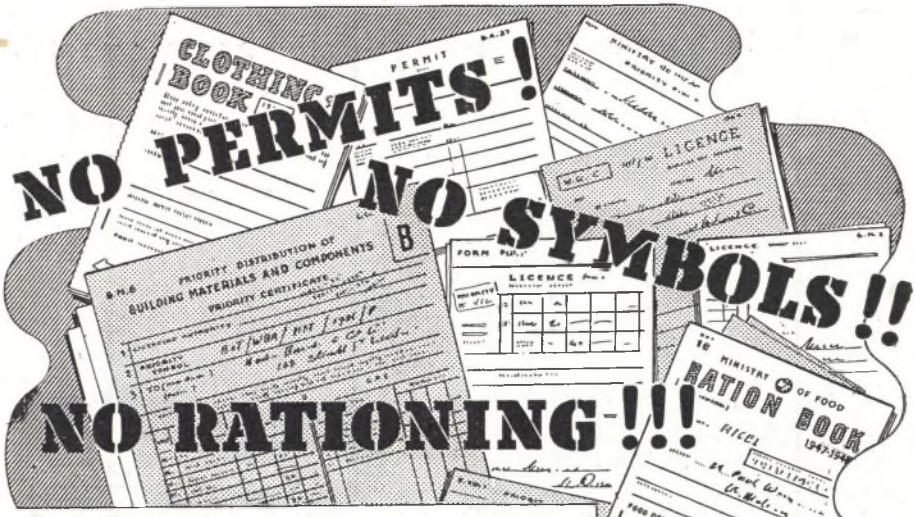
THE

ELECTRICIAN

THE TECHNICAL NEWSPAPER OF THE ELECTRICAL INDUSTRY

17 OCTOBER 1947
SIXPENCE



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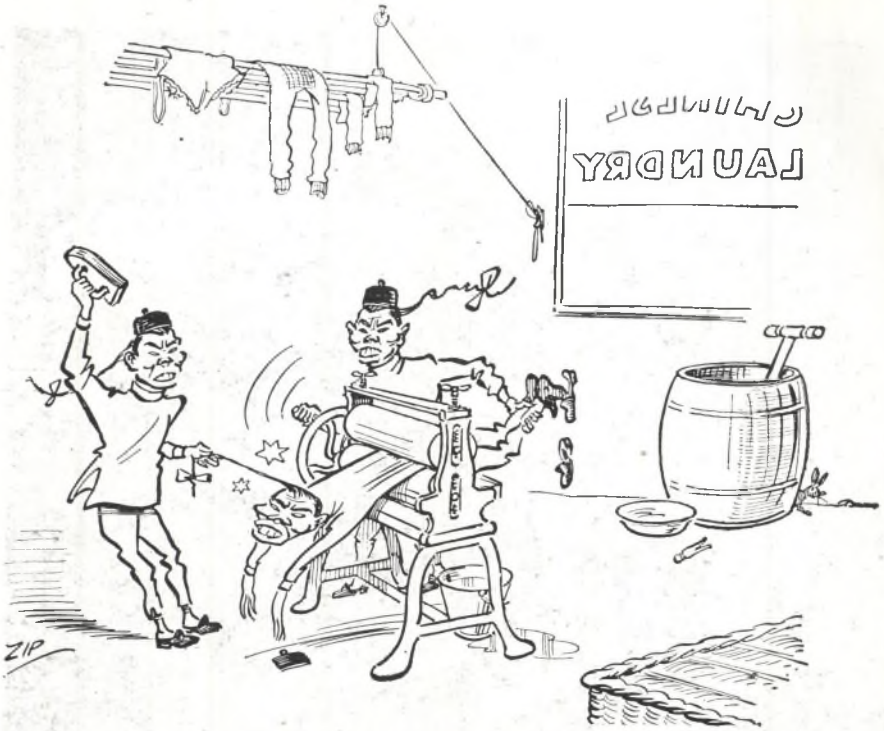

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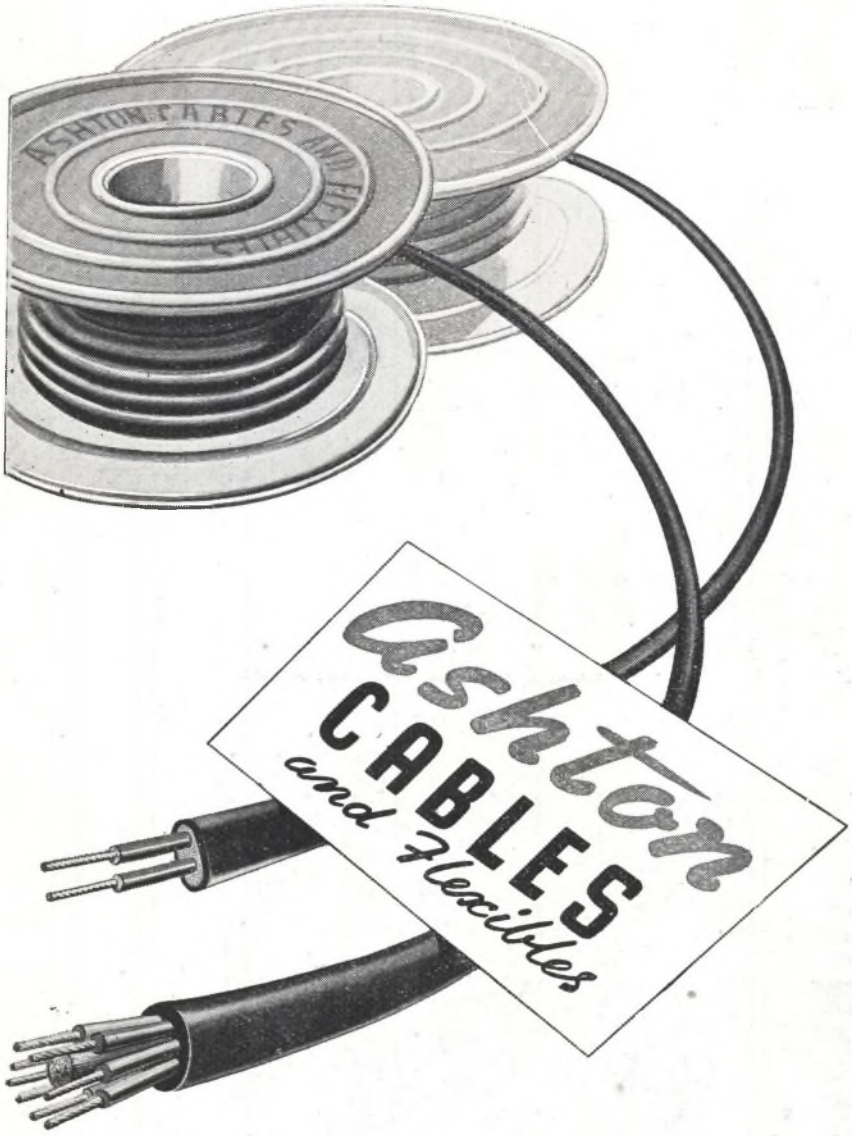

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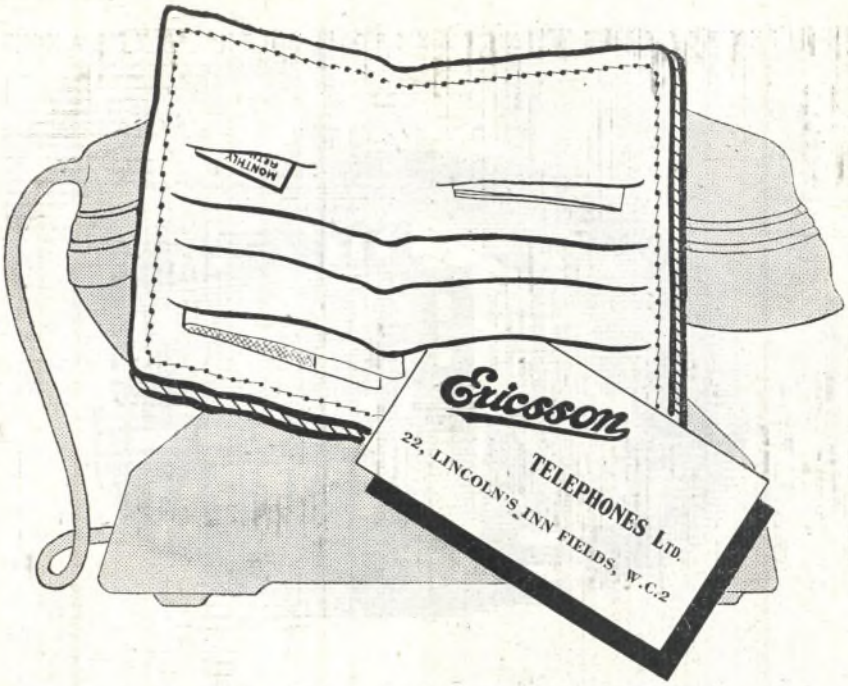

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Presidential Address

THE address which the President of the Institution of Electrical Engineers delivered at the inaugural meeting of the Session on October 9, was doubtless listened to by many with an ever-growing appreciation of the important part which the institution has played in the development of what is now generally known as industrial standardisation.

The seed from which has grown the organisation which to-day is invariably referred to with affection as the B.S.I.—but which until some years ago was the B.E.S.A.—was planted by the I.E.E. in 1882 when the institution issued rules governing electrical installations; from that small beginning has developed a body which enables all sections of industry to co-operate in the preparation of standards of every kind. To write of what has been done or of how it has been brought about would be little more than a history of the British Standards Institution, but in our abstract of Mr. PERCY GOOD'S remarks will be found details of the ideals which he has so enthusiastically pursued since 1913. That he has met with a large measure of success and that the B.S.I. serves a purpose not catered for in any other way, is evidenced by the number and variety of British Standards accepted, not only by electrical engineering but by practically every other form of industry.

A special point of interest raised in the address is in connection with the powers vested in the British Electricity Authority to manufacture the machinery or equipment it is likely to use, for while

Mr. GOOD believes in some form of public control of the generating and distribution side of electricity supply, the Authority should not, in his view, attempt to manufacture. The reason why he supports those many others holding the same opinion, is that the engineering mentality best suited for the generating side is very different from that for the manufacturing interests of the industry, by reason of the fact that those responsible for running machinery have to be satisfied with the plant for many years, whereas the manufacturing engineer should be temperamentally desirous of improving his product and always making progress.

Coal for Winter

ADDRESSING his first Press conference as Minister of Fuel and Power, on Tuesday afternoon, Mr. HUGH GAITSKELL gave an assurance that power stations will this winter receive sufficient coal to enable them to meet all demands. We cannot afford to have, he stated, a shutdown such as occurred last winter. If electricity consumption rises above the level programmed it may be necessary, therefore, to divert coal from elsewhere, and that means from industry. Translated into figures, the position is that for the six winter months, November 1 to May 1, electricity undertakings are scheduled for a consumption of 16.45 million tons (632 692 tons per week), against an actual consumption over the same period last year of 15.5 million tons (596 154 tons per week). This represents an increase in consumption of just over 6 per cent., a margin alarmingly slender when the effect of load-spreading in prolonging periods of peak demand and the still-unknown increase in domestic load since last year are borne in mind, and when it is recalled that the 15.5 million tons used last winter reflect the three weeks' stoppage in which consumption by power stations was well below average.

Electricity and Compulsory Cuts

IF the supplies allocated to generation are exceeded, industry will not, according to Mr. GAITSKELL, be able to get through, and therefore, "non-essential" consumers must reduce their consumption by at least 10 per cent. below the level of last year. Whether such a reduction is, in fact, likely, appears to rest largely upon the climate—and the degree of success of the fuel economy campaign. Pressed to say whether, if it became evident that electricity consumption was running above the programmed figure, the Government intended forcibly to reduce non-industrial use of electricity, the Minister was unable to answer, but he admitted that the possibility of compulsory cuts could not be ruled out.

The Industrial Coal Allocation

THE allocation of coal to industry this winter will be 23.51 million tons, to which must be added the equivalent of 900 000 tons in oil fuel, making 24.4 million tons, or 23 per cent. more than last winter. This, it is anticipated, will, if met in full, enable the majority of firms with assistance from the stocks accumulated during the summer to continue full production. This, however, is contingent upon two factors on which it is difficult to feel assurance; first, that the output of deep-mined coal reaches the estimated figure of 97 million tons and, second, that power stations, with their now officially-sanctioned first priority in supplies, are not forced to make inroads into the industrial ration. A further uncertainty is added by the disquieting statement of the Minister for Economic Affairs on the railway wagon situation. The shortage of trucks is now so acute that prompt restocking will largely depend upon the arrangements made for quicker turn-round and transit time and, yet again, upon favourable weather.

New Plan for Steel

WITH regard to steel supplies which will affect the generating plant replacement programme, the promised investigation into the workings of the steel control are now beginning to bear fruit, after discussions lasting a fortnight between a committee of the Government, the F.B.I., the T.U.C., and the Iron and Steel Federation. The committee has recommended a revision of the methods of control by which it should be possible to get rid of the excessive volume of "M" forms (authorisations) in circulation. In recent months, the number of authorisations, it is now admitted, has so exceeded allocations that the distribution system is

clogged with a backlog of unfulfilled orders amounting to two million tons of steel, or nearly one quarter's production. It is to be hoped that now that this example of departmental muddle which has long been evident to the industrialist has been brought to light in Whitehall, the committee will, in the words of Sir STAFFORD CRIPPS, "prevent such a state of affairs again developing." Other improvements to the control mechanism which are to be adopted, include the extension of the period of allocation from three months to six and a rearrangement of departments, so that any given firm will in general have to approach only one sponsoring Ministry for its allocations. Planning at the highest level is at last beginning to show signs of co-ordination, and that at least is welcome. But every plan in the last analysis rests upon a slender margin of coal production. The final responsibility as before, is with the mineworkers and the National Coal Board.

The Domestic Load

ANOTHER warning that expansion of the domestic electricity demand this winter would constitute a grave threat to national recovery was given by Mr. HUGH GAITSKELL at the Mansion House on Monday. The occasion was a fuel economy conference, held under the auspices of the Ministry and attended by representatives of more than 90 local authorities from the London region. The Minister was followed by Mr. W. C. PARKER, borough electrical engineer of Fulham, who gave an account of a successful fuel economy exhibition recently sponsored by his undertaking. The housewife, he stressed, would respond when she understood the grim necessity of domestic economy. It is on this point that the success so far of the new campaign must be questioned. A representative of THE ELECTRICIAN who was present at the conference formed the impression that many of the delegates who took part in the discussion were far from aware of the real nature of the problem and appeared genuinely unable to distinguish between the dual problems of peak load and fuel economy. It seems evident that until those who have the task of promoting campaigns locally are themselves clear about what is required, the public response will at best be patchy. To impart to the already overburdened British housewife the elements of electrical theory is a task in which neither the Ministry nor the various associations have yet in all cases succeeded.

Staggered Office Hours

A NUMBER of commercial and similar undertakings have recently decided to stagger their working hours, with the result that many offices now open their doors for business at times varying between 8.30 a.m. and 10 a.m. The main purpose behind the change is to facilitate transport and to eliminate or reduce the twice-daily rush upon trains and 'buses which has become so prominent a feature of city life. Such staggering is admittedly a good thing from a transport point of view, but one wonders what effect it will have upon the national load curve on those mornings when weather conditions require office lighting to be switched on? Such lighting will more often than not coincide with the morning industrial peak, and in the case of many buildings in the London area will represent many additional kW for the grid to supply half-an-hour or so earlier than on the working days of last winter. In the circumstances, therefore, we suggest that offices adopting staggered hours should have explained to them the effect which their earlier opening is likely to have upon the industrial load curve, in the hope that office lighting will be kept to a minimum until the peak is passed.

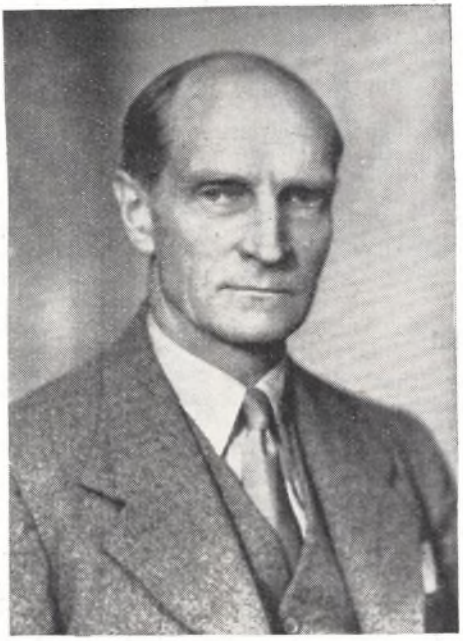
Generation in September

APROPOS of the remarks in the previous notes it is interesting to observe that electricity generated during September by authorised undertakers amounted to 1.4 per cent. more than the total for the same month last year, while for the nine months January-September the increase was 4.2 per cent. when compared with the corresponding period of 1946. When considering these figures it is as well to remember that the weather conditions during September were favourable to low domestic load and the restrictions with respect to space heating were still in operation.

Portrait—Mr. Henry Nimmo

As President of the Association of Supervising Electrical Engineers, Mr. Nimmo has often made conversational reference to his experiences in Burma, where some of the hydro-electric systems bear evidence of his ingenuity. He has been with the Electricity Commission since 1929, during which time he has held over 60 public inquiries and hearings concerning electricity supply, and was in 1945 himself appointed a Commissioner.

MR. HENRY NIMMO, M.Inst.C.E., M.I.E.E., M.I.Mech.E., Electricity Commissioner and President of the A.S.E.E., received his general education at Airdrie Academy, served a mechanical engineering (engine building) apprenticeship, and studied electrical engineering at Coatbridge Technical School. He spent a year as an electrical improver in the works, and on outside erection work in North Wales, with Bruce, Peebles and Co., Edinburgh.



In 1906 he joined the British Westinghouse Co. (now the Metropolitan-Vickers Electrical Co., Ltd.) as an erection engineer engaged mainly on the erection of generating plant, converting plant and high voltage switchgear in Glasgow Corporation stations. In 1907 he became electrical engineer to the Oakbank Oil Company, in charge of two 25 cycle three-phase power systems and a 500 V d.c. electric railway, with generating stations containing Belliss and Morcom-Westinghouse sets.

He went to Burma in 1909 as electrical engineer to the Irrawaddy Flotilla Co., primarily to build a generating station and carry out the Dallah Dockyard electrification scheme.

In 1912 he joined the Rangoon Electric Tramway and Supply Co. as assistant engineer, where he had charge successively of tramway rolling stock and car depot, the generating station, distribution, and extensions to the generating station.

In 1914 he was appointed Officiating Electrical Inspector to the Government of Burma, administering the Indian Electricity Act throughout Burma and in the Shan States, and in charge of all Government electrical installations.

He returned to this country at the end of 1915 to join the London Electrical Engineers, R.E. (T.) as a sapper, but was commissioned soon afterwards. He served in Searchlight Companies in London A.A. defences, and while on this duty in 1917 met with a serious accident; he remained in the Service while undergoing treatment until the end of 1919, when he returned to Burma to become permanent electrical engineer in the Public Works Department.

After about a year as officer-in-charge of the Burma Hydro-Electric Survey, he was again, after a short period as electrical engineer, appointed electrical inspector to the Government, which position he held until the end of 1929. As head of the department he was Electrical Adviser to the Government, Chief Electrical Engineer and Officer-in-Charge of the Burma Hydro-Electric Survey.

He was allowed by the Burma Government to act as consulting electrical engineer to Rangoon Municipality, Rangoon Port Commissioners and to the electric supply companies at Maulmein, Maymyo and Bassein, being responsible for the design and lay-out of the generating stations and distribution systems in those towns. From 1920 to the end of 1929 he was O.C. No. 2 (Rangoon) Field Coy., R.E. (A.F.I.), later Rangoon Electrical and Mechanical Coy., R.E. (A.F.I.), with the rank of Major, R.E. (A.F.I.).

Whilst home on leave in 1929 he was appointed chief engineering inspector to the Electricity Commissioners.

He is on the Council of the I.E.E.

Industrial Standardisation

Presidential Address to the I.E.E.

THE inaugural address which Mr. Percy Good, president, delivered at the Institution of Electrical Engineers on October 9, dealt in the main with industrial standardisation, and so far as space will allow his remarks are abstracted below.

Having watched the growth of the electrical industry first from inside and later from a position which had enabled him to compare its progress with that of other industries, Mr. Good said he was convinced of the truth of S. Z. de Ferranti's statement of 1910 and referred to in last year's Presidential Address, that wherever coal or gas was used for the production of heat or power, everything for which it was used would be better done were electricity the medium of application. He believed the day was not far away when all energy for industrial and domestic consumption would be in the form of electricity, and when electric-battery vehicles would have superseded fuel-burning vehicles in all built-up areas.

The electrical industry, though still young, had already placed its mark on the world. Living conditions had greatly improved as a result of the development of electrical science. That there would be an enormous increase in the use of electricity was certain, for electricity had no rival in sight and there was nothing to suggest, even dimly, that the consumer of the future would be supplied with heat, light and power other than in the form of electricity, by whatever means produced. The electrical industry, however, in common with others, was faced with the need for planning for its future development.

THE 1947 ACT

This year had seen an Act of far-reaching importance come into being. In his opinion there was no substantial case against some form of public control of the generating and distribution side of the industry, nor indeed against national control of any public service where competition was unwarrantable. That section of the industry should, however, be confined to generation and distribution, and should not be permitted to manufacture the machinery or equipment it used. A very different type of mind was required for the generating and distribution side than for the manufacturing side, for those responsible for running machinery and equipment had to be satisfied with it for many years, whereas the maker should be temperamentally desirous of improving his product. Moreover, a great deal of technical progress was made as a result of what might be called the " competition " that went on in the designer's mind in his desire to make progress.

The 1947 Act gave power to the supply authority to manufacture the goods it used, but it was hoped that the right would not be exercised if for no other reasons than those given above and the need for the country to offer for export the very latest designs in technical equipment.

The President then spoke on industrial standardisation and outlined the basic principles underlying standardisation as applied to all industries, and recorded some historical steps which had been taken by the institution to encourage its development.

EARLY INDUSTRIAL CO-OPERATION

During the middle ages there was a measure of co-operation between those engaged in a similar trade, and rules relating to the quality of their product and to conditions of sale were in common use. By the beginning of the 19th century, however, trading conditions had developed into an inhuman scramble. There was practically no co-operation within industry; there was war between rival producers; between workers for a job; and there was war against technical progress. As the century entered its last quarter a change in outlook was becoming apparent, and as an illustration of it might be cited the Cable Makers' Association, which came into being in 1899 and had been a contributory factor to the progress of the electrical industry ever since. The British Electrical and Allied Manufacturers' Association and the Electric Lamp Manufacturers' Association were products of the same period and, with other trade associations, had been concerned with the establishment of rules for the proper conduct of their industries.

Industrial standardisation was concerned with such of those rules as related to the quality of the material and the conditions under which it was to be used. These were sometimes required for the protection of the health or safety of the public, and were often called codes of practice. The institution was early in recognising the necessity for such standards, and in 1882 issued rules governing electrical installations, the 12th edition of which was in course of preparation. Today, all standards relating to the installa-

tion and use of materials and appliances were prepared by the professional institutions and were issued as British Standard Codes of Practice after consultation with industry.

In 1885 the institution set up a committee to prepare standards for electrical materials and appliances. In 1889 it recommended to the Government the establishment of a laboratory for standardising electrical apparatus, though by this was meant the calibration of electrical measuring instruments. In 1898 the Council of the institution was urged to strengthen its standards committee by adding to it "representatives of the manufacturer, user, consulting engineer and the user's engineer."

BIRTH OF THE B.S.I.

In 1901 the Institution of Civil Engineers set up an engineering standards committee to prepare standards for steel sections. This committee became an autonomous body on receiving the support of the Institution of Mechanical Engineers, the Iron and Steel Institute, and the Institution of Naval Architects, and when the committee enlarged its scope, the I.E.E. transferred its standardisation work to it and associated itself with the other four bodies in founding the organisation known to-day as the British Standards Institution. To-day, twenty-eight countries had set up national standards organisations on the lines laid down for the B.S.I., and industrial standardisation had become part of the economic structure of all industrial countries.

An analysis of the industrial standards in use to-day showed that they took one or more of the following forms:—Standards of quality, fitness for purpose or performance; dimensional standards; standard methods of sampling, and certification marking; terms, definitions and symbols (nomenclature).

To set up a standard of quality, fitness for purpose or performance it was necessary to start with the answer to the question, What is the material or article required to do? (and, quite often, What must it not do?), and an ideal standard would include requirements in terms of those mechanical, physical and chemical properties which could be assessed objectively. In our present state of knowledge, however, standards often had to include requirements which could only be assessed subjectively, but research was steadily providing the necessary data to enable requirements to be expressed with precision.

Dimensional standards were, in general, for the purpose of securing interchangeability; to establish a range of types and sizes; or to provide a means of defining function. Interchangeability played an important part in modern industry where parts from many sources had to come together. It was equally important in domestic life where it was necessary to facilitate the replacement of parts which required periodic renewal or were liable to accidental damage. A great deal of work had been done not only on the standardisation of parts but also on the preparation of standard limit systems for the various types of fit. There was a great deal of standardisation for interchangeability yet to be done in many industries, but it should be added, resistance to it was often due to a desire on the part of the manufacturer to prevent unsuitable or inferior replacement parts from being sold to the user.

On the subject of sampling and certification marking, the President said that an inspection of small samples in order to judge the value of the bulk was an inheritance of early trading practice and, to a large extent, had necessarily the character of gambling. It was only in comparatively recent times that the subject of sampling had been dealt with mathematically with a view to laying down standard methods of sampling to secure that the samples fairly represented the bulk. The study of sampling had made practical the use of certification marks on goods where testing had to be carried out on samples, either because of the high cost of the test or because the test was destructive of the product. The use of certification marks was governed by the Trade Marks Act, and whilst certification marking was not an inherent part of industrial standardisation it was increasingly being associated with it as a result of a desire to distinguish standard from non-standard goods.

NOMENCLATURE

With regard to nomenclature, Mr. Good stated that a definition of a trade term had something of the character of a specification, and frequently limited the meaning which previously had been loosely applied to the term, thereby requiring discipline in its future use. As an example might be cited the term "switch" which, by glossary definition, should be used only to describe a non-automatic device for breaking a circuit carrying its normal current.

One of the greatest aids to business was a satisfied buyer, and by its recognition that standardisation was indispensable, by the development of its trade and research organisations, by its merchanting agreements, the electrical industry had been endeavouring to conduct its affairs along proper and sound lines. The perfect structure for the industry might not yet have been found, but as the end was desirable the search was sure.

Nationalisation and Efficiency

A.S.E.E. Presidential Address by Mr. H. Nimmo

HAVING accepted an invitation to remain in office for a further period, Mr. Henry Nimmo, Electricity Commissioner, delivered the Presidential Address for the second year in succession before the Association of Supervising Electrical Engineers, on Tuesday evening. In his first address (THE ELECTRICIAN, October 18, 1946), Mr. Nimmo had reviewed the structure of the British electricity supply industry. This year, he took as his theme the Electricity Act, 1947.

After a clause-by-clause analysis of the Act, Mr. Nimmo commented that the main points of criticism which he had heard against nationalisation were: That the industry in its present form was efficient and prosperous, and there was therefore no need to carry out a major operation in its reorganisation; that the Area Boards would not be autonomous and might be subject to too much control from the Minister and the Central Authority; that some of the Boards (particularly the London Area Board) were too large for efficient operation.

Dealing with these points in turn, Mr. Nimmo said that as regards the need for nationalisation, prominent men in the industry had for years been trying to work out a suitable scheme for the reorganisation of distribution on evolutionary lines, and but for the war it might have been accomplished. He thought, also, that Section 5 of the Act indicated that for all practical purposes the Area Boards would be autonomous bodies free to use initiative and enterprise and would aim at giving their consumers the most efficient service.

It had been said, the speaker continued, that the size of an undertaking provided no guarantee of efficiency, but, while he could name a number of small undertakings which were efficient, the larger organisations ought to be able to give their consumers better service. The five largest undertakings in Great Britain on the basis of kWh sold in 1946 were Edmundsons, the County of London group, the Balfour Beatty group, the North-Eastern E.S. Co. and Birmingham Corporation. It could not be suggested that any of these organisations were inefficient or too large. Similarly, all of the five largest undertakings in the U.S.A. were larger (measured by output) than any of the Area Boards about to be formed.

So far as size was concerned, there could be no fear on the question of efficiency. That would come from expert management and by the application of sound engineering principles.

In the following table, from which Mr. Nimmo quoted, the approximate output of each of the new Area Boards, including the North of Scotland Board, was given.

Area Boards	Approx. annual kWh sold Millions
London	5 460
South-Eastern	1 027
Southern	1 622
South-Western	1 020
Eastern	2 211
East-Midlands	2 358
Midlands...	3 363
South Wales	1 903
Merseyside and North Wales... ...	1 833
Yorkshire	3 244
North-Eastern	2 395
North-Western	3 789
South-East Scotland	547
South-West Scotland	2 165
North of Scotland Hydro-Electric Board	863

Concluding, Mr. Nimmo said that when he had attended the World Power Conference at the Hague last month, he was surprised to learn that American and Continental engineers, who thought the British grid a model of its kind, took a very pessimistic view of nationalisation. He had told one critic that by and large the industry would be run by the same men, the only significant change being the change of ownership.

The meeting, which was held at the E.L.M.A. Lighting Service Bureau, had opened with the showing of the E.D.A. film, "Can We Be Rich." The chair was taken by the chairman of the association, Mr. E. J. Sutton. Others present included Mr. E. R. Wilkinson (immediate past-president), Sir John Kennedy and Mr. S. B. Donkin (past-presidents), Mr. J. W. Leech (engineer-in-chief, Central London Electricity, Ltd.), Mr. Ian Murray (Scottish Power Co., Ltd.), and Mr. J. M. Crowdy (first chairman of the association).

Before reading his paper, Mr. Nimmo presented the branch merit cup to Mr. J. H. K. Pendry, secretary of the West London branch, and made presentations to the winners of the W. E. Highfield Shield Competition. The first prize, shield and replica was received by Mr. E. P. Hollis, for his paper "In Pursuit of Safety." Mr. A. Spencer, who was unable to attend, was awarded the second prize and third prizes were won by Mr. M. W. G. Johnson, who is now in Canada, and by Mr. F. T. Bartho. A vote of thanks was accorded to the competition judges, and Mr. Wilkinson briefly replied.

About Transformers*

Some Notes on Tanking and Terminals

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

AFTER a complete set of transformer coils has been assembled on the core, the yoke plates headed in and yoke clamps fitted, the electrical connections have to be made. The conductor ends of the individual coils are usually left after winding only long enough to enable efficient joints to be made. Most manufacturers have tried at one time or another leaving conductor ends and tappings long enough to complete the erection of the transformer without having joints at the coil face, but these long ends get in the way during the winding and impregnating processes and make stacking in drying ovens difficult and wasteful of space. In addition, the long ends are liable to collect excessive varnish during the draining process and come out decorated with thick unsightly blobs difficult to remove. Further, the rising leads are often made of larger sections than the winding conductor to obtain mechanical rigidity; inter-coil connections are usually made with the actual winding conductor.

The joints are commonly made with soft solder, the conductors first being bound together with tinned copper wire, joined with copper ferrules or clips, bolted together or riveted according to the size of the conductors and the choice of the makers. Some manufacturers weld all the joints made on their transformers, except the very smallest conductors, and portable electric resistance welding machines have been designed for this purpose. It may be noted here that where a joint occurs within a coil during the winding stage, it is the invariable practice to weld the conductors, and in the case of small wires, unsuitable for welding, no internal joint can be tolerated.

The rising leads must be well insulated and firmly supported; high voltage leads are generally of round copper rod within Bakelite tubes supported at two or more places by split cleats of wood, Bakelite or pressboard drilled to fit the insulating tubes.

The low voltage leads will generally be of tinned copper strip, in which case they may pass, uninsulated, through slots in the cleat or be bolted directly to a solid cleat; sometimes it is preferred to tape the leads or wrap them with a turn of thin pressboard just at the points where they touch the cleats. Another method is to make all the cleats of metal at earth potential and rely for insulation solely upon that on the leads themselves; the advantages claimed are that the shape of the dielectric field can be controlled by the shape of the cleats and that the insulation can be of a constant specific inductive capacity and not a series of materials each of different value. The method is not largely used, because of expense.

The cleats are supported off the main structure of the core clamps.

The terminal ends of the windings are brought up to a position convenient for connecting to the bushing or cable box studs; these connections should be flexible and usually consist of a laminated copper strip in the form of an S bend and of sufficient dimensions to carry the appropriate current. Tapping leads are brought up in a similar manner to some form of ratio adjusting device; in rare cases the tapping leads are brought outside the tank in a manner similar to the terminal leads and ratios changed externally by means of links or cable ends. More generally the tappings terminate at a link board or an off circuit tapping switch, situated above the core but beneath the normal oil level. The former may consist of a number of screwed brass studs, in an insulating board, to which the tappings are attached on

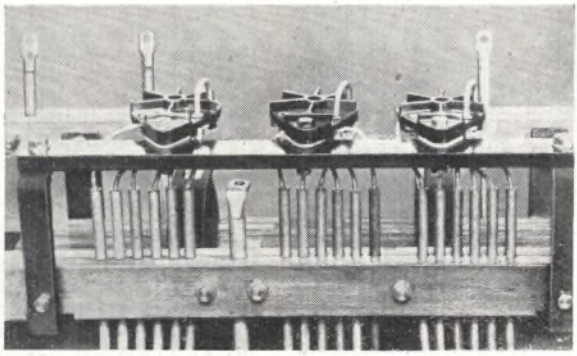


Fig. 1.—Typical ratio adjuster using plug and socket type connector

the underside, and a drilled link can complete the electrical connections on the upper side in a variety of positions according to the number of ratios required.

This method requires the use of a spanner or winged nuts to adjust, or as an alternative a board using plug and socket connectors can be used; in either case a hand hole must be provided in the lid, or the lid itself lifted to gain access to the tap changing device. Fig. 1 shows a typical ratio adjuster of the plug and socket type.

The off circuit tapping switch is merely a modification of the link board whereby the link mechanism is operated by a spindle usually terminating in a hand wheel outside the tank. In the case of polyphase transformers, the tap changers on the various phases are usually ganged on to one spindle. The contacts are mostly of the sliding or rolling type with pressure maintained between them by spring loading; some switches, however, make use of the plug and socket type of contact; a typical selection of off circuit switches is illustrated in Fig. 2. The tapping switch should be fitted with an external tap position indicator and a device for locking the spindle into position: it is common practice to arrange some scheme of interlocks so that the key to the locking

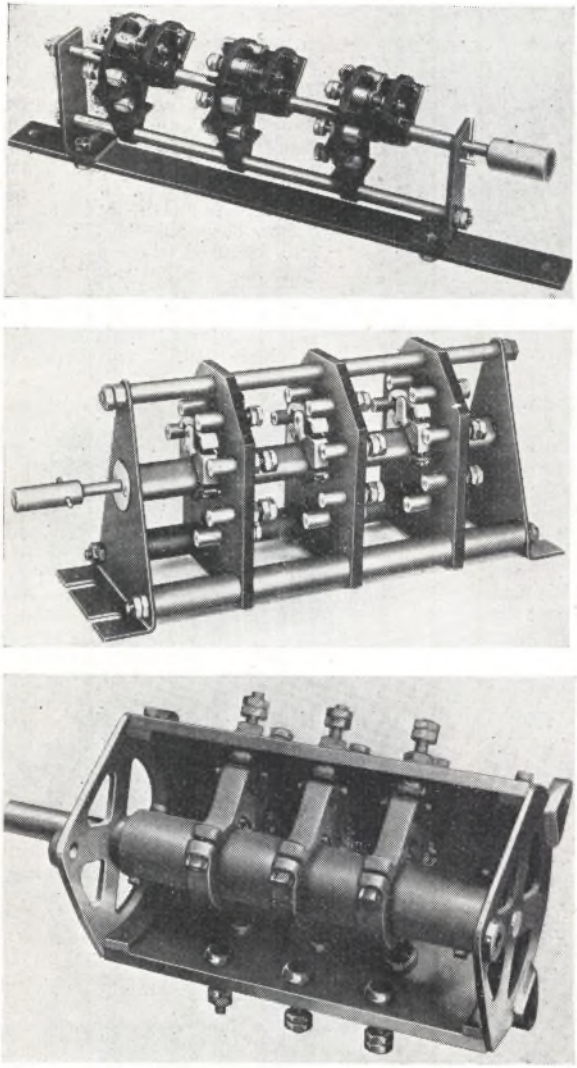


Fig. 2.—Selection of off circuit switches

* Parts I, II and III of this series were published in THE ELECTRICIAN of August 15, 22 and October 3, respectively.

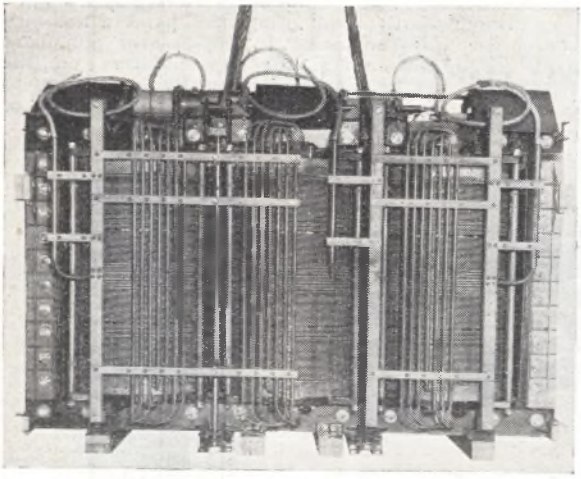


Fig. 3.—A 45 MVA transformer ready for tanking

device cannot be obtained while the transformer is alive.

It is typical practice to locate the transformer in the tank by means of wooden blocks fixed to the top and bottom yoke clamps at both ends of the transformer, and engaging in guide angles welded to the inside of the tank; in the smallest sizes the locating blocks may engage directly with the corners of the tank. This practice is more common on the Continent than in this country. A cradle is placed between the core and the tank bottom; this cradle will comprise a substantial assembly of steel channels and baulks of timber some three or four inches thick in the largest transformers, becoming no more than a sheet of pressboard about a quarter of an inch thick in the smaller sizes. Fig. 3 and Fig. 4 show a large and a small transformer respectively, in each case ready for tanking; many of the details just described can be clearly picked out from these typical illustrations.

There are two main methods of assembling a transformer in its tank, although many variations in detail. The transformer is either firmly located in the tank and the lid added as a final operation, or the transformer is hung from the lid and the supporting blocks become of secondary importance. In the first case, the terminals are usually in the neck of the tank or in pockets on the tank side; if they are mounted in the lid, hand holes must be provided to enable an electrical connection to be made from the winding. In the second case the terminals are invariably mounted in the lid. Both methods have their special applications and most manufacturers use both; at the same time most manufacturers show a preference in their standard production.

The various types of terminals offered or specified are numerous, and a few typical examples are illustrated in Fig. 5.

The first general type is that in which the external conductors, bus-bar, v.i.r. or cambric covered cable, are taken into the tank and connected directly to the transformer risers; the conductors may pass through wooden cleats, drilled or slotted to suit, or through porcelain bushes; in either case this method can only be used where protection from the weather is afforded.

The second type is where a bare connection is made outside the tank. This includes all the large high voltage bush-

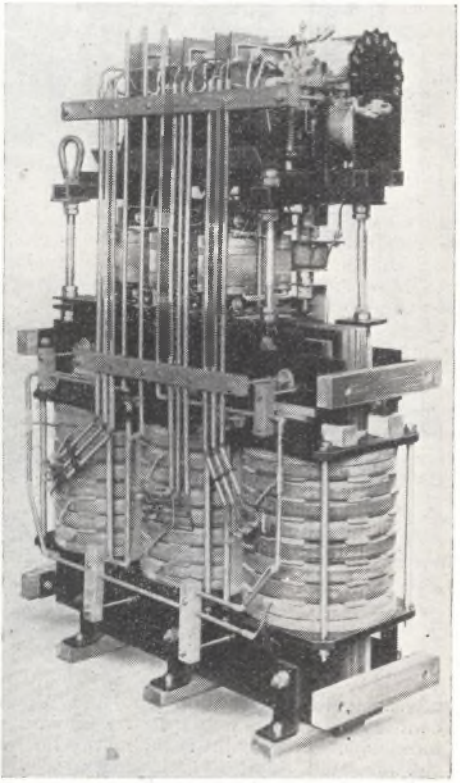


Fig. 4.—Small transformer ready for tanking. An on-load tap-changer using mercury switches is mounted above the core

ings, which are often connected directly to overhead lines.

For service up to 11 kV, these bushings are of solid porcelain with a brass stem through the centre. For higher voltages, the hollow within the porcelain is made larger and the space around the stem is filled with oil; this excludes all air and provides a greater dielectric strength than the porcelain itself. Condenser type bushings are used for the highest voltages; in this type Bakelised paper is wound directly on to the brass stem to a considerable depth; interwound with this paper are various layers of copper foil which constitute a series of capacities from the terminal voltage down to earth potential. These are designed to control the dielectric field to its ideal form and ensure that no concentration of stress occurs at any point. For outdoor service, the Bakelite is protected by a hollow oil-filled porcelain cover which gives it an appearance like a normal bushing. In all these cases the bushings are secured to the tank either by a flange cemented to the porcelain, or by a clamping-ring bearing through an oil tight gasket upon a suitably designed projection on the porcelain.

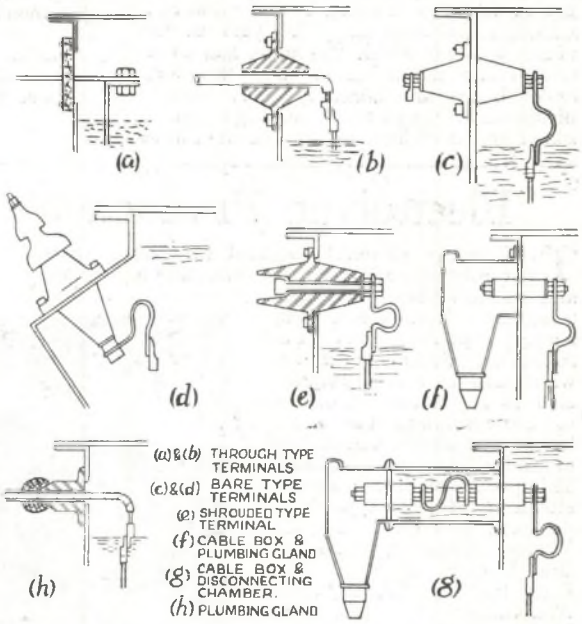


Fig. 5

The low voltage terminals of the bare type may consist of copper bus-bar passing through a wooden cleat, or a simple porcelain bushing may carry a stout copper stem terminating in a rectangular flag to which a bus-bar may be bolted. Porcelain bushings for indoor service may be of a simple form but those for operation outdoors are made with a series of water sheds, the design of which has proved a major problem. It is important that under no condition of rainfall shall the whole surface of the bushing become wet at the same time, but the protected areas must not become too ready a home for soot or industrial filth which will collect moisture under humid conditions and become semi-conducting.

As stated in a previous article, it is essential to design a transformer winding to be stronger than the flashover voltage of the associated bushing; when transformers are intended for duty in coastal areas or when atmospheric pollution is prevalent it is common practice to specify bushings having higher flashover values than those normally required for their particular service voltage. A considerable deterioration in the voltage characteristics, as contamination takes place, can then be tolerated before the value needs to be restored by cleaning. If this is done the winding must be protected during those periods when the bushing is clean, and the flashover voltage value is high. The winding itself can be over insulated or, more commonly, the bushings can be fitted with protective spark gaps set to flash-over at a value normal to the system voltage. These gaps will be practically unaffected by grime and will maintain a constant flash-over value unless that of the bushing itself becomes inferior. Included in this category may be the shrouded type of bushing in which the incoming cable is attached, usually by soldering, to the bushing stem. The porcelain, on the outside, offers a deep recess which, when the stem is drawn into position, offers a shrouding protection for the cable end.

The third general method is that which employs lead covered cables plumbed on to the tank. Simple brass plumbing glands may be fixed direct to the tank side, but this method is usually restricted to single-core cables. More usually a cast steel or fabricated steel box is provided which has one or more porcelain or Bakelite bushings according to the number of cable cores

to be led in, on the side which is bolted to the tank and one or more plumbing glands according to the number of cables to be accommodated. The glands can be arranged in any position and pointing in any direction convenient to the cable run, although attention must be paid to the radius through which the cable has to be bent either inside or outside the box. Cable boxes are normally filled with a bitumastic compound, although oil is sometimes used as a filling. In the former case the box forms a complete cable termination which can be detached from the tank easily and can, in fact, be regarded as part of the cable itself. The oil-filled disconnecting chamber is a rather expensive refinement which enables the cable box to be disconnected without disturbing the oil in the main tank. It consists of a separate straight through link box situated between the main tank and the cable box.

(*To be continued*)

Electrolytic Production of Aluminium

THE heavy currents required for the electrolytic production of aluminium and the necessity for uninterrupted operation over lengthy periods call for robust and reliable machines which are also very responsive to regulation. Conductor cross sections, also, must be of generous design to minimise losses and heating. The power plant for an installation of this type was designed and built at the Witton engineering works of the General Electric Co., Ltd., for the South Wales Aluminium Co., Ltd., at Resolven, Glamorgan. The main a.c. supply, which is taken from an overhead line at 66 kV, three-phase, 50 cycles, is transformed to 6 600 V by means of two 15 000 kVA transformers. Three motor-generator sets provide the low voltage current for the electrolytic action, each set consisting of a synchronous motor and three d.c. generators.

These, together with the exciter, are all direct-coupled on a single main shaft, an extension of which carries the exciter for the synchronous motor. In addition, a pilot exciter for the generator exciter is driven by vee-belt from the same main shaft. The synchronous motor in these sets is 9 350 H.P., 6 600 V three-phase, 500 r.p.m., operating at unity power-factor, and is arranged for reactor starting. Each of the three direct-coupled d.c. generators has an output of 5 500 A at 430 V, or a total of 16 500 A for the three generators on each set. The direct-coupled exciter is rated at 36 kW, 400 V and the pilot exciter has an output of 8 kW at 220 V, being driven at 1 050 r.p.m. The exciter for the synchronous motor is rated at 40 kW, 70/200 V. In the power house three 90 H.P., 400 V, three-phase squirrel-cage motors, running at 485 r.p.m., are used for the forced ventilation of the converting plant. The normal steady load of the cells is 32 000 A. This is provided easily by two of the motor-generator sets, leaving the third in reserve. To deal with the heavy fluctuations in current, a pair of d.c. saturated core current transformers is employed in the regulator relay circuit. These carry a separately excited a.c. winding, the impedance of which varies with fluctuations in the d.c. flux induced by the main d.c. load. The current variations which thus occur in the a.c. winding and which correspond to fluctuations in the d.c. load, are used to operate a balanced relay, which actuates the motor-driven field rheostat in the usual manner, so that the current is raised when the load falls to 31 000 A and is lowered when it reaches 33 000 A, these limits being sufficient for the satisfactory operation of the plant.

Three motor-generator sets each comprising a 9 350 H.P. *6.6 kV synchronous motor driving three 5 500 A d.c. generators; showing also d.c. switchboard in gallery*

In the installation described above there is fitted a voltage relay which, at 415 V, or any other desired voltage, suspends the constant current regulation and allows the machine to work on a fixed field.

Electric Traction Equipment

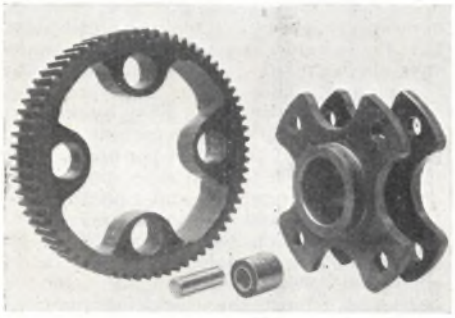
Details of Contract Awarded by Netherlands Railways

IN connection with the rehabilitation of the Netherlands railways after the war, the Metropolitan-Vickers Electrical Co., Ltd., has received a contract from the Netherlands Railways Ltd., for the supply of electric traction motors, gears and pantagraphs for high-speed motor-coach stock.

The motors, rated at 235 H.P., on the one-hour rating, are of the normal box-frame axle-hung type. They are self-ventilated, air being drawn from inside the coaches through flexible ducting attached to the motor air inlet openings.

The line voltage is 1 350, and the motors are connected permanently in pairs in series; thus each motor, though insulated for 1 500 V, has only 675 V across its terminals. Field weakening is provided and is obtained by tapping the motor field. An unusual feature of the mechanical design of the motors is that they can accommodate axle bearings of either the sleeve or the roller type.

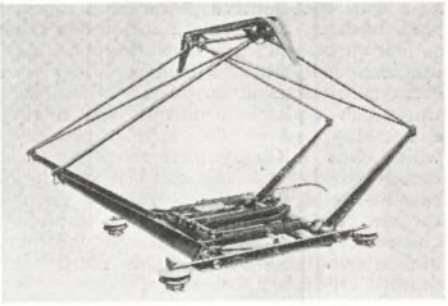
The gears, 556 sets of which are being supplied, will have a ratio of 22/57 and



Details of the resilient gearwheel

will be of the resilient type in which a hardened and ground pinion engages with a resilient gear wheel. The gear rim has inward projecting lugs, which house resilient rubber units. The gearwheel centre and the rim are located with respect to one another by accurately ground steel pins, which are pressed through the holes in the arms of the gearwheel centre and through the centre holes of the resilient units. A clearance is provided between the extremities of the centre arms and the inside of the gearwheel rim. With this arrangement all loads transmitted between the gearwheel and axle must pass through the resilient units.

The current collectors are single-shoe pantagraphs, having an operating height range of approximately 8 ft. and equipped with carbon contact strips. The single



Arrangement of the pantagraph

collector shoe has a contact pressure of 16 lb., which is constant throughout the whole of the height range. The collector shoe is supported by a spring-and-link system, which allows a little vertical movement independently of the main pantagraph structure, thus enabling continuous contact to be made, with varying heights of the overhead wire.

The operation of the pantagraph is controlled so that when air is admitted to the cylinder it rises slowly and makes contact with the overhead wire without any bounce. Also when the pantagraph is being lowered, it falls rapidly at first and then slows down, eventually reaching the closed position without impact.

Although the pantagraph structure is rigid and strong the weight of the moving parts is very low, enabling a high upward acceleration, which allows continuous contact to be maintained with an overhead wire of rapidly varying height.

A complete refresher illumination design course is being given under the auspices of the E.L.M.A. Lighting Service Bureau of Scotland, of 29, St. Vincent Place, Glasgow, at the Royal Technical College, Glasgow. Having commenced on October 10, lectures are being delivered in Room 149, on Friday of each week, at 7 p.m., and will conclude on November 14.

Electric Glass-Melting Furnaces

CHAIRMAN'S ADDRESS TO MERSEY AND N. WALES CENTRE

SOME of the applications of electricity to glass manufacture, with particular reference to electric furnaces, were described in the Chairman's Address delivered by Mr. P. C. Barnes before the Mersey and North Wales Centre of the I.E.E. on October 6.

At the beginning of his address, Mr. Barnes dealt briefly with electric machinery as a source of motive power in a modern glass works. The general conditions were similar to those in a steel works, with high ambient temperatures and a dusty and often sulphurous atmosphere. Glass was worked in a plastic condition, and a very short stoppage of the rolling process—which was normally performed by d.c. motors to give the necessary flexibility of speed—would permit it to solidify enough to jam the machines. It was therefore customary to provide a standby battery, and in some cases to duplicate the driving motors through ratchets.

GRINDING AND POLISHING

The grinding and polishing of plate glass was an excellent testing ground for electrical equipment, as it was normal to run for about 155 hours a week at full load in an atmosphere which was very humid and laden with fine sand and rouge.

Turning to electric heating methods, Mr. Barnes said that electric resistance furnaces were used for making pre-stressed or toughened glass. The furnaces were divided into a number of zones, with a thermostat controlling each, in order to ensure a closely uniform temperature, within a few degrees of 700° C., over the whole surface of the glass plate. The justification of electric heating for this process—in which chilling losses were considerable—lay in the precision of control which was fairly easily attained.

At high temperatures glass became a conductor of the second class, with a specific resistance of the order of 1 ohm per inch at 1 400°-1 500° C. This suggested direct heating by passing current through the glass as the obvious way of using electricity for glass making. Molten glass, however, was very active chemically, and easily discoloured, so that the materials available for electrodes were limited.

In a modern glass melting continuous furnace, which in this country would normally be fired by producer gas, the tank consisted essentially of a basin about 130 ft. by 30 ft. by 4 ft. deep, constructed of refractories, with a capacity of 1 300 tons of molten glass and an output of over 100 tons per day. The temperatures ran from 1 450°-1 550° C., within a few feet of the filling end, to about 1 100° C. at the drawing end. The object was to turn a mixture of sand, limestone, soda and other materials into clear transparent glass. The uses of heat in the tank were threefold: first, to bring the batch up to the temperature of reaction; second, to sustain the reaction; third, to raise the glass temperature and maintain it for a sufficient time for refining.

ELECTRODES AND MOLTEN GLASS

In electric melting, certain losses unavoidable with producer gas were eliminated, and if it was assumed that a thermal power station could deliver 20 per cent. of the heat in the coal to the terminals of the glass tank, then the efficiency of utilisation in the tank could be made as good as 50 per cent. Thus, 10 per cent. of the heat in the coal was usefully employed in the glass.

None of the available materials so far tried for electrodes had proved wholly resistant to attack by molten glass. As little as 0.1 per cent. of iron was too much for plate glass manufacture, and the effect of carbon was equally bad. A furnace using soft iron electrodes was working successfully in Sweden, making bottle glass, but for window glass, carbon electrodes were being used in France, Italy and Switzerland. The carbon was prevented from contaminating the glass by keeping the surface density of the current below a critical value. If the power per unit volume of glass exceeded what the glass could dissipate by conduction and radiation, the temperature would continue to rise and violent convection currents would be set up, together with violent evolution of the entrapped gases in the glass. If this happened against the electrodes, particles of carbon would be torn off, and arcs formed. The critical power in the neighbourhood of the electrodes was about 30-50 W per cu. in.

Concluding, Mr. Barnes said the electrical energy required to produce a ton of glass was about 700 kWh in a furnace with no losses, or about 1 000 kWh if the glass were to be refined. This figure had been obtained under good conditions. On the grounds of cost, electric melting would compete with gas if the price of 1 800 kWh did not exceed that of a ton of coal. Under present conditions in this country, therefore, there was no financial case for electric melting, although the coal consumption involved was about the same for both methods.

Boiler Draught Control

I.E.E. Southern Centre Chairman's Address

THE important position held by the engineer in the community to-day, when the great need is for increased production, was stressed by Mr. D. D. Rayner in his Chairman's Address to the I.E.E. Southern Centre, delivered at Portsmouth on October 1. The engineer qualified to lead, and it was to him that the community could look for a realistic recovery from its present troubles. He was essentially a realist with vision, not an ideologist. Earlier, Mr. Rayner had given a brief retrospect of some of the electrical engineering developments of the last 50 years—a period which, he claimed, had seen a greater revolution in the social and economic life of the world, resulting from electrical progress, than was seen in the previous ten centuries.

POWER STATION AUXILIARIES

A substantial part of the address was concerned with power station auxiliaries, in particular mechanical draught equipment. Illustrating various points with working demonstrations and slides, Mr. Rayner took, as an example of equipment which involved several engineering interests, a boiler fan, with vane control, driven by a two-speed squirrel-cage induction motor. Control of the two-speed motor for boiler house auxiliaries usually consisted of changing the speed up and down automatically, according to the amount of draught required. This represented a more complicated problem than control of a single-speed motor, for when the motor changed from low to high speed, the torque remained positive, but in changing down from high to low speed, the torque might go from positive to negative and then back to a positive value when the motor took up its load at the low speed: in other words, the torque might be reversed twice during the changing down period. The effect of such a strain repeated frequently might have disastrous results, and it was now recognised practice to allow an interval of time to elapse between opening the high speed circuit and closing the low speed, which could be accomplished by a time delay. Two-speed squirrel-cage motors driving boiler fans were usually designed so that the low speed H.P. was about half that of the high speed H.P. and, as the fan output varied approximately as the cube of the speed, a motor designed to develop 200 H.P. at, say, 735 r.p.m., would be required to develop approximately 100 H.P. at 585 r.p.m.; that was, half the high speed rating at 20 per cent. lower speed.

Vane control of output, it had been claimed, combined the advantages of constant speed with that of simplicity of control. In such a system, the fan might be driven by a single- or two-speed motor. In fact, the two-speed motor was generally employed in order to obtain a high overall operating efficiency on the combined fan and motor unit from light load to full load. Output was controlled by creating and varying at the fan inlet a swirl in the direction of rotation and concentric with the fan, by means of a set of pivoted vanes.

Coming to the control gear required for vane control, Mr. Rayner said that air-break contactors of the butt-contact type were employed. It was essential, of course, that the fan did not shut down because of a momentary drop in the supply voltage, and for this reason the main contactors were often of the mechanically latched-in type.

When, in controlling the fan output, a change of speed became necessary, it was necessary also to adjust the position of the vanes in order to give equivalent draught on the changed speed. If the draught regulation was to be smoothed, it was essential that the rate of readjustment of the vanes should correspond as nearly as possible to the rate of change of motor speed.

BALANCED DRAUGHT

In automatic boiler control the fan output was automatically adjusted to give constant steam pressure and balanced draught by "more air" and "less air" impulses from the automatic control devices. In a typical scheme, two pilot motors for vane operation were employed; a normal speed motor for adjustment of the vanes according to the impulses, and a fast resetting pilot motor for readjustment when the fan motor speed was changed. With the aid of diagrams, Mr. Rayner then described the sequence of events when changing speed up or down. Limit switches, he continued, prevented the normal vane-change pilot motor from driving the vane control mechanism beyond the end limits, and when the fan motor was stopped for any reason the vanes were automatically reset to the minimum air position. The master controller was a sensitive pressurestat which took into account the amount of pressure change and also the rate at which it was changing, and controlled the draught by altering the position of the vanes or by changing the speed of the motor. Concurrently, the speed of the stoker motors was varied to maintain the correct ratio of fuel to air supply.

Rainfall and Water Power

Chairman's Address to I.E.E. North Midland Centre

HYDRO-ELECTRIC development, with particular reference to schemes in Northern Ireland and Eire was, with other subjects, considered by Mr. E. S. Ritter in his Chairman's Address to the I.E.E. North Midland Centre on October 7. Reviewing the economics of electricity supply, Mr. Ritter said that out of the surplus of income, provision had to be made for depreciation. This was frequently difficult to assess, as a new machine might render an existing one obsolete by costing less to maintain, or by turning out a superior product at less cost. The old machine would thus finish its economic life before it was physically worn out and possibly, before its cost had been provided for in a depreciation fund.

ALLOWANCE FOR PEAK LOADS

In providing an electricity supply or a telephone or transport service, Mr. Ritter went on, it was necessary to take into the account the places and times where peak loads occurred. It was not normally feasible nor economically desirable to provide for the maximum possible demand. Instead, it was usual to cater for the probable demand at any time and place, as calculated by the laws of chance. The number of circuits and switches in a telephone exchange were determined by studies of traffic. Another factor entering into planning to meet a known demand was to allow for an increase in demand when better facilities were provided.

Pointing out that adequate storage of energy near the point of consumption was one means of covering fluctuations in supply and demand, the speaker came to the question of water power, saying that one acre of water 1 ft. deep falling through 1 ft. was equivalent to 1 kWh at 100 per cent. efficiency. Rainfall was intermittent, but the flow in streams and rivers was less variable, although the flood might be as much as one hundred times the normal flow. Annual rainfall varied from about 20 in. in the East to 30 in. in the West at sea level, up to 40 in. on high ground and 150 in. or more in mountainous country. About 16 in. was lost in evaporation.

In the case of the Shannon scheme, taking an average over the 10 years 1937-46, out of a rainfall of 39.01 in., evaporation accounted for 18.2 in., loss in flood for 4.75 in. (including 1.2 in. in fish passes, etc.), leaving 16.03 in. to go through the turbines and generate electric power. This was the equivalent of 264.63×10^6 kWh per annum on an average, and thus 41 per cent. of the rainfall was used for power production, or 77 per cent. of the available flow. Up to a year's supply of water might be stored where the falls were very high.

On high falls it was customary to use Pelton wheel type turbines, on medium falls Francis reaction type, and the propeller type—preferably with adjustable blades—for low and medium falls, particularly where the head could vary. Before a project was planned consideration should be given to existing users of water either for power, condensing, or other purposes.

In the past, Mr. Ritter recalled, mills using water power had to be sited where the plant could be placed. With the grid networks now existing this was no longer true, and it should be economically possible to develop many small schemes which could feed into the grid, either directly or indirectly. In 1921, it had been estimated that there was 12 500 kW of water power plant in use in the West Riding.

With the aid of lantern slides, Mr. Ritter then described the Shannon and Erne schemes now under construction, and made reference to the Limavady undertaking started in Northern Ireland in 1898. This undertaking was taken over by the Northern Ireland Electricity Board last year, at which date the generating plant had a capacity of 279 kW, 80 per cent. being generated by water power.

TRANSFORMER SURGES

To conclude his paper, Mr. Ritter dealt with current surges occurring when transformers were switched in. On investigating the occasional blowing of a fuse when a small transformer was connected to 230 V, 50 cycle mains, he said, it had been found that providing the transformer was switched out at a point in the voltage wave where the core was left magnetised and then switched in at a point where it became magnetised in the same direction, current surges with a peak value of from 50 to 80 times the normal (r.m.s.) full load current could occur. The Post Office Circuit Laboratory had devised a circuit controlled by high-speed telephone relays for the purpose of investigating the matter. It was found that a fuse which was intended to protect the transformer in the event of a short-circuit on the secondary was liable to blow on switching in, and also that the surge could be diminished by adding resistance in series with the primary, either permanently or during switching in.

Correspondence

The Editor welcomes the free expression in these columns of genuine opinions on matters of public interest, although he disclaims responsibility alike for the opinions themselves and the manner of their expression

Plugs and Sockets

[To the Editor]

Sir,—My attention has been drawn to the notes on plugs and sockets by "Supervisor" in The Electrician of September 26, in which criticism is made of the issue of an addendum slip to B.S. 1363, Fused-Plugs and Shuttered Socket-Outlets.

Your contributor suggests that the addendum has to do with breaking capacity, but this is in fact not so. All that it does is to indicate a simple fact, namely, that the 3 A fuse-link, which is the one of minimum rating standardised for B.S. 1363 plugs, may be too large in current rating to protect an appliance of a current rating much less than 3 A, and that if closed protection of the appliances against over-current is desired it is clearly necessary to put a second fuse-link of appropriate current rating in series with the 3 A fuse-link which protects only the flexible conductor connected to the plug. This is a statement of fact, and not an interpretation of the I.E.E. Wiring Regulations.—There is no suggestion of compulsion, and the real purpose of the addendum is to indicate to users, who may not be fully acquainted with all the points of present practice, that something may be done to help them in the difficulty.—Yours faithfully,

P. Good, Director,
London. British Standards Institution.

Telephone Statistics

[To the Editor]

Sir,—Our Lisbon office has drawn our attention to a paragraph on p. 404 of The Electrician for August 8, 1947, wherein the British Postmaster-General, replying to a question in the House of Commons, gave statistics for telephone stations per thousand population in 1945 in various countries.

This reply states that in Portugal there were four stations per thousand population and, obviously, this figure only takes into account the number of stations on the C.T.T. (Post Office Telegraphs and Telephones) system, which operates approximately one-third of the total number of telephone stations in Portugal.

This company has been the sole concessionaire for operating the telephone systems in the cities and suburbs of Lisbon and Oporto for the past 60 years and, at the end of September, 1945, had twice as many stations connected as the State systems. The actual figures at September, 1945, were:—

Population	...	...	8 132 942
C.T.T stations	...	...	29 714
A.P.T. stations	...	...	64 876

Thus Portugal has a total of nearly 12 stations per thousand population.

May we suggest, therefore, that you insert this revised figure in a convenient issue in order that your readers may be made aware that Portugal is not so backward telephonically as they might have been led to believe.

Yours faithfully,

F. Hellyer,
Secretary,
The Anglo-Portuguese Telephone
London. Co., Ltd.

Maximum Demand Alarm Device

[To the Editor]

Sir,—We have an idea that many firms may be interested in the fuel warning system which operates in this factory when the total kVA power load exceeds the permissible maximum.

The system was installed shortly after the fuel crisis last winter, at which time details came to the notice of a London evening newspaper which printed a few lines on the subject. This resulted in a considerable number of inquiries from all over the country, but during the summer, of course, interest in such devices tended to wane. The present coal situation, however, gives rise to the feeling that, possibly, the engineering industry may be in trouble again this winter with fuel shut-downs.

The avoidance of shut-downs does not rest entirely with those who produce the coal, but also with those who use power and few managements will dispute that an intelligent approach and a co-operative attitude must be adopted towards fuel consumption if we are not again to be seriously inconvenienced by another crisis.

One way of bringing home to employees in a factory the fact that too much power is being used is to give them some audible warning signal. Experience has taught us that the system we have installed serves its purpose admirably, because when the signal resounds through the works, people look round to see whether a light or an unattended machine can be switched off.

The device used is a simple one and

was developed at short notice from available materials. It could, no doubt, be improved, but it does what is needed so long as the voltage is maintained reasonably constant, and where the load is evenly distributed between phases. On this basis, it can be assumed that the current, as measured by an ammeter in any one of the three lines, is directly proportional to the kVA demand. For the audible warning, we use a buzzer coupled to the public address system, to produce a loud intermittent note which can be heard in all parts of the factory and of the offices.

The device as originally set up consisted simply of an ammeter connected in one of the three lines, and fitted with contacts which could be set so as to close at a point which represented the kVA demand at which the audible signal was desired. The closing of the ammeter contacts operated a relay, which in turn operated the buzzer in the public address system. This system had the disadvantage that it sounded the warning for instantaneous peak loads as well as for consistent overloading. This served no useful purpose and detracted from the sense of urgency which could be implied by limiting the signal to overloads, lasting for at least some minutes. We have now added, therefore, a thermal delay switch which holds back the sounding of the alarm until the overloading has been maintained for three minutes.

Yours faithfully,
For The Glacier Metal Co., Ltd.,
GRAHAM ALLEN,
Sales Office Manager.
Wembley, Middlesex.

Book Reviews

John Citizen and the Law. By RONALD RUBINSTEIN. (London: Penguin Books.) Pp. 365. Price 2s. net.

The paragraphs which appear regularly under "commercial information" in this journal are an indication that, however sound may be the advice that the law is best avoided, such a course of action is not always possible. There are, in fact, few occupations in which a little knowledge of what the law allows and requires is not a useful thing to have, and as illustration may be mentioned copyright (and, incidentally, libel)—of particular interest to those who may describe their technical work in print—patents, designs and trade marks. In the business sphere, some acquaintance with such matters as contracts, accident compensation, partnerships, company law and bankruptcy is not only desirable but essential. All that needs to be known about these matters is already available, of course, in numerous volumes of depressing size and style, and there have been, from time to time, highly condensed legal "guides" for the ordinary man. Where Mr. Rubinstein's book is exceptional is that it is both an accurate survey of almost the whole field of English civil law, and an extremely readable one as well. With an obvious affection for his subject, he has written a book which all may read with profit and enjoyment. It must not, the author warns, be taken as a substitute for legal advice. While this is no doubt true, its careful study may in many cases avert the need for it. Mr. Rubinstein's achievement is that he makes the reader feel, as he should feel, that the law exists as much to uphold his rights as it does to restrict his trespasses. Prospective readers should not be deterred by its price from buying a book which is worth far more.

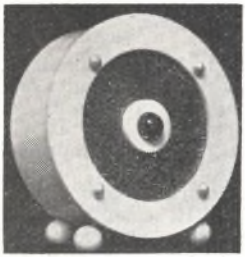
Electricity and Fire Risk (Second Edition). By E. S. HODGES, F.C.I.I., A.M.I.E.E. (London: Sir Isaac Pitman & Sons). Pp. 282. Price 15s. net.

This book has been prepared for students taking the examinations of the Chartered Insurance Institute, and for whom the author states no specialised textbook exists. It deals in a most adequate and comprehensive way with the causes and prevention of electrical fires. A casual reading of the book may convey the impression that the use of electricity involves so many hazards that it is now regarded with some disfavour by the fire offices, but this is far from the truth. The author is at some pains to make it quite clear that electricity is by far the safest form of light, heat and power, but that in order to ensure this high standard of safety, electrical installations and equipment must be of good quality and receive proper maintenance, even at some cost. Wiring systems in particular receive complete consideration, and the author comes down heavily on the side of the all-insulated type. Electrical engineers will find much of interest in the book, and it is enlightening and instructive to ascertain just how far pet ideas on installation technique, protection from shock and, especially, fire, appeal to the fire office inspectors and engineers, who take the risk of insuring the buildings in which we place our installations and equipment.

Equipment and Appliances

Plastic Extension Speakers

An extension loud-speaker of unusual appearance has recently been marketed by the Exchange Electrical Co., of 41, Cheetham Hill Road, Manchester, 4, under the trade name "Artesco." The instrument consists of a 6 in. permanent magnet speaker housed in a Perspex cabinet available in a variety of colour combinations. The overall height is 8½ in. and the depth 3 in.



Extension speaker in coloured plastics

Battery Maintenance Tool

A composite tool for servicing vehicle batteries has been introduced by Runbaken Electrical Products, of 71-73a, Oxford Road, Manchester, 1. Known as the "Quikway," it includes a spanner to fit standard terminal nuts, a reamer for cleaning starter terminals, devices for removing tight and corroded cable terminals and for cleaning the positive and negative posts.

Plastic Bobbins

After 25 years engaged in the manufacture of plastic bobbins for electrical and radio work, Fraser and Glass, Ltd., of Woodside Lane, London, N.12, have available a wide variety of moulds and tools from which bobbins of many descriptions can be mass-produced to order. A catalogue which the firm has recently published lists some of the shapes and sizes of bobbins which may be made from existing moulds.

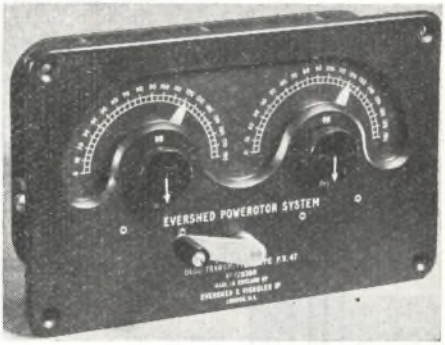
Fluorescent Pendant Fixture

A feature of a stem-suspended fluorescent lighting fixture made by the Mercury Discharge Lighting Co., Ltd., of 96a, Holloway Road, London, N.7, is the inclusion of the starter switch and suppressor condenser within the unit itself. Made for either 40 W or 80 W tubes, the fitting (type G-80-3) is constructed of Dural and finished in anodised gold. Another type of slightly different design is available, with a polished aluminium finish.

M.D.L. Dural pendant fixture

Remote Position Control

A range of position controllers suitable for operating remote mechanisms over distances varying from a few yards up to a quarter of a mile has been developed by Evershed and Vignoles, Ltd., of Chiswick, W.4. Each controller consists of a hand-operated transmitter electrically connected to one or more distant slave units, any movement of the transmitter handle causing a proportionate movement in each of the distant slaves, which develop sufficient power to operate the mechanisms to which they are coupled. The transmitter contains a rotary switch which energises in sequence three windings in the stator of the slave unit, thus causing its rotor to turn in synchronism. Various patterns of transmitters may be used. Some have a limited arc of travel, while other models permit continuous rotation in either direction. A dual rotary transmitter is also available. This comprises twin transmitters operated by a single handle; a knob below each dial enables that unit to be disengaged both mechanically and electrically should it be necessary to rotate one transmitter without the other. The position controller may be wound to operate on voltages from 20 to 50 V d.c., the current varying from ½ to 2 A. A further development of the system is the Evershed synchronising control, which ensures that two or more mechanisms separated either by distance or intervening equipment operate in synchronism.



The Evershed dual-transmitter position controller

Electrical Personalities

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

MR. H. F. CARPENTER, clerk and manager of the West Midlands Joint Electricity Authority, has been appointed secretary to the British Electricity Authority. Mr. Carpenter has been clerk and manager of the West Midlands J.E.A. for the last nine years and previously, for twelve years, was the Authority's clerk and treasurer. At an earlier period he held an appointment with the Metropolitan Water Board for eighteen years, except for a break of four years on war service. Mr. Carpenter, who is well-known throughout the electricity supply industry, is this year's chairman of the Council of the British Electrical Development Association.

MR. H. F. CARPENTER

MR. F. C. ORCHARD, chief engineer and manager of the Hornsey electricity department, has been appointed chief engineer of the Watford electricity department.

MR. JOHN R. HUNT has been appointed general works manager of Ekco-Ensign Electric, Ltd., with his office at the Ekco works, Southend - on - Sea. This appointment follows the recent merging of Ekco and Ensign lighting interests in the E. K. Cole subsidiary company. Mr. Hunt has a wide experience of the manufacture of valves and cathode tubes, and the application of electronics to lighting and his new post will give him supervision over the Ekco-Ensign plants at Southend, Preston and Rutherglen, Lanarkshire.

MR. J. R. HUNT

MR. M. J. GARTSIDE has been appointed chairman of the Rheostatic Co., Ltd., following the retirement from that position of Mr. L. Satchwell, who founded the company 25 years ago and will remain a member of the board in an advisory capacity and continue to give technical assistance to the company. Mr. T. N. Flight has been appointed vice-chairman and managing director and Mr. J. H. Stevens, deputy managing director.

MR. A. H. SHOTTER, chief assistant engineer in the Wimbledon electricity department, is to be deputy chief engineer and manager.

MR. A. FAUL, commercial assistant in the West Hartlepool Corporation electricity department, has been appointed senior accountant in the electricity department of the Nigerian Government.

MR. NORMAN PHILLIPS, of the Metropolitan Electric Supply Co., Ltd., has been appointed by the British Electrical Development Association to the post of exhibitions organiser in succession to Mr. C. Warrene, who resigned recently. Mr. Phillips, who is 37, was educated at Richmond Hill School, and, apart from serving in the R.A.F. throughout the war, in which he attained the rank of squadron leader, has spent the whole of his business life with the Metropolitan Electric Supply Co., Ltd. In 1932 he started the advertising and display department of Metesco and its subsidiaries, and has organised full-scale exhibitions for the company, arranged regular demonstrations of electric cookery and refrigeration, as well as the production of a short play.

MR. N. PHILLIPS

MR. GEORGE E. W. HIRD, who was appointed manager of Briarfield electricity department recently, after being mains superintendent at Bingley for several years, was married on October 8, to Miss Betty Kay, a member of the clerical staff of the Bingley electricity department.

PROF. P. I. DEE, F.R.S., and Sir William Griffiths, have been appointed members of the Advisory Council for Scientific and Industrial Research from October 1. Prof. Sir Lawrence

Bragg, F.R.S., Prof. Sir John Lennard-Jones, F.R.S., Sir Andrew McCance, F.R.S., and Sir Raymond Streat, retired from the Advisory Council on completion of their terms of office. Prof. P. I. Dee is Professor of Natural Philosophy at the University of Glasgow. He was formerly superintendent, Telecommunications Research Establishment. He is 43 years of age. Sir William Griffiths is chairman and managing director of the Mond Nickel Co., Ltd. He is a past president of the Institute of Metals and is 52.

MR. J. S. SMYTH has been awarded the Leon Gaster Memorial Premium by the Illuminating Engineering Society for his paper entitled "The Brightness and Legibility at Night of Road Traffic Signs."

MR. LOUIS GORDON, manager of the local electricity station of the E.S.B. (Shannon scheme), at a public meeting at Portumna, Co. Galway, was given the Carnegie Trust award, and a wallet of notes, subscribed by residents, in recognition of his bravery in rescuing from certain death a Mr. Martin, who had become entangled in electrical machinery at the power station. In releasing Mr. Martin, Mr. Gordon had bones in his right arm and hand broken in four places. It is understood that Mr. Gordon will also receive the State medal.

DR. J. W. T. WALSH has been elected president of the Illuminating Engineering Society for the 1947-48 session. Dr. Walsh was president in 1929 and is the first member to hold that office twice. He is chairman of the National Illumination Committee of Great Britain and principal scientific officer in the light division of the National Physical Laboratory, and is the author of several works on illumination and photometry. His contributions to the art and science of illuminating engineering have been considerable and he has also taken a very active part in the development of education in the profession.

Ambulance teams of the G.E.C. and associated companies, who competed for two challenge cups presented by the HON. MRS. LESLIE GAMAGE *(seated in centre, with bouquet)*

MR. M. H. ADAMS, chief engineer and manager of the Lancashire Electric Power Co., on October 6, when the B.B.C. made a recording at Kearsley Power Station,

MR. M. H. ADAMS, *chief engineer and manager, Lancashire E.P. Co., in a B.B.C. recording at Kearsley power station, explaining why the domestic load must be reduced*

explained to the B.B.C. news editor, Mr. James Bell for the benefit of the housewife, the urgent need for reducing the heating load during the industrial hours. Mr. Adams emphasized that "all the trouble that has been taken to reduce the industrial load will be wasted unless the domestic user plays his or her part." The recording was broadcast in the Northern news bulletin the same evening.

LORD ASHFIELD, chairman of the London Passenger Transport Board, and a member of the British Transport Commission, has resigned from the Railways Executive Committee, and Mr. A. B. B. Valentine, chief commercial officer and operating manager of railways of the L.P.T.B., has been appointed in his place.

THE HON. MRS. LESLIE GAMAGE, who is an officer sister of the Order of St. John and county superintendent for Berkshire of the St. John Ambulance Brigade, was present when six teams of the St. John Ambulance Brigade divisions of the General Electric Co., Ltd., and associated companies competed for two challenge cups, of which she was the donor, at the second annual competition at the Magnet Club, Witton, on October 4. The trophies were retained by the G.E.C. (Witton) "B" Division and the G.E.C. (Witton) Nursing Division.

The Operatic and Dramatic Society of the British Thomson-Houston Co., Ltd., opened their winter season with a presentation by the dramatic section of Daphne du Maurier's famous play "Rebecca" in the

Co-operative Hall, Rugby, which was filled to capacity, on October 7, 8 and 9. No

A scene in the play "Rebecca" produced by the B.T.-H. Operatic and Dramatic Society at Rugby

amateur production is without its faults, but these had been reduced to a minimum and, from all accounts, everyone who saw the show thoroughly enjoyed the performance, and Mr. Sydney S. Bagshaw, of the B.T-H. publicity department, the producer, is to be congratulated on the success achieved. The society is staging "The Rebel Maid" in November.

MR. J. M. TOOTHILL, general manager for Ferranti, Ltd., at Edinburgh, has been nominated by the Scottish Council for Industry and Development as a member of the Scottish Advisory Council for Civil Aviation.

MR. WILLIAM S. ROBERTSON, of the Intelligence Section, D.S.I.R., has been appointed scientific contacts and industrial information officer to the Scottish Council (Development and Industry) and will take up his new position early next year. He is 33 years of age, and was educated at Allan Glen's School, Glasgow, and Glasgow University, from which he graduated with first class honours in electrical engineering in 1936. On leaving the university Mr. Robertson was awarded a Sir James Caird Senior Scholarship of £450 to study at the Technical High School, Dresden, where he worked under Prof. Barkhausen on communication engineering and Prof. Guenterschulze on research on the electron microscope. In November, 1938, Mr. Robertson conducted a survey of the potentialities of hydro-electric development in Scotland, and of applications of electric power to agriculture. In August, 1939, he joined the Telecommunications Research Establishment, the R.A.F., and the Ministry of Aircraft Production radar research establishment.

MR. CHARLES INGHAM HADEN, of G. N. Haden and Sons, engineers, left £178 467 (net personalty £178 051).

Institution of Electrical Engineers

AT the inaugural meeting of the 1947/48 session of the I.E.E., on October 9, the retiring president, Mr. Vincent de Ferranti, referred to his successor's 25 years work on standardisation. It was, he said, interesting to recollect that the British Standards Institution, of which Mr. Percy Good is the director, started as an engineering standards association, and the three senior engineering institutions played a great part in the commencement of that work. Remarking that this was the 50th year of Mr. Good's membership of the institution, Mr. de Ferranti paid a tribute to the work which Mr. Good had done on the institution's behalf.

After Mr. Good had delivered his inaugural address, an abstract of which is given on p. 1137, Sir Clifford Paterson proposed a vote of thanks, which was seconded by Mr. D. B. Hoseason.

Dr. P. Dunsheath proposed a vote of thanks to the retiring president, Mr. de Ferranti, and Mr. T. G. N. Haldane seconded.

The new President then presented to Mr. de Ferranti the certificate of presidency commemorating his year of office.

A certificate of honorary membership of the Engineering Institute of Canada was presented to Dr. P. Dunsheath by Mr. Frederick Hudd, C.B.E., Acting High Commissioner for Canada. Mr. Hudd said that Dr. Dunsheath had made many great contributions to the cause of science, and the Council of the Engineering Institute of Canada recalled with pleasure his attendance at their annual meeting in Montreal in 1946.

Dr. Dunsheath said he felt the honour was not entirely personal. It was an indication of goodwill between the Engineering Institute of Canada and the Institution of Electrical Engineers in Great Britain. He felt there were great possibilities for engineers in the field of international relations. The more a body of engineers in one country contacted a similar body in another country, the more likely were they to prevent despair and misunderstanding, which were the bane of modern international life.

New Corporate Members were welcomed to the institution, and Premiums were awarded for papers written during the past session. It was announced that during the months April to September, 814 donations and subscriptions to the benevolent fund had been received, amounting to £1 530 4s. 5d.

Contracts Open

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

Luton, October 18.—Installation of electric light in third section of Luton Technical College. Specification from County Architect, Shire Hall, Bedford; deposit, £2 2s.

Birmingham, October 20.—Supply, for twelve months, of electric kettles, cookers, wash-boilers, circulator water heaters, cooker control units, circulator water heater control panels. Specifications from Chief Engineer and Manager, 14, Dale End, Birmingham, 4.

Birmingham, October 20.—Supply, delivery and erection of electric lighting equipment, comprising floodlights, fittings, lanterns, concrete columns and associated apparatus for the railway sidings and roadways at Hams Hall "B" power station. Specification from Chief Engineer and Manager, City of Birmingham Electric Supply Department, 14, Dale End, Birmingham, 4; deposit, £2.

Coventry, October 27.—Electrical installation in 448 houses on various Corporation estates. Specification from City Architect, 1a, Warwick Row, Coventry.

Rochdale, November 3. — Supply, delivery, laying, jointing and commissioning of 0.2 sq. in., 33 kV underground cable, together with associated pilot cable. Specification from Engineer and Manager, Electric House, Smith Street, Rochdale.

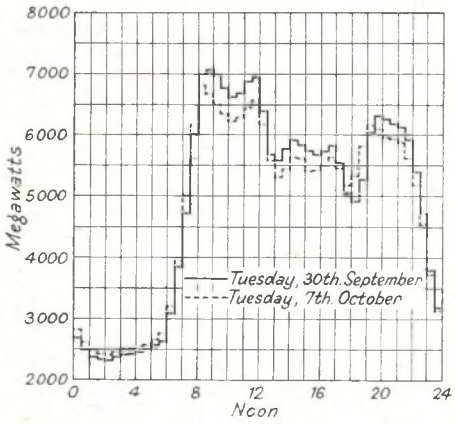
Edinburgh, November 10.—Supply and delivery of 33 kV ring main switchgear and 5 000 kVA transformers. Specifications from Engineer and Manager, Electricity Department, Dewar Place, Edinburgh, 3.

Pretoria, November 11.—Supply, delivery and erection of: (a) piping equipment and (b) circulating water pumps and equipment, for first stage of "B" power station. Specifications from City Electrical Engineer in Pretoria or from the consulting electrical engineers, Messrs. Merz and McLellan, Carliol House, Newcastle-on-Tyne, 1; deposit, £2 2s.

Stoke-on-Trent, November 12.—Manufacture, supply, delivery and erection of two 1 000 MVA outdoor oil circuit-breakers, switchgear structures, and two indoor control panels, as an extension to existing 33 kV equipment. Specification from General Manager, Electricity Department, 31, Kingsway, Stoke-on-Trent; deposit, £2.

Load Spreading and the National Demand

THE winter load-spreading schemes became operative throughout the country on October 6. In the two national load curves above, prepared by the Central Electricity Board, the load on the second day of spreading may be compared with that on the same day of the previous week, on which, however, the maximum day-time temperature, recorded in London, was 9° higher than on October 7.



The broken line, representing the load on October 7, indicates an average increase, during the night hours, of about 50 MW, rising to over 250 MW at 7 a.m. From 8 a.m. to 4.30 p.m., the load fell below the level of the previous week, after which it rose to a substantially higher level until 7 p.m.

Making allowance for the warmer weather on October 6, which might account for much of the day-time reduction in load, the curves suggest that load-spreading, on its second day, was responsible for part of the increase in demand before 8 a.m. and after 4.30 p.m. In this respect, however, it should be noted that in the period covered by the two curves, sunrise became 11 minutes later and sunset 15 minutes earlier.

Industrial Information

Electrical Travellers' Dinner-Dance

The annual dinner and dance of the Electrical Trades Commercial Travellers' Association will be held at the Café Royal, on October 24. Tickets, price 25s., can be obtained from Mr. S. Johnson, 6, The Firs, Westwood Road, London, S.E.26.

B.E.A.M.A. Contract Price Formulæ

For purposes of calculating variations in: (a) Rates of pay, the rate of pay for adult male labour at October 11 shall be deemed to be 110s.; (b) costs of material, the index figure for intermediate products last published by the Board of Trade on October 11 is 227.2 and is the figure for the month of September.

E.I.B.A. Ball

It is now confirmed that the annual ball of the E.I.B.A. will be held at Grosvenor House, on November 14. An attractive programme has been arranged. Billy Ternent and his Sweet Rhythm Orchestra will provide the music, and the cabaret is to include Sylvia Welling, Sherkot the Eccentric, and the Three Avalons. Applications for tickets at 30s. each, accompanied by appropriate cheques, can be accepted by the association at its office at 32, Old Burlington Street, London, W.1.

B.S. for Valve Bases and Holders

The British standard specification for the dimensions of radio valve-bases and the corresponding valve-holders published in 1932, and revised in 1936, has been revised for the second time, and B.S. 448:1947, entitled "Electronic-Valve Bases, Caps and Holders," has been published. Copies may be obtained from the British Standards Institution, 24, Victoria Street, London, S.W.1. (Price, 7s. 6d. post free.)

Electrical Contracting Industry

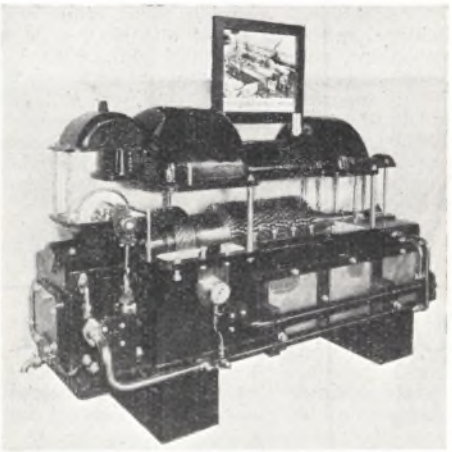
Supplies are now available of the 1947 edition of the booklet published by the National Federated Electrical Association under the title "Electrical Contracting Industry: Industrial Agreements and National Working Rules as agreed between the National Federated Electrical Association and the Electrical Trades Union." Copies, price 1s. 6d. each, may be obtained at the office of the N.F.E.A., Africa House, Kingsway, London, W.C.2.

Post-Advanced Lectures

Two courses of post-advanced lectures in electrical and mechanical engineering have been arranged by the Regional Advisory Council for Technical and other Forms of Further Education for Manchester and District to be delivered at the College of Technology, Manchester. The first is a course of fourteen lectures on "Industrial Instrumentation" on Wednesdays from 7 to 9 p.m., commencing on October 22; and the second is a course of twelve lectures on "Recent Developments in Electronics," on alternate Wednesdays from 7 to 9 p.m., commencing on November 5. Enrolments will be accepted at the College of Technology during the half-hour preceding the first lecture.

First Commercial Axial Flow Blower

Through the generosity of C. A. Parsons and Co., Ltd., there has been presented to the Science Museum, South Kensington, London, the first commercial axial flow turbo-blower. It was constructed by



The C. A. Parsons' commercial axial flow blower prepared as a museum piece

C. A. Parsons and Co. in 1901, and was supplied to the Cooksons Lead and Antimony Co., Ltd., Howden Lead Works, Willington Quay-on-Tyne. The machine was required to supply the blast for a lead-smelting furnace, its duty being to deliver 3 000 cu. ft. of free air per min. at a gauge pressure of 1¾ lb. per sq. in. The blower is of the bladed type consisting of 20 pairs of rows of blades 1⅞ in. high on a shaft diameter of 9⅝ in. It operated at a speed of 4 000 r.p.m. and was driven by a continuous current motor of 50 H.P. The machine was in continuous service until 1916 and thereafter was used as a stand-by until finally dismantled in 1937. The illustration of the machine prepared for the museum shows the arrangements which have been made for the

cover to be permanently lifted so that the internal blading can be examined. The photograph of a modern gas-turbine mounted on the cylinder cover enables a comparison to be made with the present-day type of axial flow compressor. The complete blower was given to C. A. Parsons and Co., by the Cookson Lead and Antimony Co., Ltd., for presentation to the museum.

Welding Research Association

The annual report of the British Welding Research Association states that during the year 1946-47 it has established its own metallurgical laboratories at 29, Park Crescent, London, W.1, and facilities have been provided for the investigation of metallurgical problems involved in the welding of ferrous metals and light alloys. Considerable progress has been made in developing the engineering research station at Abington Hall, near Cambridge, and a special resistance welding section is to be set up. To enable small firms and individuals, considered eligible, to enjoy certain advantages from the research work, the grade of associate member has been introduced.

E.D.A. and E.A.W. Joint Conference

A conference arranged jointly by the E.D.A. and the E.A.W. for housecraft advisers, senior demonstrators and saleswomen in the electrical industry will be held at Caxton Hall, Westminster, on October 22, 23 and 24. Mr. H. F. Carpenter, chairman of the E.D.A. Council, will preside at the opening session at 10 a.m. on Wednesday and an address will be given by Lord Citrine, chairman of the B.E.A. Dame Caroline Haslett, director of the E.A.W., will read a paper on "The Responsibilities of the Trained Woman in the Electrical Industry," and Mr. V. W. Dale, general manager and secretary of the E.D.A., will speak on "Electricity and Coal Conservation." Other subjects to be discussed include "Refrigeration and Quick Freezing," "Training and Qualifications for the Electrical Industry," "Fluorescent Lighting" and "Domestic Lighting."

Scientific and Technical Photography

Part two of the ninety-second annual exhibition of the Royal Photographic Society of Great Britain, which opened on Saturday, October 11, and will conclude on Saturday, November 1, contains an extremely interesting scientific and technical section in which are to be seen mounts from the Brown Firth Research Laboratories illustrating results achieved by photomicrography of large specimen areas of metallurgical specimens with maximum resolution plates, and electron micrographs demonstrating the application of the electron microscope to the manufacture of cemented carbide tools; prints showing the microstructures in welded brass; and two photographs of a lathe running at 2 500 revolutions per minute, one showing brass chips leaving the tool, and the other steel chips coming off the tool. Other sections cover nature, medical, record, Press and commercial photography, and there are some exquisite transparencies in colour and monochrome on view.

Copper and Soil Corrosion

The Copper Development Association announces that its publication "The Resistance of Copper to Soil Corrosion," has been largely rewritten to incorporate data resulting from recent research on the behaviour of copper buried underground, and will appear shortly as "Copper Underground: Its Resistance to Soil Corrosion." Requests for copies may be made now to the association at Kendals Hall, Radlett, Herts.

Notes for Contractors

As a result of negotiations with the Ministry of Food, in certain circumstances electrical contracting operatives will be entitled to a special allowance of cheese. The concession is intended solely to meet the needs of isolated rural workers for whom canteens or packed meals facilities are not available, and employees must be consistently engaged on work more than two miles from the nearest town or built-up area where there are feeding facilities of a suitable type. The date for the commencement of the electrical contracting industry's new indentured apprenticeship scheme has had to be postponed. The scheme will not, in consequence, come into operation on the third pay day in October, as had been announced. This decision was reached by the N.J.I.C. at its meeting on October 7, after it had been reported that unforseen difficulties and delays had arisen in the completion of matters of detail.

Reyrolle Strike Statement

A. Reyrolle and Co., Ltd., of Hebburn-on-Tyne, 1 000 of whose time-workers had staged an unofficial strike, issued the following statement on Tuesday:

"It has been, and still is, the policy of the company to extend payment by result wherever it is reasonably possible to measure effort, whatever the type of labour concerned and whether or not employed on directed production. In pursuance of this policy the company has lately introduced such schemes in various sections formerly on a time-working basis. Further action on these lines was under discussion when the present unconstitu-

tional strike caused a suspension of all negotiations. When work is resumed, these discussions will continue. The company is bound to observe rates of pay and conditions and the negotiating machinery agreed with the trade unions under national and local agreements. It cannot and will not depart from these fundamental principles or from these agreements."

Gift of Radio Set

By arrangement with the organisers of the " Enterprise Scotland " Exhibition in Edinburgh, the 400 000th visitor will be presented with a radio set made in Scotland. The receiver chosen is the Ekco " Radiotime," manufactured at the Rutherglen factory of E. K. Cole, Ltd.

Lamp Contract

The tender of Potteries Electrical Warehouse has been accepted for the supply of Atlas lamps to the City of Stoke-on-Trent for the six months ending March 31, 1948.

Trade Publications Received

The new season's list of " Siemax " and " Full o' Power " batteries for radio sets and hearing aids, and pocket torch and cycle lamp batteries, issued by Siemens Electric Lamps and Supplies, Ltd., 38/9, Upper Thames Street, London, E.C.4.

An illustrated folder, published by the Brush Electrical Engineering Co., Ltd., Duke's Court, 32, Duke Street, St. James's, London, S.W.1, giving details of Brush battery electric industrial trucks.

District Heating Plan for City of London

A RECOMMENDATION that district heating by the heat-electric system be provided for the areas of the City of London that have to be rebuilt (totalling 250 acres), subject to such a system being economically adapted during the period of reconstruction, to the rate of rebuilding and to any relative improvements in the methods of heat production, was submitted to the Court of Common Council at the Guildhall yesterday (Thursday). The estimated cost of the scheme, which is planned in four stages, covering 30 years, is £7 084 000, and it is computed that by 1977 there would be a saving of 103 000 tons of coal a year, and that the average price per therm of the heat supply at the consumers' premises could be reduced from 8d. (with coal at 55s. a ton and having a calorific value of 11 500 B.Th.U. per lb.) to 7d., or possibly 6.5d. per therm, compared with 1s. per therm, the average cost of heat from central heating boilers burning coal or coke.

The scheme is outlined in detail in a report prepared by Mr. S. B. Donkin, of Messrs. Kennedy and Donkin, consulting engineers, and submitted to the Common Council by the Improvements and Town Planning Committee.

It is proposed that, for the whole of the rebuilt area, heat shall be generated and sent out from two or three power stations situated outside the City boundary and either additionally or alternatively, from the new power station at Bankside on the south bank of the Thames if permission to do so is obtainable. Those generating stations would be equipped with plant of the latest type capable of sending out heat and electricity, the heat carrier being water and the electricity not used for district heating being sold to the B.E.A. The generating stations would be connected by flow and return hot water mains to one or more sub-stations erected within the City area from which the heat would be distributed to the rebuilt areas. These sub-stations would contain hot water accumulators to which heat could be supplied during the night for supplementing the heat both generated and supplied during the day. This arrangement with accumulators would allow the generating stations to operate at a high daily load factor, thus reducing the capacity of installed plant and the size of the transmission mains, whilst enabling the heat supply therefrom to be given at the daily load factor of the demand for heat. Consideration has been given to the inclusion of heat-pump sub-stations and/or electrode boiler sub-stations.

The supply of heat for hot tap water would be served from the distribution mains in a closed circuit through a calorifier in each block. The calorifiers would have sufficient capacity to enable the demand of 5 gal. per head of day population per 12 hrs. to be met with reasonable diversity.

It is recommended that plant for the heat-electric system be installed, firstly, on the City Road site of the demolished generating station of the County of London E.S. Co., and secondly, on the site of the Shoreditch Borough Council's Whiston Road generating station. If permitted, it is suggested that the new Bankside station be substituted for the use of the City Road and the Shoreditch stations for the first 15-year period. This would save the cost of one tunnel for transmission mains. It is proposed that four 6 000 kW sets be installed at City Road and three 12 000 kW sets at Shoreditch to meet the heat demands for the first 15-year period of development.

Electricity Supply

Fulham.—Multi-cyclone grit arresting plant is to be installed at the power station, at an estimated cost of £300 000. Pratt, Daniel, Ltd., will supply the plant for one boiler house, and James Howden and Co., Ltd., the plant for the other.

Westmorland.—The request of the Ministry of Fuel that a local fuel saving committee be formed has been ignored by the Lakes Urban Council. A member of the Council complained that people were tired of being told what they had to save.

Sheffield.—A 50 000 kW turbo-alternator which had travelled on a specially built crocodile truck between the Metropolitan-Vickers works at Old Trafford, Manchester and Sheffield at a daily rate of 4 m.p.h. was given a civic reception on its arrival.

Liverpool.—The possibility of purchasing or chartering suitable hopper vessels for the disposal at sea of ashes from the Clarence Dock station is to be investigated by the City Electrical Engineer. Meanwhile, tenders are to be invited for the removal of ashes in motor vehicles.

Ilford.—After heavy rainfall on June 27, the pumping station operated by the Ilford and Barking Joint Sewerage Committee had to deal with a flow of four million gallons of water in an hour. The increase in electrical load, amounting to 500 kW, resulting from this was provided by Diesel generating plant, and the Joint Engineers have publicly expressed their satisfaction at the saving in electricity charges thus effected.

Generation of Electricity.—The official returns rendered to the Electricity Commissioners show that 3 150 million units of electricity were generated by authorised undertakers in Great Britain during the month of September, 1947, as compared with the revised figure of 3 105 million units in the corresponding month of 1946, representing an increase of 45 million, or 1.4 per cent. During the past nine months of 1947 (i.e., up to the end of September) the total number of units generated by authorised undertakers was 30 439 million, as compared with the revised figure of 29 199 million units for the corresponding period of 1946, an increase of 1 240 million, or 4.2 per cent. The total number of units sent out by authorised undertakers during September, 1947 (i.e., units generated, less units consumed in the stations by auxiliary plant and for lighting, etc), was 2 968 million, as compared with the revised figure of 2 929 million units in the corresponding month of 1946, an increase of 39 million, or 1.3 per cent. During the first nine months of 1947 (i.e., up to the end of September), the total number of units sent out from the generating stations of authorised undertakers was 28 711 million units, compared with the revised figure of 27 534 million units for the corresponding period of 1946, an increase of 1 177 million, or 4.3 per cent.

Early this week, the British Electricity Anthority moved into permanent headquarters at Portland Court, 170a, Great Portland Street, London, W. The illustration above shows the entrance to the new offices

Scotland.—Intended to provide electric power for the slate quarrying industry on the islands of Seil, Luing and Easdale, a new distribution scheme published by the North of Scotland Hydro-Electric Board provides for transmission lines from Clachan Bridge to Toberonochy, with branches to Ardencaple House, Balvicar, Ellanbeich, Easdale and Cullipool. Power will be supplied by the Grampian E.S. Co. Overhead lines will span Clachan Sound

and Cuan Sound. The Electricity Commissioners have approved the scheme on the Board's assurance that they will proceed with it in stages after having received the Commissioners' financial sanction for each stage. The first stage will consist of a line from Clachan Bridge to Balvicar village. This will also carry supply to the Balvicar quarry, for use in pumping, winding, cutting and dressing of slate. The Board state that supplies will be extended when financial authority can be obtained and materials are available.

Bradford.—The annual report of the undertaking for the year ended March 31, 1947, shows that units generated reached a record figure of 308 379 950, representing an increase of 17.5 per cent. on the previous year's figure. Of a total of 285 804 040 units sent out, which compares with 256 396 220 units in 1945-46, 276 515 140 (235 841 920) units were supplied to the undertaking and 9 288 900 units supplied to the grid. The number of consumers increased from 77 676 to 80 705, and the maximum load on generators increased from 73 900 kW to 76 700 kW, compared with the highest recorded figure of 82 190 kW in 1945. Coal consumption amounted to 204 942 tons, corresponding to 1.489 lbs. per unit generated, or about 1.5 per cent. more per unit than in the preceding year. As reported in THE ELECTRICIAN of September 26, 1947, the installed capacity of the station was increased to 105 000 kW during the year by the commissioning of a new 22 500 kW set and the removal of an old 15 000 kW turbo-alternator. Two new 180 000 lbs. per hr. boilers are at present in process of erection, and it is hoped that one will be in operation by the middle of next month, and the other by the end of the year. At the same time, two old boilers are being removed to make room for a further 180 000 lbs. per hr. unit, which will, it is hoped, be ready by June, 1949. An additional 22 500 kW turbo-alternator is scheduled for commissioning in September, next year. As already reported, the undertaking made a net profit during the year of £47 475, compared with £40 387 in 1945-46.

Electric Mobile Crane for Material Handling

A 10 CWT. Mynne electric runabout crane, introduced by Crompton Parkinson, Ltd., and C. H. Johnson (Machinery), Ltd., has been developed for the handling of a variety of loads. The unit consists of a jib crane mounted on a 2 ton Electricar truck, specially designed for manœuvrability, with a speed of 4½ m.p.h. The maximum overall height of the jib is 15 ft. 6 in., and the minimum clearance height 6 ft. 9 in. Maximum ground to hook height is 13 ft. When a load of 10 cwt. is being lifted the maximum permissible radius of operation is 9 ft., but the radius increases with lighter loads, and 6 cwt. can be handled at a radius of 13 ft. Safe load and radius indicators of the drum type, fitted to the carriage king posts, are worked by the jib spindle and give the radius on one side and the safe load on the other.

10 cwt. Mynne-Electricar runabout crane

The crane, with the truck, weighs 2 tons 12 cwt. A ¾ H.P. totally-enclosed motor drives the hoist through a directly-coupled totally-enclosed fan-cooled worm reduction gearbox. An electro-magnetic brake acts on the periphery of the coupling. Hoisting and lowering are controlled by a reversing drum-type controller with three steps in each direction. It is fitted with an in-built self-resetting circuit-breaker, which in the event of overwinding is tripped by a hoist limit switch.

A 320 Ah battery is fitted in two sections and a special feature of the crane unit is that the crane can be removed from the truck which can then be used separately. To facilitate removal of the crane from the truck, the hoist motor is connected to the control cubicle through a special withdrawable plug.

Company News

C. A. PARSONS AND CO., LTD.—Int. div. 5%, less tax, on £600 000 ord. capital for 1947. The company was made public in May last, and the directors anticipated in the prospectus an ord. div. of 12½%, less tax, for the current year.

ELECTRICAL AND MUSICAL INDUSTRIES, LTD.—Div. on ord. 6%, less tax, for yr. ended June 30, payable Nov. 22. Div. is same as that paid for last six yrs., but bonus of 2% paid on each of last four occasions is omitted. Net prft. of co. for yr. £115 500 (£165 000) and total net prft. of group £117 335 (£195 811) after provdg. £557 695 (£562 226) for taxn.

DUBILIER CONDENSER CO., LTD.—Presiding at the annual general meeting, the chairman (Mr. W. H. Goodman) said that substantial progress had been made during the year with the rehabilitation of the factory, including the further mechanisation of manufacturing processes. At Kirkby, on a 98½ year lease from the Liverpool Corporation, they now held a factory suitable for their requirements. This was in furtherance of a scheme to create productive capacity in an area where suitable labour for their class of work was more readily available than in the London area. Production at Kirkby had commenced in January, 1947, and was being steadily increased as circumstances permitted to a level which, with the output from the Acton factory, would be capable of meeting estimated requirements. They also had operating in other parts of the country two factories making parts and subassemblies which would normally be produced at Acton if sufficient labour were available there.

EAST AFRICAN POWER AND LIGHTING CO., LTD.—The recently published "Uganda Electricity Survey, 1947," was criticised in the speech prepared by the chairman (Maj. C. M. Taylor) for the annual general meeting in Nairobi. The company had been informed, it was stated, that the Government of Uganda, having decided to adopt the recommendations in the report, would expropriate the company's licences and properties in Uganda, although these licences, covering a period of 50 years, were only granted in 1937 in open competition and in response to Government advertisements. The report had recommended the construction of a dam at the Owen Falls and a power station with an initial installed capacity of 45 000 kW, rising to a maximum of 90 000 kW, but the scheme had apparently been accepted without that comprehensive civil engineering investigation necessary for such a project. It was, the Chairman thought, extremely unlikely that the results estimated in the report would be achieved in the time laid down, and he had heard the view expressed that the capital cost might reach a figure of £8 000 000 of taxpayers' money, against the survey's estimate of £5 000 000. The company's own hydro-electric scheme a few miles downstream of the Owen Falls, which, as ultimately to be developed, would have satisfied foreseeable demands for many years to come, was estimated to cost a quarter of what the Government scheme would involve. The proposals contained in the survey to obtain load for the proposed Uganda undertaking by transmitting a supply to North-Western Kenya, and even to Nairobi, were admitted to be economically unsound. The advice given to the Kenya Government to withhold the granting of licences for provision of further generating plant indefinitely in northern Kenya and Nairobi would, if accepted, effectively stultify and deny expansion of electricity to consumers in those areas for many years. The company had made an application in January this year for permission to issue capital for existing and future commitments.

Metal Prices

Monday, October 13

		Price	Inc.	Dec.
Copper—				
Best Selected ..	..per ton	£130 10 0	—	—
Electro Wire bars ...	„	£132 0 0	—	—
H.C. Wires, basis ...	„	£149 10 0	—	—
Sheet	„	£173 10 0	—	—
Bronze Electrical quality 1% *Tin*—				
Wire (Telephone), per ton		£172 5 0	—	—
Brass (60/40)—				
Rod basis ...	... per lb.	1s. 1¾d.	—	—
Wire	... „	1s. 6⅛d.	—	—
Iron and Steel—				
Pig Iron (E. Coast Hematite No. 1)	...per ton	£9 10 0	—	—
Galvanised Steel Wire (Cable Armouring) basis 0.104 in. ...		£35 15 0	—	—
Mild Steel Tape (Cable Armouring) basis 0.04 in.	„	£22 15 0	—	—
Lead Pig—				
English	„	£91 10 0	—	—
Foreign or Colonial ...	„	£90 0 0	—	—
Tin—				
Ingot (minimum of 99.9% purity) ...	„	£442 10 0	—	—
Wire, basis ...	... per lb.	5s. 6¾d.	—	—
Aluminium Ingots	...per ton	£80 0 0	—	—
Spelter	...	£70 0 0	—	—
Mercury (spot) ... (*ex. warehouse*)	per bott.	£16 0 0	—	—

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

Commercial Information

Mortgages and Charges

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

BRENTFORD TRANSFORMERS, LTD., London, S.E.—August 6, £3 500 mortgage to North London District I.O.O.F., M.U., Friendly Society; charged on 54, St. John's Park, Greenwich. * Nil. October 9, 1946.

SINGLETON BROS. (INSTRUMENTS), LTD., London, S.W., dealers in electrical equipment.—August 6, two mortgages, to Midland Bank, Ltd., each securing all moneys due or to become due to the Bank; respectively charged on land, hereditaments and premises at Guildford Road and Oreston Lane, both Effingham, and fixtures, etc.

KEGO ELECTRIC CO., LTD., Wembley.—Aug. 11, six Land Registry charges, to Barclays Bank, Ltd., each securing all moneys due or to become due to the Bank; respectively charged on land and buildings, on North side of Grand Union Canal, South of Mount Pleasant and Beresford Avenue, Alperton; 47, Belmont Avenue, Wembley; 5, Newcombe Park, Wembley; 29, Madeley Road, Ealing; 67, George Fifth Way, Ealing, and Caldaric House, Mount Pleasant and Beresford Avenue, Alperton. * £1 000. June 29, 1946.

Rescinding Order

BACKHOUSE, Lawrence, 23, Central Avenue, Prescot; THORNTON, Charles Henry, 18, Melbourne Street, Stretford, and EVANS, Sydney, 23, Royle Street, Seedley, Salford, all carrying on business in partnership under the style of "The Arc Electrical Company," at Palatine Buildings, Victoria Street, Manchester, as electrical and wireless suppliers. Court: Manchester. Nature and Date of Order Annulled—Adjudication dated July 24, 1923. Rescinded—Receiving Order dated July 18, 1923. Dismissed—Petition dated July 3, 1923. Date of Annulment, Rescission and Dismissal—September 22, 1947. Grounds of Annulment, Rescission and Dismissal—It appearing to the Court that all the debts, statutory interest, costs and expenses have been paid in full.

Coming Events

Friday, October 17 (To-day)

ILLUMINATING ENGINEERING SOCIETY, BIRMINGHAM CENTRE.—Chairman's Address, by C. J. Allderidge. *6 p.m.*

SCOTTISH ENGINEERING STUDENTS' ASSOCIATION.—Edinburgh. At the Royal British Hotel. "The Electrical Resistance Wire Strain Gauge," by A. G. Hadjiopyrou *7.30 p.m.*

I.E.E., MEASUREMENTS SECTION.—London. Chairman's Address, by D. C. Gall. *5.30 p.m.*

BRISTOL ELECTRIC CLUB.—At the Grand Hotel. Monthly Meeting.

I.E.E., N. EASTERN STUDENTS' SECTION.—Newcastle-upon-Tyne. At King's College. "Some Aspects of Short-Circuit Testing," Chairman's Address, by D. Lightlo. *6.30 p.m.*

ELECTRICAL POWER ENGINEERS' ASSOCIATION.—Stoke-on-Trent. At the City Electricity Department. "Mercury Arc Rectifiers," by J. C. Milne. *7 p.m.*

Saturday, October 18

I.E.E., N. MIDLAND STUDENTS' SECTION.—Leeds. At the City Electricity Department. "Insulations as Applied to Electrical Machines," by Miss J. Green. *2.30 p.m.*

I.E.E., LONDON STUDENTS' SECTION.—Visit to Battersea Power Station.

Monday, October 20

I.E.E., WESTERN CENTRE, TRANSMISSION GROUP.—Bristol. Inaugural Meeting.

I.E.E., MERSEY AND N. WALES CENTRE.—Liverpool. At the Royal Institution. "Electrical Control of Dangerous Machinery and Processes," by W. Fordham Cooper. *6.30 p.m.*

I.E.E., N. EASTERN CENTRE, RADIO AND MEASUREMENTS GROUP.—Newcastle-on-Tyne. Address, by V. Z. de Ferranti. *6.15 p.m.*

I.E.E., LONDON STUDENTS' SECTION.—Chairman's Address, "The Influence of Propagation on the Uses of Radio Waves," by E. M. Hickin. *7 p.m.*

BIRMINGHAM ELECTRIC CLUB.—At the Grand Hotel. "Multi-Broadcast Carrier-Frequency Radio Relay," by A. R. Almond. *6.30 p.m.*

Tuesday, October 21

I.E.E., SOUTHERN CENTRE.—Brighton. At the Technical College. "Ultra-High-Speed Relays in the Fields of Protection and Measurement," by W. Casson and F. H. Last. *5.45 p.m.*

INSTITUTION OF POST OFFICE ELECTRICAL ENGINEERS.—London. At the I.E.E. "Engineering Control Statistics—Some Difficulties and Possible Solutions," by W. H. Scrivener. *5 p.m.*

I.E.E., S. MIDLAND CENTRE.—Stafford. At the premises of the English Electric Co., Ltd., Stychfields. "The Practical Training of Professional Electrical Engineers," by D. B. Hoseason. *6.15 p.m.*

Wednesday, October 22

I.E.E., N. WESTERN CENTRE, Radio Group.—Manchester. "New Possibilities in Speech Transmission," by Dr. D. Gabor. *6.30 p.m.*

JOINT E.D.A. AND E.A.W. CONFERENCE.—Caxton Hall, Westminster. *10 a.m.*

Friday, October 24

INSTITUTION OF MECHANICAL ENGINEERS.—London. Presidential Address. *5.30 p.m.*

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NALDERS Hyper-Scale, Air-Damped, Soft Iron Instruments — Spring Control — are available for alternating or continuous current. Readings are accurate and dead-beat, dials being 4", 6" or 8" diameter as required. Power consumption is low and working parts are completely insulated from casings.

N.C.S. PRODUCTS include all types of Electrical Measuring Instruments as well as Protective Relays, Synchronisers, Circuit Breakers, etc. In the complete range every need of accuracy, reliability, durability and convenience is fully met, prices being competitive without sacrifice of quality.

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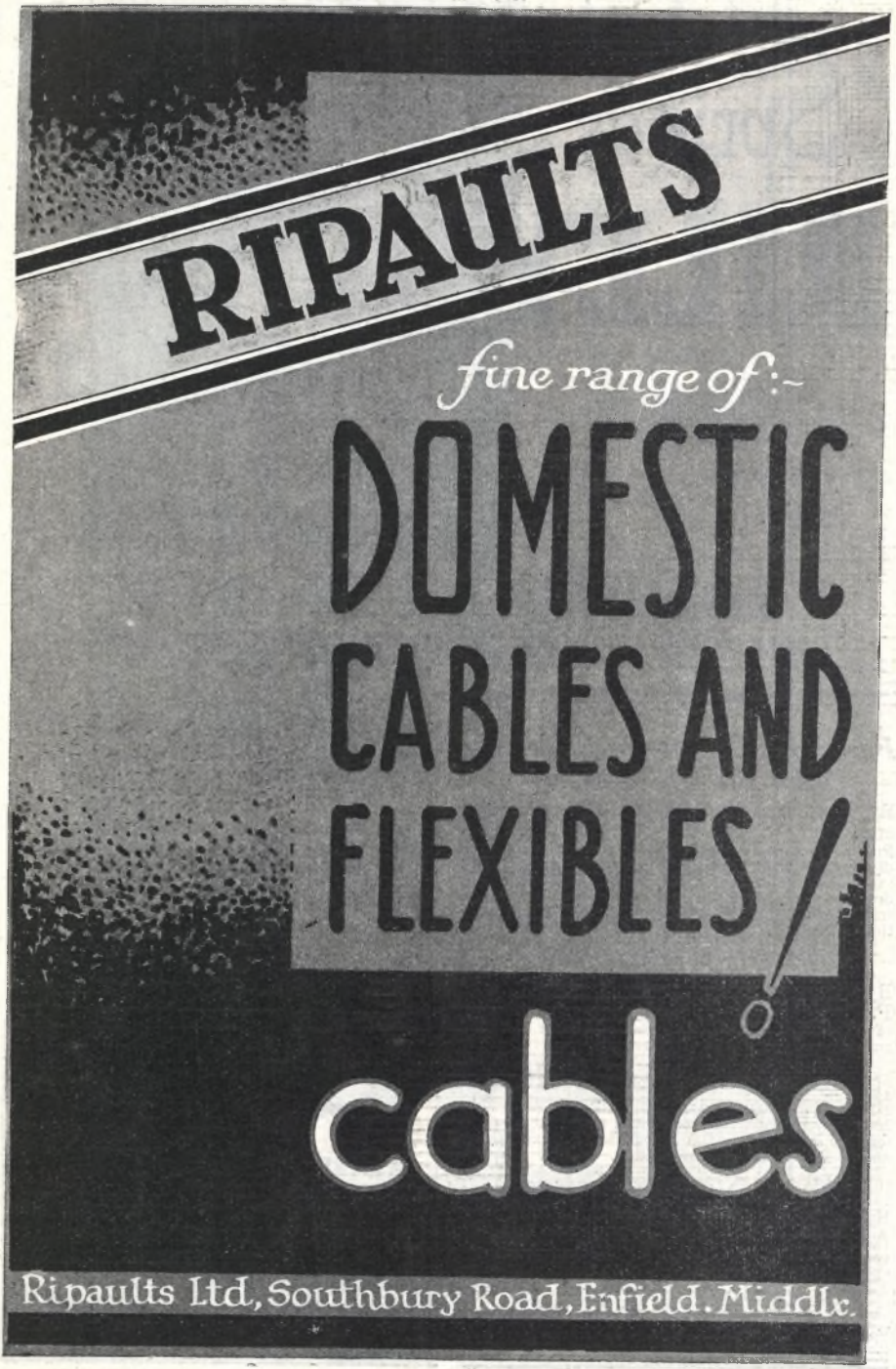
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INDEX TO ADVERTISERS IN THIS ISSUE

CLASSIFIED ADVERTISEMENTS

None of the vacancies in these columns relates to a man between the age of 18 and 50 inclusive, or a woman between the ages of 18 and 40 inclusive, unless he or she is exempted from the provisions of the Control of Engagement Order, or the vacancy is for employment exempted from the provisions of that Order.

SITUATIONS VACANT

BOROUGH OF MAIDSTONE ELECTRICITY DEPARTMENT.

APPOINTMENT OF CONTROL ROOM ENGINEERS.

APPLICATIONS are invited for the above positions.

Applicants should have had a sound technical training and experience in the operation and control of large E.H.T. switchgear, preferably in a steam-driven selected station.

The salary will be Grade 9a, Class G, of the National Joint Board Schedule, at present £343 per annum.

The successful candidates must pass a medical examination and contribute to the Corporation's superannuation scheme.

Applications, stating age and full particulars of training and positions held, on forms to be supplied on application endorsed "Control Room Engineer," must be addressed to the undersigned, so as to be received not later than October 31st, 1947.

E. E. HOADLEY, C.B.E., M.I.E.E.,
Engineer and Manager.
(266)

COUNTY BOROUGH OF EAST HAM.

APPOINTMENT OF ASSISTANT TO INSTALLATIONS ENGINEER.

ELECTRICITY DEPARTMENT

APPLICATIONS are invited for the above appointment from persons with sound technical training and who have had considerable experience in the preparation of estimates and specifications for all classes of installation work for new public buildings, schools, canteens and housing programmes. The successful applicant will be required to work under the direction of, and assist, the Installations Engineer. Candidates should possess the Higher National Certificate in electrical engineering, or equivalent qualification.

The salary will be in accordance with Class F, Grade 8b, of the National Joint Board Schedule, at present £405 6s. per annum, rising to £421 1s. per annum.

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

Applications, on forms to be obtained from the undersigned, accompanied by copies of not more than three recent testimonials, must reach me not later than October 25th, 1947.

Canvassing in any form will be a disqualification.

H. A. EDWARDS,
Town Hall, Town Clerk.
EAST HAM, E.6.
September, 1947. (213)

COUNTY BOROUGH OF SOUTHEND-ON-SEA ELECTRICITY DEPARTMENT.

SENIOR DRAUGHTSMAN.

APPLICATIONS are invited for the above appointment from persons under 35 years of age who have had a sound general engineering and drawing office training, experience in the layout of 33 kV and 11 kV switchgear, the design of substations and industrial buildings and reinforced concrete work.

Salary in accordance with A.P.T. Grade 2 of the National Scale, £360-£405, plus war bonus, at present £59 16s. per annum.

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

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

Applications must be received at that address not later than October 31st, 1947.

Canvassing will disqualify.

ARCHIBALD GLEN,
Town Clerk.
(265)

HUDDERSFIELD CORPORATION ELECTRICITY DEPARTMENT.

APPOINTMENT OF TWO JUNIOR MAINS ASSISTANTS.

APPLICATIONS are invited for the above positions at a salary in accordance with the National Joint Board Scale, Class H, Grade 10a, £316-£329 per annum.

Candidates should have had a sound technical education and experience in general mains work. Operation of E.H.T. equipments and Student or Graduate Membership of the Institute of Electrical Engineers would be an advantage.

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

Applications, endorsed on the envelope "Junior Mains Assistants," stating age and full particulars, and including copies of not more than two recent testimonials, should reach the undersigned not later than Friday, October 31st, 1947.

F. A. ELLIS, M.I.Mech.E., M.I.E.E.,
Market Street, Engineer and Manager.
HUDDERSFIELD.
October 8th, 1947. (267)

FOR SALE

ACCUMULATOR or Battery Boxes. 34 000 available. Size 4½ in. L. × 3½ in. W. × 8½ in. H. With or without lids. Made of 6 mm. Bitumen Compo, which can easily be cut to smaller size. Low price for quantities.—Box 2,200, G.T.C. Ltd., 82-94, Seymour Place, London, W.1. (261)

AMMETERS, Voltmeters and Wattmeters, switchboard/portable pattern, first grade accuracy. Sizes varying from 2 in. dial to 6 in. dial inclusive. Short delivery. —Write for price and literature to: Measuring Instruments (Pullin) Ltd., Electrin Works, Winchester Street, Acton, London, W.3. (247)

BRITISH Electric Co. (Beco) Ltd. can supply most types of A.C. and D.C. Motors from stock.—British Electric Co. (Beco) Ltd., Electra House, 25-29, Lower Road, Rotherhithe, S.E.16. Bermondsey 3449. (20)

ELECTRIC HOIST BLOCKS, capacity 5 cwt. to 7 tons. Reasonable delivery.—A. Morgan and Co., 50, Wilkin Street, London, N.W.5. Telephone: GUL. 1147. (24)

ELECTRIC MOTORS, A.C. and D.C. We supply all types and sizes of Electrical Machinery: Slow Speed Reduction Gears can be supplied to customers' requirements with short deliveries.—Send your enquiries to The Electropower Co., Ltd., 3, Retreat Close, Kenton, Middlesex. Tel.: WORdsworth 4928. (14)

FLUORESCENT Lighting. 4 ft. and 5 ft. single, double and triple lamp fittings manufactured by B.T.-H., G.E.C. Siemens, Ediswan, Crompton, etc., complete with ring gear and lamps, supplied immediately from stock ready for installation, or can be installed by us (in London area only). All fittings and gear fully guaranteed. Full range demonstrated in our showrooms.—Apex Industries Limited, 27, North Audley Street, W.1 (near Selfridges). Mayfair 0618-8960. (89)

FOR SALE

FLUORESCENT LIGHTING UNITS, 5 ft. Reflector or Swallow, £5 18s. ; 4 ft. Reflector, £4 18s. 6d. ; 4 ft. Batten, £4 9s. 6d. All self-contained and complete with new tubes. Call or write for September lists. Also 80 watt silent tapped Chokes, 27s. 6d. ; 40 watt ditto, 25s. Bi-pin Holders, P/F Condensers, 4 ft. Tubes.—MOSS BROS., 53, Goodge Street, W.1. Mus. 5385. (TC114)

FOR sale from stock. New Lundberg SWITCHES, 2 in. × 1⅛ in. × 1 in. Adhesive Tapes, white, 1 in. and 1½ in.—For particulars and price apply : E. S. Mashal, 86, Alie Street, E.1. Phone : Royal 4405/6. (264)

JUNCTION Electric Irons, complete with Stand, Switch connector, and Flex, again available, very prompt deliveries (beautifully chromium plated. The finest of its kind in the world, A.C., D.C., in all voltages), with wide range of electrical accessories.—Distributors : Brooks and Bohm Ltd., 90, Victoria Street, London, S.W.1. (27)

KICK SWITCHES, 15 amp., suitable for fires, convectors, wash boilers, etc. Send 3s. P.O. for sample.—SEDWAY ELECTRIC LTD., 80-81, Gt. Hampton Street, Birmingham, 18. Phone : NORthern 2084. (TC110)

LADDERS, Trestles, Steps, Handcarts, etc.—From : Ramsay & Sons (Forfar) Ltd., Forfar. Phone 172. (10)

LAMPS, large stock of SEDWAY LAMPS, 25 W to 150 W, available from stock. Also SEDWAY 1 kW and 2 kW reflector FIRES, and 12 in. rod ELEMENTS. Send for price list.—SEDWAY ELECTRIC LTD., 80-81, Gt. Hampton Street, Birmingham, 18. Phone : NORthern 2084. (TC109)

LAMPSHADE Wires, Fanguards, etc., to customers' requirements. Spotwelding and small capstan capacity available.—Industrial Design and Manufacture, 1a, Devonport Road, Shepherds Bush. (262)

NEW Rotary Converter (filtered), 24 v. D.C. input, 230 v. A.C. output, 100-120 watts, £12 10s.—Universal Electrical, 221, City Road, London, E.C. (268)

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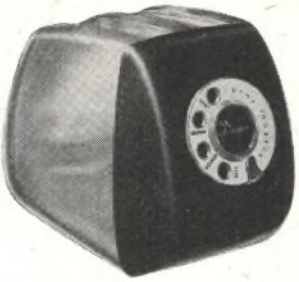

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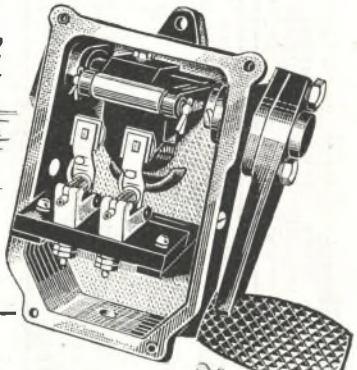

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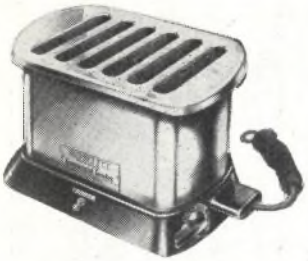

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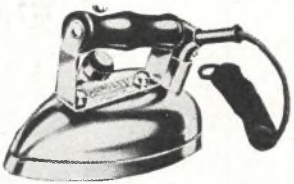

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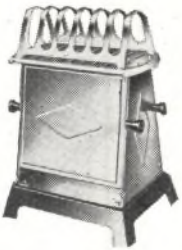

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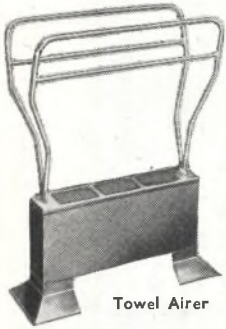

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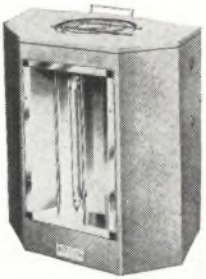

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