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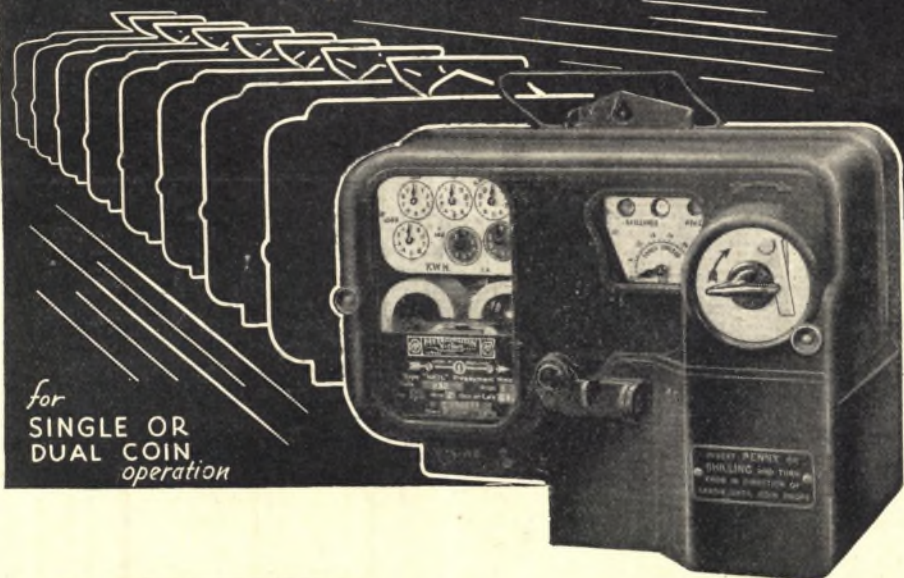
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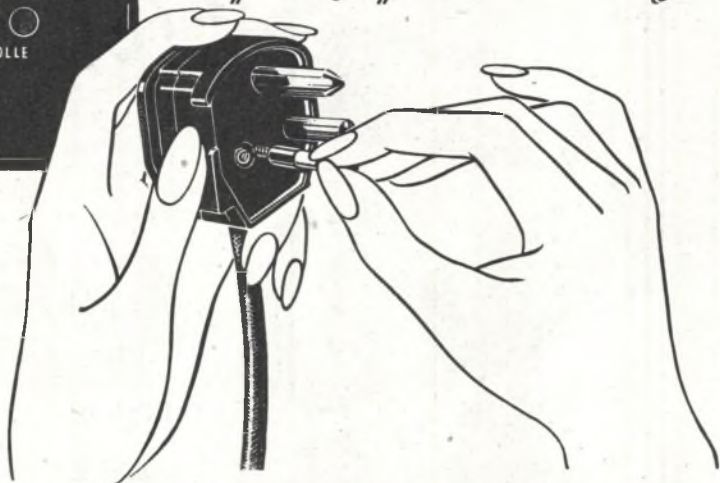
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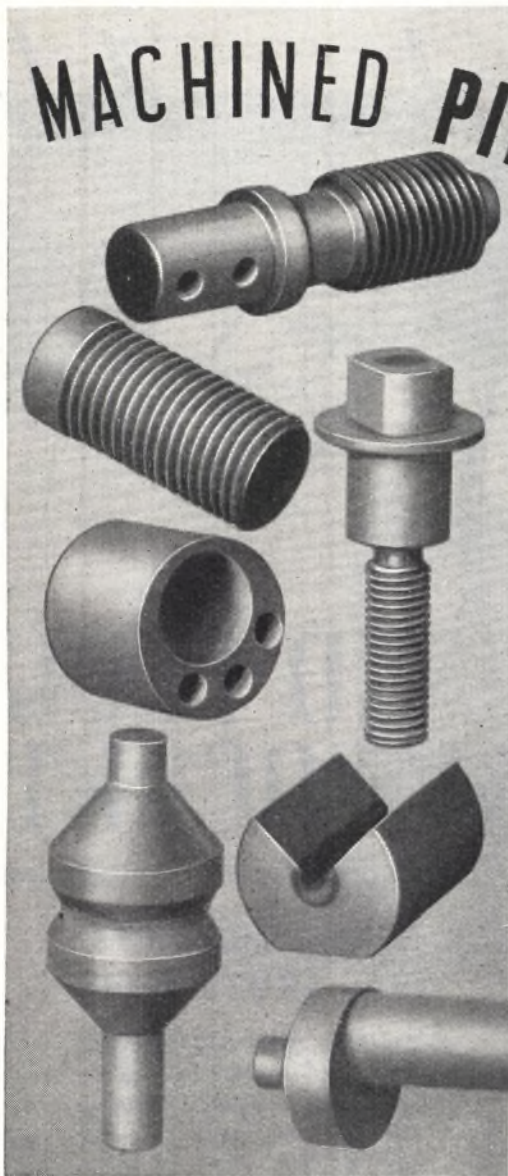
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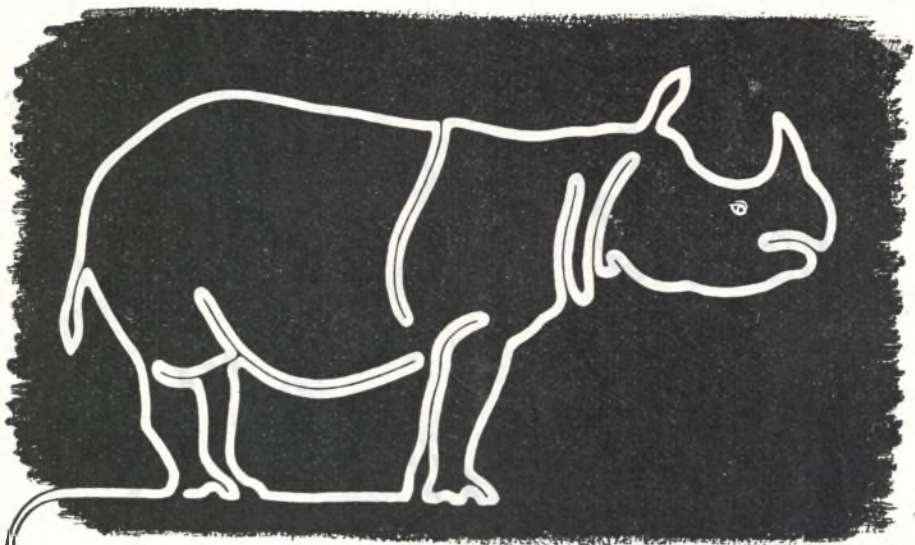


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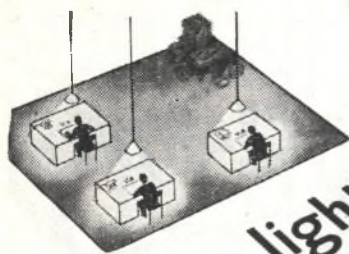


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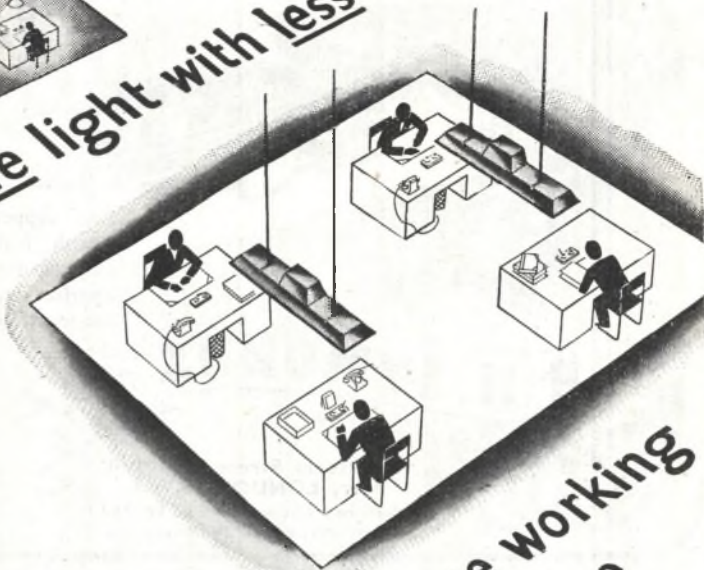


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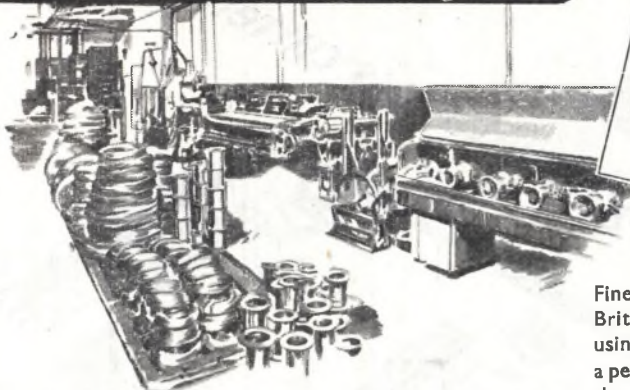


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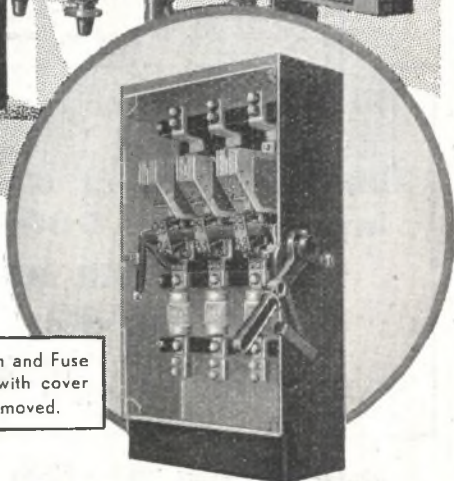
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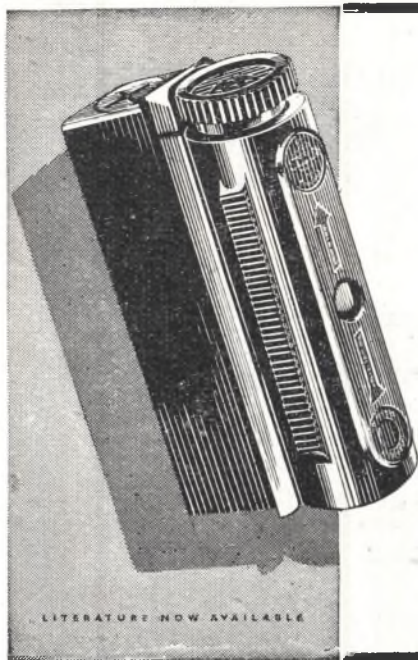
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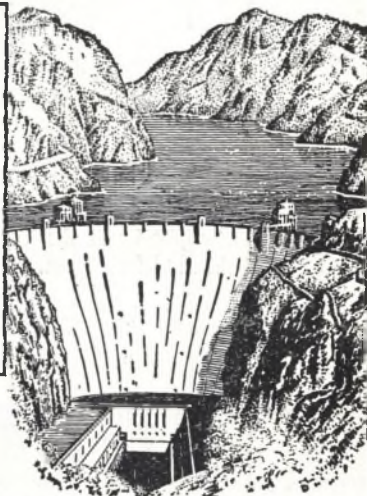
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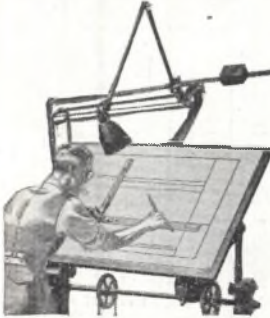


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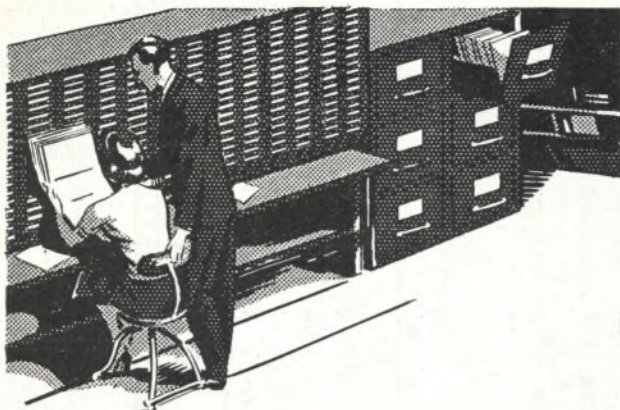
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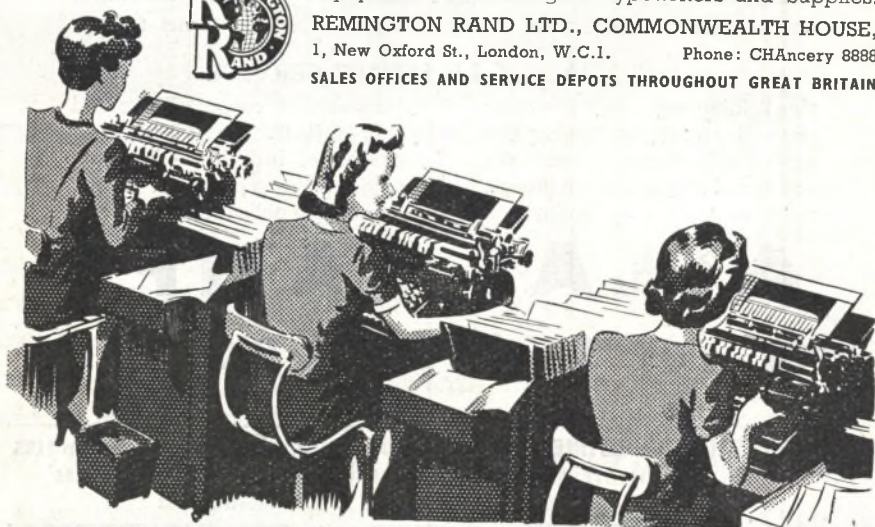
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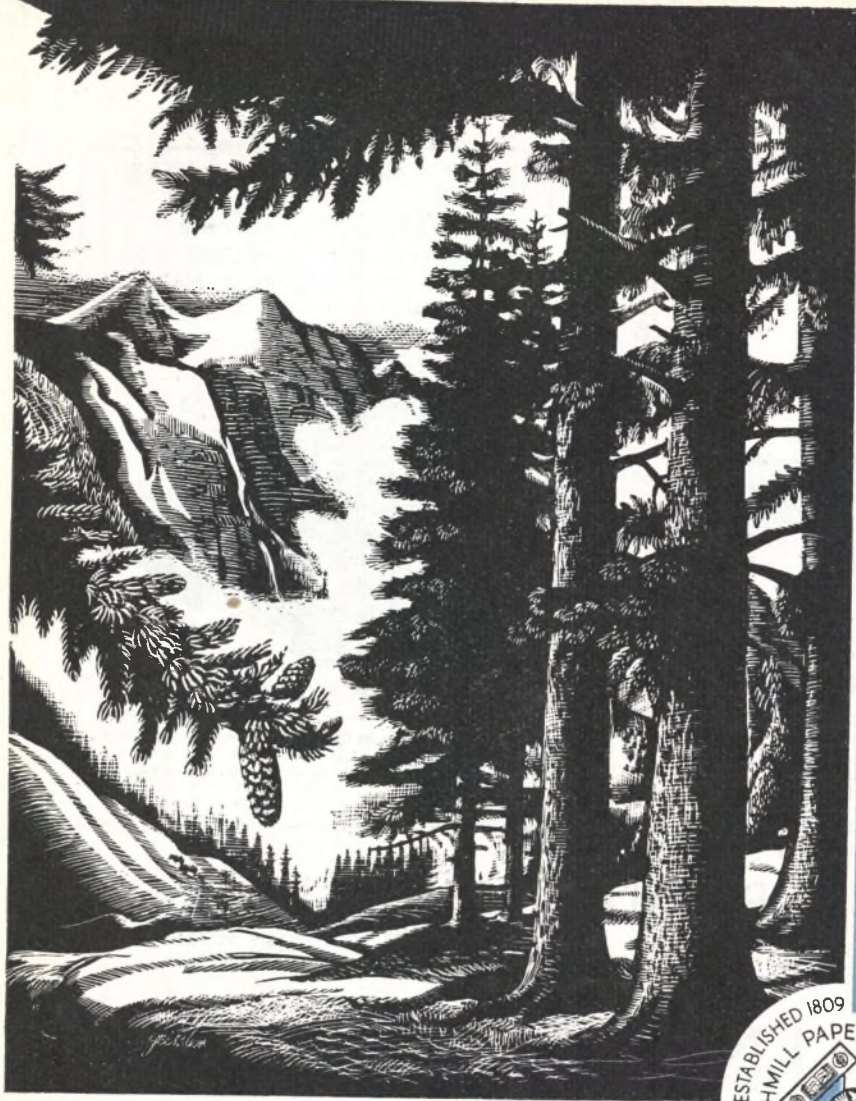


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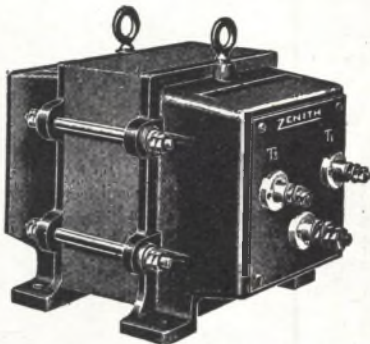
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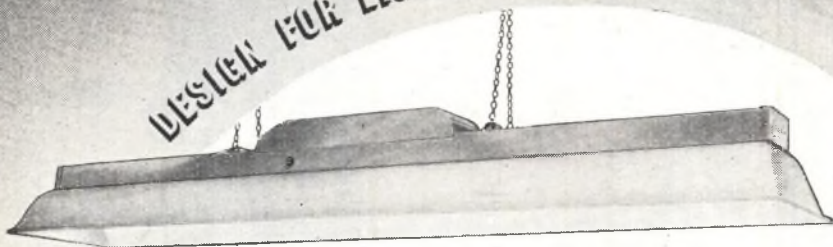
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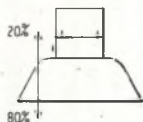
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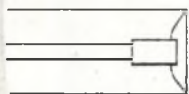
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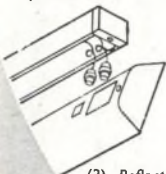
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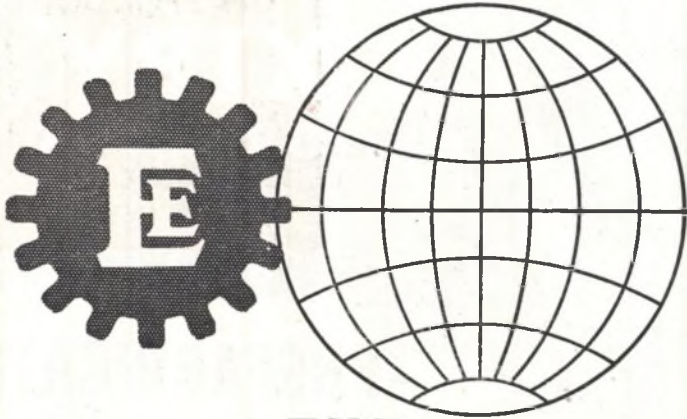
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Coal Danger

FEAR of the coal position in its relation to electricity supply during the winter has been voiced in this column on a number of occasions in the last six months, and the official figures concerning output show that our anxiety is not without foundation. Coal supplies for electricity generation from current output and stock-lifting for the winter, were given by the Minister of Fuel a fortnight ago as amounting to 16.45 million tons, and in THE ELECTRICIAN of October 24, doubt was expressed of their adequacy. To that doubt is now added the possible danger that not even the 16.45 million tons may be available. Coal at the volume above for the purpose of electricity generation was determined as part of the Government programme for the coming winter, and when announcing it, the Minister of Fuel made it clear that should the supply industry consume more than 16.45 million tons, the excess could only be met by drawing upon coal supplies intended for industry. As good or bad as the figure of 16.45 million may be, it is based on a forecast of 3.9 million tons of deep-mined coal in a full working week without holidays, whereas for the past five weeks, output has been falling short of that volume. In the words of the Minister for Economic Affairs, "We have not reached the production levels necessary for winter supplies and so our whole production programme is in jeopardy."

This observation is, we understand, intended to mean that there is a danger that industry, because of coal shortage, may not be able to attain its output

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target, and while that danger exists some pruning of the coal allocation for electricity generation is a temptation which the Minister may find hard to resist. In order to help him do so, however, we draw attention to the fact that whereas before the war it was the aim of the supply industry to start the winter with coal stocks equal to 10 to 12 weeks' winter consumption, the reserve on October 25, according to the Ministry of Fuel, was only six weeks' stock. The Minister must also bear in mind that coal consumption for electricity generation has in the past invariably exceeded deliveries during the winter months, and this year the wagon shortage may complicate the issue.

The Industry and Export Targets

WHILE the general economic picture, and not least the position of the supply industry both as regards coal and re-equipment is, if anything, even less satisfactory to-day than a month ago, it is most encouraging to note that the manufacturing side of the industry has taken front place in agreeing to the export targets announced on September 12. According to Mr. HAROLD WILSON, the new President of the Board of Trade, the electrical machinery, telephone and telegraph apparatus and wireless apparatus manufacturers have already stated that, provided sufficient quantities of coal and raw materials are made available, they will be able to reach their targets, while the wire and cable manufacturers have asked that their target of a monthly rate of £900 000, which, incidentally, is the figure reached during the fourth quarter of 1946, be increased. So far this year, the monthly average has been £1 060 000. That this should be possible at a time when internal consumption is also running at a high rate indicates a technical efficiency of which all concerned may be proud.

Steel Control

FOLLOWING the assurance recently given by the Minister for Economic Affairs that the steel allocation machinery was to be cured of its worst defects, the Board of Trade has now set up Regional Export Committees, "to co-ordinate official measures to encourage and assist exports and to assist in ensuring that the importance of the export drive is appreciated at every level of

industry down to the factory floor itself." If the committees are given reasonable freedom of action, some of the annoyances and hindrances hitherto arising from over-centralised control may be avoided, and Mr. WILSON'S assertion that in dealing with individual firms the committees will be given the maximum discretion is on this account to be welcomed. Yet another aspect of control on which a long overdue decision appears at last to have been taken is the present arrangement under which a firm handling some important export development has to go to one department for its materials, to another for any necessary building and to still another for advice on markets, etc. This state of affairs, we are told, is to end, and so far as possible one responsible department will look after all a firm's needs from other departments. Sound as these measures may, we hope, prove to be, the pity is that had more attention been paid to the voice of industry, they could have been taken two years ago.

Staggered Hours and Fire Risks

THE Fire Offices' Committee Fire Protection Association have drawn attention to the fact that relieving the peak load by spreading the working day over a longer period, may or may not increase the fire hazard. Whether it does or does not, depends upon the alertness of mind which managements are able to encourage among their employees, for fire is, in the majority of cases, caused through negligence or carelessness. In commenting upon the risk, the association points out, among other things, that the majority of serious fires in industrial buildings occur after working hours. Staggered hours mean that people are present to detect fires and extinguish them in their incipient stages for more of the 24 hours than would be the case with normal working. The hazards will not be so great when regular shifts having effective supervision are employed, as when night work is due to spasmodic rushes of orders with resulting casual employment. On the other hand, machinery will be working for longer periods than normally without opportunity for inspection and overhaul. In many cases the latter can be done only when machinery is silent, with the result that wear and tear will be increased, and

supervision reduced. The period of time during which artificial lighting and heating are required may be extended with corresponding increase in the hazards attached to both these features. Further, the physical strain resulting from a change in working hours may affect workers, reducing their alertness.

E.D.A.—E.R.A. Committee

THE question of closer collaboration between the E.D.A. and the E.R.A. has been considered by the former, and as a result, a Joint Consultative Committee is to be established, with a view to preventing overlapping of effort on the part of the two associations. The desirability of such a committee became apparent in connection with information on the load characteristics of domestic appliances and the behaviour of domestic consumers, in that separate publication of the information on the subject by the Domestic Installations and Appliances Committee on the one hand and Section K. of the E.R.A. on the other, limited the results. The duty of the Committee will be to avoid duplication of effort by examining various subjects for investigation and deciding within the province of each association, which can carry out most effectively any particular item of research.

Radio and the Press

THE introduction of two-way radio facilities for reporters covering important assignments is brought a stage nearer by the announcement, in our contemporary, "The Newspaper World," that the Post Office is now prepared to grant licences to newspapers to operate "walkie-talkie" equipment, so long as the apparatus has a maximum power not exceeding 1 W, is of a type approved by the G.P.O., and channel selection is carried out by means of a switch. It will, however, be some months before any sets are generally available for Press use, and the congestion problems likely to arise when a number of reporters cover the same event will necessitate a scheme, drawn up by the newspapers concerned, to regulate traffic. Until this is done, the G.P.O. will not issue licences for more powerful equipment. While the introduction of radio-telephony will undoubtedly lessen the interval between a newsworthy event and its appearance on the front page, we foresee a period of

teething troubles which may well cause some consternation in Fleet Street. Not the least of these may be that in default of some security system on the lines of scrambling or carrier suppression—which would scarcely be feasible with portable apparatus—the opportunities for piracy by any organisation equipped with an efficient listening post will be considerable.

Power Station Extensions

DUE to transposition in type setting, the limitation upon power station extensions imposed by the cut in the capital equipment programme was given in our last issue as 1 500 MW in 1948 and after 1949, 1 150 MW. The limitations should have read 1 150 for 1948, 1 600 for 1949 and 1 500 MW thereafter, for it was in that order that the figures that followed were arrived at, and is the order in which they will, it is anticipated, appear in the White Paper. Since making observations on the effect which the limitations will have upon the supply industry, we have had an opportunity of hearing the considered opinion of those who will have the responsibility of meeting the electricity demand in 1950 onwards. These are, in brief, to the effect that though it is the Government to-day which has made the limitation on power plant extension, it will be the British Electricity Authority which will be criticised by the public for the inconveniences caused in the years to come. The circumstances are, in fact, the same as those which have surrounded the Central Board since 1940, and so that the good name of electricity may not suffer, no opportunity must be lost in publicising the fact that the shortage of generating capacity which will mark the years 1950 onwards is born of Government policy and is in no way due to lack of vision on the part of the industry.

B.E.A. Appointments

THE appointments made this week by the B.E.A. to fill certain of the key engineering positions in the organisation will be noted with interest. The names given in this issue are well known in the industry as being held by men well experienced in running electricity supply, and readers will join us in wishing them every success in their new surroundings.

B.E.A. APPOINTMENTS

CHIEF ENGINEER AND TWO DEPUTY CHIEFS NAMED

THE British Electricity Authority this week announced five further appointments. They are as follows:—

Mr. V. A. Pask, who is at present engaged on special duties with the Central Electricity Board, is to be chief engineer.



MR. V. A. PASK

He is 52 years of age and has had 35 years' practical experience in all classes of electricity supply work. Mr. Pask received his early education and engineering training in Preston, and afterwards held appointments in Paisley, Hull and Bootle before becoming deputy general manager and engineer of the Newcastle and district electricity undertaking. He was for eight years city electrical engineer at Norwich prior to joining the C.E.B. in January, 1940, as district manager for Mid-East England. Four years later he also took over the managership of North-East England when the two areas were combined for administrative purposes. At the end of 1945 Mr. Pask became personal assistant to the general manager.

Mr. J. D. Peattie, deputy chief engineer to the C.E.B., is to be deputy chief engineer concerned with transmission. He is 57 years of age and has been with the Central Board for the last 18 years. He was the Board's chief operation engineer for 15 years until he took up his present appointment in 1944. For three years before the 1914-18 war, in which he served with the Royal Naval Division, Mr. Peattie was with Siemens Schuckertwerke, Berlin, and in the interval between the war and his joining the staff of the C.E.B. in 1929, he held appointments, successively, with Metropolitan Electrical Co., Ltd., Edmiston Brown and Co., Ltd., and the Manchester electricity department.

Mr. R. R. Martindale, chief operating engineer and executive assistant to the Engineer-in-chief, London Power Co., is



MR. J. D. PEATTIE

to be deputy chief engineer concerned with generation. He is 54 years of age. After works training with J. H. Holmes and Co., of Newcastle, Mr. Martindale joined the electricity supply industry in 1911 in the service of the Tynemouth Corporation, and held appointments, successively, with the Cleveland and Durham Power Co. and with the London Electric Supply Corporation at their Deptford generating station (later taken over by the London Power Co.). During the 1914-18 war he served in the R.A.O.C. as officer-in-charge of mobile workshops for artillery repairs in the field. In 1926 he was appointed chief assistant engineer at the Deptford generating station of the London Power Co., and in 1932 became chief assistant engineer at that company's Battersea generating station. He was appointed personal assistant to the Engineer-in-Chief of the London Power Co. in 1937, and in 1940 became chief operating engineer and executive assistant to the Engineer-in-Chief.

Mr. H. Nimmo, Electricity Commissioner



MR. R. R. MARTINDALE



MR. H. NIMMO

and president of the A.S.E.E., is to be area liaison controller. He is 62 years of age and, before becoming an Electricity Commissioner in July, 1945, he was chief engineering inspector to the Commission from 1929. Fuller details of Mr. Nimmo's career were given in a "Portrait" in our issue of October 17. Mr. Nimmo will continue to act in a part-time capacity as an Electricity Commissioner until the Commission is formally dissolved.

Mr. R. A. Finn, a partner in the firm of Sydney Morse and Co., London, is to be solicitor and chief legal adviser. He is 47 years of age and has had considerable experience of legal work for the electricity industry.

The appointment of deputy chief engineer for research has still to be made.

A.C. Network Analyser

Calculating Device for Power Engineering Problems

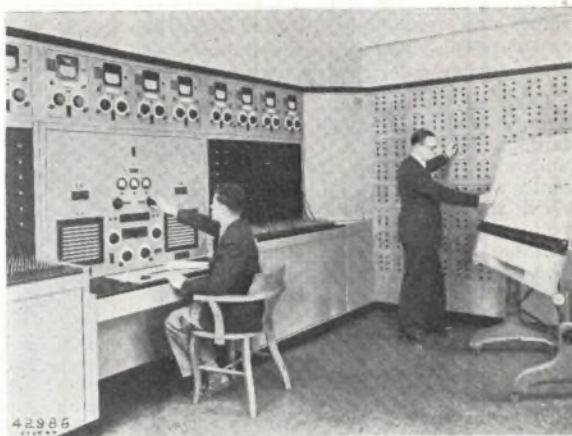
THE accurate prediction of the operating characteristics of a projected power scheme or of the effect of an alteration to an existing system, while of great importance to supply engineers, may frequently involve calculations so protracted and laborious as to be impracticable. The solving of such problems can be greatly expedited by the use of an a.c. network analyser, a precision instrument embodying variable resistors, reactors, capacitors and transformers, together with voltage sources variable in magnitude and phase, all of which can be arranged to form a miniature counterpart of the generators, lines, load and other components of the system being studied.

In recent years, a number of network analysers for special purposes have been constructed in this country and overseas, but up to the present an instrument has not been available for general use in Great Britain. On Tuesday afternoon, at the B.T.H. Willesden Works in Neasden Lane, London, N.W.10, such an equipment, built by the companies of the A.E.I. Group, was officially opened by the chairman of A.E.I., Ltd., Mr. Oliver Lyttelton. A number of other directors and officials of the group, including Dr. H. Warren, were present at the ceremony.

Giving a short introductory talk, Mr. H. Trencham, who had been associated with the design of the instrument since its inception before the war, explained that although the analyser had been built on the same broad lines as instruments made by the General Electric Co., of America, many ideas by British engineers had been incorporated.

The scope of the A.E.I. analyser is not limited to electrical problems, and its employment will facilitate the solution of many mathematical and scientific problems capable of expression in terms of electrical equivalents. Installed in a suite of rooms to enable the preliminary data on any problem to be collated in comfort, it will now be available for use by accredited representatives of any supply authority, manufacturing company, industrial organisation or scientific body which considers it may be of assistance.

The analyser consists of variable voltage sources with impedances and coupling units of sundry types, all of which may be interconnected to form a model equivalent to



Setting up a problem on the A.E.I. network analyser

the system under consideration, together with means of metering the units so built up. To limit the physical size to an economical and easily workable level, a frequency of 500 c/s and nominal voltage and current values of 50 V and 50 mA have been adopted as basic quantities. This enables telephone-type apparatus to be used for interconnection and switching functions, with resultant saving in space. As far as the calculations on the board are concerned, the analyser quantities are immaterial, since, before setting up a problem, all the system characteristics are computed as percentages of a selected voltage and kVA base.

After analysis has been carried out, the results are interpreted as system values with the aid of the appropriate factors. Normally, a single-phase equivalent network is derived from the system diagram and used in setting up. This equivalent is derived directly from phase quantities for systems under balanced conditions, or by means of symmetrical and related component methods where unbalance occurs as, for example, in the case of single-phase to earth faults.

The three central cubicles of the equipment are made with desk fronts, all the metering controls and the majority of the

supply circuits being located at the centre desk so as to be readily accessible during operation. Provision has been made for 12 generator units, 120 line impedance units, 30 load impedance units, 36 auto-transformers, 60 capacitor units, 16 coupling transformers of ratios of 1:1, 2:1, and $\sqrt{3}$:1, and there are 12 metered jumper circuits. The three-phase, 500 c/s supply is obtained from a motor-generator set, electronically regulated to within ± 0.2 per cent. of the nominal value, and remotely controlled from the centre desk.

TWELVE VOLTAGE SOURCES

Each of the generator units comprises essentially a phase-angle control, variable through 360° , and a voltage magnitude control with a range from 0 to 285 per cent. without appreciable phase change. With these, it is possible to obtain 12 voltage sources on the analyser, each variable in phase angle and magnitude. The line and load units are tapped reactor banks and non-inductive resistors.

To represent a load in situations where the voltage may vary, or to represent differential tap selection on transformers in parallel, auto-transformers, each having a range of ± 30 per cent. in 1 per cent. steps, are used. Banks of tapped capacitors represent the capacity of long lines, cables and other apparatus, and the coupling transformers make it possible to include the effect of mutual coupling between circuits.

Normal indicating instruments are installed for the control of the motor-generators and the generator units. For metering circuits set up by means of the various elements, there are three master instruments; a voltmeter, an ammeter and a watt/var meter. All these are operated by negative-feedback amplifiers and thus represent a negligible burden on the circuits into which they may be inserted. Multiple ranges are obtained by suitable current shunts and voltage dividers.

To provide a convenient phase reference for the currents and voltages being measured, a phase-shifting device is mounted on the main control panel to feed a variable resistance load. From this circuit, a voltage and current, variable in phase and magnitude, can be matched with values obtained from points in the set-up network, using the master instruments, and thus the phase-angle of the network quantities can be readily determined.

The five main groups of problem to which the a.c. network analyser may be usefully applied are: (a) studies of systems operating normally and load division (including best location of additional generators and effects of reactors and load varia-

tions); (b) studies of systems under fault conditions (including maximum short-circuit duty for circuit-breaker applications and the effect of various neutral earthing methods); (c) stability studies; (d) apparatus and circuit problems (including generation of harmonics by transformers and rectifiers and starting methods for synchronous motors) (e) various mechanical, thermal and other non-electrical problems which can be represented by electrical equivalents.

It is expected by the designers that the maximum error in any set-up on the analyser will be ± 2 per cent., and that generally it will be less. They stress, however, that the accuracy of the results obtained cannot be better than the accuracy of the system data upon which studies are based, and those using the equipment are urged to obtain the most accurate data possible. The analyser has certain fundamental limitations. First, it is limited to a single frequency, so that in the study of harmonic problems, for example, a separate analysis on the appropriate network may be necessary for each frequency. Secondly, it is a "steady state" device, applicable to the solution of transient stability problems only by step-by-step methods. The study of the effects of lightning and switching surges is usually better performed on other types of model circuits. Finally, the analyser cannot solve problems for which no theory of solution is known.

Those wishing to avail themselves of the services offered by the new instrument are asked to communicate directly with the Engineer-in-Charge, A.E.I. Network Analysis Department, 20, Neasden Lane, London, N.W.10.

I.M.E.A. Convention

WITH reference to the note in THE ELECTRICIAN of October 10, with respect to holding an I.M.E.A. Convention next year, it is understood that arrangements are now in hand for holding such a convention. The arrangements envisage that should the vesting date be a date prior to the holding of the convention, the British Electricity Authority will be prepared to act as guarantors within specified limits. On the vesting date, the industry will operate under the B.E.A. and Area Boards and, subject to the concurrence of the latter, the Authority will be prepared to give the necessary permission for the payment of expenses of the two nominated representatives of each member, on a scale similar to that now paid by the respective local authorities. The venue of the convention will be notified in the near future.

STANDARD'S NEW FACTORY

ORDNANCE WORKERS MAKE TELECOMMUNICATIONS GEAR

TWO years ago the Royal Ordnance factory at Newport, Monmouthshire, was transferred to Standard Telephones and Cables, Ltd., under the Government scheme for the distribution of industry in what were formerly distressed areas, and soon afterwards the machines that had been turning out guns, projectiles and bayonets were being replaced by tex-



MR. GEORGE A. ISAACS, *Minister of Labour*, and the MAYOR OF NEWPORT (second and third, respectively, from the left) watch a high-speed braiding machine used in the production of flexible cables. MR. R. J. DIGHT, *works superintendent*, is on the left

tile cable machines from the Standard factory at North Woolwich, followed early in 1946 by plant and material from the company's war dispersal factories at Leicester and insulant plant from their Enfield works. A training school and classes were instituted for the instruction of local labour and now nearly 1 600 workpeople, many of whom had been making munitions of war in the same workshops, are producing telecommunication cables and long distance transmission equipment which are being sent all over the world. An order has been received from the G.P.O. for 800 miles of drop cable, and a large quantity of military equipment is being reconditioned.

On Friday, October 31, Mr. George A. Isaacs, Minister of Labour and National Service, was among a party who toured the works, and he was greatly impressed by what the company had achieved in the conversion of the factory, the facilities provided for the workpeople's welfare and recreation, the high standard of efficiency attained in a period of about a year and nine months and the quality of the equipment turned out.

In introducing Mr. George Isaacs, who

addressed the workpeople assembled in their canteen after lunch, Sir Thomas Spencer, managing director of the company, said they had trained some 2 000 local people who ought to be proud of what they had established in their town. He wished to thank them publicly for the part they had played in building up that new industry. The programme for 1948 included a very large percentage increase in production for export. He wanted them to meet that budget and he was confident that they were going to succeed. The company was very proud of its reputation, and he knew the people of Newport would not let it down.

Mr. Isaacs referred to the good spirit that existed between the management and workers in the factory and stressed the importance of the work they were doing there for export and for internal communications.

The Mayor of Newport thanked the Minister for his attendance and spoke of the good relations that existed between the company and the local authority.

The conversion of the factory necessitated considerable planning and installation work. Although the existing air-compression plant was available for connection to the rubber mixers, the sliding doors of which operate pneumatically at a pressure of 100 lb. per sq. in., many additional services were required. Miles of pipe-work had to be erected for service to rubber making machines. The excavation of 70 000 cu. ft. of soil was necessary to enable strong foundations to be made before the transferred machines could be established and used. Three existing boilers had to be supplemented by a vertical boiler of 250 lb. per sq. in. steam pressure, and a similar boiler ordered for planned future loads. Some two miles of steam pipe were installed and over 1 000 valves were necessary to give control with flexibility to the complex system in the rubber and plastic cable shop. To bring cooling water to the rubber mills, Banbury mixers and calenders, a closed cold water system supplied from a 10 000 gal. storage tank by means of impeller pumps was designed, to provide pressure in place of gravity, and installed in trenches cut in the floors and covered with concrete slabs reinforced to bear standard floor loadings. To maintain the supply of water in this system five centrifugal pumps capable of handling 40 000 gal. an

hour at a pressure of 50 lb. per sq. in. are used. For the distribution of power, over five miles of tubing and 16 miles of wiring, ranging from the smallest size to .2 in. cables, were required for harnessing the plant, including the 200 H.P. motors which turn the Banbury mixers.

Some idea of the size of the factory, which measures a mile and a quarter round the perimeter, may be gathered from the fact that it covers thirty-five acres, has a working floor space of 350 000 sq. ft. and the main shop floor is larger than the deck of the "Queen Mary." The only extension planned at the moment is to the transmission testing apparatus shop, providing accommodation for another 80 operatives. This highly specialised apparatus, covering the complete range of requirements of communication systems, is called for in ever-increasing quantities for testing and maintaining networks throughout the world, and its manufacture is one of the important activities in the factory. It is much in demand in the U.S.A. Examples of this equipment in the process of assembly and complete, were seen by the visitors in their conducted tour of the workshops. In one of the shops, it was mentioned, work was being done on part of the public address system for the new chamber of the House of Commons, which is being supplied by the company.

Much interest was displayed in a

machine in the main cable shop for the insulation of wire conductors with p.v.c. or rubber, by a continuous extrusion and vulcanising process. The operator was feeding into the machine pre-heated strips of p.v.c., and the plastic was extruded on to the moving wire and then vulcanised by steam heat as it passed through the machine. This method saves the time that would be taken by a separate vulcanising process. One of these machines will deal with 20 000 yards of conductor an hour.

Another machine, of the longitudinal type, was covering with rubber sheet 25 wires simultaneously. It can insulate 30 wires at once with one or more layers of rubber. The vulcanising is done separately.

Another operation that attracted special attention was the continuous extrusion of lead sheathing for cable. The machine operates at a pressure of three tons per sq. in. and will cover a mile of cable with one charge.

A task not previously undertaken by the company was the making of three insulating machines of standard design. More machines were needed and were unobtainable, so they were manufactured in the tool room of the works at Newport.

Cord finishing and much of the fine work requiring a delicate touch is done by young women.

Electrical Equipment of Ships

ALTERATIONS and additions to the current Regulations for the Electrical Equipment of Ships have been authorised by the Council of the I.E.E. A supplement to the third edition of the regulations containing these amendments is published, and the changes will have effect from November 1. The alterations and additions will extend the currency of the present edition pending the issue of a revised 4th edition. It will be found that the amendments embrace the whole field covered by the regulations, but that they are chiefly concerned with the recognition of new types of cable and with developments arising from the use of alternating current in ships. The new types of cable now recognised under an amendment to Reg., No. 701 include polychloroprene-insulated cables of the "R.N.N." type, cambric-insulated cables with polychloroprene sheathing, and mineral-insulated copper-sheathed cables. The requirements covering the insulation of mineral-insulated copper-sheathed cables are set out in a

newly framed Regulation, No. 917.

Among the changes introduced to deal with a.c. supplies, is a new Reg., No. 105, requiring the adoption of standard phase-rotation for three-phase supplies, and a new Reg., No. 416, which details the special requirements in relation to the installation of transformers.

A new definition of tubular fluorescent lamps (B.S. 1270, type-reference MCF/U) is given, and the requirements in relation to the fittings and auxiliaries for such lamps are set out in a new Reg., No. 1007.

Tables 1 to 5, giving the current ratings of various types of cable, have been amended slightly in relation to cooling-air temperatures, and Tables 1A, 4B and 4C have been inserted. The first of these deals with the current rating of three-core vulcanised-rubber-insulated cables; the others deal with cambric-insulated polychloroprene-sheathed cables.

Copies of the supplement may be obtained from the Secretary of the institution, price 1s. net.

Portrait—Dr. Stanley Whitehead



BORN in 1902, at Sutton, Surrey, Dr. Stanley Whitehead has not a scientific background, as some might think, but one in which his grandfather, William Saunders, was music director to Chappell's and a promoter of Popular Classical Concerts at St. James Hall, where his father, Walter Whitehead, was manager for a period. His educational history is imposing and includes Sir Walter St. John's School, 1914-20; Open Science Scholar, Jesus College, Oxford, 1920-24; Mathematical Moderations (Class I); Final School in Physics (Class I); Major Scholarship for research, working at Clarendon Laboratory under Prof. Lindemann (Lord Cherwell). He was introduced by the late Mr. Davies (secretary, Central Liberal Office), a family friend, to Dr. Crowley (Crowley & Partners) who suggested electrical engineering as a career. The D.I.S.R. had advised the E.R.A. to appoint a physicist, so Stanley Whitehead left Oxford in 1925 and arranged to study electrical engineering part-time under Prof. MacGregor-Morris, taking the A.M.I.E.E. examination in 1927 and a Ph.D. in electrical engineering at London University in

1930. He became an A.M.I.E.E. in 1930, a F.Inst.P. in 1934, and a M.I.E.E. in 1938.

He joined the E.R.A. in 1925 and worked mainly on dielectrics until 1928, when he began association with the late Mr. P. D. Morgan, making use of temporary facilities of various kinds on transmission problems in connection with large h.t. networks, notably sheath and other transmission losses, cable ratings, telephone interference, vibrations and corona. Other subjects were electrical equipment of ships and, in 1934, radio interference. In 1935 he began the E.R.A. Perivale Laboratory with Mr. Morgan, who died before the building was occupied. He took charge of general researches at Perivale, becoming assistant director, E.R.A. Laboratory, in 1938. In 1944 he was appointed assistant director of the E.R.A., acting director from January 1, 1945, and director from January 1, 1946.

He was responsible for the ratings of cables issued by the E.R.A. and the cable ratings in the I.E.E. regulations. He was chairman of the I.E.C. Committee on h.v. measurements which produced the current sphere gap calibrations; chairman of the recent I.E.C. meeting on radio interference; chairman of two B.S.I. sub-committees, and a member of the Electrical Industry Committee. He is deputy chairman, British National Committee of C.I.G.R.E., member I.E.E. Measurements Section Committee and I.E.E. Committee on Radio Interference; chairman, London Branch of Institute of Physics, and a member of the Board; a member of the joint Institute of Physics and Mathematical Association Committee which produced the report on the teaching of mathematics to physicists; a member, Management Committee of Science Abstracts and Editorial Panel of Journal of Scientific Instruments.

Though he has not much spare time he is a member of the Royal Institution and attends its functions when possible. When younger he played rugby five, rackets and lawn tennis. His main outdoor activity is now in pleasure river craft in a non-competitive manner. His indoor hobby is mainly sporadic book collecting, which tends now to be limited to historical scientific works, particularly in mathematical physics, and to books on painting.

He married in 1929, Mary Lyon Moreland, formerly of Somerville College, and a Matthew Arnold prizewoman of 1926. They have one son and one daughter.

Atomic Energy Problems

ELECTRICITY GENERATION PROSPECTS IN TEN YEARS

THE opinion that a considerable quantity of electricity would be generated in this country by 1957 through a system of atomic pile "batteries"—the super batteries of the future—was expressed by Dr. T. E. Allibone in an address at a luncheon of the Batti-Wallahs' Society on October 30, with the president, Col. H. J. Wellingham, in the chair.

Dr. Allibone, in order to give his audience some idea of the force of atomic energy, said that, translated into electrical terms, a pound of uranium could be converted into atomic energy of the order of 15 million kWh, which if passed through an electricity generator might give 5 million kWh.

Dealing with recent developments, Dr. Allibone said the latest information from America was that one of the uranium piles that was being constructed could be operated at a much higher temperature than, say, 100° C.; they had not been told at what temperature it was to be operated, but it would be suitable for supplying steam or helium gas to turbines. A cloak of secrecy had been imposed by the Americans, but so far as they could tell, an atomic pile would be ready, perhaps, within a year.

As to progress in this country, it was announced a few weeks ago that the first of the uranium piles was working at Harwell, and was capable of generating small power. The next, they were told officially, was expected to be working some time next year. There was still quite a lot of work to be done before the second pile would be working, and even so it was not known whether it would be working at a temperature sufficiently high to operate steam engines. There were technical difficulties, outlined by Prof. Cockcroft recently, which had to be overcome. In this country, for example, there was no large reserve of helium, which meant that we would have to use water and raise steam for circulation purposes.

One problem arose from the fact that it was essential to make the system carrying the cooling water out of material which would not absorb the neutrons that were so precious for bringing about the reaction in the pile. It was confidently stated that the problems would be solved, but there were many things to do, particularly tests with new materials and high temperatures under special conditions of neutron bombardment. It had been suggested that it would be two or three years before plant capable of

generating energy which was useful could be manufactured in this country, but even if it was 1950 before the first of the higher temperature piles was working, it was reasonable to expect that by 1957, only ten years from now, many more than one of those units would be operating.

Unfortunately there was another difficulty. While atomic energy was being produced in the battery, there was also being produced the material, plutonium, which, when separated chemically from the pile, could be used in atomic bombs. A pile large enough to supply a city of the size of Manchester would produce every year sufficient plutonium to make twelve atomic bombs, and by the time the whole country was working uranium batteries, production of that dangerous material would be staggering. One of the greatest problems that would have to be solved was how was human conduct to be regulated so that that by-product was not used in an incorrect manner? We could not avoid the advent of atomic energy. Literally the discovery of that fissile material, which could be so potentially dangerous, was thrust upon us, and we had to accept it whether we liked it or not.

The other aspect, of the way in which the materials into which uranium split, could be used, was also a matter of absorbing interest. Nearly all those substances, which were radio-active, would be available to scientific laboratories all the world over in a short time. They were available already in the U.S.A., and would be available in this country next year. In the influence they would have in research throughout the scientific world those radio-active substances would, perhaps, confer greater benefit on humanity than atomic energy itself. Those other things gave us untold means of understanding organic reactions—reactions in the human body and the whole realm of physics, metallurgy and engineering. Hitherto we had only poor weapons; now with those radio-active weapons the whole face of industrial research and symptomatic research would be transformed in ten years, and there was no doubt we would have some tremendous benefits from the developments.

Mr. M. Whitgift, hon. secretary and "mate," announced that the speaker at the next luncheon of the society on November 27 would be Sir Arnold Gridley, M.P., whose subject would be "The Danger to Production of Nationalisation."

• 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. W. H. AINSWORTH, of the X-ray department of Philips Electrical, Ltd., has celebrated his silver jubilee with the company. The presentation of a gold watch by the managing director, Mr. S. S. Eriks, was followed by a luncheon at Frascati's,



MR. W. H. AINSWORTH (right) receiving a gold watch from MR. S. S. ERIKS, managing director of Philips Electrical, Ltd., in commemoration of his silver jubilee with the company

where Mr. Ainsworth's colleagues handed him a radio set and an illuminated address. In 1925, Mr. Ainsworth was transferred from X-ray Tubes, Ltd., now defunct, to Philips Lamps, Ltd., and assigned the task of starting an X-ray department and introducing the Metalix tube in this country. Mr. Ainsworth visited Buckingham Palace in 1928, during the illness of King George V, to attend an X-ray examination of the King's chest, and later for a dental X-ray examination of the King. He is now in charge of all planning and ordering for the company's X-ray equipment going overseas.

MR. W. M. ROWLAND has been appointed a director of the Morgan Crucible Co., Ltd.

MR. VICTOR W. BONE has been appointed deputy chairman of Davey Paxman and Co., Ltd.

MR. H. J. MILDREN, formerly assistant director of communications' components production, Ministry of Supply, has joined the staff of A.B. Metal Products, Ltd.

In their first-round match in the C.M.A. tournament the Victoria Works Athletic Club (Johnson and Phillips Ltd.), beat Edison Swan by 5 goals to 2. In the next round the Johnson and Phillips club have

been drawn against Southern United Telephone Cables, Ltd. (Dagenham) and the game will be played on the J. and P. ground at Kidbrook.

MR. HORACE DEACON, general manager of Cryselco, Ltd., Bedford, has been elected to the board of the company.

MR. PETER M'KENZIE, of Marconi's Glasgow branch, has been appointed president of the Radio Industries' Club of Scotland, with Mr. James Turner as vice-president.

LORD ASHFIELD, following his appointment as a member of the British Transport Commission, has resigned the chairmanship of the London Passenger Transport Board as from October 31.

MR. A. McWATT GREEN, as Western Scotland (excluding Glasgow) representative for Ekco-Ensign Electric, Ltd., will operate from "Hoddam," Newlands Road, Newlands, Glasgow.

MR. O. S. WOODS, of the West Midland J.E.A., has been appointed by the Manchester Electricity Committee to be resident engineer at the Barton power station, to succeed Mr. W. E. Plowman, who has retired.

The dramatic section of the sports club of the Micanite and Insulators Co., Ltd., recently gave a successful performance of Noel Coward's comedy "Hay Fever." For an amateur organisation the standard of acting was high and, after entertaining appreciative audiences of the staff and



Scene from the play "Hay Fever," performed by the Dramatic Section of the Micanite and Insulated Co.'s Sports Club

their friends in the company's well-equipped recreation hall for four nights, the performance was repeated on two nights at the Lloyd Park Pavilion at the

invitation of Walthamstow Borough Council.

MR. D. B. HOSEASON, director of studies, Administrative Staff College, Henley-on-Thames, and Mr. J. W. J. Townley, engineer and manager, West Ham electricity department, have been elected members of the General Council of the Engineers' Guild.

Among those who attended the memorial service for Sir Leonard Pearce at Westminster Chapel, Buckingham Gate, S.W., on Tuesday, November 4, were:

Maj. Harry Richardson (deputy chairman, London Power Co.), and the Hon. Eric Butler-Henderson, Mr. C. Parker, Mr. H. T. Young, and Mr. J. A. Gatti (directors), Sir George Bailey (Metropolitan Vickers Electrical Co., Ltd.), Col. Sir A. Stanley Angwin (Cable and Wireless), Sir Cyril Hurcomb, Sir Frederick Leggett, Sir Noel Ashbridge, Sir Frank Gill, Sir John Kennedy (Electricity Commission), Mr. C. G. Morley New and Mr. H. Nimmo (Electricity Commissioners), Mr. J. D. Peattie (C.E.B.), Dame Caroline Haslett (E.A.W.), Major-General A. E. Davidson, Prof. E. W. Marchant, Mr. T. G. N. Haldane (a vice-president), and several past presidents of the I.E.E. with Mr. W. K. Brasher (secretary).

Mr. Norman French

REPRESENTATIVES of industry and of the journalistic profession from various parts of the country and from overseas were present at a luncheon at Grosvenor House, London, on Monday, given by the directors of Benn Brothers, Ltd., to Mr. Norman French, managing director, and editor of "The Timber Trades Journal."

Mr. E. Glanvill Benn (chairman), who presided, said the function had been arranged to mark Mr. French's service with the company extending over nearly 30 years.

Major W. Newland Hillas, president of the Timber Trade Federation of the United Kingdom, proposed the health of the guest. Sir Ernest Benn supported, and on behalf of the firm and staff, presented to Mr. French a handsome bookcase and a desk.

In acknowledging the tributes and the gifts, Mr. French spoke of the past 30 years as the period marking the greatest expansion of the trade and technical Press and of its services to the industries of the country. The good journalist in this field, he said, endeavoured to uphold the highest ideals of the profession—honesty, cleanness, courage, fairness and a sense of duty to the reader and the community.

Mr. John Benn, Mr. E. B. Monkhouse (Timber Controller) and Mr. J. L. Baynes also spoke, and the last-named said that one of the greatest services rendered by the responsibly conducted trade journal to-day was in the provision of a forum for the free expression of views by members of the trades for which they catered.

representatives of the English Electric Co., London Electric Supply Corporation, London Passenger Transport Board, and other electrical companies and associations.

MR. WILLIAM E. BRUNT, borough electrical engineer of Todmorden from 1920 to 1941, left £519.

Obituary

MR. WILLIAM DENSHAM, formerly of Marconi's Wireless Telegraph Co., Ltd., on October 25, aged 70 years. After early experience in the General Post Office, Mr. Densham joined the Marconi Co. in March, 1899, and assisted Marconi in his early experiments in the Isle of Wight, at Poldhu, Clifden and in America. In later years, Mr. Densham held technical and administrative positions in the head office of the company, and retired at the end of 1939. He returned to do war work in September, 1941, and finally gave up work at the end of 1944, when he retired to Ryde, Isle of Wight.

Railway Statistics

THE nearly static condition of British electric railways during the war years is pointed out in a collection of statistics, covering the operation of the railway systems of Great Britain between 1938 and 1946, published last week by the Railway Executive Committee. Including the electrified lines of the L.P.T.B., there was a net addition of only 18 miles of single track during the war; including sidings, there were 2 458 miles of single track in 1938 and 2 707 miles at the end of 1946. Train miles run by electric passenger trains fell from 79 878 000 in 1938 to a minimum of 60 470 000 in 1941, and have since recovered to 73 344 000 in 1946. Miles run by electric freight trains, however, have shown a steady increase from 3 000 in 1938 to 112 000 in 1946.

Some indication of the greater loads now carried is given by the electricity consumption statistics. Low tension units used were 1 179 464 000 in 1938, giving approximately 15.2 units per train mile, and had risen to 1 283 220 000 for 1946, representing about 17.6 units per train mile.

The data on the rolling stock position in 1946 shows that there were 20 electric locomotives in service, of which 18 were on the L.N.E.R. system. The total of electric passenger-carrying motor vehicles was 2 263, of which 1 613 were on the Southern Railway.

The book, which contains much other information on the working both of the electric and steam railways, is obtainable from the Railway Clearing House, 203, Eversholt Street, London, N.W.1, price 2s. net.

Answers to Technical Questions

We produce below the answers to a selection of questions which have been sent to us by readers. The co-operation of students and others in making this feature one of general interest is invited

What causes the losses in the sheaths and armouring of single-core cables?

The losses are due to eddy currents set up in the sheath or armouring by the alternating magnetic field due to the alternating currents in the conductors of the

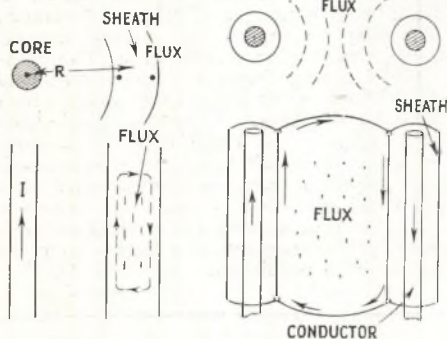


Fig. 1

Fig. 2

cables. Two sets of currents are caused, known commonly as sheath eddies and sheath-circuit eddies.

Sheath Eddies.—Fig. 1 shows a core surrounded by part of a lead sheath of exaggerated thickness. Due to the current I in the conductor there will be a circumferential flux set up in the sheath having a density of $B=2I/r$ units. If a current path as shown dotted is considered it can be seen that the path is linked with some of the flux and will therefore have a current set up in it due to transformer action. Similar effects will be caused by currents in adjacent single-core cables. As the sheath is only about $\frac{1}{4}$ in thick in practice, the magnitude of these currents is small and the additional losses caused by them are not more than 2 or 3 per cent. of the I^2R losses in the conductor.

Sheath-Circuit Eddies.—Two adjacent cables with their sheaths are shown in Fig. 2, the cables carrying currents in opposite directions. A considerable amount of flux passes vertically between the wires as shown and if the sheaths are connected together at two points as indicated it can be seen that a complete short-circuited turn is linked with this flux; a current will therefore circulate as shown by the arrows. This current may be considerable and cause losses as high as 50 per cent. of the conductor I^2R losses.

The obvious way of avoiding this loss would appear to be to ensure that the sheaths are fully insulated from each other—in this case, however, a voltage would be induced in them by the flux, which, in a typical case, may be 7 or 8 V per mile for 100 A in the conductor. Under short-circuit conditions, when currents up to 50 000 A may flow, the voltage may reach several thousand in a mile or two of cable. This voltage may cause an arc between sheaths which would probably result in a cable breakdown. It is usual, therefore, to bond the sheaths together at intervals and to put up with the additional loss incurred rather than risk reduction of reliability due to possible faults caused by arcing between sheaths. Three-core cables are not, of course, subject to these losses because the magnetic field outside the cable is practically zero.—E. O. T.

To what extent can the wind be used as a source of power for driving electric generators?

The windmill for grinding corn or pumping water has been in use since about 1200 A.D., but within the last half century such mills have fallen out of use owing to the increasing use of the petrol engine or the better availability of a public electric supply. Recent difficulties with these

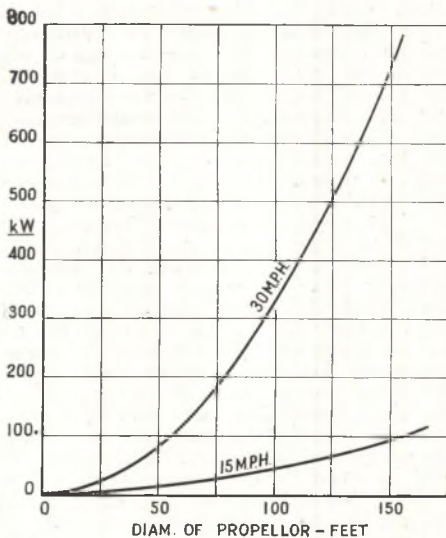


Fig. 3

alternative power sources have, however, again focused attention on to the possibility of harnessing the wind and using it to drive electric generators. Many small plants have been put into service and several larger plants proposed, of which one has been built.

The maximum output available from plants with different sizes of propeller and for different wind speeds are shown in Fig. 3. The output is proportional to the square of the propeller diameter and it can be seen that to get a reasonably large output a very large structure will be required. The intermittent nature of the wind is a further difficulty and in most cases necessitates some form of storage to tide over the windless periods.

For small plants a storage battery therefore forms an essential item and a typical plant comprises a two-bladed propeller about 6 ft. in diameter and mounted on a metal tower about 40 ft. high; the propeller drives a d.c. generator which is connected in parallel with a battery in exactly the same way as with a motor-car generator. Reference to Fig. 1 indicates that the maximum output of such a plant

will be about 1 kW and it can conveniently be used in conjunction with a battery of about 150 Ah capacity. Such a plant would be suitable for supplying some lighting, but would be quite inadequate for heating or cooking.

Large scale developments have been suggested in Germany and Russia, but the only actual example is a 1 000 kW unit operating on the system of the Central Vermont Public Supply Corporation in America. This installation comprises a two-bladed propeller 130 ft. in diameter mounted on a tower 110 ft. high, the tower itself being on a 2 000 ft. hill known as Grandpa's Knob, in Rutland, Vermont. The shaft is geared to a synchronous generator running at 600 r.p.m. The question of storage does not arise since the power system can absorb any power which may be available. A governor varies the pitch angle of the propeller blades in order to avoid overloading and loss of synchronisation due to excessive wind speeds. The technical operation of this plant, which is experimental, appears to be quite satisfactory, but comparative cost figures have not so far been published. E. O. T.

Henley Students' Prize-Giving

A CALL to young men in industry to fit themselves for important positions was made by Dr. P. Dunsheath, speaking at the first annual conversazione held in connection with the W. T. Henley's Telegraph Works Co., Ltd., education scheme at the Woolwich Polytechnic on Saturday. In the course of his speech, much of which was given up to an interesting account of his recent visit to Australia and New Zealand, Dr. Dunsheath emphasised the importance of cultivating a wider outlook, of taking every opportunity to learn of distant lands, of making friendships and of cultivating hobbies, the value of which might often exceed that of book learning. Time and again, he said, when some post had to be filled, the utmost difficulty was experienced in finding the man for the job. Many young men complained that there were no opportunities for advancement. That was certainly not the case. The opportunities were there, but there was a dearth of young men of the right type. The man who had gone out of his way to acquire the necessary knowledge and to build up his character so that he could shoulder responsibilities and make decisions would always be in demand. Britain had need of such men to-day.

The conversazione, which was attended by the parents of many of the 165 students

at present taking part in the Henley education scheme, opened with a short address by Mr. A. H. M. Jacob (director).

Presenting the prizes to successful students, Sir Montague Hughman (chair-



DR. P. DUNSHEATH speaking at the conversazione. SIR MONTAGUE HUGHMAN (chairman of the Company) is fourth from the left

man) mentioned that 90 per cent. of those eligible in the company were now participating in the education scheme, which had necessitated a considerable expenditure.

Following the prize giving, an exhibition of engineering models and scientific apparatus was held.

Electricity Supply

Accrington.—Formal consent to the establishment of a new generating station at Huncoat has now been granted by the Electricity Commissioners.

Battersea.—Consent has been issued to the extension of the Borough Council's generating station by one 30 000 kW turbo-alternator, two 190 000 lbs. per hr. boiler units, and the necessary ancillary plant and building and civil engineering works.

Westminster.—In connection with the proposed provision by Westminster City Council of a water heating scheme for the Pimlico housing estate, the Electricity Commissioners have issued their consent to the installation of the necessary plant at the London Power Company's Battersea station. The equipment will include two 1 350 kW (M.C.R.) turbo-alternator sets and the estimated cost is £85 000.

Yorkshire.—On the grounds that the impending nationalisation of the industry makes such a step unnecessary, the Ministry of Fuel and Power has refused to confirm the Cracoe, Hebden and District Special Order authorising Electrical Distribution of Yorkshire, Ltd., to proceed with a scheme to supply several townships in the Craven Dales. These would have included Appletreewick, Barden, Burnsall, Cracoe, Hebden, Rylstone, and Thorpe. As a result of this refusal, it is reported, keen disappointment has been felt in the area concerned, where some villagers had already wired their houses in anticipation of an early supply. An official of the company, commenting on the situation, reported that ever since application for the Order was made, in August, 1946, there had been "one continual battling with official resistance."

Bolton.—An interesting example of blended sodium and filament lighting, giving a high standard of visibility and evenness of illumination, is illustrated by the photograph of Victoria Square, Bolton, on this page. The installation, which was carried out by the Revo Electric Co., Ltd., consists of 16 Revo fittings, each containing one 140 W Philips' sodium lamp and two 150 W gas-filled lamps. In Newport Street, which may

be seen in the background of the picture, there are 11 similar units, each containing one 140 W sodium and two 100 W g.f. lamps. The units are spaced at



The Revo "blended sodium" lighting installation at Bolton

120-180 ft. apart in Victoria Square and 110-150 ft. in Newport Street, and were mounted on existing poles. The height to light centre is 23 ft. and 25 ft. respectively. Developed especially for this scheme, the Revo lantern is an open-type fitting, comprising heavy weather-proof cast-iron canopy and frame, housing silvered mirror reflectors for the g.f. lamps, which are situated at each end. Refractor panels are fitted in each side and opalescent panels in the ends. The Lighting Committee of the Bolton Corporation now intend to complete the lighting of the town centre with similar equipment. Of the 144 units to be installed, some 78 are already in use. The roads in the town centre will then link up with nine radial outgoing roads equipped with plain sodium lighting, this scheme avoiding any abrupt changes in intensity. Two 'bus stations in the town have also been lighted by Revo blended sodium equipment.

Derby.—The 21st anniversary of the installation of pulverised fuel-fired boilers at the Corporation power station was marked by a small private luncheon, at which Mr. R. H. Gummer, a director of International Combustion, Ltd., stated that his firm, at the time the Corporation took its pioneering decision to instal p.f.

equipment, had only £500 000 of orders on its books. To-day the comparable figure was £25 000 000. Of the five chief engineers who have had control of the undertaking, four are still alive, and three—Mr. G. H. Lake, Mr. F. Nicholls and the present chief engineer and manager, Mr. F. H. Pooles—were present. A telegram of greetings was sent to Mr. T. P. Wims-hurst who, because of his advanced age, was unable to attend.

Dewsbury.—It is believed that the Corporation, which takes bulk supplies from the Yorkshire E.P. Co., will receive a refund of about £18 000 by the application of the decision made by the Electricity Commissioners in respect of the Ilkley undertaking.

Heston and Isleworth.—An application by the Borough Council for permission to instal two 1 000 kW Diesel-driven sets, at an estimated cost of £47 550, in its Hounslow generating station has received the consent of the Electricity Commissioners. The Council states that the sets will be used to implement the existing 3 100 kW steam generating plant, which is run in parallel with the bulk supply

taken from the Metropolitan Electric Supply Co., Ltd.

Luton.—Under the title of "How You Can Avoid Electricity Cuts," Mr. C. T. Melling (borough electrical engineer) has prepared a four-page leaflet for distribution to housewives, shopkeepers and office and hotel managers in his area. It explains in simple terms the necessity for load-shedding and stresses that a two-bar electric fire uses the same energy as a two h.p. electric motor in productive industry. Consumers are urged to help by making a special effort on one day of each week to reduce their demand to a minimum, suggested economies being no electric fires until 7 p.m., switching off thermostatic water heaters before breakfast, putting off ironing until the evening and arranging meals which do not require the electric cooker on that day. The leaflet ends: "The day when there may be load cuts in your neighbourhood is —day (the day stated depending upon the district). That is your special economy day, when you should save all the electricity you can so as to avoid electricity cuts. Better a little than none at all."

Electricity Sales in Great Britain

THE statistical summary below, prepared by the Electricity Commission, analyses sales of electricity by all authorised undertakings in Great Britain during the years 1945-46 and 1946-47. The figures refer to the years ending December

31, 1945 and 1946 for companies and J.E.A.'s; March 31, 1946 and 1947, for public supply authorities in England and Wales; and May 15, 1946 and 1947, for public electricity supply authorities in Scotland.

CLASS OF SUPPLY	PUBLIC AUTHORITIES (EXCLUDING C.E.B. BUT INCLUDING J.E.A.'s.)				1945-46			
	1946-47		REVENUE		UNITS SOLD		REVENUE	
	Units	Percent- age of total	Amount	Average per unit sold	Units	Percent- age of total	Amount	Average per unit sold
	Millions	%	£	Pence	Millions	%	£	Pence
Lighting, heating and cooking ...	10 571.6	49.9	55 876 476	1.269	8 387.7	44.5	47 695 806	1.365
Power ...	9 871.7	46.5	36 130 950	0.878	9 752.2	51.7	34 955 221	0.860
Public lighting ...	173.5	0.8	866 278	1.198	168.6	0.9	841 610	1.198
Traction ...	586.7	2.8	2 342 357	0.958	547.0	2.9	2 144 720	0.941
Totals ...	21 203.5	100.0	95 216 061	1.078	18 855.5	100.0	85 637 357	1.090
COMPANY UNDERTAKINGS								
Lighting, heating and cooking ...	4 938.0	36.4	35 539 735	1.727	3 936.9	31.3	30 557 294	1.863
Power ...	8 037.1	59.3	29 907 509	0.893	8 134.2	64.7	30 139 377	0.889
Public lighting ...	57.2	0.4	440 509	1.848	31.1	0.3	250 682	1.937
Traction ...	529.5	3.9	1 686 626	0.764	468.0	3.7	1 485 993	0.762
Totals ...	13 561.8	100.0	67 574 379	1.196	12 570.2	100.0	62 433 346	1.192
ALL AUTHORISED UNDERTAKINGS (INCLUDING C.E.B.)								
Lighting, heating and cooking ...	15 509.6	44.3	91 416 211	1.415	12 324.6	39.0	78 253 100	1.524
Power ...	17 908.8	51.1	66 038 459	0.885	17 886.4	56.5	65 094 598	0.873
Public lighting ...	230.7	0.7	1 306 787	1.359	199.7	0.6	1 092 292	1.313
Traction ...	1 369.4	3.9	4 842 970	0.849	1 246.7	3.9	4 356 523	0.839
Totals ...	35 048.5	100.0	163 604 427	1.121	31 657.4	100.0	148 796 513	1.128

Electric Traction Equipment

New Motors and Controllers for Railways and Tramcars

CLAIMING, over equipment of standard types, the advantages of higher accelerations, balancing speeds and braking rates, negligible noise and vibration, low weight and lower first cost, a new class of electric traction equipment for tramcars and railways is now available from the traction division of Crompton, Parkinson, Ltd.

The complete equipment comprises truck units of the American P.C.C. type and "Vambac" control gear, evolved as a further improvement on the P.C.C. developments in the United States.

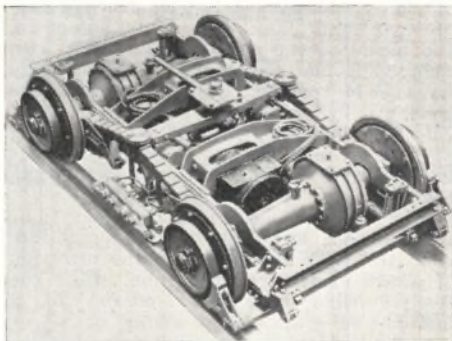
Manufactured by Maley and Taunton, Ltd., in collaboration with Crompton Parkinson, the type HS. 44 truck is available with either resilient or solid wheels, worm or spiral bevel gears, and with different brake arrangements. It is suitable for double bogie, single-deck or double-deck cars weighing approximately 20 tons fully loaded, and for gauges of one metre, 3 ft. 6 in. or 4 ft. 8½ in. The truck is of the "side bearing" type, and the body resting on a self-lubricating bearing on each side.

Each truck is fitted with two motors, the main features of which are: Circular roll frame with four main and four interpoles; self-ventilation with protected inlets and outlets and special parallel flow fan; large roller-type armature bearings; class "B" insulated windings, and Bakelised armature and field coils. The control system provides for the four motors on a car to operate in two permanent series-parallel pairs connected across a 550 V supply. This arrangement limits the commutator voltage to 275 V per motor, and permits a one-hour rating of 45 H.P. at 144 A, 275 V.

With the new car all axles are motored, and the number of control notches has been increased from 12 to 100. This provides for the mean accelerating effort to be sustained nearer to the adhesion limit, while individual variations from notch to notch are small. Acceleration is automatic, and the rate can be varied by a pre-selection adjusted by the driver. The electric braking operates at a high value of retarding tractive effort, and deceleration is automatic, at a rate which can be varied by pre-selection with the controller.

The four traction motors are controlled by a resistor used both for starting and for rheostatic braking; the amount of resistance in circuit is varied by the rota-

tion of a reversible pilot motor governed indirectly by the driver. Resistor and pilot motor form a unit termed the "accelerator," and the master controller, reverser, and accelerating relay themselves



The type HS. 44 tramcar truck. This unit has two motors, resilient wheels and brake-drums on the ends of each axle

form one complete unit. The control equipment includes two circuit-breakers, contactor panels, and the customary auxiliaries.

The control system operates on the principle of maintaining the motor current approximately constant—within the limits of the apparatus—at a value determined by the pre-set position of the controller. Since the rate of acceleration depends on the rotational speed of the pilot motor, it is varied by adjusting the motor speed by means of a potentiometer regulating the voltage applied to the armature.

This new "Vambac" (variable automatic multi-notch braking and acceleration) equipment has already been applied to tramcars in Blackpool and Glasgow and preliminary trials have proved its advantages. In both cases the trucks are fitted with resilient wheels, designed so that the load is transferred from the tyre to the axle through two rubber sandwiches bonded between steel plates.

With the high braking performance obtained it is not advisable to apply brake shoes to the tyres of resilient wheels, and brake drums with Ferodo brake-shoes are therefore mounted on the ends of each axle.

The control equipment is manufactured by Allen West and Co., Ltd., and was developed by them in collaboration with Crompton Parkinson, Ltd.

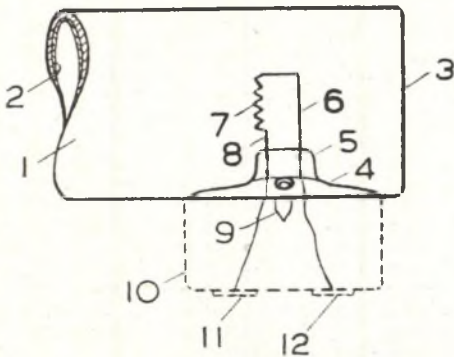
Electrical Inventions

Fluorescent Lamp Design

The majority of tubular fluorescent lamps, the patentees state, are made with the electrode stems placed at the ends of the tubular envelope. The tube is then closed by sealing, with free ends to the rims of each stem flare. During manufacture, the inside of the envelope is coated with fluorescent material which, however, may have to be removed from the ends of the envelope in order to facilitate sealing. The stem flare itself is not provided with a fluorescent coating. Further, the finished tube is capped, the caps covering at least part of the glass tube.

The disadvantages of this construction, it is stated, are that the luminous flux from the tube is screened in the direction of a prolongation of the tube, while the freely visible caps may consist of a material of a disturbing colour, or which may be subject to gradual discoloration. When a number of tubes are being placed end to end to form a continuous line, the interruption made by the caps is claimed to be undesirable both from a lighting and æsthetic point of view.

The modification described in the specification (which, it is admitted, has already been applied to tubular incandescent lamps) is to seal the electrode stems radially into the tube. Referring to the



diagram, the electrode 7 is sealed to the wall of the tube 1 with a stem flare 4. Lead-in support wires 6, 8 pass through the flattened part of the stem 5. An exhaust and filling tube is shown at 9, and the lead-in wires are soldered to the contacts 11, 12 of a cap. Before sealing, the inside wall of the tube and the inside of the closed end are coated with a fluores-

The abstracts below, which are prepared with the permission of the Controller of H.M. Stationery Office, are written from the viewpoint of general interest and do not attempt to define the scope of the inventions, nor indicate in which features novelty lies. Specifications may be obtained from the Patent Office, price 1s. each, or 1s. 1d. abroad.

cent material. The end spaces of the envelope can then participate in the radiation conversion and other disadvantages inherent in the conventional construction, claim the patentees, are overcome.

Lumalampan Aktiebolag, Sweden. Convention date (Sweden), July 12, 1943. Complete specification accepted June 20, 1947. No. 589 467.

The Southern Railway

AT a meeting of the I.E.E. yesterday, Thursday, Mr. C. M. Cock, chief electrical engineer of the Southern Railway, delivered a paper entitled "Electric Traction on the Southern Railway," in which is given the first comprehensive description of the complete scheme of electrification of that railway. The system of electrification is 660 V d.c. with a top-running-contact conductor rail. The return circuit is by way of the running rails. Three-phase electrical energy, generated or purchased at 11 000 V, 25 c/s, and purchased at 33 000 V, 50 c/s, is stepped down and converted to direct current for traction, by means of rotary-converter and mercury-arc-rectifier substations. The paper includes some historical remarks, reasons for electrification, and results. It describes the power supply arrangements, the cable transmission system, the sub-stations, the track equipment, and the electric vehicles. Particular attention has been given to the more modern equipment, and there is some amplification of detail on matters of unusual interest. Operating features that are of interest follow descriptions of the equipment to which they relate. Construction was stopped by the outbreak of war in September, 1939. The paper deals with developments previous to that time, but the electric locomotives completed subsequently are briefly described.

Details of the discussion which followed the reading of the paper will be given in our next issue.

Equipment and Appliances

"Joystick" Control Switches

Two types of "joystick" controllers, for machine-tool or other machine control, each being used in conjunction with contactor-type motor starters, are recent introductions of Brookhirst Switchgear, Ltd. The principal advantage of this type of control over ordinary push-buttons, state the makers, is that mal-operation can be prevented more easily by arranging the switch handle



The Brookhirst "joystick" controller

motion to be in accord with the required motion of the machine or machine tool. For example, lowering the switch handle can control the lowering of the tool-head, table or work; moving the handle to the right can effect movement to the right. One type of switch has four positions, the handle remaining in the selected position until reset; a second type can be arranged for four or five positions, with or without master stop button, which can be fitted with lock-out features. The switch handle is provided with spring return to "off" position (in centre) and is suitable for "inching" control only.

Forced Air Unit Heating

The principle of forced air circulation in factories and offices, either as a means of general space heating or to furnish supplementary heat in conjunction with an existing system has, among its advantages, simple automatic control and relative ease of installation. Carter and Co. (Nelson), Ltd., are now making three types of unit heater, ranging from a 2.5 kW model for offices, etc., to 5 kW and 10 kW models for industrial use. The heat is derived from a nickel-chrome element operating at black heat, behind which and mounted in the same housing is a motor-driven fan forcing the warm air into the room. Thermostatic control can be provided, and the units can be used in summer with the heaters inoperative for ventilation. In addition to the temperature control thermostat, which is optional, each unit is provided with a thermostatic cut-out to protect the heating element in the event of

fan failure. Standard units have open protected type motors, but totally enclosed motors can be fitted where necessary. The motor rating is $\frac{1}{2}$ H.P. and the heaters are available for single- or three-phase supplies.

Flexible Cable Accessory

A useful accessory for preventing the twisting of flexible cables has been developed by the Barnett Manufacturing Co., Ltd., of 102, Cranbrook Road, Ilford, Essex, and forwarded to us for examination. Known as "Flexacord," it consists of a length of wire, shaped into a moderately open spring with an internal diameter of about $\frac{1}{2}$ in. In use, it may be coiled around the flexible cords of electric irons, telephones, vacuum cleaners or other portable appliances, where it imparts a considerable degree of extra rigidity. Another application is for cleating together flexible cables.

In Parliament

Industrial Load Spreading. — The reports so far received are very encouraging, and the regional boards and their district and other committees deserve the highest praise for the way in which they have carried out the task entrusted to them. They have received a very full measure of co-operation from both sides of industry, and the results are a tribute to the value of full joint consultation in such matters. It has not been necessary to impose or threaten sanctions in any of those industries, and all the progress so far made has been done by co-operation and goodwill. (MR. G. ISAACS, Minister of Labour and National Service.)

B.E.A. Salaries. — The annual salary of the Chairman of the British Electricity Authority (Lord Citrine) is £8 500; that of the Deputy Chairman (Sir Henry Self) £5 000; those of the full-time members (Mr. J. Hacking and Mr. E. W. Bussey) £3 500; and those of the part-time members (Dame Caroline Haslett, Ald. Sir William Walker and Lt.-Col. E. H. E. Woodward) £1 000. The four Chairmen-Designate of Area Boards (Mr. J. Eccles, Ald. W. Lewis, Mr. J. S. Pickles and Mr. H. J. Randall) cannot be appointed to the B.E.A. until the Area Boards have been formally constituted, and they will not receive remuneration for their services as part-time members of the Authority. (MR. H. GATTSKELL, Minister of Fuel and Power.)

Industrial Information

New Factory Opened

The Telegraph Condenser Co., Ltd., North Acton, London, officially took over their new factory at Whiteside, Bathgate, on October 30. The factory, built by the Scottish Industrial Estates, Ltd., was started in April, and half of it was in production by August. There are at present 400 workpeople, and it is hoped to employ 1 000 eventually. Mr. W. H. M. Fadzean, chairman of the company, speaking at the official opening, said he felt sure that the completion of the part of the factory now occupied, within a period of five months, constituted a post-war building record in Britain.

Silver Jubilee Attained

Grierson, Ltd., engineering and electrical contractors, St. George's House, 195-203, Waterloo Road, London, S.E.1, attained their Silver Jubilee this year. Mr. Ronald Grierson severed his connection with the company some years ago, but many of the personnel of all ranks have been actively associated with it since its earliest days, including Mr. J. L. Musgrave (chairman), Mr. C. J. Mills and Mr. C. S. Light (directors and chief engineers), and Mr. H. P. Musgrave (director and secretary). A contract with a topical interest entrusted to the company was the rewiring of Lieut. Philip Mountbatten's old school, Gordonstoun, near Elgin, Scotland, after de-requisitioning from war service.

Northmet Film Unit

About twelve months ago the Northmet Film Unit was formed for the production and projection of films having, inter alia, educational, instructional and historical

value. The display section, using a mobile projector equipment, has already given approximately 150 shows to local organisations, and bookings for the coming winter



A "Brush-Bred" "Pony" truck, one of five Brush battery-electric vehicles seen at the Dairy Show, Olympia

are heavy. The second film, "Northmet Cine Magazine No. 2," just released, is in colour, with John Snagge as commentator. It runs for about 20 minutes and deals in an interesting way with new aspects of Northmet service, concluding with a recording of the commencement on the Rye House site of work in connection with the erection of the new power station.

Fluorescent Lighting in a Tramcar

A successful experiment in fluorescent lighting has been carried out by the British Thomson-Houston Co., Ltd., in three of Blackpool's single-deck railcoaches, which



On the left is a view of the stand of the B.E.D.A. at the Dairy Show at Olympia. Keeping milk clean by the use of electrical sterilising equipment was the theme of the G.E.C. stand, shown on the right



run along the roadways. Special Mazda tubes were employed, operating in series on a line voltage of approximately 500 V d.c. To counteract the effect of the



Fluorescent lighting in a Blackpool Corporation railcoach. Half saloon, looking from the centre

numerous breaks in the supply line which would normally manifest themselves in the form of lamp "blinking," and would have affected seriously the efficient operation of the fluorescent lamps, a special device was developed by the company's engineers who devised the electrical circuit and were responsible for the installation. Thirty-two lamps were used, giving an overall illumination, at reading level, of 25 lumens per sq. ft.

Notes for Contractors

Members of the National Federated Electrical Association have been notified

Addition to Staff Bonus

On October 31 the first anniversary of the opening of the new extension to the premises of Metway Electrical Industries, Ltd., Brighton, the directors called the staff together and gave them a resume of the year's working up to April 30 last. The managing director, Mr. D. G. E. Barrie, said that during the first five months of the year the company had delivered £23 000 worth of more material than in the corresponding period of last

When the E.A.W. took over their headquarters at 35, Grosvenor Place, London, S.W., they found the premises badly damaged as a result of the war. Austerity conditions prevented the association

from doing all that they wanted, but how successful have been attempts to put their house in order is illustrated by the photographs reproduced. That on the left is typical of the condition of the rooms as they were, complete with puddle on the floor, while the right-hand picture is one of the rooms as now seen.



year. This was mainly due to additional lines that had been put into production. He announced that the directors had decided that for every complete year's service an additional $\frac{1}{2}$ per cent. should be added to the 15 per cent. bonus, and many of the recipients received 18 per cent. on their gross wages.

New Research Organisation

The need for a research organisation whose resources are readily accessible to the small industrial firm and to the independent inventor of limited means is filled by the recent formation of the Amal-

gamated Research and Development Co., Ltd., who, in addition, provide between industry and inventors and inventions a new link through which the translation of ideas may be accelerated to the state of production. Initially this company has been set up with the financial backing of Associated British Engineering, Ltd., Dawnay, Day and Co., Industrial Bankers, and the General Mining Industries Ltd. of South Africa, but the shareholding interests are likely to be extended to industrialists in other parts of the Empire. The registered offices are at Duke's Court, 32, Duke Street, St. James's, London, S.W.1.

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:—

Manchester, November 10.—Manufacture, supply, delivery and supervision of erection at the hydraulic power station, Water Street, of one electrically-driven submersible borehole pump, with starting and control gear. Specification from the Secretary, Waterworks Offices, Town Hall, Manchester, 2.

Blackpool, November 12.—Supply and delivery of five 400 kVA and one 300 kVA transformers, 6.6 kV/252 V each phase to neutral, arranged to give a temporary supply at 210 V phase to neutral. Specification from Borough Electrical Engineer, Shannon Street, Blackpool.

Belfast, November 14.—Supply and delivery of mains cables and joint boxes. Specification from City Electrical Engineer and General Manager, East Bridge Street, Belfast; deposit, £2 2s.

Southampton, November 14.—Supply and delivery of: (a) refrigerators; (b) vacuum cleaners; (c) washing machines. Specifications from Borough Electrical Engineer, Civic Centre, Southampton; deposit, £1 ls.

Edinburgh, November 21.—Supply, delivery and erection of an electric passenger/goods lift at Portobello power station. Specifications from the Consulting Engineers, Messrs. Kennedy and Donkin, 12, Caxton Street, London, S.W.1.

Woolwich, December 1.—Supply of meters during year beginning January 1, 1948. Specification from Borough Electrical Engineer, Electric House, Powis Street, Woolwich, S.E.18; deposit, £1 ls.

Woolwich, December 1.—Supply of: (a) meters; (b) h.v. and m.v. cables; (c) transformers; during year beginning

January 1, 1948. Specifications from Borough Electrical Engineer, Electric House, Powis Street, Woolwich, S.E.18; deposit, £1 ls. each.

A Traders' Charter

IN a message to the nation just issued by the Society of Individualists and National League for Freedom claims made by the business community are set forth in a form that might well be said to constitute a tradesman's charter.

We of the business community (states the document) claim:

That we have been responsible for making available every material amenity known to civilisation.

That without our work mankind would still be in a state of primitive barbarism.

That labour labours to no effect unless we arrange for the exchange of its products.

That supplies of the means of life are steadily and rapidly diminishing, because governments are not subject to those beneficent economic forces which govern and control the work of individual enterprise.

We claim the right to shoulder responsibility.

We have worked for profit on the terms that we paid the losses, and have thus ensured to the whole of society the maximum of economy.

We claim that the economic freedom upon which our national supremacy was founded, offers the only way out of our present distress.

It is recognised that a return to freedom and competition must mean, for a time, hardship, confusion and inequalities. It is for the nation, adds the message, to choose between these temporary troubles and permanent destruction by political methods.

Company News

BRITISH ELECTRIC TRACTION CO., LTD.—Int. divs. on 6% cum. ptepg. pref., 3% actual (same), less tax; on 8% non-cum. prefd. ord., 4% actual (same), less tax; on defd. ord., 15% actual (same), less tax. Payable December 6, 1947.

ATLAS ELECTRIC AND GENERAL TRUST, LTD.—Rev. to Mar. 31, £366 638 (£331 961), less taxation £155 540 (£149 596), lvg. £211 118 (£182 368). To deb. int. £20 625 (£19 531), rent, sals., etc., £12 996 (£14 842), dirs.' fees £2 400 (£2 800), Uruguay rep.'s exes. £3 800 (£1 800), genl. res. £40 000 (£5 359), Pref. div. £115 500 (£110 250), fwd. £232 453 (£216 656). Gross recpts. of Uruguayan subsid. co., Sociedad Comercial de Montevideo, for the yr. to Mar. 31, 1947, were \$6 923 096 (\$6 871 938). Blice. of rev. over operating costs for the yr. (before provdgd. for deprecn. and renewals) was \$153 346 (\$278 701). Deductgd. this from debit blice. brot. fwd., debit carried fwd. is \$328 317.

VOKES, LTD.—Most of the company's pre-war customers were now returning, and they had some new ones requiring their products in considerable volume, said the managing director, Mr. C. G. Vokes, at the annual meeting. The quality and performance of the company's filters under war-time conditions was so high that many firms, who previously were not convinced of the need for scientific filtration, were now coming to the company for filters of various kinds, to the obvious benefit of their own products. Their filters were best known in pre-war days for internal combustion engines, compressors, air conditioning plants, factory equipment, etc., but they were now undertaking considerable business for the radio, television and other industries. They could still claim that they were supplying filters for almost every purpose in every industry all over the world.

MADRAS ELECTRIC SUPPLY CORP., LTD.—Net rev. 1946 £116 858 (£161 140), plus divs. on invests. £11 200 (£11 965) and transf. fees £131 (£148), mkg. £128 189 (£173 253). Deduct deprecn. and renewals nil (£50 000), tax £47 404 (£42 446), 4½% notes int. £4 500 (same), deposit int. £1 171 (£1 239), loss on exchange £138 (£269), lvg. net profit £74 976 (£74 799). Ord. div. (already declared) 5% (8), fwd. £91 391 (£57 715), units sold 68 355 507 (69 139 933). Speaking at the annual meeting, Mr. K. A. Scott-Moncrieff (chairman) said that the undertaking was handed over to the Madras Government on August 29 this year, and the corporation was to be paid the fair market value of its physical assets at the time of pur-

chase. The agreements which had now been signed with the Government provided for the payment of £1 000 000 on account, on the date of handing over, and for payment of the balance of the purchase money when the amount of the final valuation was settled. They also provided that should the final valuation fall below £1 000 000 the corporation was to make a suitable refund. This was a most unlikely contingency. At the time of transfer a cheque for Rs. 13 333 333, say £1 000 000, in part payment of the purchase price was received. In these final negotiations the Board was fortunately able to secure the services of Sir John Dalton, who went to Madras and, in collaboration with the agents, settled various matters connected with the transfer. The valuation of the assets would take many months to complete and might be followed by prolonged arbitration proceedings, so taking perhaps over a year to arrive at the final figure. In the meantime, stockholders should disregard all statements and estimates as to the amount they were to receive.

Metal Prices

	Monday, Price	November 3 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. 1½d.	—	—
Wire ... "	1s. 6½d.	—	—
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) ... per bott.	£16 0 0	—	—
<i>(ex. warehouse)</i>			

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

County Court Judgments

NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be actions. But the Registry makes no distinction. Judgments are not returned to the Registry if satisfied in the Court books within 21 days.

HOPE'S RADIO AND ELECTRICAL SERVICE (a firm), 6, Sunnyside Road, Wyke Regis, Weymouth, radio and electrical engineers. £18 5s. 6d. Aug. 22.

ROBINSON, J. (male), 88, Wolsey Drive, Kingston-on-Thames, electrician. £12 17s. 2d. May 16.

SHERIDAN'S ELECTRICAL AND RADIO CO. (a firm), 111, Wood Street, Walthamstow, radio dealers. £14 4s. 8d. June 5.

BOOTH SHARP, LTD., 3, Silver Street, Wythall, near Birmingham, electrical engineers. £13 2s. 10d. Aug. 15.

Winding Up Order

BARLITE LAMPS, LTD., registered office: 13, Elizabeth Street, Blackpool. Court: High Court of Justice. Date of Order: October 20, 1947. Date of Presentation of Petition: September 11, 1947.

Order for Discharge

SIMS, George Robert, Syra, Thornley, Durham, carrying on business at Hartlepool Street, Thornley, motor and electrical engineer. Court: Durham. Date of Order: September 22, 1947. Nature of Order made: Bankrupt's discharge suspended for nine days, and that he be discharged as from October 1, 1947.

Coming Events

Saturday, November 8

ELECTRICAL POWER ENGINEERS' ASSOCIATION, NORTHERN METER AND INSTRUMENTS (TECHNICAL) GROUP.—Manchester. Engineers' Club. "Meter Jewels and Pivots, and Methods of Reconditioning Them After Service Use," by F. Seddon. 2.30 p.m.

Monday, November 10

I.E.E., N. EASTERN CENTRE.—Newcastle-on-Tyne. "Commercial Development of Electricity Supply as a Consumer Service," by C. T. Melling. 6.15 p.m.

I.E.E., S. MIDLAND CENTRE, INSTALLATION AND TRANSMISSION GROUP.—Birmingham. Inaugural Address by R. H. Rawll, and "Electrical Aspects of Overhead Electric Cranes," by G. V. Sadler. 6 p.m.

Tuesday, November 11

I.E.E., S. MIDLAND STUDENTS' SECTION.—Stafford. County Technical College. "Neon Lighting," by D. T. Thompson. 7 p.m.

I.E.E., RADIO SECTION.—London. Discussion. "What Equipment is Necessary for the Servicing and Testing of Electronic Devices?" 5.30 p.m.

I.E.E., CAMBRIDGE RADIO GROUP.—Cavendish Laboratory. "Pulse Communication," by D. Cooke, A. J. Oxford, Z. Jelonek and E. Fitch. 8.15 p.m.

I.E.E., N. MIDLAND CENTRE.—Leeds. "The British Grid System in War-Time," by J. Hacking and J. D. Peattie. 6.30 p.m.

I.E.E., N. WESTERN INSTALLATIONS GROUP.—Manchester. "The Application of Electrical Technique to the Services of Some Other Industries," by H. Cobden Turner and G. M. Tomlin. 6 p.m.

LEICESTER ELECTRICAL SOCIETY.—Electricity Offices, Charles Street. 6.45 p.m.

Wednesday, November 12

I.E.E., TRANSMISSION SECTION.—London. "Standardisation of Power Cables," by W. H. L. Lythgoe. 5.30 p.m.

I.E.E., SCOTISH CENTRE.—Edinburgh. Heriot-Watt College. "Neutral Earthing of Three-Phase Systems, With Particular Reference to Large Power Stations," by J. R. Mortlock and C. M. Dobson. 6 p.m.

I.E.E., N. EAST SCOTLAND SUB-CENTRE.—Aberdeen. Caledonian Hotel. "Industrial Applications of Electronic Techniques," by H. A. Thomas. 7.30 p.m.

I.E.E., RUGBY SUB-CENTRE.—Electricity Showrooms. Faraday Lecture. "Electricity and Everyman," by Dr. P. Dunsheath. 6.15 p.m.

BELFAST ASSOCIATION OF ENGINEERS.—"Electronics," by G. M. Tomlin.

RADIO INDUSTRIES CLUB OF THE MIDLANDS.—Birmingham. Queens Hotel. Luncheon. 1.15 p.m.

I.E.E., WESTERN CENTRE.—Bristol. "Electrical Control of Dangerous Machines and Processes," by W. Fordham Cooper. 5 p.m.

I.E.E., S. MIDLANDS STUDENTS' SECTION.—Birmingham. James Watt Memorial Institute. Films Evening. 7 p.m.

Thursday, November 13

I.E.E., S. WESTERN SUB-CENTRE.—Taunton. Report. "The Practical Training of Professional Electrical Engineers," by the Joint Committee on Practical Training in the Electrical Industry. 3 p.m.

I.E.E., INSTALLATIONS SECTION.—London. "Electrical Aspects of Overhead Travelling Cranes," by G. V. Sadler. 5.30 p.m.

I.E.E., N. EAST SCOTLAND SUB-CENTRE.—Dundee. "Industrial Applications of Electronic Techniques," by H. A. Thomas. 7 p.m.

Friday, November 14

I.E.E., N. EASTERN STUDENTS' SECTION.—Newcastle-on-Tyne. Old Assembly Rooms. Annual Dance. 8 p.m.

INSTITUTION OF MECHANICAL ENGINEERS.—London. "Differential Analysers," paper by H. E. Rose and S. C. Redshaw. 5.30 p.m.

JUNIOR INSTITUTION OF ENGINEERS.—London. Annual General Meeting. 6.30 p.m.

ELECTRICAL POWER ENGINEERS' ASSOCIATION, MIDLAND TECHNICAL GROUP.—Stoke-on-Trent. City Electricity Department. "Modern Methods of Boiler Control," by W. Szwander. 7 p.m.

ELECTRICAL INDUSTRIES BENEVOLENT ASSOCIATION.—London. Grosvenor House. Annual Ball.



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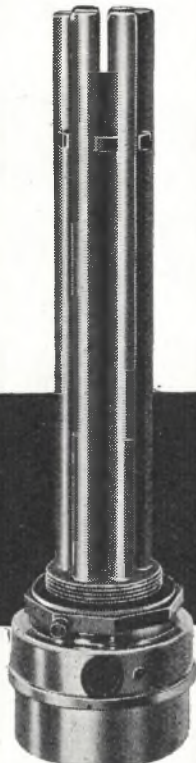
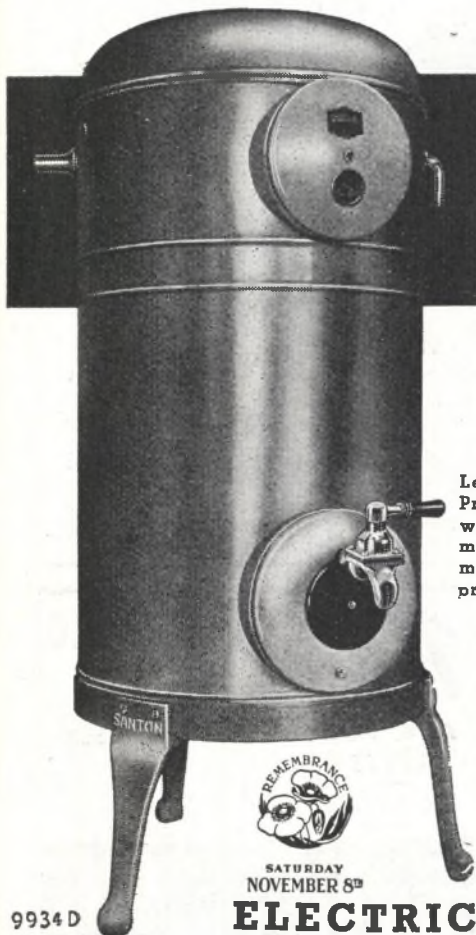
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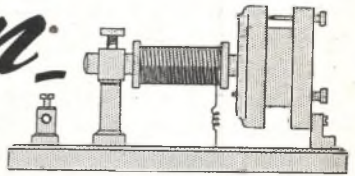
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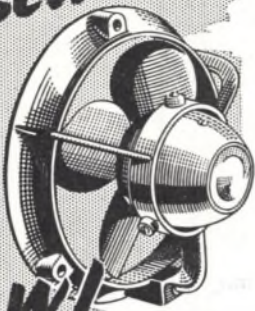
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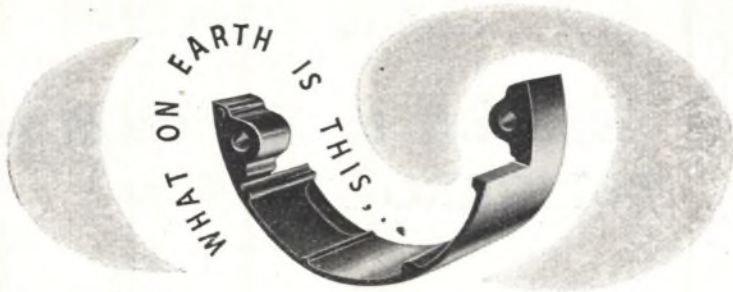
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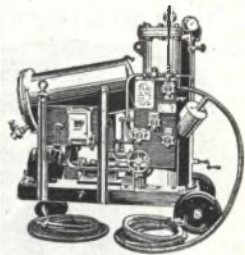
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.... and don't let anyone think I'm not important!

'cos when you come to think of it, it's the messenger that makes the wheels go round.

'Course there ain't so many of us as there were a few years ago. Then, round about 9.30, you'd have seen dozens of blokes like me hot-footing it for Charing Cross Road, Kingsway or Farringdon Road, and let me tell you that most of us would be lucky if we got back before dinner time. Why, at one Tic'c'e Counter I know, there was a sort of cartoon drawn on the wall by a weary messenger—

"R.I.P.", it said, "died waiting".

Yes, I know all about Trade Counters and I must say I like the journey to the Sun best of all. If they haven't got what's on the order then they'll give you the nearest they have and if the boss rings up in advance they even have the stuff ready waiting for me.

Perhaps that's why I often hear my guv'nor say—

**"It's worth while to have
an account at the SUN"**

**The
SUN ELECTRICAL Co. Ltd.,**
118-124, Charing Cross Road, London, W.C.2.

also at LEEDS, SLOUGH,
NEWCASTLE-ON-TYNE.

Telephone : Temple Bar 3500 (18 lines)
Telegrams : Sunelec, Westcent, London.

No. 5. The Messenger Boy.



SATURDAY
NOVEMBER 8TH

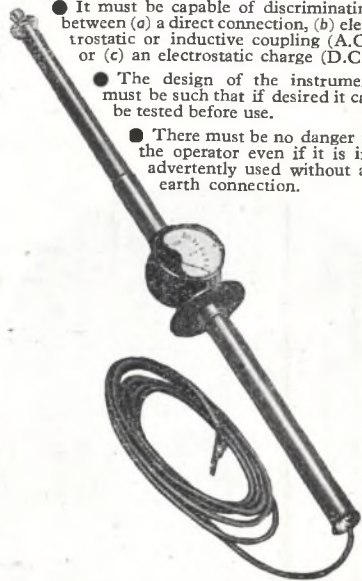
Agro Electrical Co., Ltd.	1399
Barries Electrical Agencies Ltd.	1352
Brentford Radio	1398
British Cork Mills Ltd.	1396
British Diamix Ltd.	1387
British Thomson Houston Co., Ltd.	1345
British Thomson Houston Co., Ltd. (Mazda)	1347
Birch, H. A., & Co., Ltd.	1354
Clarke, H., & Co., Ltd.	1340
Cole, E. K., Ltd.	1337
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Crompton Parkinson Ltd.	1341, 1353
Cusson Gerrard & Co., Ltd.	1386
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London Electric Firm Ltd.	1386
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Lundberg, A. P., & Sons Ltd.	1398
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Mavitta Drafting Machines Ltd.	1348
Measurement Ltd.	Cover iv
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Metropolitan Vickers Electrical Co., Ltd.	Cover ii
Midland Electric Manufacturing Co., Ltd.	1338
New Products (Nottingham) Ltd.	1384
Oldfield Engineering Co., Ltd.	1398
Remington Rand Ltd.	1349
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Santon Ltd.	1383
Scholes, George H., & Co., Ltd.	1346
Siemens Electric Lamps & Supplies Ltd.	1343
Stainless Steel Wire Co., Ltd.	1382
State Electricity Commission of Victoria	1397
Sun Electrical Co., Ltd.	1389
Symonds, R. H., Ltd.	1344
Taylor Tunnicliff & Co., Ltd.	1400
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Trapnax Ltd.	1355
Tullis Russell & Co., Ltd.	1351
Uhlhorn Bros. Ltd.	1352
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LIVE LINE TESTER

**Detects High Voltage
Live Lines and Conductors**

Complies with recommendations of E.R.A. Tech. Report F/T 133

- The instrument must be capable of being used with safety to the operator either indoors or out of doors, under all normal weather conditions.
- It must give a reliable indication that the conductor is not at earth potential.
- It must be capable of discriminating between (a) a direct connection, (b) electrostatic or inductive coupling (A.C.) or (c) an electrostatic charge (D.C.).
- The design of the instrument must be such that if desired it can be tested before use.
- There must be no danger to the operator even if it is inadvertently used without an earth connection.



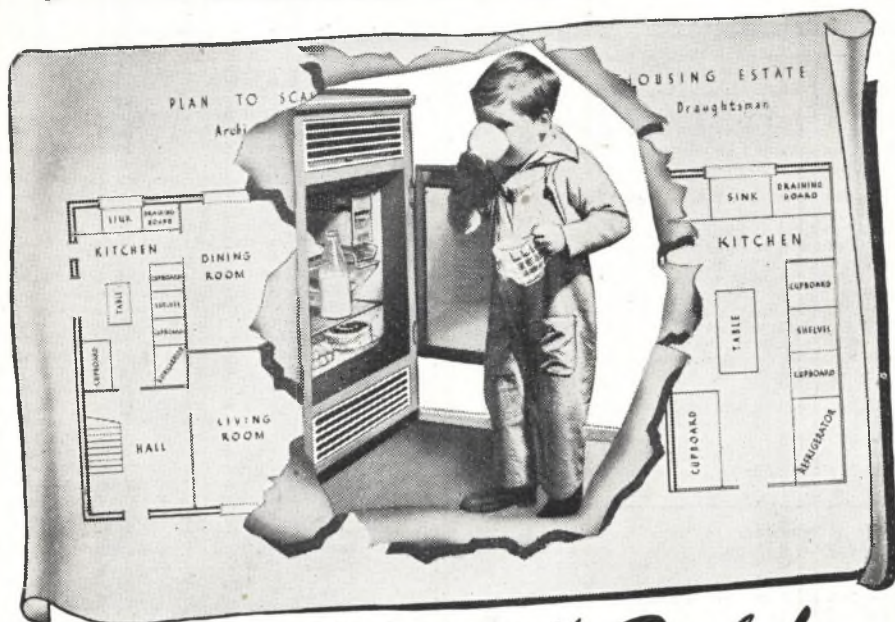
The Everett Edgcumbe Live Conductor Tester embodies a Series Resistor with a Rectifier Moving-Coil Indicator of high sensitiveness, reading direct in Kilovolts to "Earth." The scale is open at the lower end, enabling it to be checked on a medium voltage circuit before use. A flexible lead terminating in a bulldog clip forms an efficient earthing connection.

EVERETT EDGCUMBE

**COLINDALE WORKS,
LONDON, N.W.9
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Manufacturers of all kinds of indicating and recording electrical instruments. Photometry Experts.

SEEING THROUGH THE BLUEPRINT . . .



- for the Health of the People!

An Electrolux Refrigerator may seem a relatively small item in the planning of a housing estate. But, seeing beyond the blueprint, it's an item which will silently safeguard perishable food from wastage, flies and dirt, and so protect the health and the pocket of the people.

In recognition of this fact the Government has ordered 10,000 Electrolux *Silent* Refrigerators in addition to the 50,000 already supplied for temporary "Prefabs." Local Authorities and

Private Builders too are striving to make available to ALL the People the advantages of Electrolux Refrigeration.

Electrolux has no machinery, no moving parts. This means freedom from vibration, low maintenance cost, dependability, and absolute *Silence* at all times.

Electrolux "built-in" Refrigerators, which can be operated by Electricity, fit into any kitchen plan when built into modern kitchen furniture at any height.



By Appointment
Refrigerator
Makers

Electrolux

Silent REFRIGERATION



By Appointment
Suction Cleaner and
Refrigerator Manufacturers

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Also Manufacturers of the famous Electrolux Quiet Suction Cleaners

36/5

CLASSIFIED ADVERTISEMENTS

TENDER

BOROUGH OF LEYTON ELECTRICITY DEPARTMENT.

OFFERS are invited for the purchase and removal from the address below of the following 230-volt 50-cycle Pre-payment Meters:—

- 127 C & H. 5-amp. 2-part Single Coin.
- 104 C & H. 5-amp. Ordinary Id. Coin.
- 486 A.E.G. 5-amp. 2-part Dual Coin.
- 356 A.E.G. 5-amp. Ordinary Dual Coin.
- 345 A.E.G. 10-amp. 2-part Is. Coin.
- 43 A.E.G. 10-amp. Ordinary Is. Coin.
- 80 A.E.G. 10-amp. 2-part Id. Coin.
- 42 A.E.G. 10-amp. Ordinary Id. Coin.

The above can be inspected Mondays to Fridays, 9 a.m. to 5 p.m.; Saturdays, 9 a.m. to 1 p.m. Enquiries to be addressed to the undersigned, who is not bound to accept the highest or any offer.

A. E. MORGAN,
B.Sc.(Tech.), M.I.E.E., A.M.I.Mech.E.,
Borough Electrical Engineer and Manager.

Electricity Offices,
Cathall Road,
LEYTONSTONE, E.11.
October 28th, 1947.

(313)

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

SHEFFIELD CORPORATION ELECTRICITY DEPARTMENT.

APPLICATIONS are invited for the following positions:—
ASSISTANT MAINS ENGINEER.

Applicants must possess an engineering degree or equivalent technical qualifications admitting to corporate membership of the Institution of Electrical Engineers, must have had a thorough engineering training, including experience in the mains department of a large supply undertaking, and be capable of taking charge of 33 kV, 11 kV and L.T. mains construction and maintenance work in one half of this Undertaking's area of supply.

The salary will be in accordance with Class M, Grade 8, of the N.J.B. Schedule, commencing at £635 per annum.
CHIEF RECORDS DRAUGHTSMAN.

Applicants must have had a sound technical training and must have had experience of the working of an extensive mains records system, the preparation of sub-station layout drawings, mains extension drawings and electrical network diagrams, and be a competent draughtsman capable of taking charge of the drawing office in the distribution department of this Undertaking.

The salary will be in accordance with Class M, Grade 8, of the N.J.B. Schedule, commencing at £635 per annum.

The appointments will be subject to the provisions of the Local Government Superannuation Act, 1937. Applicants must preferably be not more than 40 years of age or have had previous local authority service carrying transfer value within the meaning of the Act. The selected applicants will be required to pass a medical examination.

Applications, on forms to be obtained from the undersigned, are to be returned to me not later than November 24, 1947, accompanied by copies of not more than three recent testimonials. When applying for application forms, state for which appointment a form is required.

J. R. STRUTHERS,
General Manager and Engineer.
Commercial Street,
SHEFFIELD, 1.
October, 1947.

(321)

SITUATIONS VACANT

BOROUGH OF ACCRINGTON ELECTRICITY DEPARTMENT.

APPLICATIONS are invited for the following positions at Hyndburn Road Generating Station:—

(1) CHARGE ENGINEER, Class F, Grade 8, of the National Joint Board Schedule, at present £442 per annum. Candidates must have had a thorough practical engineering training and be experienced in the operation of high pressure boilers, the auxiliary plant, and the operation of a modern generating station. Candidates must hold the London City and Guilds Higher National Certificate or be Corporate Members of the Institution of Electrical Engineers and/or the Institution of Mechanical Engineers.

(2) SWITCHBOARD ATTENDANT, Class F, Grade 9a, of the National Joint Board Schedule, at present £327 per annum. Candidates must have had sound technical training and practical experience in the control of H.T. and L.T. switchgear. Preference will be given to candidates possessing the National Certificate.

The successful candidates will, if satisfactory, have the opportunity of being transferred to the new Accrington Huncoat Generating Station when the same is ready for commissioning.

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

Applications, stating age, full particulars of training and experience, accompanied by copies of three recent testimonials, should reach me not later than Monday, November 24th, 1947. Canvassing, either directly or indirectly, will disqualify.

P. D. WADSWORTH,
Town Clerk.
(322)

CITY OF MANCHESTER ELECTRICITY DEPARTMENT. BARTON POWER STATION.

APPLICATIONS are invited for the appointment of one ASSISTANT SHIFT CHARGE ENGINEER, at a salary in accordance with Class K, Grade 8b, of the N.J.B. Schedule (£487 per annum to commence).

Candidates must have served a workshop apprenticeship and have at least the Higher National Certificate in Electrical or Mechanical Engineering. Training and experience in boiler operation essential. Age limit 40 years.

The appointment will be subject to the City Council Superannuation Scheme, and the successful candidate will be required to pass a medical examination.

Applications, giving age and full particulars of technical training and experience, together with copies of recent testimonials, should be endorsed "Assistant Shift Charge Engineer," and addressed to the Chief Engineer and Manager, Electricity Department, Town Hall, Manchester, 2, and be received not later than 10 a.m. on Monday, November 17, 1947. Canvassing, directly or indirectly, will disqualify.

PHILIP B. DINGLE.

Town Hall,
MANCHESTER, 2.
October, 1947.

(308)

ACTIVE and experienced Representative required to develop the sale of all types of Rubber Insulated Cable in the North Eastern Area, location Newcastle.—Applications, detailing training and experience, should be sent to: The Employment and Welfare Officer, Johnson & Phillips Ltd., Victoria Works, Charlton, S.E.7. (284)

ASSISTANT Sales Manager with experience of modern sales promotion methods required for ATLAS Lamp Sales Division. Only men with first class background will be considered.—Apply in confidence with full details to: Box ASQ, Thorn Electrical Industries Ltd., 105, Judd Street, London, W.C.1. (309)

SITUATIONS VACANT

DRAUGHTSMEN required by switchgear engineers. Experienced in contract work, protective gear diagrams or design.—Applications in writing, with full particulars, to: Ferguson, Pailin Ltd., Manchester, 11. (84)

ELECTRONIC Circuit, and Electro-mechanical Engineers required for research and development work; good academic qualifications essential; apprenticeship or industrial or research experience desirable. Knowledge of any of the following subjects would be of assistance: Radar and television pulse techniques; centrimetric components; time-base generators; A.C. and D.C. amplifiers; feedback amplifiers; servos, especially low power electro-mechanical; stabilised power supply units; data transmission systems; gyroscopic applications; table form layouts. Some mathematical ability is desirable.—Write, with full details of qualifications, experience, age and salary required, to: The Personnel Manager, Sperry Gyroscope Co., Ltd., Great West Road, Brentford, Middlesex. (305)

FLUORESCENT Lighting Tube Technician required. Must be fully conversant with all sides of manufacture and be prepared to train operatives.—Write, giving full particulars of experience in full competence and state age and salary expected, to: Box L.H.N., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.2. (310)

REQUIRED by firm of Scientific Instrument Makers in West London area Engineers with experience of precision mechanical design, good academic qualifications essential, and apprenticeship or industrial experience desirable. Knowledge of any of the following subjects would be of assistance: Mechanical systems of fire control computation; ballistics precision gearing; gyroscopic designs; hydraulics; data transmission systems; modern production methods of precision mechanical components. Some mathematical knowledge desirable.—Write, with full details of qualifications, experience, age and salary required, to: The Personnel Manager, Sperry Gyroscope Co., Ltd., Great West Road, Brentford, Middlesex. (304)

SITUATIONS WANTED

No. 1 **ELECTRICIAN** Officer, Merchant Navy, age 24, two years full charge of ship's electrical system (hospital ship), soon to be released, seeks post of responsibility with prospects, Assistant or Senior Maintenance Electrician. Experience general maintenance and engine room with turbo and Diesel engines.—Box L.H.M., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4. (298)

FOR SALE

A **QUANTITY** of Electric Bulbs, 12 v. and 24 v. S.B.C., for serial burning.—Suplex Lamps Ltd., Suplex House, 239, High Holborn, W.C.1. Phone: Holborn 0225. (279)

ALTERNATOR Sets, brand new, Diesel driven, 50 and 30 kVA, 400/230 v., 3-phase, 50 cycles, radiator fan cooled and electric starting. Delivery December.—R.S. & Engrs. (Surbiton) Ltd., 8, Claremont Road, Surbiton, Elmbridge 5095. (320)

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 (Pulkin) Ltd., Electric 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)

ENGINES, 1 h.p. to 6 h.p., Alternators (5 kVA), Lighting Plants, Charging Sets, Motors, etc. 1000 in stock.—Victoria Engineering, Cordwallis Estate, Maidenhead. 34-0 (326)

FOR SALE

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, Edison, 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)

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, Goadge Street, W.1. Mus. 5385. (TC114)

FOR sale from stock. New Lundberg SWITCHES, 2 in. x 1½ in. x 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)

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

LANGLEY LONDON LIMITED offer substantial and regular supplies of Laminated Plastic S.R.V.P. Tubes in round and rectangular sections. Some additional capacity available for processed tubes, but principally for plain tubes in lengths up to 40 in. Enquiries are invited.—Langley London Limited, 161, Borough High Street, London, S.E.1. (307)

LARGE quantities of the following EQUIPMENT: Cathode Ray Tube Holder, 12-pin side contact, type IOH/1055; 4-pin Socket (Jones), type IOH/4052; 2-pin Plug (Amphenol), type IOH/397; Plug, Co-axial Plug, type IOH/528; 2-pin Amphenol Plug, types (R.A.F. IOH/399 and U.S.A.A.F.) PL-P165; 4-pin High Voltage Plug, type IOH/8517; 6-pin High Voltage Socket, type IOH/7439.—Turner Manufacturing Co., Ltd., Villiers Street, Wolverhampton. (315)

MACHINERY: Capstans, Lathes, Mills, Drillers, Slotters, Grinders, Presses, Bandsaws, Sawbenches, Hacksaws, Pulleys, Chucks, Sandblast Plants, Compressors, 1000 Electric Motors, 200 Engines. List free.—Victa Engineering, Cordwallis Estate, Maidenhead. (327)

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)

QUANTITY of 3-way S.P. and Neutral, 500 v., 15 amp., I/C Fuseboards. Also quantity of 5 ft. Fluorescent Tubes, D/B, used one month only for exhibition lighting, 20s. each.—MOSS BROS., 53, Goadge Street, W.1. Mus. 5385. (TC115)

STANDARD FUSES, 15 amp. vit. porcelain body, arranged for front wiring and back busbar connection, or completely assembled units as required for incorporation into fuse boards. Also Distribution Boards, 15 amp., 3-way double-pole clad type, in aluminium die-cast housing with 3 knock-out entries either side for ½ conduit. Supplies from stock, or good deliveries for larger quantities.—For full details apply: Renas Eng. Co., Ltd., 107, Albert Road, S.E.25. Phone Addiscombe 6055-6-7. (256)

FOR SALE

MATHEW Brothers offer: Two-ton Ransome & Rapier Petrol/Electric Mobile Cranes, overhauled, 3 available, from £750 each; Tiny Tim 15-v., 20-amp. Petrol Charging Sets, new, boxed, £25 each; Coventry Climax self-contained 2½-kVA, 130/3/50 Petrol Alternator Sets, fitted 4-cyl. water-cooled engine, £35; Onan self-contained 2-kVA, 230/1/50 Petrol Alternator Sets, overhauled, £110; Ford self-contained 5.6-kVA, 230/1/50 Petrol Alternator Sets, overhauled, £220; Newman self-contained 200/250-v., 12-kW D.C. Petrol Generating Sets, new in packing cases, £295; G.E.C. self-contained 110-v., 16-kW Petrol Generating Sets, mounted on four-wheeled trailer, £250; Austin self-contained 15-v., 200-amp. Battery Charging or Plating Generating Sets, new, £220; Homelite 30-v., 1,500-watt D.C. Petrol Charging Sets, less a few parts, £20; 40-h.p. B.T.H. 400/3/50 Squirrel Cage Motors, R.O. bearings, 3-terminal type, no starters, £67 10s.; ½-h.p., 110-v. D.C. shunt wound Hodgson Motors, 680 r.p.m., new, £12 10s.; 6-h.p., 110-v. D.C. shunt wound Crompton Parkinson Motors, 1 000 r.p.m., flange mounting, new, £22 10s.; 1-h.p. J.A.P. Industrial Petrol Engines, new, £17 10s.; 3-h.p. Petter Industrial Petrol Engines, new, £37 10s.; 10-h.p. ditto, new, £57 10s.; 14-h.p. Continental Petrol Engine, totally enclosed, new £65; 6-v., 230-a.h. Storage and Starter Batteries, £11; 12-v., 168-a.h. ditto, £18; 400-a.h. ditto, £18.—Mathew Brothers, Wallington, Surrey. Telephone: Wallington 4050. Telegrams: Matbro, Wallington. (324)

S.H.E.F.I. MOVING COIL PICK-UP is now available for both Home Trade and Export. It combines for the first time High Fidelity with High Output Voltage, enabling it to directly replace normal Moving Iron Pick-ups without any extra amplification. It has an exceptionally clean response with no undesirable resonances, thereby reducing needle scratch. Retail price, including Transformer, £3 5s. 3d., plus 14s. 6d. Purchase Tax. Wholesale and Retail enquiries invited. Illustration sent on request.—Brooks & Bohm Ltd., 90, Victoria Street, S.W.1. (TC118)

SELF-PRIMING ELECTRIC PUMPS, 300 g.p.h., £15 15s.—JOHN E. STEEL, Bingley, Yorks. Phone 1066. (TC112)

TINNED ARMATURE BINDING WIRE. All sizes from 16 s.w.g.—28 s.w.g. supplied from stock on 7lb., 14 lb., or 28 lb. reels.—Frederick Smith and Co., Wire Manufacturers Ltd., Caledonia Works, Halifax. (46)

VACUUM Cleaner, Spares and Accessories. Belts, Brushes Bearings, Fans, Dustbags, etc. Largest stock of spares in the country. Repairs, rewinding, etc.—Reliance Vac Spares, Ltd., 152-154, Broadway, Bexley Heath, Kent. (TC116)

WIRE. Quantity of 24g. Nickel-Chrome Resistance Wire 65-15%, by Fox and Concordia, for immediate disposal.—Whyte-Leafe Machine Tools Ltd., 107, Albert Road, S.E.25. (289)

15 x 3 SWITCHPLUGS, all sizes Switchplugs, Sockets, Plugtops, Multiplugs, Switches, Lampholders, Battenholder, Junction Boxes, Ceiling Roses, Adaptors, Connectors, Elements, &c. Immediate delivery.—Douglas Turner Ltd., 13a, Edge Street, London, W.8. (288)

250-KW steam condensing GENERATING PLANT or turbo alternating set. The Generator should give an output of 250 kW at 400/440 volts, 3-phase, 50 cycles.—A. Robertson, 49, Leadenhall Street, London, E.C.3. Phone Royal 1759. (316)

BOXES of all kinds, sizes and designs for the Electrical Industry, made for individual requirements, with speedy delivery.

BIRNEY SMALLWOOD PRODUCTS LTD., "Swan Works," Fishers Lane, London, W.4. (325)

FOR SALE

CIRCUIT BREAKERS: 15 amp. 250 v. Single Pole; complete with automatic overload cut-out; robust moulded construction. Accepted by most supply undertakings as efficient switch fuses if used in conjunction with our Distribution Boards.

DISTRIBUTION BOARDS: 5 and 15 amp.; 2, 3, 4 or 6 way; D.P. or S.P. and N.P.; wood cases; improved design and finish. Bus Bars and Terminals fitted complete at no extra charge.

EKGO and SMITHLITE FLUORESCENT FITTINGS: Complete; ex stock. Large quantities available carriage paid.

INSULATORS: Suitable for overhead service cables. Bakelite, brass inserts; screwed P.O. thread for pin mounting; vertical type with drip groove, 5½ in. high, ¾ in. dia. Large quantities available, sample 2s. per return discount on quantities.

WOOD SWITCH BLOCKS: ¾ in. round and square, 6 in. by 3 in. by ½ in.; 9 in. by 3 in. by ½ in., and 6 in. by 6 in. by 1 in. White Enamelled and Walnut Finish from 6s. 6d. to 6s. 3d. per dozen respectively. Large quantities available, sample 2s. per return. Discount for quantities and for natural finish.

CLOTHES HORSE RAILS designed for Electric Dryer; in light steel tubing. Stove enamelled any colour. Quantity deliveries four weeks.

METROPOLITAN DISTRIBUTION LTD., TRURO. (210)

DYNAMO & MOTOR REPAIRS LTD., Wembley Park, Middlesex.

Telephone: Wembley 3121 (4 lines).

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

REBUILT MOTORS AND GENERATORS.

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

SEND US YOUR ENQUIRIES.

OVER 1 000 RATINGS ACTUALLY IN STOCK HERE. (6)

FLUORESCENT LIGHTING AND ELECTRICAL COMPONENTS for the EXPORT and HOME MARKETS.

FOR EXPORT details send for Scemco EXPORT BULLETIN.

For Home details send for Scemco Home Catalogue.

SCEMCO FLUORESCENT LIGHTING.

FITTINGS. 1 000 complete with Lamps always in stock. Trough, Flush, Batten and Specialised styles for the 5 ft. 80 watt, 4 ft. 40 watt, and 3 ft. 30 watt fluorescent lamps.

SCEMCO COMPENDIUM SETS.

Comprising: Fluorescent lamp, Lamp holders, Starter lamps and holders and Power factored choke for 5ft. 80 watt, 4 ft. 40 watt, and 3 ft. 30 watt.

SCEMCO CONTROL GEARS.

Extensive range, covered by the Scemco Guarantee, including Tapped Ballast units from 110 v. to 250 v. A.C. 50 cycles for 80 watt and 40 watt Lamps, also instantaneous starting units for 80 watts.

SCEMCO ELECTRICAL COMPONENTS.

Including 5 amp, 10 amp., and 15 amp. Switches, Switch Sockets and Plug Tops. Three-pin, domestic and industrial patterns.

Please mark enquiries clearly: EXPORT or HOME to:

SCEMCO LTD.

Scemco House, 6-7, Soho Street, London, W.1.

Phone GERRARD 1461-2-3. (TC119)

SACKS AND BAGS in excellent condition for all commodities, as low as 6d. each.—Write: John Braydon Ltd., 230, Tottenham Court Road, W.1. Tel. No. Museum 6972. (8)

FOR SALE

PACKING CASES FOR EXPORT or for the home trade. Prompt deliveries. Or case-boards in random lengths for making cases of various sizes.—For quotation and details of our service send enquiry to: **F. RAWLE & CO., LTD.**, 71, Kensington Avenue, London, E.12. Phone: GRAngewood 2005. (282)

TINNED STEEL ARMATURE BINDING WIRE. All even numbered sizes from 16 s.w.g.—28 s.w.g. supplied from stock on 7 lb., 14 lb., or 28 lb. reels.
FREDERICK SMITH & CO., WIRE MANUFACTURERS, LTD., CALEDONIA WORKS, HALIFAX. (9)

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G.  R.

Sales by Auction.
By Order of the Minister of Supply.
Without Reserve.

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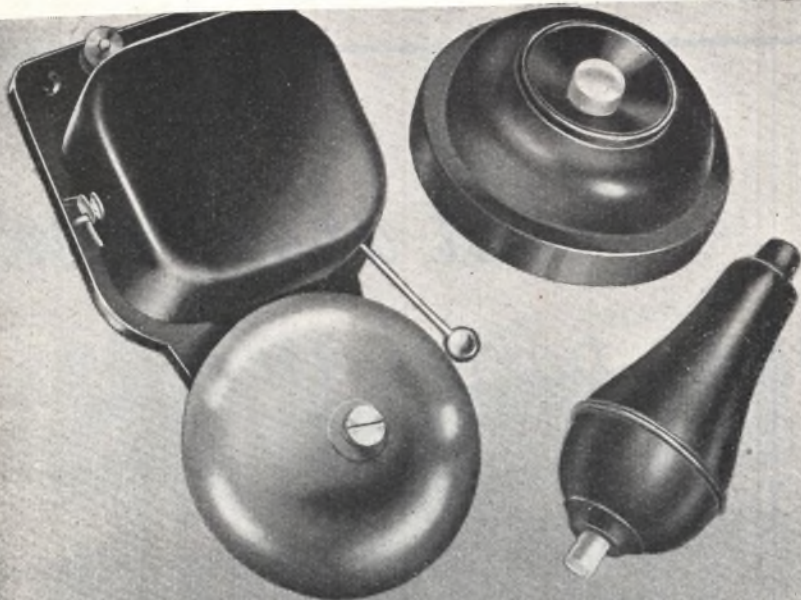
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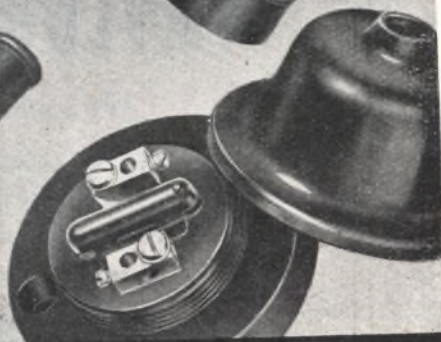
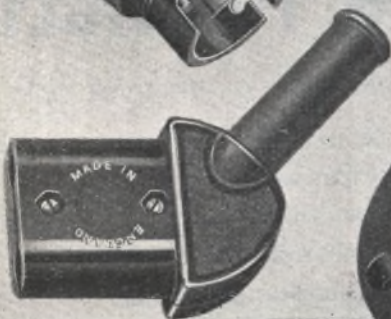
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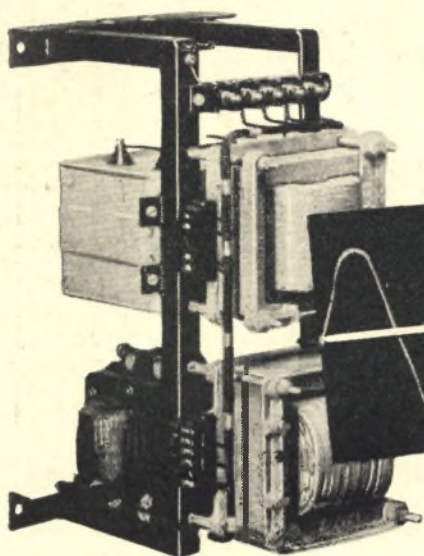
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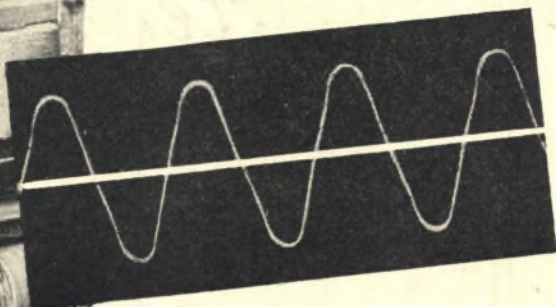
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