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THE TECHNICAL NEWSPAPER OF THE ELECTRICAL INDUSTRY

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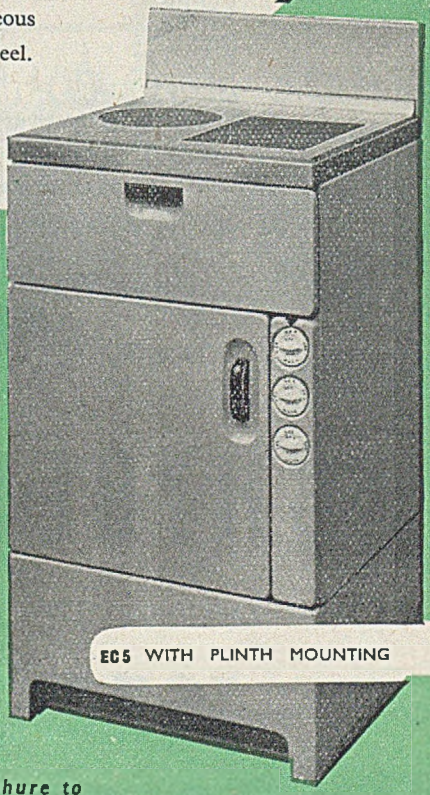

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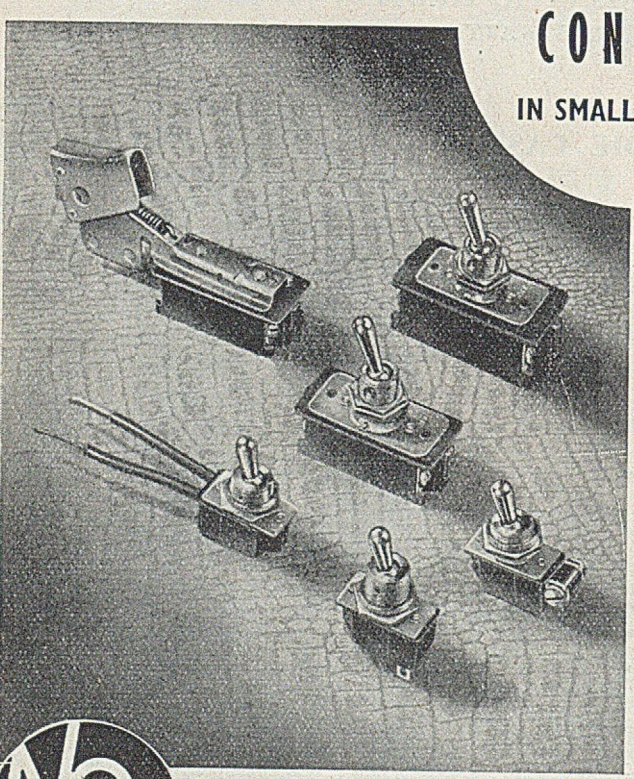

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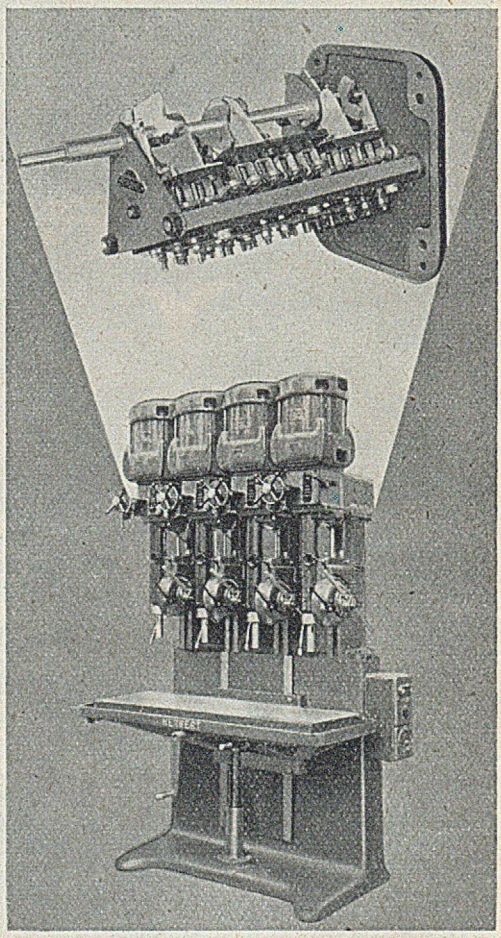

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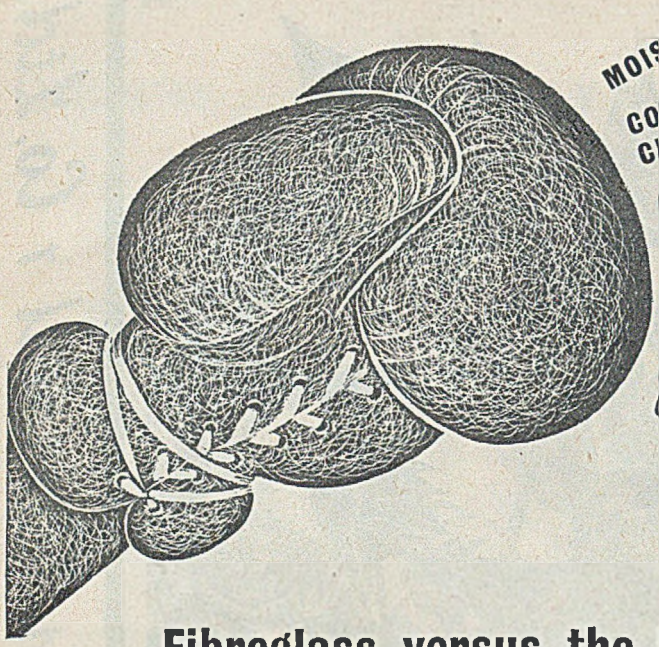

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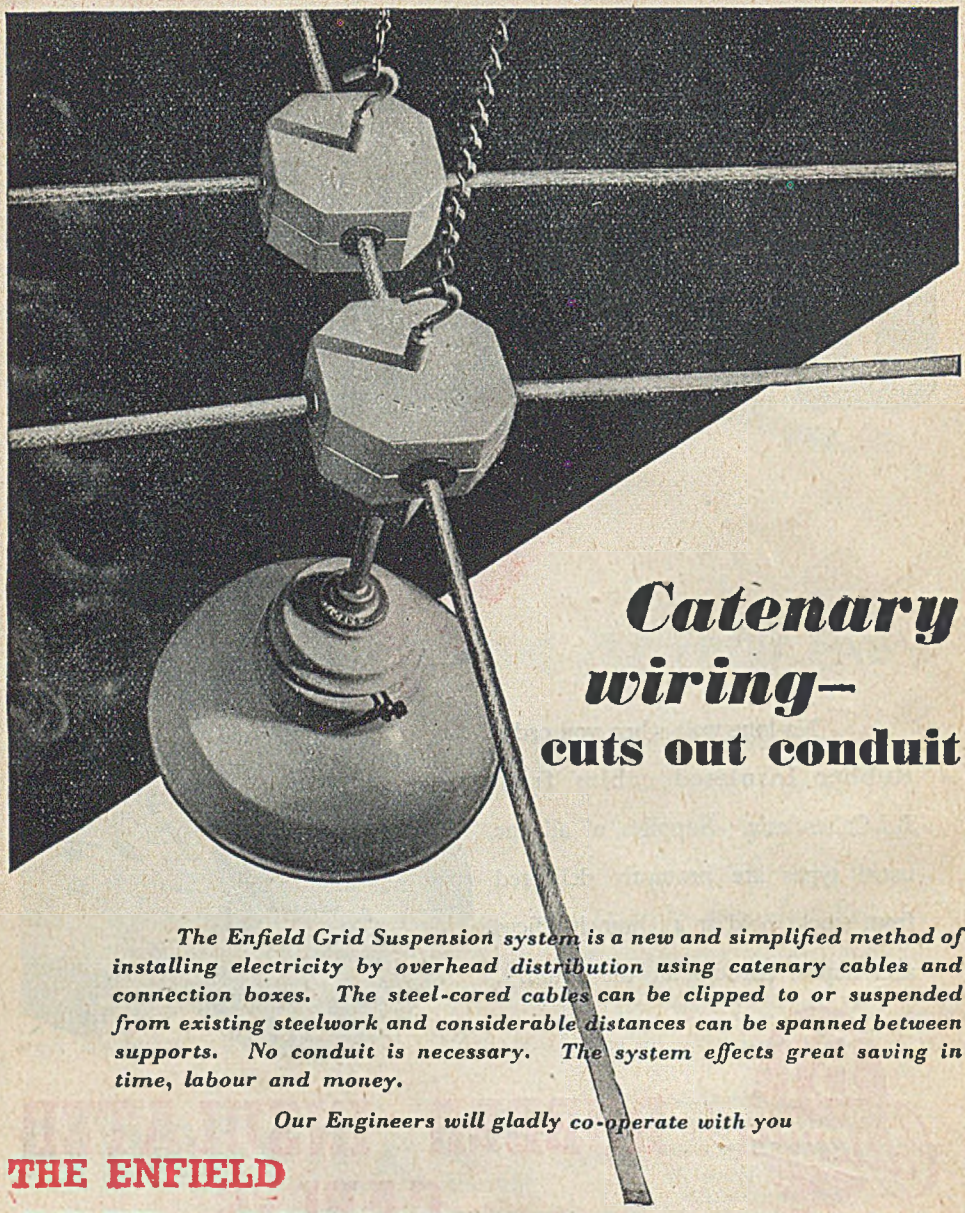

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Electrical Contracting

THE address which Mr. N. AISH delivered at the annual meeting of the E.C.A.—last week's issue, p. 43—suggests that the electrical contractor is not altogether happy in his relationship with the nationalised industries. The bone of contention is that vexed problem trade terms, and it is Mr. AISH'S view that there is already evidence that the discounts offered to the nationalised industries by some manufacturing organisations have been an incentive to those industries to undertake work which would otherwise have been the province of the electrical contractor.

With regard to the British Electricity Authority, the final policy in respect of electrical contracting has, it was claimed in the address, not yet been declared, though an interim policy of *status quo* is in operation. In this connection, however, Mr. AISH is again critical and claims that in some areas the interim policy is not being observed. These views have, we understand, been transmitted to the B.E.A. in the hope that negotiations may smooth out the difficulties which seem to have revealed themselves during three months of Authority operation, and the outcome is awaited with interest.

The supply industry has for many years, and generally speaking, been on good terms with the contractor and we see no reasonable argument against a continuance of that condition. Indeed, it is in the interest of the electrical industry as a whole that the B.E.A. and

the E.C.A. should view each other with respect, for with the conditions imposed upon the industry by national shortages, and the fact that both organisations have as their objective service to the public, any change in that relationship would be detrimental to the good name of electricity, and is likely to provide ammunition for the politically-minded but electrically ill-informed gossip column writers.

The B.E.A. has been in operation for no longer than three months, and it is to be expected that with so great a change in administration as nationalisation has involved, there will be during the next twelve months or so many criticisms of the type levelled at the Authority by the E.C.A. In raising the point and in ventilating his opinion, Mr. AISH has done the industry, his association, and the Authority a genuine service, for only in that way can difficulties be overcome, correct policy be decided, fair trading conditions be established and misunderstandings be rectified.

Views on Current Affairs

The Technical Writer

AT the Royal Society scientific information conference—which reached its conclusion last Friday—Prof. E. M. da C. ANDRADE expressed a wish that the clarity with which so many of the older writers set out their thoughts and experiments would find some imitators to-day. This opinion will receive the support of most editors of technical journals, for many of the articles submitted for publication require to-day far more subediting than did similar articles submitted before the war. The reason for this seeming decline in the ability of the technical writer to express himself is in our view born of the fewer opportunities presented to authors to exercise their skill—due to the paper shortage and the restricted space in the technical journal available to contributors. In number, free-lance articles of the requisite standard are to-day fewer than used to be the case, possibly because the long period necesary before publication is a discouragement, a condition which needs serious review.

Scientific Information

AT the conference referred to in the previous note, fears as to the possible adoption of Prof. BERNAL'S plan—see THE ELECTRICIAN of June 25—for the central control of the publication of scientific papers have finally been allayed, although it was clear from the start that any such attack on intellectual freedom would meet with considerable opposition. The positive outcome of the conference has been the formulation of a number of recommendations, which were to be laid before the Council of the Royal Society yesterday and may be published in report form before the end of the year. Editors of scientific journals and abstracting services are to be invited to form committees for the consideration of such matters as the allocation of subjects; recognising the fundamental importance of ready access to information, the conference also urges the removal of any such barrier as copyright. A further recommendation is that central scientific library and information services be set up, and in particular that the Science Museum and Patent Office libraries be extended. But, as Sir ROBERT ROBINSON, President of the Royal Society, pointed out at the closing session, to implement these proposals would entail considerable expenditure. Since their fulfilment would benefit scientists in all parts of the Commonwealth, it would be hardly fair to appeal for financial assistance to the United Kingdom Government alone.

Salesmanship and Exports

REFERENCE was made in THE ELECTRICIAN of June 4, to the fact that, in future, the extent to which we could sell our goods abroad was no longer limited by production, but by methods of salesmanship and the attention paid to the needs of foreign markets. Speaking at the third annual meeting of the B.E.T.R.O. last week, the President of the Board of Trade at long last gave

official recognition of this difficulty and of the problem set the industry of overcoming the importation restrictions imposed by Governments which formerly encouraged our trade. The salesman, at all times a most important factor in the development of export trade, is today faced with a task, on the successful accomplishment of which depends the attainment of the increase in export volume set by the Government, and on his efforts depends much of our national economic stability. The export salesman is fully conscious of his responsibility; he is eager and enthusiastic; in order that his efforts may bring the best results, however, those manufacturers producing the goods he has to sell, must pay ever increasing attention to making what the foreign markets need. Without that attention to detail, competition may be too strong to be healthy.

The Demand Still Grows

WARNING of some of the difficulties which will face the supply industry next winter was voiced in our last issue, and the latest figures with respect to electricity generation are significant. The figures are published by the Ministry of Fuel, and whereas during the week ended June 11, electricity sent out amounted to 698.2 million kWh, and for the week ended June 18, 698.2 million kWh, the figures for the week ended June 25, were 709.4 million, making for eight summer weeks 5 805.7 million kWh, compared with 4 990.2 million during the same period last year. Coal stocks at the power stations at June 26 amounted to 3 787 700 tons, and consumption during the week ended on that date was 477 900 tons, compared with 475 000 tons the week before.

Historical Records

EARLIER in the year, reference was made in our Correspondence columns about the desirability of ensuring that, with the disappearance of the separate electricity undertakings, documents of historic interest and value should be preserved. We raise the subject again because there must be, despite the already good response to the appeal, still many reports and so on, which are suitable material for keeping. The B.E.A. is anxious to ensure the retention and safe custody of these records and to make certain that potentially valuable books and documents are not destroyed merely with the object of saving time and storage space, or because of the physical difficulties of transferring to new premises the large volume of records which may be involved. It is considered important that certain records, of which official minute books and major accounting books are obvious examples, should be retained for some time to come. These may concern both the Central Authority and the Area Boards and it is suggested that, in any case where doubts may arise as to how old records should be dealt with, the matter might first be referred to the Secretary of the B.E.A.

House Building Frustration

IT is a generally accepted fact that when the building trade is busy, all trades are busy. This is, at any rate, true with respect to the electrical contractor, the domestic electrical appliance and switchgear manufacturer, the small cables maker, to name only a few, and the remarks of Sir HARRY R. SELLEY, president of the Federation of Master Builders, on the subject of Government policy are, therefore, of interest. Speaking at a luncheon of the Society of Individualists recently, he strongly condemned the attitude of the Government with regard to private builders, and, as an example of frustration, pointed out that at Luton, the local builders had placed before the Government facts to prove that they were in a position to build 800 houses, having all the material and labour they required, but the licences were not forthcoming. Some time ago, according to Sir HARRY, his association's opposite number in America said they would arrange to have sent to this country sufficient timber to build 10 000 houses and they would "freeze" the necessary dollars. "We went to the Government," added the speaker, "and said we will build 10 000 houses, but the answer has been such a long time coming that the offer has been withdrawn. The timber merchants are bowed down with stocks which they cannot get licences to free, and all other housing fitments and components are in a similar position."

Portrait—Mr. A. G. Ramsey

CHIEF engineer of the Ministry of Works and president-elect of the Association of Supervising Engineers, Mr. A. G. Ramsey, O.B.E., B.Sc. (Eng.), M.Inst.C.E., M.I.E.E., M.I.Mech.E., has had an extensive and varied experience of engineering, research, and technical matters related to public works and industry.

His education at Emanuel School, continued in Switzerland and Germany and finishing at London University, where he took his B.Sc. (Eng.) degree, provided an appropriate background for the technical and practical training he received with the British Westinghouse Electric and Manufacturing Co., Ltd. (now Metropolitan-Vickers Electrical Co., Ltd.), at Trafford Park, Manchester, as one of the first college apprentices under Sir Arthur Fleming.

Mr. Ramsey entered the Government service in 1914 when he was appointed by the then Office of Works to be district engineer for Scotland. Five years later he became assistant engineer at the London headquarters; from 1920 to 1924 he was acting deputy chief engineer, and for the following twelve years was engineer-in-charge of special works. In 1936 he was appointed to the position of deputy chief engineer of the Ministry of Works, which he occupied until 1941, when he was promoted to the post of chief engineer. From 1936 onwards Mr. Ramsey was responsible for the engineering side of the Ministry's greatly extended operations, preliminary to and in association with the war effort. When the Civil Defence Research Committee was formed, he was appointed a member. His services were recognised some years ago by the award of the O.B.E.

In addition to his professional duties Mr. Ramsey's activities and interests have ranged over a very wide field, and he has worked with a number of technical and other committees. The B.S.I. claimed much of his time, for he has served on the Engineering Divisional Council from 1943 to 1946, the General Council from 1944 to 1947, the Electrical Industry Committee, the Mechanical Industry Committee and the British National Committee of the International Electro-technical Commission. He is an active member of the I.E.E. Installations Section, and was chairman for the year 1943-44. He is also doing valuable work as a member of the Mechanical Research Board of the D.S.I.R. The problem of preventing the emission of deleterious fumes and substances into the air from chimneys and industrial plant was another matter with

which he was concerned as a member of the Government Chemists' Committee on the Elimination of Grit and Sulphur from Power Stations and of the Standing Committee of Co-operating Bodies on Atmospheric Pollution.

Mr. Ramsey is also a member of the Ministry of Labour Technical Personnel Sub-committee (Civil, Electrical and Mechanical Engineering), who are trying to relate the demands of industry and the Government for professional and technical men to the output of the colleges and universities; the Council and Executive Committee of the Public Works, Roads and Transport Congress, and various Codes of Practice, Government departmental and institution committees.

Mr. Ramsey's main interest, outside engineering, is education, both general and technical. He is vice-chairman of a well-known school and governor of another, and his interest in engineering education, awakened in his college-apprenticeship days by Sir Arthur Fleming, has never flagged.

In accordance with the custom of the association, Mr. Ramsey will deliver his Presidential Address at the opening meeting of the London lecture session of the A.S.E.E. at the E.L.M.A. Lighting Service Bureau, London, W.C.2, on October 19.

The Paris Conference (I)

1 500 Delegates from 37 Countries at the C.I.G.R.É.

THE twelfth session of the Conference Internationale des Grands Réseaux Electriques opened at the Fondation Berthelot in Paris on June 24, when some 1 500 delegates, from five continents and 37 countries, heard the president of C.I.G.R.E., M. Ernest Mercier, deliver the opening address. He stated that the membership had increased from 1 100 last year, and paid tribute to the work of M. Tribot Laspière, who was responsible for the printing of the papers, the organisation of their distribution, and the conference arrangements generally. He suggested that the finances of the conference would need reconsidering, in view of its ever-widening scope.

On the effect of nationalisation and other administrative rearrangements in the supply systems of the countries of the delegates, he said that the C.I.G.R.E. was an association of individuals and not of national delegations, and that its aims were purely technical. Mr. H. W. Grimmitt (Ministry of Fuel and Power) briefly thanked the President for the hospitality which it had clearly been made obvious the French National Committee were about to extend.

FRENCH NETWORKS

M. Pierre Ailleret, a vice-president of C.I.G.R.E. and Director of Studies and Research in the Electricité de France, then commented on a large number of pictures and diagrams of the French national network which he demonstrated by means of lantern slides. Some of the large-scale transmission scheme details which he revealed, showed that France had made many studies in the direction of high-power, long-distance systems. The 220 kV oil-filled cable connections from the Massif Central to Paris, for instance, have been in successful operation since 1935, serving as the termination of the 220 kV overhead lines. For these, a construction generally similar, but in many respects lighter than that described in a paper presented later in the conference by Mr. A. E. Percivall (Blaw-Knox, Ltd.), had been adopted, but for the French lines, which in the near future will reinforce what amounts to the Western European grid, 400 kV is to be adopted. For this, two S.C.A. conductors in parallel are to be used for each phase; at present, one of these lines is in operation at 220 kV with a double circuit arrangement, instead of the single circuit to be employed in the final state. Slides depicting 100 MVA three-phase, 220-150 kV transformers were especially interesting, as units of this size have not yet been seen in Great Britain.

In the afternoon a group of papers dealing with overhead line problems were discussed at the first session. These dealt largely with theoretical design problems, of special interest to the mechanical engineers concerned with overhead line construction. Mr. A. E. Percivall's paper, on "The Mechanical Design of 264 kV Transmission Lines in Great Britain," was presented at this meeting.

CHANGING LIVE-LINE INSULATORS

Although there was considerable discussion on conductor vibration no new solutions were proposed. A film was presented by the Southern California Edison Co., showing "hot-wire" changing of insulators, guard rings and the like. The methods employed were seen to be efficacious in the dry climate in which they were used, but it would seem unlikely that the insulated rods, pliers, clamps, and so on, could safely be applied to the live 132 kV lines of the British grid, except on the very few days in the year when the humidity was extraordinarily low.

It was interesting to note that British practice on the 132 kV system has of recent years hardened towards the use of compression clamps, which have been found entirely satisfactory in service. Those concerned with overhead lines in Great Britain were, therefore, surprised that so much discussion from Belgium, France, Switzerland and America, should have been devoted to the cone joint for steel-cored aluminium conductors, of sizes comparable with those used here.

On the morning of Friday, June 25, the first group of papers to be discussed dealt with insulators. Here, Mr. J. S. Forrest, of the South Western Electricity Board, spoke on the subject of semi-conducting glazes, on which Mr. J. H. Pirie (Taylor, Tunnicliff and Co.), had presented a paper. Since it was acknowledged that the atmospheric pollution in Great Britain was more severe than that obtaining in the countries from which the majority of delegates emanated, the views of the British members, based on the results of tests at the former Central Electricity Board's high-tension testing station were received with interest. The special reporter of this group, Mr. G. H. Gillam (Taylor Tunnicliff and Co.) suggested that

a full-scale trial of stabilised insulators should be carried out on a line operating at not less than 132 kV. A U.S.A. delegate suggested, however, that the use of the semi-conducting material in the glaze might upset other desirable qualities in the insulator as a whole. The second main point in the insulator discussion concerned the reasons for the alleged " ageing " on insulators. M. Cabanes (Electricité de France) said that there was no doubt about the ageing of insulators, and his experience was based on tests taken over two years on 20 000 km. of h.t. overhead line. The cement was blamed for ageing by M. R. J. Brafer (S.A. Societe Blago de Ceranique) but Mr. Forrest and Mr. G. Perrins (Bullers Ltd.) did not agree.

LINE FAULT LOCATION

While the first group of papers on June 25 showed that British engineers were well advanced in the study of the subject and had authoritative views to present, the papers taken later, dealing with the subject of fault location, showed their Continental and Canadian colleagues to be somewhat ahead of British practice. The rapid location of faults on h.t. lines is doubtless, of even greater importance in countries with poor accessibility to the lines running over difficult terrain. However, many engineers of the former Central Electricity Board could have related experiences during which considerable delay in the restoration of supplies was caused by the lack of adequate fault localisation.

The two methods described were widely different. The first, by M. S. Margoulies (Ste Ame U.C.E. Linalux) and M. P. Fournaire (Professor of the Institute Montefiore), uses a 70 kV surge generator, and then measures by means of a cathode-ray oscillograph the reflections caused by the discharge from the surge generator passing to earth through the fault; their apparatus, however, is not portable at this stage of development. While they claim excellent results, the gathering felt that the second method, introduced by Mr. Wilfred G. Hoyle (National Research Council of Canada) had some advantage, as the whole of the apparatus involved was entirely portable. It worked on the radar principle of measuring small amplitude, low-power pulse relection time, and exhaustive tests show that an accuracy to within about 1 per cent. could be obtained. In addition to the papers mentioned above, Mr. P. L. Bellaschi (U.S.A.) referred to another method whereby the surges emanating from the fault itself could be caused to work recorders permanently installed at each end of the line. He suggested that it would soon be possible to give direct readings from similar apparatus, which would enable relatively unskilled operators to obtain an accurate fault location.

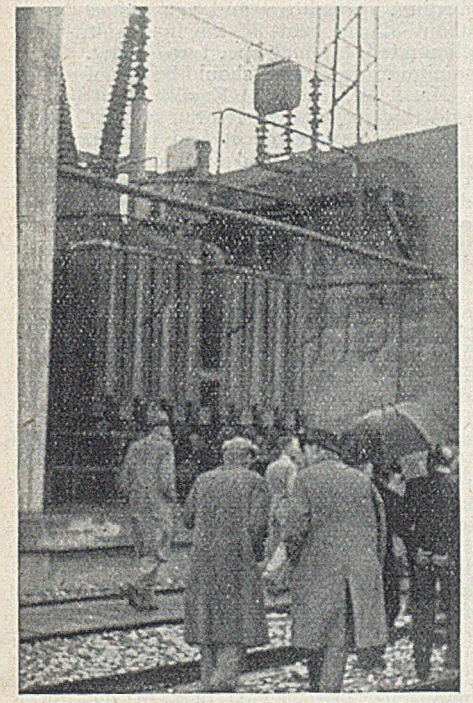
The afternoon session dealt with cables and electrolytic corrosion, and the chairman was Dr. P. Dunsheath (London Electricity Board). This discussion centred on the details of oil-filled and internal gas-pressure cables, with frequent reference to those at 220 kV which have been operating for some years in France and elsewhere. It was made clear that in the present economic conditions no one design would be suitable for all countries, as the relevant availability of lead, copper and other materials is not a stable feature when the choice of cable has to be considered. The question of electrolytic corrosion has obviously been the subject of much research, but it has been hampered by the considerable differences between the various national standards. Mr. J. Kopeliowitch (Palestine Electric Corporation) brought out this point in discussing the permissible loading of buried cables, and mentioned that the U.S. engineers, accept a higher core temperature for normal operating conditions than is at present adopted elsewhere. M. R. De Brouwer (S.A. Distrigaz, Belgium) in his paper, suggested that cables could be immunised against corrosion by being rendered electronegative in relation to the soil through which they passed. He said that all corrosion ceased when potentials of 0.85 V for steel piped lines and 0.55 V for the lead sheath of cables were applied. The cathode-protection scheme which he outlined, uses as the cathode the " main " to be protected. The metallic body in contact with the soil, is the anode, and a source of polarisation current has to be provided.

TOWER CONSTRUCTION

One of the heaviest programmes for any day of the conference was that of Saturday, June 26. In the morning two sets of papers were discussed simultaneously. One group dealt with towers and tower foundations, and had perhaps more interest for the mechanical engineer than for those whose duties are primarily concerned with the electrical side. Much valuable data, however, was found in the papers, and the mention of pipe towers filled with concrete, by Mr. Vogeli (S.A. Motor Columbus) was something of a novelty. Mr. P. J. Ryle, (Merz and McLellan) also took part in this discussion.

The second group of papers, on Saturday morning, dealt with network stability and load and frequency control. Some ten papers were presented under this heading, an enormous amount of technical

data from Canada, France, Great Britain, U.S.A., Hungary and Switzerland, being put forward. It was obviously impossible that the discussion could deal with the detailed points of so wide a field. The paper by Mr. A. J. Gibbons and Mr. E. B. Powell (formerly of the London



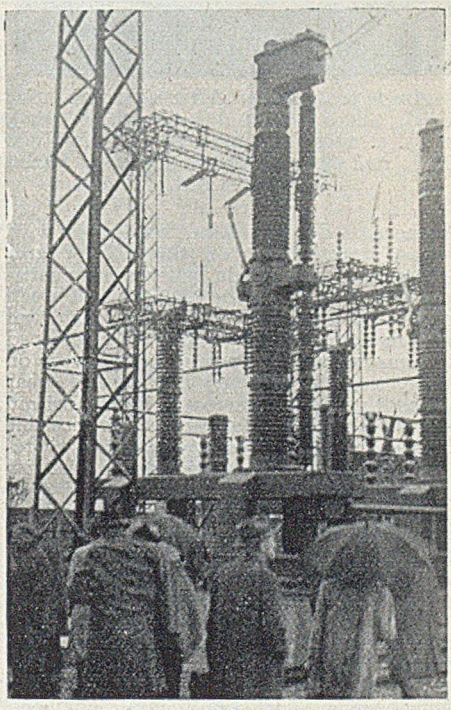
100 MVA, three-phase, 220/66 kV transformer at Chevilly sub-station

Power Co.) dealt with the general characteristics of the high voltage cable system in the London area, and the French representatives devoted much of their discussion to comparison between the problems facing those responsible for the London power network and that of Paris. Much attention was devoted to the problems of stability at times of light load, when the alternators have to operate at leading power factors. M. Henriet (Electricité de France) stated that with the neutral point also earthed through a resistance, as in London, they found that only three-phase short-circuits affected them seriously.

A large part of the discussion centred on the design and use of calculator boards to ascertain load flows and short-circuit values. Here M. Kostenko (U.S.S.R.) made a long contribution in the form of a special report. Many speakers from France, Sweden, Switzerland and Belgium spoke on the question of steady-state stability, and it was shown that many methods have been developed for evaluating the stability limits in the under-excited region of the performance curve of turbo-generators. Series excitation was not suggested for the smaller machines, but M. H. David and M. J. Favereau (Electro Mécanique Co., France), as a result of model tests, felt they could say that series excitation, used with a voltage regulator of high temporary stability, would make possible the transmission of power for a distance of about 1 200 km. with complete stability.

Somewhat incongruous amongst this group of papers was one by Dr. M. Seidmear (Budapest University) dealing with long distance constant-power transmission. He suggested that for producing electric power at the lowest possible cost, long distance transmission lines must operate at very high load factors, and that to do this the only possible method was to use hydro-electric power with pumped storage to cover peaks, with steam power stations for base load use.

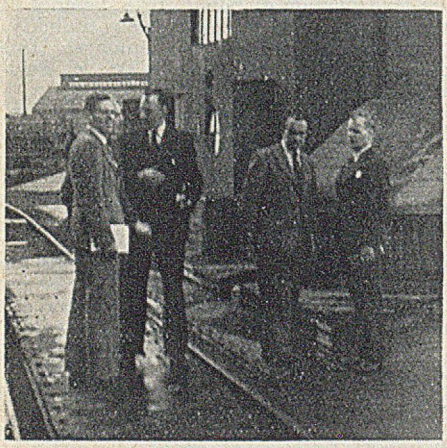
When the session on Saturday resumed, after lunch, the first subject was protec-



SIR V. DE FERRANTI *puts his coat over* MR. E. T. NORRIS *while inspecting a 220 kV minimum-oil circuit-breaker at Chevilly*

tion and relaying. Four papers were presented, two from Sweden, one from Switzerland, and one from France. The use of capacitor-type voltage transformers was mentioned by Mr. Nordell and Mr. Hogfeldt (Sieverts Kabelverk). They stated that over 500 of these units were used up to the end of 1947, and that the first, operating at 220 kV, were used in 1936.

Mr. F. J. Lane (transmission design



At Amghi power station, left to right: MR. CUFFE (*Eire*), MR. R. H. COATES (*Southern Div.*), MR. A. R. COOPER (*Merseyside and N. Wales Div.*) *and* MR. PETERSEN (*Overseas liasion officer, B.E.A.*)

engineer, B.E.A.) said that experience with voltage transformers on the 132 kV grid system in Great Britain had not been satisfactory, owing to the failure between layers. After 10 to 15 years, the cylindrical bushing type was being gradually replaced by a magnetic type transformer. He went on to say that the tendency in protective gear on high voltage systems in Great Britain was to make the gear as far as possible independent of the voltage supplies, thereby simplifying the arrangements and increasing the reliability. Mr. Nordell gave further figures showing the high degree of reliability found on the Swedish system. The prominent position occupied in the protective gear world by Great Britain was acknowledged by the gathering generally; the number of correct fault clearance operations (as a proportion of the total number of faults) is of the order of well over 90 per cent. in Great Britain—something which the Continental engineers found to be generally in excess of their own achievements in this direction. Mr. J. G. Wellings (B.T-H.) also contributed to this part of the discussion.

A second paper by Mr. G. Jancke (Swedish State Power Board) dealt with high speed reclosing, giving results of tests at 220 and 132 kV on the Swedish networks. The paper stated that this form of re-closing was an inexpensive and effective method of increasing the reliability of operation of radial networks of low and medium pressure, and suggested that about 82 per cent. of the line faults were eliminated by high-speed re-closing. The minimum dead time should be 0.2 of a sec.

Mr. J. M. Ferguson (English Electric Co.) said that in tests carried out at the Nelson Research Laboratory it had been reassuring to find that 0.15 sec. after the arc, the ironised gases had reached satisfactory distances from the contacts. In the case of air-blast circuit-breakers he was glad to be able to bear out the conclusions given in the papers.

The conference moved on to the discussion of earthing and here the principal report was that given by Mr. C. W. Marshall (deputy chief engineer (Research), B.E.A.). His paper gave a complete description of the reasons leading up to the multiple direct neutral earth system on the British 132 kV grid, and pointed out that it was adopted because it was the most economical in capital costs. The selective clearance of fault elements was satisfactory. It was acceptable to the British telecommunications authorities as being less liable to interfere with their services, and it was less likely to be subject to surge voltages of internal origin. The considerations leading to this decision had been shown after some 16 years of service to be as valid now as they were then. He was able also to say that in the lower voltage sections of the grid, Petersen coil neutral earthing was used, with generally good results. The British Electricity Authority gave close consideration to each individual case in order to review the possibility of improving the performance by the use of these coils.

A small group of miscellaneous papers taken late in the afternoon of Saturday included the report of the committee studying reactive and distortional phenomena, as well as an interesting paper by Dr. J. Kopeliowitch (Palestine Electric Corporation) giving an enormous amount of statistics relating to the development of electricity production in the countries of the world. He drew conclusions as to methods of predicting the growth in a particular set of circumstances, together with other suggestions on the size of turbo-alternator units and the use of interconnection on a large scale between systems having different load characteristics, to increase the plant utilisation time. Here, water power stations and thermal stations were shown in

the report to act as valuable complements, one to the other.

There was also a paper by Mr. Abdel Aziz Ahmed (chairman and chief engineer, State Hydro-Electric Power Commission of Egypt) dealing at some length with the hydro-electric schemes in the Nile Valley, including the Aswan Dam now under construction.

The next day, June 27, proved a welcome relief from the concentration necessary for the varied subjects dealt with in the conference room. Excursions were organised to Caen and the landing beaches, and to the chateaux of the Loire.

HIGH FREQUENCY CURRENTS

On resumption of work in the Conference Hall on June 28, two groups of papers were dealt with, covering, in general, high frequency currents in relation to power networks. The first group on high frequency telecommunications showed that the use of carrier currents on the French h.t. network is very widespread, and M. Paimboeuf (chief operating engineer, Electricité de France) mentioned in his paper that in the constant desire to increase the number of linkages of this type they had now reached a limiting state, where the number of frequencies available, and the channels that could be used, had all been taken up. It was suggested that the solution would be in the use of amplitude modulation, and of the very highest degree of stabilisation of frequencies by means of quartz filters, with circuits of the highest quality. Asked in the discussion how much testing was required to ensure the reliability of these circuits, another French delegate, M. Chevallier, stated that they had difficulty in obtaining the right type of staff for this work. Some tests were made each day, others each week, and in general, apparatus was checked twice a year. He said that Electricité de France has set up a special school for training staff in h.f. communication work in conjunction with power lines.

INTERFERENCE

The second group of papers dealt with telephonic and radio interference. Here, M. Henriot, speaking on the subject of transpositions used on power lines, said that they considered one complete transposition in any circuit was adequate. Mr. C. W. Marshall (Great Britain), chairman of the International Studio Committee on Telephonic and Radio Interference, said that from the replies the committee received from all parts of the world it seemed that the subject was (to quote the words of the report) "in a low category of practical importance." The British grid system had been built in strict confirmation with the C.C.I.F. suggestions as to transpositions, and the power engineers complained that they formed an awkward and expensive obstacle to maintenance work. They had taken out the majority of the transpositions and since this change, in 1939, there had been no evidence of any trouble arising therefrom. He suggested, therefore, that the C.C.I.F. should modify its recommendations in this respect.

Dealing with another point raised by Dr. E. K. Saraoja (Finland), in a paper on the grounding of telephone lines at high voltage transmission line crossings, Mr. Marshall went on to say that the danger of breakage of power conductors was a slight one. The h.t. engineer must employ the highest possible factors of safety. He supported the conclusion reached by Dr. Saraoja that the cable would not be a sufficient safeguard at crossings with 110 kV lines, since the earth resistivity was, in general, high enough to result in a cable sheath potential which might even exceed 10 kV under the worst conditions, and the scheme would thus lead to a breakdown in the cable.

POWER STATION VISITS

The afternoon of June 28 provided opportunities for members to visit one or other of two of the principal power stations in the Paris region. These were the Centrales, known as the Arrighi plant situated at Vitry Sud, and the Saint Denis No. 2 station. At Arrighi the delegates were first given a summary of the station's characteristics by the aid of large diagrams, and were then conducted to every part of the plant by M. Bouvattier, chief of generating plant for the Paris region. He proved himself extremely helpful and gave much detailed information to the many engineers present. The station comprises four turbo-alternators of 55 000 kW each, constructed by Alsthom. The general layout was first conceived in 1927, the first section was in operation in 1931, and the second half a year later. The station is so designed that it can be completely doubled in size. It has a neatness and efficiency of layout which would bear every possible comparison with the stations being laid out in Great Britain at the present time.

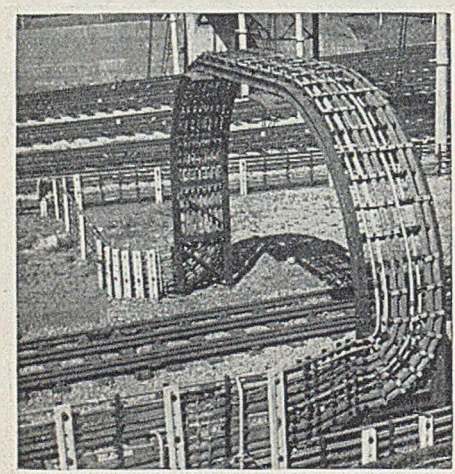
The general assembly of the permanent members was also held in the afternoon, and later in the evening a reception and soirée was given by the French National Committee of C.I.G.R.E. M. Francis Poulenc, possibly the most distinguished French musician of our time, accompanied M. Pierre Bernac in some songs of his own composition.

(To be continued)

Cable Bridge Construction

SOME PROBLEMS IN DESIGN

ONE of the major problems in the recent extensions of the surface lines of London Transport concerns the supply of electric power and the signalling for close headway working, which necessitates the provision of numerous cable runs. As many of these extensions are on, or adjoin existing lines previously worked by



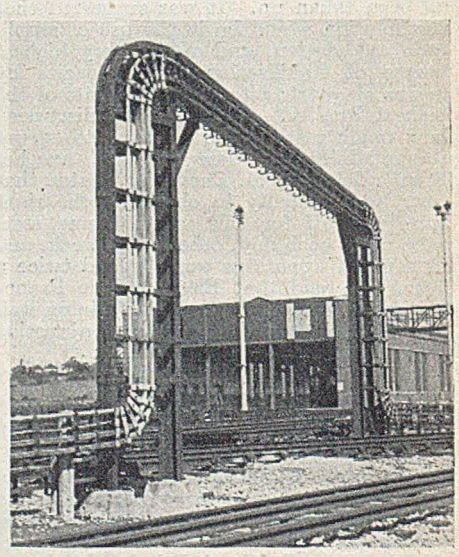
Bridge crossing two tracks for 8-ways of signal cables at Newbury Park

steam, such runs have frequently to cross the tracks, particularly at junctions, in depôts and at station goods yards. To facilitate accessibility for maintenance, overhead cable crossings are preferable to the underground type.

The cables are hung from brackets suspended on posts on one or both sides of the line. They are 4 ft. apart, and while the larger cables span between the posts, the smaller ones require support at 2 ft. centres. This is achieved by utilising an intermediate bracket designed to hang on the compressed air supply main, which is a 1½ in. dia. galvanised pipe and always occupies the top way of the post brackets. The signal cables (⅝ in dia.) are laid together, up to a maximum of 21 in one way; while the larger cables for traction current (2⅜ in. dia.), and for h.t. transmission (up to 3½ in. dia.) are supported singly.

Four of the main requirements of a cable bridge are: (1) that the base connects with the post runs, so that some cables may pass by the bridge while others run on to it with smooth curves in a regular manner; (2) the relative position of the cables does not change in passing over the bridge; (3) the signal cables laid together on one way must remain in the same relative position without reversal, the cable laid first at the bottom remaining there when it has crossed the bridge; (4) cables are not bent to a radius sharper than that specified for each kind.

The ideal structure would, therefore, consist largely of a series of curves, but the resulting forces and moments could not economically be provided for in such a design. Moreover, where a walk-way is required, provision must be made for a man to walk or climb with his body erect. To achieve structural simplicity and economy in material, a beam or light lattice girder in vertical columns is the solution, but the cables cannot make a sharp turn between the columns and the beam, nor at the foot of the columns. For appearance, projections beyond the sweep of the cables should be avoided. Difficulties associated with appearance where a double span is needed—sometimes unequal



Bridge for 8-ways of signal cables at entrance of Hainault depot

in length or in the number of cables carried—can often be overcome by the provision of two separate bridges of similar outline but of a different width.

Telecommunication Research

Inspection of the Dollis Hill Establishment of the Post Office

THE Post Office Research Station at Dollis Hill held an "open day" on July 1, the first since 1937. The history of this establishment goes back to 1878, when the earliest experimental work in connection with the Post Office telephone and telegraph services was recorded. Twenty-six years elapsed, however, before one or two members of the Engineering Department were relieved of their administrative duties to enable them to pursue investigations of a purely experimental nature in a room specially set aside in the Central Telegraph office. Five years later—in 1909—the Research Section was recognised as a separate entity and was allotted additional laboratories in a nearby building. After the 1914/18 war, expansion of the Research Section was accelerated and an eight-acre site at Dollis Hill, seven miles away in north-west London, was acquired.

The present buildings were not finally opened until 1933, although the work was transferred from Central London in 1921, when accommodation took the form of ex-army huts. Right up to the beginning of the last war, the activities of the Research Station expanded steadily, but during the war they were diverted almost entirely to military applications.

The present period is devoted to catching up with arrears of normal development, and the time is thus convenient for reviewing some of the principal activities at Dollis Hill. The staff at the establishment number nearly 900, of whom approximately one-third are qualified engineers or scientists.

The principal activities and functions are directed especially towards improved and economical working of the telecommunication services of the Post Office, where there is wide scope for the application and development of physical science. The Post Office maintains close links with the principal manufacturers of telecommunication equipment by exchanging and co-ordinating information.

The modern method for long land-line telephone routes is to concentrate a number of conversations in a single pair of conductors, the conversations being separated on the route by using for each a different band of the frequency spectrum. Thus, the traffic capacity of a route is determined by the total band-width of frequencies it can carry, rather than by the number of conductors it contains. With wide-band amplifiers (or "repeaters") placed at intervals of about six miles on a modern co-axial (or concentric) type of cable, two co-axial tubes can carry over 600 separate conversations simultaneously. This technique of wide band transmission is being still further developed for the transmission of television to programme centres at different parts of the country. Short lengths of wires in ordinary telephone cabling can be "equalised" for carrying television signals locally, but for long-distance line transmission of television, the newer types of cable are essential.

By means of frequency separation, several telegraph transmissions can be sent simultaneously over a single telephone circuit independently of whether the telephone circuit is on a radio link, a co-axial cable, or by normal transmission over a pair of wires.

The Research Station has played a leading part in the development of semi-automatic means of switching long-distance telephone circuits. These enable the trunk operator at the calling-end to actuate switches by dialling over the long-distance line and thus, avoid any delay which might arise from the operator being dependent upon assistance of other operators at remote exchanges. The methods of dialling which are used in local areas could not be extended to the long-distance lines, and a system had to be worked out in which all the signals could be transmitted by currents in the speech frequency range, without mutual interference between speech and signals. This system is now working on more than 3 000 British long-distance circuits.

With regard to telephone circuits by submarine cable, a substantial advance has been made by the insertion of submerged repeaters, which make possible an increased number of simultaneous conversations. One constructed in 1943 for the Holyhead-Isle of Man cable was, it is believed, the first submerged repeater to be inserted in a working telephone cable anywhere in the world. The scheme is being developed to enable several repeaters to operate along a submarine cable, with facilities for testing and supplying power to each from the shore ends. Details of one of the principal cables exhibited at Dollis Hill were given in THE ELECTRICIAN of December 12, 1947, p. 1713, with respect to the Anglo-Dutch cable.

Long distance, short-wave radio links have been greatly improved by the use of

single-sideband radio transmitters and receivers. On the Trans-Atlantic link reception from the U.S.A. has been increased in efficiency by the employment of special receivers and an aerial system, two miles long, installed at the radio station at Cooling (Kent). This equipment separates the mutually interfering waves by which the signals arrive after successive reflections from ionised layers in the upper atmosphere, and so reduces the effects of distortion and noise. During last week's visit to Dollis Hill, actual transmission from the U.S.A. to Cooling was received, via a land-line from Cooling.

The Post Office is the department responsible for control and regulation of radio communication, and the applications of piezo-electric quartz crystal vibrators have been studied since 1925 for frequency control of radio transmitters and for frequency measurement. Dollis Hill has, incidentally, provided quartz clocks, the most accurate time-keepers now known, to the Royal Observatory.

The techniques for acoustical measurement have been developed much more recently than their electrical counterparts. The Research Station has standardised equipment for the measurement of sound pressures at any desired point, in the open or in a confined space, so that objective measurement of the performance of telephone instruments of any type can be made in conditions appropriate to this use. Recording of sound is studied for special applications. Two techniques were demonstrated during the visit last week, based on the use of sound tracks on glass discs and lacquer-coated metal discs. A non-reverberatory room, also seen last week, was of outstanding interest, and it is believed that there is only one other of its type in the world, namely, in the U.S.A. The room resembles a padded cell, the walls, ceiling and floor being lined with sacks of glass fibre, and reminded one of the domestic heat testing chambers at the Fuel Research Station and referred to below. In both cases the floors had of necessity to be covered with iron grilles which were the only unsymmetrical features of the designs.

Domestic Heating Research

THE Fuel Research Station of the D.S.I.R. in Blackwall Lane, Greenwich, was open to visitors last week, when the calorimeter building was inspected. Sir Edward Appleton, secretary of the Department, acted as host.

The calorimeter building consists essentially of four cubicles, each about the same size as the living room of a small dwelling, with other rooms for housing the apparatus necessary for carrying out tests. The establishment is primarily of interest to manufacturers of solid fuel appliances, but it contains a considerable amount of electrical equipment, including American thermo-couple recording potentiometers.

As Sir Edward Appleton explained, the purpose of the calorimeter rooms is to enable one to find out accurately how much heat is produced by domestic solid fuel heating appliances and where it all goes. The walls, ceiling and floor are of copper-covered plywood, the floor being over laid with an iron grating which will withstand a maximum working load of 50 lb. per sq. ft. The rooms are air-tight with specially balanced draught arrangements for eliminating leakage. The copper sheeting on the inside and outside of the plywood is divided into separate sections, each 2 ft. × 1 ft. 6 in., and at the midpoint of each is embedded a differential thermo-couple, so that the temperature difference across the walls, floor and ceiling can be measured and recorded electrically. The rate at which heat flows through the plywood can be determined from a knowledge of its thermal conductivity and the temperature difference between the inner and outer surfaces. The thermo-couple wiring system is arranged in such a way that the heat flow can be measured through any of the individual sections, or any group of sections, such as a complete wall. The material of the walls was selected to give as low a heat capacity as possible, consistent with suitable thermal conductivity and mechanical strength.

The whole of the air entering the cabinet is controlled automatically in such a way that the pressure is the same inside and outside. The appliance then operates under conditions of natural draught, and risk of leakage is reduced to a minimum. The rate of air flow into the cabinet is automatically recorded.

For summer-time use and for appliances of high heat output, cooling is provided by a refrigeration plant, which feeds cooling batteries in ducts leading from the input fans in two of the chambers. The air can thus be chilled when it passes through the fan ducts.

Fluorescent Lighting

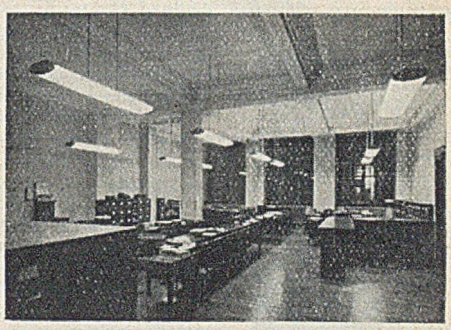
New Lamp Sizes and Colours Demonstrated at Brighton

RECENT developments in fluorescent tubes and fittings were introduced to a gathering of sub-area managers, engineers and commercial assistants in the South-Eastern Electricity Board's area at Brighton on Tuesday, July 6, when addresses were given by Dr. J. W. Strange and Dr. H. H. Ballin of Thorn Electrical Industries, Ltd. Mr. C. Boyles, purchasing officer to the South-Eastern Electricity Board, presided.

Dr. Strange, who is director of research for the company, dealt briefly with the fundamentals of lamp design, covering sizes, loading and relative efficiencies; lamp circuits, with particular reference to quick starting; and colour. He said that while he would choose the 4 ft. 40 W lamp as the most efficient type, yet because of the high initial cost the 5 ft. 80 W lamp with a higher light output and lower efficiency sold more readily in this country. He demonstrated the new 40 W 2 ft. " Atlas " tube, which is used in pairs, each pair having one set of control gear. Starting is achieved by an " Atlas " " Quickstart " unit operating both tubes and making possible immediate striking without reduction in tube life. Dr. Strange said that while it was possible to run this short 40 W tube singly it was not economical to do so, and in most cases the 3 ft. 30 W lamp would be a better proposition. The short 40 W lamp had shown itself particularly applicable to d.c. areas. It was much more ready to start because of the short length and relatively wide tube, and he thought they could look forward to some very interesting applications in d.c. areas.

Dr. Strange referred to the importance of the question of loading in relation to efficiency and lumen maintenance. With the new powders, he said, they could have relatively high loading with better maintenance figures and longer lamp life up to 10 000 hours.

Discussing the question of deciding what lamp colours were suitable for special purposes, Dr. Strange demonstrated the effect of fluorescent lighting and incandescent lighting separately and in combination on coloured materials. Experiments in collaboration with a well-known painter had shown, he said, that for a studio a cold light of not less than 6 500° K. colour temperature was desirable. This also proved a very useful colour for printing works and so on, and as a result the company had introduced recently the " Atlas " " Northlight " tube. The standard " Atlas " " daylight " tube had a colour temperature of 4 500° K, which had become increasingly popular for offices and stores. Another new " Atlas " lamp demonstrated was the " Peach " tube, with its warm, yellowish tinge, which Dr. Strange said was particularly suitable for domestic surroundings, for restaurants and shops where food is displayed and for omnibuses and coaches.



A fluorescent lighting installation at the offices of the American Foreign Insurance Association, Moorgate, using an "Atlas" FM/2080 unit

In reply to questions, Dr. Strange said that a circular fluorescent tube might be very attractive for decorative purposes, but it would give a lot of trouble to produce and would be very expensive. He did not think there was any getting away from the bulky nature of the fluorescent street-lighting fitting; a fairly extensive light source seemed inevitable. Except under very severe conditions combining low temperature with high humidity, there was not, in tests he had carried out, any tendency to fail to maintain the arc in the fluorescent tube.

Dr. Ballin gave a survey of the progress made in fitting design, and different types of fluorescent lighting installations were illustrated by lantern slides. Examples of continuous lines of fittings with ribbed " Perspex " covers for industrial use and also for departmental stores were given to indicate the trend of lighting practice. A new industrial local lighting unit, using a 30 ft. 30 W tube, was displayed.

Dr. Ballin suggested that there should be a testing house for fluorescent lamps and fittings on similar lines to that set up by the E.D.A. for appliances, and that the B.E.A. might set up a clearing house between the manufacturers and the ultimate users.

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. T. E. GOLDUP celebrated his 25th anniversary with the Mullard Company on July 2. From an Admiralty Research Establishment, Mr. Goldup was appointed to the technical department of the Mullard Radio Valve Co., Ltd., on July 2, 1923, in charge of the manufacture of silica and Government valves. Later he was made technical assistant to the works manager. In 1928 Mr. Goldup was transferred to the head office to run the technical service department and to set up the valve replacement department. In 1938 he was made a director of Radio Transmission Equipment, Ltd., and in 1940 he became a director of the Mullard Radio Valve Co. Mr. Goldup has been a prominent member of the I.E.E. for many years, and was chairman of the Radio Section during its jubilee year. In 1948 he was elected to the Council of the institution. He is also a member of the City and Guilds Institute Advisory Committee on Telecommunications Engineering, the Education and Training Committee of the I.E.E., and the Advisory Board of Governors of the Norwood Technical Institute.

MR. T. E. GOLDUP

SIR JOSEPH NAPIER has been elected vice-chairman of the General Cable Manufacturing Co., Ltd.

MR. J. H. PATERSON has been elected president of the Institute of Welding and Mr. O. V. S. Bulleid has been chosen to fill the office of vice-president.

MR. E. ROYDEN ALLTREE, joint managing director of Hugh Stevenson and Sons, Ltd., has been appointed a director of Oldham and Sons, Ltd.

MR. H. O. MAYFIELD, assistant substations superintendent with the Southern Electricity Board, has been appointed to the secretariat of the Electrical Power Engineers' Association as assistant secretary, London and South-Eastern area. Educated at Melton Mowbray Grammar School, he spent seven years with the Metropolitan-Vickers Electrical Co., Ltd., after technical training. In 1931 he joined the sub-stations department of the Metropolitan Electric Supply Co.

MR. J. HACKING, deputy chairman of the British Electricity Authority, has been appointed a member of the Scientific Advisory Council set up by the Minister of Fuel and Power to advise him on the scientific aspect of his statutory duties, and new scientific knowledge and developments in relation to fuel and power, and to keep the whole field of fuel and power under continuous review with the object of identifying problems needing scientific investigation.

MR. K. N. SWASH, of Brookhirst Switchgear, Ltd., relinquishes his position as Leeds office manager on being appointed chief engineer to the company. Mr. Swash will be succeeded at Leeds by Mr. H. R. Renfree, who moves from the Manchester office, where he was assistant to Mr. F. A. Leonard.

MR. W. A. BOUCHER, managing director of Spedding, Ltd., Auckland, New Zealand, who is on a world tour, has arrived in England by air and will be

MR. C. B. COLSTON, *managing director of Hoover, Ltd. (right), presenting the silver championship cup to* MR. S. T. ASTRIDGE, *of Moulds, Ltd., winners of the Hoover national window dressing competition, at the Savoy Hotel, London, on June 30. In the centre is* MR. R. G. MOULD, *managing director of Moulds, Ltd. The prize-winners were given in our last issue*

pleased to see representatives of responsible British manufacturers who are anxious to establish their products on the New Zealand market. Communications should be addressed to Mr. Boucher, care of the Bank of New Zealand, 1, Queen Victoria Street, London, E.C.4.

Reproduced on this page is a photo-

Presentation of Brico golf and bowls trophies

graph of the presentation of trophies following the golf and bowls competitions, which formed part of the annual gathering of sales representatives of the Brico group at Coventry last week. Seen in the photograph are: Messrs. A. W. Blunt, managing director, Bricovmo, Ltd.; E. Carpenter, director, British Piston Ring Co., and Bricovmo, Ltd.; H. F. Smith (winner of bowls trophy) and A. R. Fraser (winner of golf trophy), British Aero Components, Ltd.; V. W. Oubridge, managing director, British Piston Ring Co., Ltd. (making the presentation); and A. N. Harley, director, British Aero Components, Ltd.

MR. BASIL CADBURY-JONES has been appointed London manager of British Driver-Harris Co., Ltd. He will operate from 413, Bank Chambers, 329, High Holborn, London, W.C.1.

SIR WILLIAM A. STAINER, F.R.S., Sir Charles F. Goodeve, F.R.S., Dr. H. L. Guy, F.R.S., Sir Thomas Merton, F.R.S., and Mr. R. A. Riddles were invited by the British Transport Commission in February last, to examine and report on the arrangements for conducting research in the railway and other undertakings vested in the British Transport Commission, and to make suggestions for the organisation of such work in future. The Committee is at present engaged in examining the existing research facilities of the various undertakings controlled by the Commission.

MR. T. GLOSTER-DOWNING, chairman and managing director of Oral (Great Britain), Ltd., and his son, Mr. Vivian Gloster-Downing, a director of the same company, have just returned to England from a survey of the world's markets, during which they covered a distance of more than 250 000 miles by air since June, 1946. Their purpose was to appoint some eighty regional managers, or sales managers, on behalf of their company, which acts as export managers for British manufacturers. Mr. T. Gloster-Downing was formerly in the British Consular Service.

Obituary

MR. EDWARD PHILLIPS, principal of Edgar Phillips, Ltd., electrical engineers, and installation contractors, West Hartlepool and Wingate, aged 65 years.

Electrical Statistics

DURING May, authorised electricity undertakings consumed 498 000 tons of coal as against 537 000 tons in April, and 449 000 tons in May last year. Stocks held by those undertakings at the end of May amounted to 3 589 000 tons, compared with 3 484 000 tons in the previous month, and 2 485 000 tons in May last year. The quantity of electricity generated fell from 3 744 000 000 kWh in April to 3 482 000 000 kWh in May. The figure for May, 1947, was 3 092 000 000 kWh.

The Monthly Digest of Statistics for June also shows that in January and February rotating electrical machines of 1 250 H.P., of the value of £3 157 000 were delivered, of which machines of the value of £517 000 were for export. Fractional horse power motors of £1 140 000 value were delivered and those for export were worth £159 000. During April accumulators to the value of £1 129 000 were produced, and those for export were valued at £346 000.

For January and February the monthly average production of electric fires was 46.2 thousands, of which 33.4 thousands were for the home civilian market; electric irons, 159 thousands, of which 106.2 thousands were for the home market; vacuum cleaners, 52.1 thousands, of which 40.6 thousands were for the home market; electric kettles, 44.8 thousands, of which 34.2 thousands were for the home market.

Classed as building components, the number of electric cookers produced in May was 15.1 thousands, contrasted with 21.2 thousands in the previous month and 18.5 thousands in May, 1947; electric wash-boilers, 6.4 thousands against 7.3 thousands in April and 13.1 thousands in May last year; electric immersion heaters, 17.8 thousands, compared with 15.2 thousands in April and 26.5 thousands in May, 1947.

Electrical Industry in Turkey

QUALITY DISCLOSURE IN ECONOMIC SURVEY

THAT Turkish safety standards are low, that British goods cannot compete with cheaper foreign products, and that for many electrical goods quality is a secondary consideration, are among the disclosures in an Economic Survey of Turkey, now available from the Stationery Office.

PREFERENCE FOR BRITISH GOODS

British machinery is in general preferred, but price counts in the market for light machinery. The value of U.K. exports of electrical goods and apparatus to Turkey in 1947 was £663 000. The elimination of Germany from the Turkish import market, states the report, has left a gap which is being filled by the U.S. and the U.K., but the amount that can be purchased from America is limited by dollar resources. Turkey holds a sterling balance of £17 million, and if her export production develops as it should, she should be able to pay without difficulty for larger imports from Britain for some years to come. This market includes electrical goods and telephone and telegraph material.

A good market exists for vacuum cleaners, thermostatically-controlled irons, toasters, small fires (not exceeding 1 kW), portable boiling plates, fans, refrigerators, fluorescent lighting, small motors, and many British manufacturers of these products have already established agencies in Istanbul. There is no market for electric washing machines, immersion heaters or office telephones. Turkish safety standards being lower, the Turks use components and wiring chiefly obtained from Italy at about one-third the price of corresponding British products. The import of radio receivers, prohibited during the war, is now permitted, but, it is stated, the market is still understocked, and British receivers are only arriving in small quantities. Diesel-driven generating sets of 50 to 250 H.P. are used in provincial towns for generating electricity supply. Smaller sets are also used in mills and factories for the same purpose. Generating sets are mostly of the vertical high-speed direct-coupled to generator type, supplied by continental makers. Since the war Danish makers have made their presence felt, securing one or two contracts.

Recent developments in posts, telegraphs and telephones, include an increase in post offices in Turkey from 1 329 in 1938 to 1 341 in 1944 (latest figure available). Telephone subscribers increased from 19 900 in 1938 to 29 300 in 1946, and radio licences from 46 200 to 183 000. In 1946, the P.T.T. awarded a contract valued at £480 000 to the G.E.C. for a multi-channel line trunk telegraph and telephone system, and in the same year a further contract valued at £312 500 was placed with Standard Telephones and Cables, Ltd., for radio telegraph and telephone installations in Ankara and Istanbul. More recently, the P.T.T. have ordered 30 railway postal vans for dealing with mail en route from Czechoslovakia, at a total cost of £290 000; 2 000 tons of cable from the W. T. Henley's Telegraph Works Co., Ltd., value £258 000, and telephone equipment from France, value £43 750. Developments in broadcasting include contracts placed with the R.C.A. (U.S.A.) for a 150 kW medium-wave transmitter to be erected at Istanbul, and another contract valued at £191 000 for a 100 kW plant for Ankara, to Marconi's W. T. Co., Ltd. Delays in deliveries make it unlikely, it is added, that these will be in operation before the end of 1948.

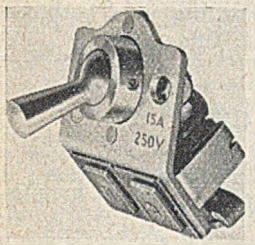
POWER PLANT EXTENSIONS

In regard to electric power, the survey shows the following power plants as being in process of construction or projected:—Catalagzi: 60 000 kW, source of power, coal, under construction by the Metropolitan-Vickers Electrical Co., Ltd., should be in operation this year; Tuncbilek (near Tavsani): 60 000 kW, source of power, lignite, definite funds to be allocated in near future; Saniyer (100 km. west of Ankara): 75 000 kW, source of power, hydro-electric, no further details available; Caglayik (near Eskisehir): 60 000 kW, source of power, water, plans being prepared by Swedish firm; Silikdar (on the Golden Horn): capacity not known, source of power, coal. Plant already working, but coal-handling equipment valued at £50 000 to be installed; Daphne (near Harbiye): 70 000 kW, source of power, water, the Vali of Antioch is interested in reviving this project which has laid dormant for years, finance of project unknown; Kadincik (near Adana): 18 000 kW, source of power, water, project in abeyance until financing of scheme decided upon.

Equipment and Appliances

15A 250V Switch

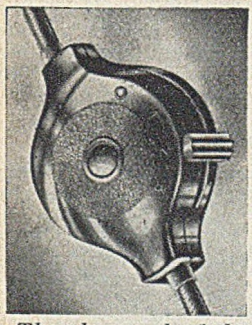
For use with electric fires, washing machines and similar appliances, the AF-1 switch manufactured by A.B. Metal Products, Ltd., Great South West Road, Feltham, has an overall depth, including maximum sweep of contacts, of only 1¾ in., measuring ⅝ in. forward from the escutcheon plate and 1 in. back; width is 1½ in. The small size of the switch, which is rated at 15 A, 250 V, is said to be due to the high conductivity of the beryllium copper contacts and to the quick make-and-break action. All visible metal parts are plated and the switch is mica-insulated throughout.



Switch suitable for electric fires

Three-Heat Cord Switch

Electrothermal Engineering, Ltd., have gone into production with a new three-heat cord switch for controlling the current input to electric pads, blankets, bed-warmers, irons and similar appliances. Of neat design, this switch has one "off" position, while its three positive-action positions for varying the degree of temperature are indicated by raised figures. The case is manufactured in brown moulded material, or can be supplied in other colours to order; there are cord grips at each end. Rated at 2 A, 250 V, it is designed for single or double-pole operation in series or parallel.

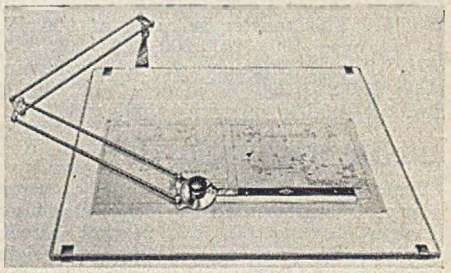

Three-heat cord switch, weight 1½ ozs.

Flexible Conduit Tubing

For protection of flexible leads to electric motors and machine tools, trailing cables, and so on, the conduit tubing manufactured by Metway Electrical Industries, Ltd., King Street, Brighton, is composed of heavy quality p.v.c. sheathing, reinforced with inner and outer spirals of galvanised mild steel wire. Brass wire spirals are recommended for tropical climates. Polyvinyl chloride is notably inert and resists the action of most acids and alkalis at normal temperatures. It is unaffected by oils, petrol and most organic solvents and is highly resistant to burning under normal conditions. Insulation between the inner and outer spirals of wire is enough to stand 2 500 V a.c. before breakdown. The tubing includes metal inserts at each end and a pair of brass adaptors. It is sold in specified lengths with the adaptors, or to customers' requirements without the adaptors. Maximum length of coil is about 36 yds.; various bore sizes are available.

Drafting Machine

For use with an Imperial size board, Mavitta Drafting Machines, Ltd., Highlands Road, Shirley, near Birmingham, have produced the "Minor" unit, finished in enamel and chromium plate. The machine is made of steel tube and cast aluminium alloy and weighs 2½ lbs. All moving parts are fitted with plain bearings; there is one scale which will rotate through 180°. For left-handed use the arms and scale can be reversed.


The "Minor" drafting machine

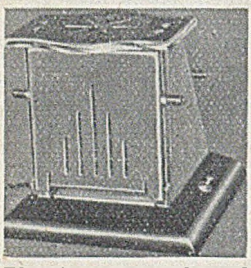
Electric Hair Dryer

Encased in ivory or walnut Bakelite, the "Sylentflo" hand hair dryer, manufactured by Fractional H.P. Motors, Ltd., West Heath Works, Rookery Way, London, N.W.9, has a shaped handle and two thumb switches, rated at 4 A each. The dryer is driven by a 40 W shaded pole induction motor, with impregnated coils bound with silk tape and fitting into the hub. The fan is an aluminium pressing in two parts, each with 36 blades, forming a turbine wheel. The air heater

within the exit spout is rated at 360 W and is mica-wound. A separate earthing conductor bonds all internal metal parts. Units can be supplied for 200/220 and 230/250 V.

Electric Toaster

With black moulded Bakelite base and sides chromium-plated on copper or vitreous-enamelled in green or cream, the electric toaster now produced by the Electric Appliance Manufacturing Co., Ltd., 345, Green Lanes, London, N. 4, incorporates doors which automatically turn the toast when opened, a large top-plate and a toggle switch in the base, or a three-pin, non-reversible, Bakelite flexible cord coupler on models for under 200 V. The toaster is rated at 600 W, at voltages 100/120, 200/220, 230/250, or to order. Three-core 23/36 flex is supplied for 200/250 V models, and 40/36 flex for models operating under 200 V.



Electric toaster with toggle switch in base

Electric Water Heater

The "Harbrix" "instant" water heater, manufactured by the Dominion Electric Heating Co., 23, Market Street, Birkenhead, for wall fixture, weighs approximately 9 lbs. and measures 8 in. by 5¼ in. by 4½ in. Standard models are supplied for 200/210, 220/230, 240/250, and 105/115 V, and have a nominal loading of 5 kW. There is a combined water flow and current control switch and a front panel indicator, illuminated when current is being used. The two elements are of the immersion type, with cable entry at the back of the heater. For water outlet there is a swivel type swan neck pipe, chromium-plated and supplied in a standard size of 7 in., or in other sizes to order. A variable flow restrictor is fitted to adjust the pressure of the water supply at the point of installation.

Portable Radiant Heater

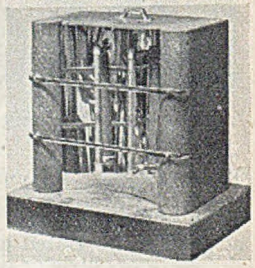
Designed to provide a gentle background warmth at a lower operating cost than an electric fire, the "Medrae" radiant portable heater, produced by the Dulrae Manufacturing Co., Ltd., 156, Great Portland Street, W.1, has a consumption of about 650 W and can be used from any 5 A point. The panels of the radiator are made from a material with asbestos-fibre base and are bonded under heat and pressure with thermo-setting phenolic resin, nickel-copper resistance wire being embedded during this process to form the heating element. The loading is 10S W per sq. ft., which gives, it is claimed, a low surface temperature of about 160° F. For use in a bathroom, for warmth and airing, a similar unit with a loading of 54 W may be fitted to the wall.

Conduit Pipe Clip

A new type of support clip to carry standard conduit tubing in sizes from ⅜ in. to 1 in. is now available from A. Robinson and Co., Ltd., of Liverpool, 20. A particular advantage of the clip, a sample of which has been sent us for examination, is that it requires one screw only for mounting. The saddle and cover strap are each components of an automatic lock which is completed by pressing the strap to the saddle by hand. The saddles are secured to the wall or base board by means of a single screw passing through a countersunk slot. An audible "click" is heard when the two parts are fully engaged, and the time taken for installation of a length of conduit is appreciably reduced. The clips, which are known as "Barclics," are manufactured from a non-corroding metal to B.S.S. 1 004, and are light and convenient to handle. They are made in varying forms to suit all standard requirements, and the specialised needs of hospitals, etc.; sizes outside those already available are to follow, say the makers.

Portable Electric Fire

The "Maple Leaf" portable electric fire, illustrated on this page, is designed by Brooks and Bohm, Ltd., 90, Victoria Street, London, S.W.1, and can be supplied for any voltage. There are two 1 kW elements, each with its own switch and backed by a large reflector; three-core flex is provided. The cabinet is finished in crackled green and gold, with handle and guard of chromium-plated brass, and is mounted on a steel platform 3½ in., with width, including stand, 19 in. and depth 12 in.



The "Maple Leaf" portable fire

Industrial Information

Electrical Imports for India

A list of additional articles to be freely licensed for import into India from sterling and soft currency countries has been issued by the Import Trade Controller at Bombay. The list includes tubes and rods for the manufacture of electric bulbs, bulbs for torches, domestic refrigerators and component parts of wireless reception instruments and apparatus.

Orders for Britain

The first buyers' delegation from British Columbia to visit this country, headed by the Hon. L. H. Eyres, Minister of Trade and Industry, which was entertained on its arrival by Benn Brothers, Ltd., proprietors of THE ELECTRICIAN, at a luncheon attended by manufacturers and exporters from various parts of the United Kingdom, has placed orders in Britain totalling 6 970 000 dollars.

Electrical Coaling Plant

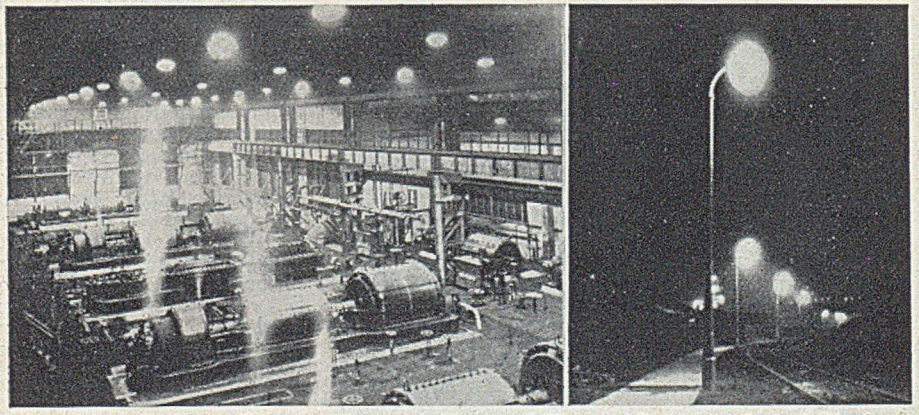
Contracts have been placed by British Railways, London Midland Region, for a new electrically-operated coaling plant, ash-disposal plants, a turntable, and other equipment in connection with the first stage of the modernisation of the motive power depôt at Crewe North. The contract for the coaling plant, which will be of the wagon-hoist type, with a reinforced concrete bunker of 200-ton cacapity, and capable of re-fuelling two locomotives with five tons of coal each in three minutes, has been placed with Henry Lees, Ltd.; the same firm will also supply two ash-disposal plants of the automatically-operated skip hoist type, with overhead reinforced concrete bunker of 25-tons capacity. An order for a turntable of 70 ft. diameter, with vacuum turning gear, has been placed with Cowans, Sheldon and Co., Ltd.

Electrical Exports to Spain

Following agreements reached between British and Spanish Government officials, Spain has agreed to grant import licences to a far greater extent than hitherto for United Kingdom scientific and precision instruments, telecommunication equipment, radio parts, Diesel engines and other goods. Further information regarding the additional import facilities now available maybe obtained from the Export Promotion Dept., Thames House North, Millbank, London, S.W.1.

Ammonia Works' Lighting

A number of replacements and additions were made recently to an extensive lighting installation at the ammonia works of Imperial Chemical Industries, Ltd., Billingham, for which the British Thomson-Houston Co., Ltd., had supplied the equipment earlier. At the same time, various tests were carried out, and these showed that the lanterns and fittings employed, both inside the works and in roadways, had successfully withstood the abnormal atmospheric conditions caused by various chemical processes. The original indoor installation in the compression plant section consisted of twenty-nine 400 W "Mazda" high-pressure mercury vapour lamps and twenty-two "Mazda" 500 W gas-filled lamps in enclosed dust-



Lighting installation at the ammonia works of Imperial Chemical Industries, Ltd, Billingham. Left: Compression plant section, lit with 400W mercury vapour lamps and 500W gas-filled lamps. Right: Road and rail lighting by "County" side-entry lanterns

tight concentrating reflectors, the latter being mounted at a height of 30 ft. above the working plane. To provide adequate road and rail lighting, 570 lanterns, specially designed for Imperial Chemical Industries, Ltd., on the pattern of the "Mazdalux" side-entry "County" lantern have been installed in the area surrounding the works.

Gift for Mother of "Quads"

Mrs. Good, mother of the Bristol "quads," has been presented with a Parnall "Wringlet" by the manufacturers, Parnall (Yate), Ltd. It is of the type fitted to several makes of electric washing machines.

Changes of Address

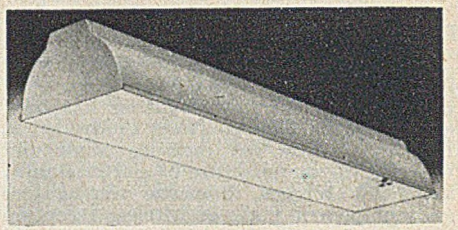
The address of the publicity department in London of British Insulated Callender's Cables, Ltd., is now 21, Bloomsbury Street, London, W.C.1. (Telephone: Museum 1600.) The London branch of the company, of which Mr. N. H. Miller is manager, has also moved to this address.

Annual Holidays

Erskine, Heap and Co., Ltd., announce that their Lancashire switchgear works at Salford, Manchester, 7, will close for the annual holidays on Friday evening, July 23, and re-open on Tuesday morning, August 3. No goods will be received or despatched during the holiday period, but a small staff will be in attendance to deal with urgent matters.

New Lighting Unit

Thorn Electrical Industries, Ltd., have added to their range of "Atlas" industrial equipment a local lighting unit constructed of heavy gauge steel and finished in high grade white stove enamel. The unit (No. FA/0030), which houses the "Atlas" 3 ft. 30 W fluorescent lamp, is only 4⅝ in. deep and 7½ in. wide, and all the control gear



New "Atlas" industrial local lighting unit, housing a 3 ft. 30W fluorescent lamp

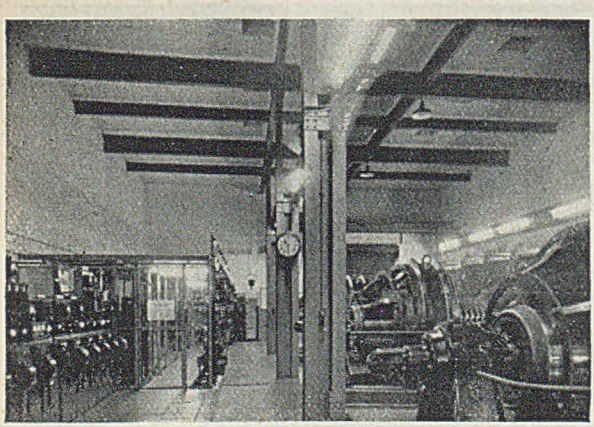
is incorporated in the body of the reflector.

Trade Agreement

Mullard Electronic Products, Ltd., Century House, Shaftesbury Avenue, London, W.C.2, have concluded an agreement with Hallicrafters, Inc., of Chicago, the amateur communications receiver and transmitter designers, whereby Mullards have the right to manufacture all Hallicrafter communication designs. In addition, Mullards will be responsible for the representation of Hallicrafters in the United Kingdom, Eire and Australasia. This supersedes the previous McElroy-Adams Hallicrafter arrangement. One of the first models that will be released under this arrangement is the Hallicrafter SX 42 communication receiver, which gives coverage from 0.5 to 110 Mc/s. with frequency modulated reception from 50 to 110 Mc/s. Inquiries should be addressed to the Communications Division of Mullard Electronic Products, Ltd.

Fluorescent Lighting in Sub-Station

The Southern Region, British Railways, has introduced an experimental fluorescent lighting installation at the Streatham sub-station — a windowless structure built to replace the original one, which was totally destroyed by enemy action. Thirty-eight fluorescent tubes are arranged to give a uniform illumination throughout the interior of the sub-station. The lamps are arranged to run off a 50-cycle supply of electricity, thus enabling standard equipment to be used. The sub-station is equipped with rotating machinery, but no stroboscopic effect has been noticed with the fluorescent lighting.



Fluorescent lighting installed recently at the Streatham sub-station, Southern Region, British Railways

Removal

Midland Distributors, Ltd., 67, St. Peters Street, St. Albans, announce the removal

of the company to Bowers House, Harpenden, Herts. (Telephone: Harpenden 118.) All communications should be addressed there.

Purchase Tax Concession

The Marconiphone Co., Ltd., announce that where a matching transformer is sold with a pick-up, but not as an integral part of the pick-up, it will no longer be subject to purchase tax.

Bulgarian Steamship Equipment

The Export Promotion Department of the Board of Trade have received an inquiry for the full equipment of a 1 000-ton passenger steamship, including two steam turbines, two turbo-dynamos, electric anchor windlasses, steering engines, electric loading windlasses and electric towing winches. The inquirer is M. Nickolai D. Vassileff, 2, Biruzovstreet, Sofia, Bulgaria.

Indian Wholesalers

The Export Promotion Department of the Board of Trade inform us that they have received a request from Fazalbhoy, Ltd., wholesale dealers in radio and electrical goods, 16, New Queen's Road, Bombay, 4, for catalogues, price lists and details of availability of various items of canteen, refrigeration and air conditioning equipment. The company was established in 1936 and is considered a suitable connection for United Kingdom firms. Manufacturers are asked to inform the Department, for record purposes, of any action taken.

Minister Visits Works

The Minister of Supply, Mr. G. R. Strauss, recently paid a visit to the Stag Lane Works, Kingsbury, N.W.9, of Delco-Remy and Hyatt, Ltd., inspecting ignition equipment and other automobile accessories, as well as electric motors and fans. At the end of his visit, the Minister addressed the workers over factory loud-speakers and complimented them on the work they were doing, especially in relation to exports.

Electric Reading Lamps

The revised B.S. No. 710 "Electric Reading Lamps," replaces B.S. 710 "An Electric Study and Reading Table Lamp," published in 1936. The new standard takes into account improvements in design since then and covers floor standards as well as table standards. It specifies the essential components, the dimensions and arrangement of the light-controlling device. Requirements are also given for the distribution of light flux and illumination given by the fitting and for its brightness, together with requirements for stability, electrical safety and robustness. Copies may be obtained from the British Standards Institution, 24, Victoria Street, S.W.1

Telephone Number Changed

Goodmans Industries, Ltd., Lancelot Road, Wembley, announce that their telephone number has just been changed to Wembley 1200 (8 lines).

Axial-Flow Turbine for Sugar Mills

The Brush Electrical Engineering Co., Ltd., have received an order from Umfolozi Co-operative Sugar Planters, Ltd., of South Africa, for a 2 500 kW turbo-alternator set for their sugar mills at Umfolozi. The set will comprise an axial-flow geared, multi-stage impulse, back-pressure steam turbine, with double helical totally enclosed force-lubricated reduction gear, and an alternator of the salient pole, duct-ventilated, single-bearing type, with half-coupling integral with the rotor shaft, the stator end shields and air shields being of fabricated steel. The set is to operate with steam at 150 lbs. per sq. in. and 520° F. at the turbine stop valve. The speeds of the turbine and alternator will be 8 000 r.p.m. and 1 500 r.p.m., respectively.

British-Benelux Business

For the purpose of discussing the establishment of business connections with the Benelux countries, a number of representatives of British firms met M. A. L. R. Marque, president of "Ofic"—Benelux, Brussels, at the Charing Cross Hotel, London, on Wednesday, June 29. M. Marque said that the "Ofic" organisation was formed in 1936 for the general promotion of trade, and a London Committee had been set up recently to promote trade between Great Britain and the Benelux countries. With that object in view a meeting would be held in London in September,

A consignment of fluorescent lamps for export about to be driven to London Docks from the central stores of Philips Electrical, Ltd., Waddon, Croydon

and representatives of British firms would be asked to talk to Belgian audiences about their products. He believed that the " Ofic " system of introductions could provide business connections that would be profitable in the future. He warned manufacturers that the Belgian market was not an easy one, but if they succeeded in obtaining a footing there they would open the way for exports to the rest of Western Europe, because the difficulties were the same. Unless they gave their agents full instructions, material for display and adequate support they could not hope to succeed.

World Power Conference

A new edition of the booklet " World Power Conference, 1948, National Committees and Representatives," has been published. Particulars are given of the national committees or national representatives in the 39 member-countries of the World Power Conference. Copies may be obtained from Mr. C. H. Gray, secretary, International Executive Council, World Power Conference, 201-2, Grand Buildings, Trafalgar Square, London, W.C.2.

X-Ray Equipment for Poland

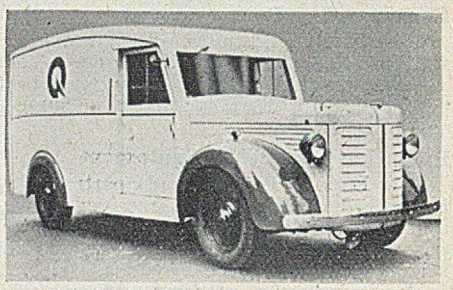
On Tuesday, July 6, £3 500 worth of X-ray and electro-medical apparatus from the General Sikorski Memorial Hospital Fund, was formally handed over to the Children's Clinic of Poznan University, Poland, at a ceremony held at the headquarters in London of Philips Electrical, Ltd., makers of the equipment. The Polish Ambassador, representing Poznan University, received an illuminated scroll commemorating the event. This was presented to him jointly by Mrs. E. d'A. Willis, and Major Rowland Sanders, trustees of the General Sikorski Memorial Hospital Fund.

Second Diesel-Electric Locomotive

The second Diesel-electric locomotive to be built for main line express duty on British Railways began its trials on Monday, July 5, at the Derby works of the London Midland Region, British Railways. After a short period of preliminary running, this 1 600 H.P. unit, No. 10 001, will be tried out in conjunction with its predecessor, No. 10 000, on the West Coast route express passenger trains between London and Glasgow, the two identical units being coupled together as one 3 200 H.P. locomotive. Comparative tests will be made between the performance of this twin Diesel-electric unit and that of the latest improved design of steam locomotive.

Electric Station Wagons

Q. Vehicles, Ltd., 6, Avonmore Road, Fulham, W.14, are, we understand, developing electrically-driven vans and station wagons for urban use. At the moment these are confined to small trucks and a vehicle of the shooting-brake type.



A " Q " electric vehicle

Powered by two batteries, it is claimed that each can complete a round trip of about 40 miles at an average speed of 20 m.p.h. The cost of recharging batteries, it is understood, amounts to one halfpenny a mile. Electric vehicles are not subject to purchase tax.

Waveguide Terminology

A glossary of terms used in waveguide technique, including many specialised words which were not dealt with in the 1943 edition of B.S. 204 (" Glossary of Terms Used in Telecommunication ") has been prepared by the British Standards Institution, with the object of standardising the nomenclature in this branch of telecommunication. The Standard (Supplement No. 1 (1948) to B.S. 204) may be obtained from the British Standards Institution, 24, Victoria Street, S.W.1, price 2s.

Calendar Cards

Calendar cards for July, August, and September, sent to us by Brookhirst Switchgear, Ltd., feature tinted photographs, mounted on a cream background, of their workpeople in the finishing shop and component assembly and coil-winding departments. Descriptions of the processes illustrated are given on the back of each card. Dates for the current month, together with those for the preceding and following months, are shown below the photographs.

Electric Transport Statistics

Statistics published by the British Transport Commission for the four weeks ending April 18 show that the total number of electrical staff employed on British Railways at the end of the period was 1 554, including three women; those employed by London Transport, rail and road, totalled 2 456, 876 of these, including four women, being concerned with generation, and the remainder with distri-

bution. British Railways rolling stock included 57 Diesel and Diesel-electric locomotives, compared with 48 the same date a year ago, and including one new unit built in the railway workshops during the four weeks; 4 053 electric passenger carriages, compared with 4 009 a year ago, and including 12 new units built in railway workshops during the four weeks, as against two withdrawn from service; and three electric non-passenger carrying coaches, showing no increase over the past year.

Engineering Society's Journal

The journal of the University College, London, Engineering Society for the session 1947-48, contains articles on "Engineering: Past and Present," by Prof. C. A. Hart, "The Development and Operation of Television Cameras," by S. J. Fricker, "The Investigation of Streamline Flow," by P. J. E. Stride, "Ignition Circuits in Aero Engines of the Piston Type," by R. E. D. Bishop, and "Inductive Co-ordination," by P. R. Robinson. Notes on old students and accounts of the society's activities during the year are also given.

Harwell Atomic Pile

The second and more powerful atomic pile, with a rated output of 6 000 kW, at Harwell, began operating at low power on Saturday, July 3. The Harwell pile has been designed primarily as an experimental tool, to provide as many facilities as possible without unduly complicating the engineering of the structure. When operating at rated output it should be able to produce all of the radioactive isotopes required in this country by medical and other research workers. The pile consists of several hundred tons of graphite blocks in which a large number of cylindrical rods of uranium are arranged in a regular lattice. These rods are enclosed in aluminium cans which lie in channels in the graphite. Cooling air is drawn through the channels by several large electrically-driven exhausters, to remove the heat released when the uranium atoms break down by fission. The operation of the pile is controlled by two sets of neutron-absorbing rods which can be pushed in and out of the pile. The first set of rods is adjusted to keep the pile operating at a constant power level; the second set is available to shut down the pile in any emergency, and is brought into action automatically.

Trade Publications Received

Illustrated leaflets (Ref. No. 5/48, 2/49 and 1/48) dealing with muffles, coils and d.c. solenoids, comes from Westool, Ltd., of St. Helen's, Auckland, Bishop Auckland, Co. Durham.

An interesting and profusely illustrated brochure dealing with expanded metal resistances comes from the Expanded Metal Co., Ltd., Burwood House, Caxton Street, London, S.W.1. The brochure covers industrial, marine and traction applications.

The April issue of "Technique," useful house organ published quarterly by Muirhead and Co., Ltd., electrical instrument makers, Beckenham, Kent, contains an interesting article on phonic motors and timing devices, and "Magslip" motors. Bulletin No. 610A, also received, deals with the standard transmission measuring set manufactured by this firm.

In Parliament

N. of Scotland Hydro-Electric Board.—The Board have issued to the National Debt Commissioners, under Treasury guarantee, £6 millions of North of Scotland Electricity 3 per cent. Guaranteed Stock, 1968-70, at par. The effect of this issue is to increase the outstanding capital of the Board to £11 million, the previous issue of £5 million North of Scotland Electricity 2½ per cent. Guaranteed Stock 1967-1972 having been made to the public in July, 1947. (Sir S. CRIPPS, Chancellor of the Exchequer.)

Employees' Pensions.—Replying to a question, Mr. A. Robens, Parliamentary Secretary to the Ministry of Fuel and Power, said that the regulations dealing with the pension rights of transferred employees (under Section 54 of the Electricity Act) were now being discussed with the trade unions and associations concerned. He could not say when these consultations were likely to be concluded, and had no evidence that the transfer of ownership of undertakings had been hindered because these regulations had not been issued.

Wire Shortage.—In a debate on the wire drawing industry, reference was made to the thousands of drums of cable lying in store awaiting the necessary sheathing wire. Mr. Erroll (Altrincham and Sale) said that a very valuable order for h.v. cables to be sent to France and Italy had been lost because British cable makers had not been able to supply them in good time. Replying, Mr. J. Jones (Ministry of Supply) said that it was absurd to suggest that the Government allocated steel to individual firms. Industry itself allocated the amount of steel required. In 1938, wire rod production in this country was 4.2 per cent. of the overall steel production; by 1946 it was 5 per cent. and last year, as a result of the fuel crisis, it was 4.9 per cent. The wire drawing industry was getting a percentage increase of the increased total production.

Electricity and Agriculture

Electrical Features at the Norfolk and York Shows

THIS year the Royal Norfolk Summer Show was held on June 30 and July 1 at Keswick Hall, a few miles outside Norwich. The attendance figures reached 48 913—only 2 000 short of last year's record total for the two days.

ELECTRICAL EXAMPLE

The quality of exhibits was high and the display of the Eastern Electricity Board and the E.D.A. was outstanding, both in its planning and presentation and in the appearance and variety of equipment and apparatus on view. Distinguished by a clock tower, the exhibit was laid out in three marquees: domestic and industrial, agricultural—and refreshment marquee. The frontage to the agricultural marquee was laid out with flowers and a fountain playing. Outside the industrial and domestic marquee was a small open-air cinema projector showing electrical films. Close by was a large scale map of the E.E.B.'s 8 000 square mile area and maps of the Norfolk and Suffolk Sub-Areas, showing the location of offices and showrooms. Fronting the agricultural marquee were soil-warming frames, a small greenhouse, Dutch lights and cloches, showing the various applications of soil warming methods.

The industrial and domestic marquee showed a wide range of cookers, water heaters, wash-boilers, kettles, irons, toasters, etc. The catering section included ice cream freezers, pasteurisers, hot-cupboards, vegetable boilers, a frozen food counter, steam cooker and boiler, restaurant range, cutting and wrapping machine, soda fountain, etc. The agricultural section included grinding mills, pumps, welding equipment, fans, soil warmers, dairy appliances, sterilisers, incubators, log saws, etc. Demonstrations of much of this equipment were given during the two days of the show.

In the domestic marquee appeared two contrasted kitchens, ancient and modern. The former was an 1897, period piece kitchen belonging to a rural cottage and showed the copper, stove and other furnishings available fifty years ago. Next to it was shown the modern all-electric kitchen available to rural households with the same amenities as those available to the town housewife.

Another historic class of exhibit appeared in the passage-way linking two marquees. This was an exhibit of more interest to supply men than to consumers although it had the merit of being able to remind the consumer that all electrical technical apparatus develops into more and more efficient designs in the same way that farm machinery evolves. The exhibition consisted solely of meters, starting with the very early 1884 Ferranti barrel type d.c. meter, then the 1893 Scott quarterly type d.c. meter, the 1900 Long-Schattner prepayment d.c. meter, and finally a range of Ferranti d.c. and a.c. meters from 1905 to 1931.

The Eastern Electricity Board and the E.D.A. issued a two-page leaflet giving a schedule of exhibits and bearing "An open letter to all interested in farming," from the Board's chairman, Mr. C. T. Melling.

It should be added that the catering arrangements of the Board were commented on by many guests as excellent. Representatives of the Norwich Corporation and of Great Yarmouth, of the Eastern Area Board members and staff and of the B.E.A. headquarters were among those invited to sample luncheons and teas of high standard. The enterprising staff of the Norfolk Sub-Area produced an effective little "Staff Handbook" which mapped out the approach to the grounds from Norwich and Ipswich, the plan of the marquees, the chief events of the show and the equipment to be found on the E.E.B.'s stands. This handbook also listed the appliances on view and being demonstrated, giving the names of the staff from Norwich, Yarmouth and Stowmarket who were responsible for each equipment and activity. The handbook was completed by a list of other stands of interest, the names of the Electricity Stand Committee and a message of welcome from Mr. J. A. Sumner, manager of Norfolk Sub-Area.

THE ROYAL

An electric farm with working models was a feature of the Royal Show, at York, this week, the exhibit being the responsibility of the E.D.A. in conjunction with the North-Eastern and Yorkshire Electricity Boards. A two-storey barn with "drive through" formed the central building. On the ground floor was a 10 H.P. Briton grinder with bin and cyclone dust extractor. This discharged into a bin on the upper floor, and was then available for a 2 cwt. 2 H.P. dry and wet mash

mixer below. Also on view were a 3 H.P. Essex hammer mill; a 1 H.P. vertical spindle mill, the Economil; a Morris two-way 2½ cwt. sack hoist, with push-button control; and the Ferranti-Jeans seed conditioner; a 50 kW Penny and Porter model grain dryer, capable of dealing with 5 cwt. per hour.

The dairy building included an Alfa Laval combine recorder milking plant in a milking parlour, used in conjunction with Prestcold duplex coolers. This equipment was used to cool and place in churns milk produced by cows on the adjacent Milk Marketing Board exhibit. Thermal storage steam raisers (G.E.C. and Woolley Electrobloc) were installed in the dairy. In the "motor room" between the milking parlour and the dairy were the vacuum pump, cooler, compressor unit, and an automatic pressure water supply set. Adjacent to a wash basin was a Simplex electric hand dryer. In a producer-retailer's dairy were a Kelvinator cooler. Cock bottle filler and capper. Prestcold 100 cu. ft. coldroom. Gascoigne bucket milking plant, auto-washer and goat milking equipment. A G.E.C. self-contained sterilising chest was installed, and also a Prestcold churn-immersion milk cooler.

In the poultry section were displayed a range of incubators—all electric and as automatic as incubation requirements permit—single and multiple tier brooders, G.E.C. candling lamps and Bingham 7/8 H.P. plucking machines. The repair and maintenance buildings housed a full-scale arc-welding equipment, a vacuum operated sack cleaner, paint sprayer, and tyre inflator, and an electric vulcaniser. Electricity applied to greenhouses, to soil-warmed garden frames, soil sterilisation, and thermostatic control, two electric milk delivery vehicles, and domestic appliances were also featured.

A display by the General Electric Co., Ltd., included dairy sterilising equipment, a storage steam raiser, propeller fans, and a model of a barn equipped with fan and ventilating ducts for distributing air through hay. A large part of the stand was devoted to soil warming equipment, transformers catering for the needs of amateur and commercial growers, and a welding set for the farm workshop. Cookers and appliances were also shown.

Installing Electric Discharge Lamps

IN view of the developments which have taken place in the application of electric discharge lighting since the 11th Edition of the Regulations for the Electrical Equipment of Buildings was published in 1939, the I.E.E. Wiring Regulations Committee, at present engaged in the preparation of a 12th edition, have produced, as a matter of urgency, a revised Section 8—The Installing of Electric Discharge Lamps. This has been issued under the date, July 1, and supersedes the previous Section 8.

The section is in two parts, namely Section 8A, which is applicable to all types of electric discharge lamp installations irrespective of the voltage used, and Section 8B, which contains additional regulations applicable to installations where the open-circuit voltage exceeds 650 V. The maximum open-circuit voltage permitted by the Regulations for a high-voltage installation is, under the new Section 8B, 5 000 V to earth.

In the introduction to the revised section, attention is drawn to the use of the terms 'capacitor' and 'inductor' for 'condenser' and 'choke' respectively. This departure from the terminology used in the original 11th Edition of the Regulations has been adopted to conform with the present practice as set out in the British Standard Glossary of Terms used in Electrical Engineering (B.S. 205).

The new Section 8A which refers to all electric discharge lamp installations, applies to those operated at normal supply voltage, (e.g. those using 80-W or 40-W fluorescent tubes) which now become, for the first time, the subject of specific requirements in the Regulations. The revised requirements for high-voltage installations comprise those in the new Section 8A and those in the new Section 8B and are substantially the same as were required by the previous Section 8, now superseded.

Copies of the revised Section 8 may be obtained at a cost of 6d. (7d. post free).

Trolley Wire Fatigue

A REPORT (Ref. O/T1), entitled "Fatigue of Grooved Cadmium Copper Trolley Wires," which is shortly to be published by the British Electrical and Allied Industries Research Association, describes fatigue and tensile tests similar to those dealt with in Ref. F/T147, in which the controlling influence on the fatigue strength of round cadmium copper trolley wires was shown to be the surface condition of the specimen. The present investigation was carried out on grooved wires having the same nominal cadmium contents, as supplied by three makers.

Contracts Open

WE give below the latest information regarding contracts for which tenders are invited. In the case of overseas contracts, manufacturers and exporters should apply, quoting reference numbers, to the Export Promotion Department, Board of Trade, Thames House North, Millbank, London, S.W.1, unless otherwise stated:—

Montevideo, July 12.—Supply of 5 500 copper sleeves for cable splices, and 75 pliers for use with the sleeves. Specification available for inspection at Board of Trade. (Ref. E.P.D. 36 635/48.)

Wellington (N.Z.), July 12.—Supply of textile-covered, lead sheathed telephone cable. Quantity required 15 pairs, 15 miles and 25 pairs, 15 miles. Specification available at Board of Trade (Ref. 36 648/48).

Wellington (N.Z.), July 12.—Supply of 350 miles I.R.V. or P.V.C. twin cable and 40 miles I.R.V. or P.V.C. eight-wire cable. Specification available for inspection at Board of Trade. (Ref. 37184/48.)

Wellington (N.Z.), July 13.—Supply of one 10 000 kVA synchronous condenser for Stoke sub-station. Specification available at offices of High Commissioner for New Zealand, 415, Strand, London, W.C.2. (Contract No. 85.) Tenders to State Hydro-Electric Dept., Wellington.

Wellington (N.Z.), July 14.—Supply of (1) galvanised steel line wire for telegraph and telephone purposes to the latest British Standard Specification No. 182, quantity required 30 tons (weight per mile 400 lb.) and 25 tons (weight per mile 150 lb.), and (2) binding and jointing galvanised steel wire for telegraph and telephone purposes to the latest British Standard Specification No. 184, quantity required 3 tons (weight per mile 60 lb.). Specification available at Board of Trade (Ref. No. 36 648/48).

Brisbane, July 15.—Supply of 33 kV indoor metal-clad switchgear. Specification available for inspection at Board of Trade. Tenders to City E.L. Co., Ltd., Brisbane.

Uruguay, July 19.—Supply of material for equipping 30/6 kV, 50 cycles, transformer stations, for Usinas Electricas y Telefonos del Estado. Specification (in Spanish) available for inspection at Board of Trade. (Ref. 35594/48.)

Montevideo, July 20.—Supply of 40 complete sets of equipment for telephone operators with spare parts for Direccion General de Comunicaciones. Specification (in Spanish) available for inspection at Board of Trade. (Ref. 36965/48.)

Montevideo, July 20.—Supply of 1 000 telephone subscribers' individual protection boxes and spares for these, for Usinas Electricas y Telephonos del Estado. Specification (in Spanish) available for inspection at Board of Trade. (Ref. 36967.)

Buenos Aires, July 22.—Supply and installation of the following equipment for the transformer station at Jujuy: Six three-phase transformers; one three-phase voltage regulator; eight circuit-breakers; one switchboard; one rectifying set and accumulators; 1 000 metres of underground armoured cable; 20 terminal boxes. Specification (in Spanish) available for inspection at Board of Trade. (Ref. 37497/48.)

Montevideo, July 22.—Supply of 300 sets of extension telephone instruments with spares, for Usina Electricas y Telefonos del Estado. Specification (in Spanish) available for inspection at Board of Trade. (Ref. 36969/48.)

Montevideo, July 23.—Supply of 10 sets static electric generators each composed of one Diesel motor coupled to one three-phase alternating current generator for Usinas Electricas y Telefonos del Estado. Specification (in Spanish) available for inspection at Board of Trade.

Montevideo, July 26.—Supply of uncovered copper wire conductors for Usinas Electricas y Telefonos del Estado. Specification available for inspection at Board of Trade. (Ref. E.P.D. 37232/48.)

Montevideo, July 27.—Supply of 500 000 metres lead-covered double conductor cable for Usenas Electricas y Telefonos del Estado. Specification (in Spanish) available at Board of Trade. (Ref. 37235/48.)

Wellington (N.Z.), July 27.—Supply of two 30 000 kVA synchronous condensers for Haywards sub-station. Specification available at offices of High Commissioner for New Zealand, 415, Strand, London, W.C.2. (Contract No. 84). Tenders to State Hydro-Electric Dept., Wellington.

Cape Town, July 28.—Supply of cables and jointing material for Electricity Department, for working pressure of 12 kV between phases on a three-phase system and for cables for working pressure of 660 V. Specification available for inspection at Board of Trade (Ref. 36898/48.)

Montevideo, July 28.—Supply of 300 000 metres lead-covered twin pair telephone cable and accessories for the Usinas Electricas y Telefonos del Estado. Specifica-

tion (in Spanish) available for inspection at Board of Trade. (Ref. E.P.D. 37231/48.)

Montevideo, July 29.—Supply of 108 500 porcelain insulators for Usinas Electricas y Telefonos del Estado. Specification (in Spanish) available for inspection at Board of Trade. (Ref. 37239/48.)

Montevideo, July 30.—Supply of the following equipment: 1 000 two-way switches on rocking keys; 400 auxiliary bells; 750 socket bases for telephones; 500 plugs for these sockets for Usinas Electricas y Telefonos del Estado. Specification (in Spanish) available at Board of Trade. (Ref. E.P.D. 37233/48.)

Teheran, August 4.—Supply of various products, including electrical sundries, for Iranian Tobacco Monopoly. Specification available at the Chancery of the Iranian Embassy, 50, Kensington Court, London, W.8.

Montevideo, August 5.—Supply of two electric pumping sets for Usina Electrica 7 Telefones del Estado. Specification (in Spanish) available for inspection at Board of Trade. (Ref. E.P.D. 37499/48).

Durban (S.A.), August 6.—Supply of current transformers and time switches. Specification available for inspection at Board of Trade. (Ref. 36700/48.)

Montevideo, August 18.—Supply of 1 000 000 metres of black vulcanised twin conductor insulated for outside use for Usinas Electrica y Telefonos del Estado. Specification (in Spanish) available for inspection at Board of Trade. (Ref. 36968/48.)

Durban (S.A.), August 20.—Supply of the following three-phase transformers: Two 25 kVA; two 200 kVA; five 750 kVA (6 600/550 V); one 200 kVA (11 000/550 V); four 25 kVA; two 500 kVA; one 750 kVA (11 000/380 V); four 25 kVA; two 50 kVA; four 100 kVA; four 200 kVA (11 000/380 V). Specification available for inspection at Board of Trade. (Ref. 36 710/48.)

Pretoria, August 24.—Supply of 33 kV and lower voltage auxiliary transformers. Specification from the City Electrical Engineer in Pretoria, or from the Council's Consulting Electrical Engineers in England, Messrs. Merz and McLellan, Carliol House, Newcastle-on-Tyne; deposit, £2 2s.

Brisbane, August 27.—Supply of 50 stepdown distribution transformers, outdoor type, ranging from 200 kVA to 1 000 kVA, three-phase, 50 cycles, no load, 10 500 V Delta to 430/248 star, also two ditto, but 5 500 V Delta to 430/248 star, 500 kVA, for Brisbane City Council. Specification available at Board of Trade. (Ref. 37 275/48.)

Montevideo, August 30.—Supply of subterranean armoured cable and complimentary material for Usinas Electricas y Telefonsos del Estado. Specification (in Spanish) available for inspection at the Board of Trade. (Ref. 37498/48).

Bangkok, September 6.—Supply of one set d.c. welding plant; motor generator mounted three or four-wheeled trailer, for single-operator motor, 220 V and 380 V, welding range 30-250 A, complete with accessories; one set a.c. welding plant, transformer oil-cooled type, portable steel-wheeled trailer, for single-operator 200-500 V, 50 cycle, three-phase, same welding range, complete with accessories, for Bangkok Railway Dept. Catalogues and full particulars essential; price to be quoted in Siamese currency for delivery at Makasan workshops.

Talkha (Egypt), September 29 (extension).—Tenders for the erection of the 25 000 kW power station at Talkha. Plans and specification available for inspection at Board of Trade. (Ref. EPD 32587/48.)

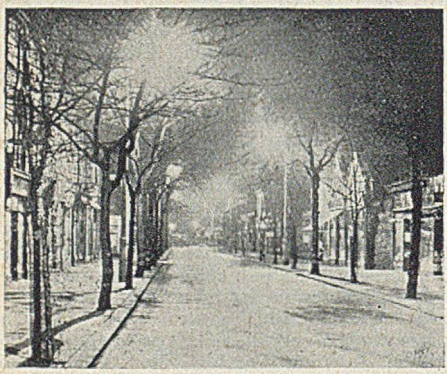
Buenos Aires, October 28.—Supply of machinery and plant for the manufacture of electric cable and for the drawing of the corresponding copper wire for the Direccion General de Fabricaciones Militares, Avenida Cabildo No. 65, Buenos Aires. Monthly output wanted of five million metres of electric cable, and 20 tons of wire for bobbins. Specification (in Spanish) available at Board of Trade. (Ref. EPD 37 304/48.)

Luxembourg.—Supply of telegraph and telephone material required by Luxembourg Telegraph and Telephone Department, as follows: Line material cross-pieces with supports for four double lines; various supports, including wooden poles 8.5, 10 and 13 m.; bronze wire (2 mm. dia.); subscribers' protectors and protectors for 25 double lines; wall and mobile units with local batteries and automatic wall and mobile units; cables and wires for interior installations, single, twin and multi-core cables; also armoured cables for underground networks. Particulars from Division Technique, 17, Rue de Hollerich, Luxembourg, and Board of Trade notified of any action taken.

Leicester Industrial Electricity Committee has been re-constituted to include representatives from warehouses, shops and offices as "non-industrial" users. The title of the committee has been changed accordingly to Leicester Industrial and Commercial Electricity Committee. It is expected to play an important part in working out a fuel saving scheme to operate next winter.

Electricity Supply

Berkshire.—In an address to the Berkshire branch of the National Farmers' Union, Mr. W. A. H. Parker, the union's electricity consultant, stated that there are 150 000 farms in the country still without electricity. Last year only 3 500 farms were connected, and at this rate it would



Metrovick "Trafford" lighting at School Road, Sale

take over forty years to electrify the whole industry. The union had drawn up a five-year scheme for farm electrification, but this was held up because of shortage of poles and steel.

Debden.—The L.C.C. reports with respect to street lighting at Debden Estate, Essex, that in consultation with the Chigwell U.D.C. it is proposed that the street lighting shall be provided by the Eastern Electricity Board at an estimated cost of £17 600. Gas lighting could be provided for £13 255, but in view of the considerable saving in maintenance costs, the District Council is prepared to meet the difference (£4 345) in the cost of adopting electric lighting.

Sale.—To improve its street lighting, a trial installation incorporating the latest type equipment has been carried out in the School Road shopping centre. It is a staggered arrangement of nine Metrovick "Trafford" lanterns mounted 25 ft. above the ground from Stanton type 6-B concrete columns, the average lateral spacing being 135 ft. In each lantern a horizontally burning 250 W mercury discharge lamp is positioned low down in a one-piece bowl refractor. This combination permits very accurate control of the light distribution in the vertical plane with the result that, while the installation has a high and even background brightness, it is free from direct glare. It is stated that the trial has proved very successful and the scheme is to be extended as soon as the street-lighting restrictions are eased.

Belfast.— A gross profit of £340 773 4s. 2d. (net £106 313 8s. 8d.) is disclosed in the annual report of the City Electrical Engineer for the Borough of Belfast for the year ended March 31, 1948. The report states that there was an increase in income of £157 258 18s. 2d. over the previous year but working costs increased by £190 895 8s. 10d. to a total (including the cost of energy supplied) to £1 390 711 13s. 8d. Total number of units sold was 426 937 452, against 402 782 818 the previous year, an increase of 24 154 634 units. Lighting absorbed 11 859 460 units; domestic, 67 779 425 units; general power, 97 779 425 units; shipyards, 40 517 305 units; transport 34 612 670 units; bulk supplies, 174 894 296. The number of consumers connected to the supply network was 102 748, an increase of 5 792. Ten miles of high tension and 41 miles of low tension cables were laid underground with ½ mile h.t. and nine miles l.t. overhead lines and six miles of overhead and rural service cables. Other notable developments included twelve new substations, continued changing of supplies from d.c. to a.c., and the development of the 33 kV primary transmission system. The report states that the Harbour Power station generated 258 937 640 kWh at a consumption of 174 512 tons of coal; East Bridge Street station, 137 500 kWh with 369 tons of coal. During the year 227 777 000 kWh were purchased from Ballylumford station. The installation of a 30 000 kW turbo-alternator with boiler plant and switch gear should be in operation by next spring. During the year, the report states, the Electricity Board for Northern Ireland acquired the undertaking of the Antrim Electricity Supply Co.

West Midlands J.E.A.—That the number of units generated decreased from 1 065 188 172 in 1946 to 977 808 316 in 1947, while the number of units sold to bulk consumers increased from 988 260 486 to 1 031 429 856 (which included an import from C.E.B. of 123 176 500 units as compared with an export of 5 575 369 units in 1946) is revealed in the final report for the year ended December 31, 1947, of the

West Midlands J.E.A. This reduction was largely caused by the failure of generating plant at Ironbridge and the restrictions imposed during the severe winter. Total generating capacity of the authority's stations was rated at 318 530 kW, while maximum load was 300 950 kW compared with 267 290 kW in 1946. An output of 1 118 000 000 units, of which the authority's own estimated requirements amounted to 1 112 300 000 units, was provided in the Central Board's 1948 programme. The total number of units supplied in bulk to other authorised undertakers in the West Midlands district since the transfer of the generating stations in 1947 was 931 680 321 units against 890 695 646 units in 1946. There were 82 high-voltage consumers in the distribution area (same as 1946) and 25 976 low-voltage consumers (24 387 in 1946) at a revenue of £199 084 and £251 600 respectively. Average price per unit was .92d. and 1.49d. respectively. Sales of electricity to the C.E.B. amounted to 921 442 074 units at a cost of £2 416 740. Coal consumption was lower, 687 948 tons, against 733 683 tons in 1946 at a cost of £1 455 385 and £1 413 596 respectively. The revenue accounts for the year under review (distribution area) showed the total expenditure amounted to £436 507 against income of £462 088, leaving a surplus for the year of £25 581.

Liverpool.—After considering the relative merits of fluorescent, sodium and blended sodium lighting, the Street Lighting Committee has decided in favour of sodium for the central city streets. Mr. C. Cholerton Smith, the acting lighting engineer, stated that experience had shown that the public rapidly got over any prejudice against this form of light which, incidentally, was the least costly.

The E.I.B.A. Annual Meeting

THE need for greater support from the electrical industry and those employed in its various branches was emphasised at the annual meeting of the Electrical Industries' Benevolent Association held at the Institution of Electrical Engineers in London on Friday, July 2. The report of the Council for 1947, an abstract from which was given in our last issue, showed a substantial increase in the number of beneficiaries and the amount of monetary grants resulting in a deficit in the revenue account for the first time in the history of the association.

Mr. Walter Riggs, the retiring president, who was in the chair, in moving the adoption of the report, said their first concern was the reaction of the electrical industry to the changed circumstances in which the E.I.B.A. found itself. Everyone in the industry should know of the good work that the association was doing. There was a great deal of ignorance about that, and the industry had not supported its benevolent fund as well as some other industries had supported theirs. It was not among the worst in that respect, but it was lagging behind. The report showed that the dramatic increase in the work of the association had been most successfully tackled and carried through. He trusted that it would be taken to heart by the industry.

Mr. A. Brammer said that while employers knew of the work of the association the employees did not, and steps should be taken to bring it to their notice.

Mr. Riggs said it was realised that it would be more necessary in the future to get in touch with employees, who, perhaps, did not know of the activities of the E.I.B.A.

The following were elected to fill vacancies on the Council: Messrs. E. H. Ball, Ivor Cox, H. A. Deacon, H. de A. Donisthorpe, E. C. Holroyde, and H. C. Neville. Messrs. R. Wilson Smith, R. W. Hughman, E. E. Hoadley, W. C. Yuille and C. G. Morley New, who retired, were thanked for their services.

Mr. A. G. Beaver, chairman of the Sun Electrical Co., Ltd., and a past-president of the Electrical Wholesalers' Federation and of the Radio Wholesalers' Federation, was elected president for the ensuing year. He has been a member of the association from its inception in 1904, and of the Council for a number of years.

Mr. Beaver announced that the Electrical Wholesalers' Federation had decided to make a grant of £5 000 to the E.I.B.A. for a purpose to be associated with homes for old people and as a memorial to their late director, Mr. Adolph Albrecht.

A hearty vote of thanks was accorded Mr. Walter Riggs, who had held the office of president for the last two years.

Sir Vincent de Ferranti, Mr. H. A. Deacon and Mr. A. B. Wildsmith were elected to fill vacancies on the Court of the association, and Mr. L. C. Sharpe was elected chairman of the Court.

Company News

GREENWOOD AND BATLEY, LTD.—Tdg. pft. to March 31, plus gross inc. from invests. and property and war damage in respect of bldgs., £134 650 (£86 226). Fin. ord. div. 10%, mkg. 15% (same).

GREAT NORTHERN TELEGRAPH CO.'S HOLDING CO.—Total div. of 11% (13%), or Danish Kr. 5.94 per share (7.02) of Kr. 54 for yr. ended June 30. Carry fwd. Kr. 2 953 (Kr. 2 416).

GARRARD ENGINEERING AND MANUFACTURING CO., LTD.—The circulated statement of the chairman, Mr. H. V. Slade, says that, notwithstanding shortages, in 1947 production of electric motors, radio-gramophone units and automatic record changers was the highest ever.

SCOTTISH CABLES, LTD.—After dirs.' remun. £14 213, tdg. pft. for yr. ended April 30 ,£208 235 (£161 879). To audrs.' remun. £156, interest on loan cap. to date of repayment £3 524, provn. for depreen. £25 400, lvg. pft. for yr. before taxn. £179 155 (£132 917). To inc. tax res. for 1949-50, £59 841, mkg. total tax provn. £112 767, exes. for pref. issue and conversn. to pub. co. £5 015, pref. div. £1 668. Ord. div. 30% £41 250, fwd. £35 011 (£16 556).

RUSTON AND HORNSBY, LTD.—Consol. bal. sheet shows stock and work in progress £4 662 306 (£3 171 595), debtors and payments in advance, less provs. £1 892 036 (£1 632 344), sub-subsid. loan acct. £69 (£77), invest. at cost nil (£150 856), cash £72 669 (£357 735), mkg. curr. assets £6 627 080 (£5 312 607). Trade cred. (inc. taxn., dfrrd. repairs and deb. interest) £2 248 449 (£1 666 601), acceptance cred. and loans £413 125 (nil), proposed divs. £119 213 (same).

AVELING-BARFORD, LTD.—Speaking at the annual meeting, the chairman, Mr. Edward Barford, said that there were three parties in industry, capital, management and works, and basically the interests of all were indivisible. Broad directives to industry were all that were needed from officials: directors and management should be made responsible for their loyal interpretation. During the last two years, 95 per cent. of the machinery exported by the firm had arrived at the time promised.

TELEPHONE MANUFACTURING CO., LTD.—Speaking at the annual meeting, the chairman and managing director, Mr. Fred T. Jackson, said that the national restrictions on capital expenditure had resulted in a reduction in the rate of deliveries called for by the British Post Office. Connections overseas were increasing, however, and during 1947 equipment was sent to 42 countries. Although the firm had had no orders from the Ministry of Supply, they were in constant touch with its Signals and Radio Developments Establishment, with which they were jointly developing certain apparatus.

PYE, LTD.—Pft. for yr. ended March 31, after dirs.' emols., less paid by subsids., £15 126 (£204 dirs.' fees), £207 769 (£120 543 after E.P.T. and pfts. tax). Brt. in £155 660 (£142 076), and share premium, less costs, nil (£165 434), available £363 429 (£428 053). To staff pension fund £5 000 (£4 000), gen. res. nil (£165 434), tax £92 100 (£65 000 inc. tax). Pfrrd. ord. 10% (same) div. £8 250, dfrrd. ord. 25% (same) £29 709. Dfrrd. ord. div. res. £12 500 (nil) and distrib. to employees £12 500 (nil), fwd. £203 370. Consol. bal. sheet shows fixed assets £402 634 (£378 147), curr. assets £1 692 298 (£1 290 792) and curr. liabs., inc. divs. recommd. and employees' pft.-sharing distrib., £1 055 409 (£729 318).

LISBON ELECTRIC TRAMWAYS, LTD.—The circulated statement of the chairman, Sir Alexander Roger, says that during 1947 the number of passengers carried continued to increase, but the supply position did not improve to the extent anticipated. When it became apparent that their British suppliers would be unable to deliver during 1947 any of the main order of 82 single deck 'buses, orders for 'buses were placed in Italy, and contracts were made for the construction in Portugal of bodies on British chassis. Early in 1948 the 'buses with locally built bodies began to be delivered and the first complete 'bus of the new fleet was shipped from England. Since then a steady flow had been maintained and by September 147 'buses should be in service. The Portuguese Government's Zezere hydro-electric scheme was progressing and the company was studying the problem of linking up its network with the electric grid shortly to be constructed.

W. AND T. AVERY, LTD.—Full rpt. for yr. to March 31 shows tdg. pft. £458 599 (£389 026), rev. from props. £665 (£136), inc. from subsids. and other invests. £191 121 (£150 568), surplus on realisn. of property and Gov. secs. £6 800 (nil), mkg. £657 185 (£539 730). Depreen., etc., requs. £94 311 (£70 053), cap. res. £50 000 (nil), dirs.' fees (net) £10 000 (same), dirs.' other emols. £27 652 (£24 036), audrs.' fees £1 400 (same), overseas taxn. £35 973 (£22 222), U.K. taxn. £275 155 (£208 952),

patents written off nil (£1 000), lvg. net pft. (already announced) £162 694 (£202 067), to which is added £75 000 (nil) no longer required for tax provn. Reconversn. and develop. res. absorbs £100 000 (£50 000), research res. nil (£50 000), pensions fund £10 000 (nil), pref. div. £8 141 (same), ord. interim 5% (same), £23 490 (same), fin. (already proposed) 15% (10% and bonus 5%), £70 470 (same), lvg. £96 854 (£71 261) fwd.

BRITISH ELECTRIC TRACTION CO., LTD.—Speaking at the annual meeting, the chairman, Mr. H. C. Drayton, said that takeover prices for the B.E.T. Electricity Supply and National Electric Construction Company had had to be arranged as there was no Stock Exchange quotation. This had been done by taking a percentage of the earnings and capitalising it on a varying yield basis, which was not a particularly satisfactory method of arriving at a valuation. The amount of electricity stock received was £1 408 000. For the B.E.T. Electricity Supply share of the Antrim undertaking, acquired by the Electricity Board for Northern Ireland, they had received the full value of £790 000.

ASSOCIATED INSULATION PRODUCTS, LTD.—Divs. from subsid. and assoc. co.'s., etc., for 1947 £122 045, less admin. exes., etc., £19 865, tax £54 010, lvg. £48 170. To sec. interim. div. 10%, mkg. 16%, £40 136, fwd. £32 177. Consol. pft. and loss acct. shows tdg. pft. and sundry inc. £845 998 (£527 931), plus divs. on trade invests. £9,953 (£9 921), mkg. £855 951 (£537 852). Ded. depreen. of props., etc. (except land), £64 717 (£64 672), pensions nil (£25 000), interest £7 869 (£8 246), dirs.' fees £9 183 (£5 583), management remun. £46 486 (£34 196), audrs.' remun. £3 168 (£4 023), U.K. pfts. tax £95 000 (£101 811 E.P.T.), fed. and other foreign taxes £72 515 (£58 592). Pfts. of holding co. and subsids., before tax, £557 013 (£235 729), less attrib. to outside interests £238 154 (£98 157), attrib. to holding co. £318 859 (£137 572). Deduct tax £124 119 (£48 485), res. for fluets. in stock values, less transfers from contings. res. £92 312 (£24 526), attrib. to outside interests £44 642 (£11 389), bal. attrib. to Associated Insulation Products £147 070 (£75 950), less retd. by subs. £98 900 (£52 931), lvg. net pft. £48 170 (£23 019). To divs. 16% (7%), £40 136 (£17 559), fwd. £32 177 (£24 143).

SIEMENS BROS. AND CO., LTD.—The annual statement of the chairman, Dr. Henry R. Wright, says that the order sheet for 1947 was substantially higher than that for 1946, and since there were difficulties in recruiting female labour for the Woolwich factory, arrangements had to be made for still more work to be done at the West Hartlepool factory. By the end of the year export orders for telephone products rose to over 60 per cent. of the whole, but practically no equipment could be made available for private telephone business at home. Large orders had been received for automatic trunk exchanges using the firm's motor-uniselector. Lead shortages were hampering cable production; supplies were only enough for 75 per cent. of the firm's capacity. The new lamp factory of Siemens Electric Lamps and Supplies, Ltd., designed specially for the production of "Sieray" fluorescent lamps, was now in operation. The research laboratories had developed the "Sieflash" high intensity flash tubes, and a new gas arc, representing an important step in the development of silent light sources of high intensity for film studios, etc. Submarine Cables, Ltd., had also had a successful year, during which a submarine cable had been laid between Aldeburgh and Domberg, Holland, enabling 84 conversations to be carried out simultaneously. For some time there had bene a dearth of qualified technical staff for the telephone industry: the firm's student courses had been interrupted during the war, and since their resumption there had been insufficient time for completion of training.

Railway Electrification

DURING a tour of the Eastern Region, British Railways, Sir Cyril Hurcomb, chairman of the British Transport Commission, announced at Sheffield on Monday that when the electrification of the Manchester-Sheffield-Wath lines was completed in December, 1952, all classes of passenger, goods, and mineral trains would be worked by electric traction. Overhead power transmission at 1 500 V d.c. would be employed. The completion of the electrification scheme would be carried out in four stages; between Wath and Dunford in March, 1951, from Dunford to Manchester (London Road) in the following year, and the third and fourth stages, which included Sheffield to Barnsley Junction and Levenshulme to Manchester (Central) in December, 1952. For hauling passenger and freight trains 85, 1 860 H.P. mixed traffic electric locomotives would be built, 28 of them with electrically heated boilers to provide steam heating when hauling passenger trains. One mixed traffic electric locomotive had been completed and was at present being tested in Holland, where it had covered satisfactorily 55 000 miles to date.

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 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.*

L. H. MARTIN AND CO., LTD., R/O., 12, Macclesfield Street, Shaftesbury Avenue, W.1, electrical engineers. £13 14s. 1d. May 5.

RUDD, L. O. (male), Tudor House, 57, Stephenson Road, Heaton, Newcastle-on-Tyne, electrical engineer. £16 15s. 10d. April 21. (Trading as E. H. KELSEY.)

GALE, Arthur Wm., 6, Thornclowe Gardens, Waddon, electrical engineer. £16 0s. 4d. April 30.

MASON RADIO AND ELECTRICAL (a firm), 1097, Warwick Road, Acocks Green, electrical engineers. £20 13s. 7d. April 22.

CASTLE, H. (male), 130, Sheffield Road, Barnsley, electrical dealers. £58 9s. 9d. April 30.

J.W.H. INSTRUMENTS, LTD., R/O., next No. 2, Westway, Shirley, radio and electrical engineers. £18 16s. 6d. April 30.

SUSSEX ELECTRICAL INSTALLATIONS (a firm), 53, Ann Street, Worthing, electrical dealers. £13 1s. 4d. April 26.

ANDERSON, Olive, 47, Margaret Street, Hull, electrical engineer. £17 14s. 8d. April 26.

Adjudication

AARONS, Hannah Rose (married woman), 35, Tallack Road, Leyton, London, E.10, lately carrying on business as RADCO CO. (WHOLESALERS), Leyton, at 764, Lea Bridge Road, London, E.17, and at 35, Tallack Road, electrical wholesalers. Court: High Court of Justice. Date of Order: June 26. Date of filing petition: June 23.

Release of Trustee

WILSON, Jack, residing at "Knowlden," Ashwood Drive, Riddlesden, Keighley, and carrying on business at 81, Bradford Road, Riddlesden, Keighley, Yorks., electrical engineer. Court: Bradford. Trustee: Firth, Harry Mitchell, Eldon Chambers, 5, Eldon Place, Bradford, incorporated accountant. Date of release: June 21, 1948.

Order Made

SIMMONS, Cecil William James, 34, Brougham Hayes, Bath, Somerset, electrical and radio engineer. Court: Bath. Date of Order: June 3. Notice of Order: Bankrupt's discharge suspended for six weeks, and that he be discharged as from July 15, 1948. Grounds named in Order for refusing an absolute Order of Discharge: Proofs of facts mentioned in Section 26, sub-section 3 (B. and C.), Bankruptcy Act, 1914, as amended by Section 1 of the Bankruptcy (Amendment) Act, 1926.

Public Examination

DAVIS, Cyril, 198, Hessle Road, and WALSTER, Robert, 14, Arian Terrace, Gillett Street, Hessle Road, carrying on business in copartnership as "DAVIS AND WALSTER," at 198, Hessle Road, Kingston-upon-Hull, electrical engineers and contractors. Court: Kingston-upon-Hull. Date of first meeting: July 13, 12 noon, at County Court Offices, Bishop Lane, Hull. Date of public examination: July 26, 12 noon, at the Guildhall, Hull. Date of Order for Summary Administration: June 30.

BICKERSTAFFE, Thomas, residing and carrying on business at 131, Ribbleton Lane, Preston, Lancs., electrical contractor. Court: Preston. Date of first meeting: July 7, 11 a.m., at the Official Receiver's Office, 20, Byrom Street, Manchester, 3. Date of public examination: July 30, 10.30 a.m., at Sessions Hall, Lancaster Road, Preston.

Dividend

SCHOLES, Herbert Carr (described in the Receiving Order as SCHOLES ELECTRIC CO.), 72, High Street, Sidcup, Kent, electricians), residing at 37, Albany Road, Chislehurst, Kent, and lately carrying on business as the proprietor of Scholes Electric Co. Court: Rochester. Amount per £: 13s. 11½d., supplemental, payable July 14, at Official Receiver's Office, 280a, High Street, Rochester.

Metal Prices

		Monday, July 5 Price	Inc.	Dec.
Copper—				
Best Selected...	...per ton	£130 10 0	—	—
Electro Wire bars	... ,,	£132 0 0	—	—
H.C. Wires, basis	... ,,	£149 10 0	—	—
Sheet ...	... ,,	£172 10 0	—	—
Bronze Electrical Quality—				
Wire (Telephone)	...per ton	£174 5 0	—	—
Brass (60/40)—				
Rod basis ...	...per lb.	1s. 1¾d.	—	—
Wire	... ,,	1s. 6¼d.	—	—
Iron and Steel—				
Pig Iron (E. Coast Hematite No. 1)	...per ton	£10 5 0	—	—
Galvanised Steel Wire (Cable Armouring) basis 0.104 in. ...		£36 5 0	—	—
Mild Steel Tape (Cable Armouring) basis 0.04 in.	,,	£23 0 0	—	—
Lead Pig—				
English	,,	£91 10 0	—	—
Foreign or Colonial ...	,,	£90 0 0	—	—
Tin—				
Ingot (minimum of 99.9% purity)	...per ton	£577 0 0	—	—
Wire, basis ...	...per lb.	7s. 6d.	—	—
Aluminium Ingots	...per ton	£80 0 0	—	—
Spelter	... ,,	£75 0 0	—	—
Mercury (spot) ... (*ex warehouse*)	...per bott.	£15 0 0	—	—

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

Coming Events

Saturday, July 10

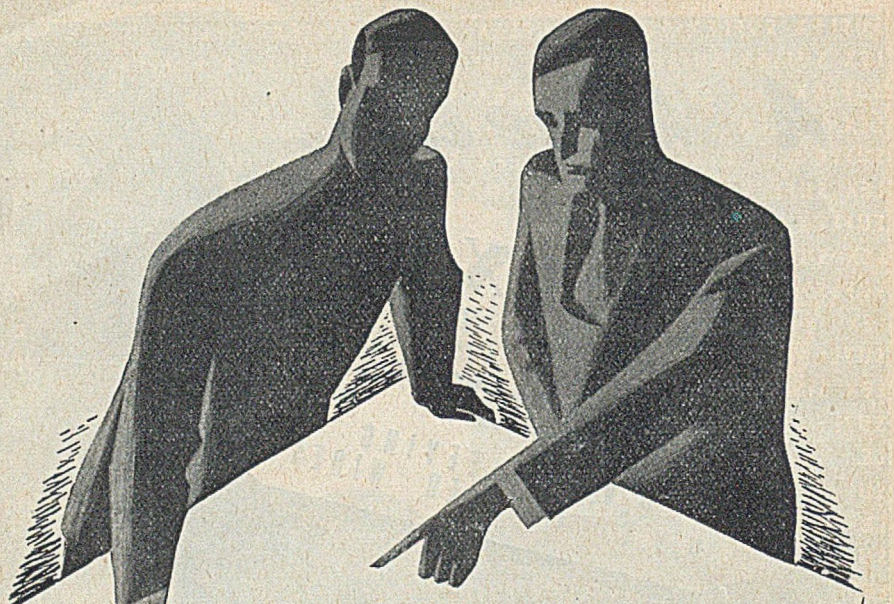
I.E.E., S. MIDLANDS STUDENTS' SECTION.—B.B.C. Transmitting Station, Droitwich. Visit. *2.15 p.m.*

Sunday, July 11

I.E.E., LONDON STUDENTS' SECTION.—Cambridge. Visit.

Wednesday, July 14

ASSOCIATION OF OPTICAL PRACTITIONERS.—School of Hygiene, London, W.C.1. "Factors Concerned in Vision, Light and Seeing," by Dr. Matthew Luckiesh. *3 p.m.*



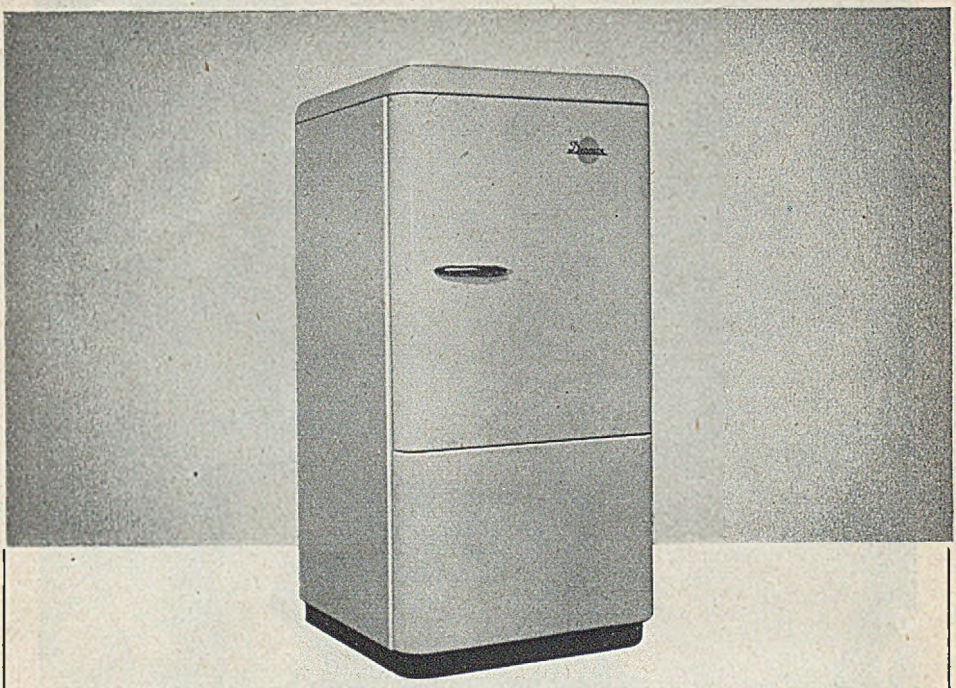
2 HEADS are better than 1

P-G12/48

Though we have been in the battery business for something over sixty years we are always adding to our store of useful experience. Sometimes it is something you tell us; sometimes it's a 'new angle' we are able to suggest to you. Whichever way it is, we are always ready to prove that two heads are better than one, either by providing complete specifications for any battery installation you like to name or by giving a second opinion on an existing scheme.

PRITCHETT & GOLD *and* **E.P.S. CO LTD**
50 GROSVENOR GARDENS LONDON SW1

Batteries for Switch Closing, Switch Tripping, Emergency Lighting, Supervisory Control, Telephones, Supply to Auxiliaries



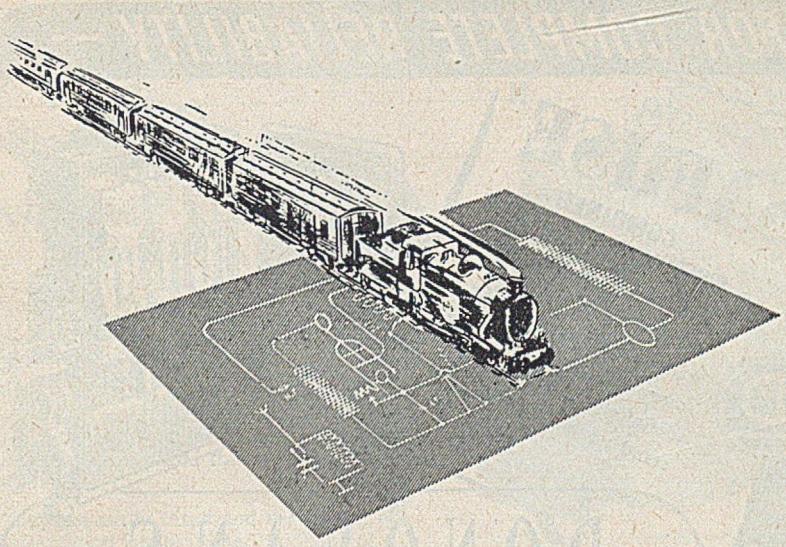
*** DIAMIX REFRIGERATOR : MODEL 4**

Diamix Refrigerators are manufactured by specialists in the science of Refrigeration. The design of this British Refrigerator is unique and incorporates the very latest feature to combine con structional efficiency with absolutely economical and guaranteed trouble free operation.

Diamix

REFRIGERATORS

BRITISH DIAMIX LTD., EDGWARE ROAD, CRICKLEWOOD, N.W.2. *GLA.* 9861



For *all points* North, South, East *and* West . . .

Intricate point-to-point wiring jobs are effectively accomplished with *Hamofil* Connecting Wires. Specially designed for efficient, economical wiring of electrical, radio and electronic apparatus, *Hamofil* is available in solid and stranded tinned copper conductors, with rubber insulation in seven plain colours.

★ *Hamofil* "Push Back"—a popular and inexpensive grade—permits the cotton braiding to be slid back along the wire to facilitate joining or soldering. In seven colours and their combinations.

Hamofil is available with the following conductors:—1/22, 1/19, 7/33 *and* 14/36 *s.w.g.*

HAMOFIL

connecting wires

Full details on request

De La Rue Insulation Limited

IMPERIAL HOUSE, 84/86 REGENT STREET, LONDON, W.1

Telephone: Regent 2901 *Telegrams: Delinsul, Piccy, London*

DA20/47

INDEX TO ADVERTISERS IN THIS ISSUE

CLASSIFIED ADVERTISEMENTS

None of the vacancies in these columns relates to a man between the age of 18 and 50 inclusive, or a woman between the age 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

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD.

APPOINTMENT OF STATISTICAL AND ECONOMICS OFFICER.

APPLICATIONS are invited for the above post in the Commercial Department of the Board at Area Headquarters at a salary of £750 per annum, subject to a later adjustment to conform with the scale of salaries agreed after negotiations with the appropriate organisations. Applicants should have a degree in economics or a diploma in statistics, and should have organising ability and experience (preferably in the electricity supply industry) in compilation of returns, business charts, and the preparation of statistical analyses and sample surveys for forward commercial development.

The successful candidate will be required to satisfy the Board's Medical Adviser and contribute to a superannuation scheme.

Applications on the prescribed form, which can be obtained from the Secretary, Merseyside and North Wales Electricity Board, Electricity House, Love Lane, Pall Mall, Liverpool, 3, must be despatched for delivery here not later than 14 days from the appearance of this advertisement.

JAMES RANKIN,
Secretary.
(1163)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD.

APPOINTMENT OF PUBLICITY AND PUBLIC RELATIONS OFFICER.

APPLICATIONS are invited for the above post at Area Headquarters at a provisional salary of £850 per annum, subject to later adjustment to conform with scales of salaries agreed after negotiations with the appropriate staff organisations.

Applicants should be experienced in the organisation of publicity campaigns, public exhibitions, etc., and have the ability to maintain a satisfactory relationship between the Board and its consumers through the medium of the Press and public associations, including particularly the representatives of agriculture.

The successful candidate will be required to satisfy the Board's Medical Adviser and contribute to a superannuation scheme.

Applications on the prescribed form, which can be obtained from the Secretary, Merseyside and North Wales Electricity Board, Electricity House, Love Lane, Pall Mall, Liverpool, 3, must be despatched for delivery here not later than 14 days from the appearance of this advertisement.

JAMES RANKIN,
Secretary.
(1164)

THE UNIVERSITY OF LIVERPOOL.

APPLICATIONS are invited for the post of Lecturer in the Department of Electrical Engineering (Electro technics) at a salary within the range £500-£800, to be fixed according to qualifications and experience.

Applications, stating age, academic qualifications and practical experience, together with the names of three referees, should be received not later than August 23rd, 1948, by the undersigned, from whom particulars of the conditions of appointment may be obtained.

STANLEY DUMBELL,
Registrar.
June, 1948. (1167)

SITUATIONS VACANT

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD.

APPOINTMENT OF CHIEF COMMERCIAL OFFICER AT AREA HEADQUARTERS.

APPLICATIONS are invited for the above post at a salary to be agreed between the range of £1 750 and £2 500 per annum, according to experience and qualifications. Applicants must preferably have been technically trained and have had commercial experience in a large electricity undertaking. Ability to create economic tariff structures and stimulate rural and industrial development is essential. The successful candidate will be expected to advise the Board on forward commercial policy and practice and take charge of the whole of their commercial activities, including the negotiation of supply contracts.

The successful candidate will be required to satisfy the Board's Medical Adviser and contribute to a superannuation scheme.

Applications on the prescribed form, which can be obtained from the Secretary, Merseyside and North Wales Electricity Board, Electricity House, Love Lane, Pall Mall, Liverpool, 3, must be despatched for delivery here not later than 14 days from the appearance of this advertisement.

JAMES RANKIN,
Secretary.
(1165)

SOUTH AFRICAN RAILWAYS.

VACANCIES FOR COMMUNICATION ELECTRICIANS.

BY permission of the Ministry of Labour and National Service under the Control of Engagement Order, 1947, applications are invited from qualified Electricians (Telegraph and Telephone) for employment on the South African Railways. Applicants must have served an apprenticeship or recognised equivalent. Appointment will be on a five-year contractual basis and includes free passages to South Africa for successful applicants and their families and free return passages after five years unless absorbed in the South African Railway service and subject to certain conditions.

The rate of pay is 3s. 6d. per hour for a 46-hour week, plus a temporary cost of living allowance at present £140 per annum for married and £40 per annum for single personnel.

Applications, giving age and full details of experience may be made in writing to the Secretary, Office of the High Commissioner for the Union of South Africa, Trafalgar Square, London, W.C.2, quoting reference number 15/421, or in person to any employment exchange (reference O.M.P. 45817).

(1179)

SOUTH WESTERN ELECTRICITY BOARD.

TARIFFS SECTION HEAD CHIEF COMMERCIAL OFFICER'S DEPARTMENT.

APPLICATIONS are invited for the above position dealing with electricity supply tariffs. Candidates must have an extensive knowledge of electricity supply economics, electricity tariffs structure and have had experience in compiling and co-ordinating statistics. The duties will include the complete survey of existing tariffs in the Area, formulation of proposals for their simplification and preparing estimates of revenue.

The commencing salary will be £1 000 to £1 250 per annum, according to qualifications, experience, etc. But the scales of salary have not yet been settled and may be subject to negotiations through the machinery set up under the Electricity Act, 1947.

Applications should be made not later than Tuesday, July 20th, and should be addressed to the Secretary (Establishments). Those made before July 12th should be addressed to the South Western Electricity Board, Pulteney Hotel, Bath, and those made after July 12 should be addressed to the South Western Electricity Board, Electricity House, Colston Avenue, Bristol, 1. (1169)

SITUATIONS VACANT

SOUTH EAST SCOTLAND ELECTRICITY BOARD.
Commercial Department, Headquarters.

ONE SENIOR TECHNICAL ASSISTANT AND ONE COMMERCIAL ASSISTANT.

APPLICATIONS are invited for the following appointments.

The posts in each case are superannuable, and successful candidates may be required to undergo a medical examination. The salaries are to be regarded as provisional and subject to further negotiations with the appropriate organisation.

SENIOR TECHNICAL ASSISTANT.

Candidates should hold a University degree or equivalent qualification in electrical engineering and have had experience in the distribution and consumers' departments of an electricity undertaking, including power sales and the preparation of supply agreements. An interest in budgetary estimating, cost accounting and statistical methods is essential and previous experience in these subjects would be a recommendation.

Commencing salary £600 to £800 per annum according to qualifications and experience.

COMMERCIAL ASSISTANT.

Candidates should hold recognised qualifications (engineering, accountancy or secretarial), and have had experience in cost accounting and the preparation of sales and revenue returns and estimates in respect of an electricity undertaking.

Commencing salary £500 to £600 per annum according to qualifications and experience.

Applications, which will be acknowledged, should be sent to the Secretary, South East Scotland Electricity Board, 53, Melville Street, Edinburgh, 3, not later than Saturday, July 31st, 1948. (1170)

DRAUGHTSMEN. Applications invited from Switchgear Draughtsmen with experience of general switchboard work, high and low voltage control panels, etc., also for development work.—Applicants should state age, experience and salary required to: Employment and Welfare Manager, Johnson & Phillips Ltd., Victoria Works, Charlton, S.E.7. (1097)

DRAUGHTSMAN, Chief and Detail, for F.H. electric motors and electro Mechanical assemblies. N.E. London. Progressive posts.—Write full details: Box 408, Aldridge, 1, Whitefriars Street, London, E.C.4. (1166)

LONDON firm offers opportunity to young Commercial Engineer of proved sales ability and initiative to develop their electric motor department. Permanent progressive position.—State age, experience and salary required to: Box L.L.P., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4. (1168)

BUSINESS OPPORTUNITIES

TO Manufacturers, Wholesalers, etc. We have large stocks of Radio and Electrical Goods which may be of interest to you. On the other hand, you may have large stocks of interest to us. We are prepared to barter or *contra* goods for goods.—Call, write or phone: L. Goodman (Radio) Ltd., 9, Percy Street, W.1. Museum 0216. (1174)

SCEMCO LTD. invite correspondence from leading makers of Television Sets regarding the sole distribution of a specialized set through the "Scemco" Home and Export Mail Order Sales Organisation weekly contacting 5 000 home traders and 1 500 export houses.

Mark replies: **MANAGING DIRECTOR, "CONFIDENTIAL," SCEMCO LTD., SCEMCO HOUSE, 6-7, SOHO STREET, LONDON, W.1. GER. 1461.** (TC167)

BUSINESS FOR SALE

LEEDS (suburb). Electrical Contractors, Radio, Gramophone Sales and Service. Two double-fronted shops, showrooms, offices, workrooms, on rental. Eight main agencies. Price, goodwill, valuable equipment, large stock, £3 500.—Y.I.D.C. Ltd., Harrogate Road, Rawdon, Leeds. Tel.: Rawdon 191. (1171)

FOR SALE

A.C. Motors, 3-phase, 6 600, 3 300, 400 volts, 1 to 550 h.p. Alternators, 3¾ to 500 kVA. Kohler plant rebuilt, 110 volts. 800 watts. Lists.—E. Binns, 156a, Falsgrave Road, Scarborough. (1177)

A.C. Motors: 500 brand new Motors from 1 to 10 h.p. always in stock at competitive prices—Hampson Industries Ltd., Union Street, West Bromwich. (1152)

A SUMMER Bargain of Motors, coupon-free and down-pointed: 36 ¼ h.p. 220/230 v., 1-ph., 50 cyc., ball bearing, 1 425 r.p.m.; 17 ½ h.p., 220/230 v., 1-ph., 50 cyc., ball-bearing, 1 425 r.p.m.; 12 ½ h.p., 220/240 v., R.I., 1-ph., 50 cyc., 1 425 r.p.m.; 9 ½ h.p., 220 v., 3-ph., 50 cyc., ball-bearing, 2 800 r.p.m.; 3 2 h.p., 230 v., 1-ph., 50 cyc., ball-bearing, 1 425 r.p.m.; 2 5 h.p., 230 v., 1-ph., 50 cyc., ball-bearing, 1 425 r.p.m.; 4 7 h.p., 200/230 v., 1-ph., 50 cyc., ball-bearing, 1 425 r.p.m.; 12 ½ h.p., 220/220 v., 1-ph., 50 cyc., capacitor, geared, 1 425-500 r.p.m.; 9 ½ h.p., 415 v., 3-ph., 50 cyc., squirrel cage, ball-bearing, enclosed ventilated, speed 1 445 r.p.m.; 17 1 h.p., 400/440 v., 3-ph., 50 cyc., squirrel cage, ball-bearing, enclosed ventilated, speed 1 450 r.p.m.; 32 1½ h.p., 380/420 v., 3-ph., 500 cyc., squirrel cage, ball-bearing, enclosed ventilated, speed 1 425 r.p.m.; 47 2 h.p., 400/440 v., 3-ph., 50 cyc., squirrel cage, ball-bearing, enclosed ventilated, speed 1 425 r.p.m.; 8 2 h.p., 400/440 v., 3-ph., 50 cyc., squirrel cage, ball-bearing enclosed ventilated, speed 960 r.p.m.; 12 2½ h.p., 400/440 v., 3-ph., 50 cyc., squirrel cage, ball-bearing, enclosed ventilated, speed 1 425 r.p.m.; 17 3 h.p., 400/440 v., 3-ph., 50 cyc., squirrel cage, ball-bearing, enclosed ventilated, speed 1 400 r.p.m.; 14 3 h.p., 400/440 v., 3-ph., 50 cyc., squirrel cage, ball-bearing, enclosed ventilated, speed 960 r.p.m.; 12 3½ h.p., 400/440 v., 3-ph., 50 cyc., squirrel cage, ball-bearing, enclosed ventilated, speed 1 400 r.p.m.; 27 4 h.p., 400/440 v., 3-ph., 50 cyc., squirrel cage, ball-bearing, enclosed ventilated, speed 1 400 r.p.m.; 17 5 h.p., 400/440 v., 3-ph., 50 cyc., squirrel cage, ball-bearing, enclosed ventilated, speed 1 400 r.p.m.; 21 5 h.p., 400/440 v., 3-ph., 50 cyc., squirrel cage, ball-bearing, enclosed ventilated, speed 1 000 r.p.m.; 15 5 h.p., 400/440 v., 3-ph., 50 cyc., squirrel cage, ball-bearing, enclosed ventilated, speed 720 r.p.m.; 17 5/1.6 h.p., 400/440 v., 3-ph., 50 cyc., ball-bearing, commutator type, 1 400/480 r.p.m., with pilot motor and preset control panel and push-button box; 127 3/2/1¼/1 h.p., 400/440 v., 3-ph., 50 cyc., squirrel cage, change-pole motors, speed 1 460/970/720/460 r.p.m.; 80 1 h.p., 400/440 v., 3-ph., 50 cyc., squirrel cage, flange mounted, 925 r.p.m.; 51 1 h.p., 400/440 v., 3-ph., 50 cyc., squirrel cage, flange mounted, 2,800 r.p.m.—Burdette & Co., Ltd., 15, Clapham Manor Street, S.W.4. (1151)

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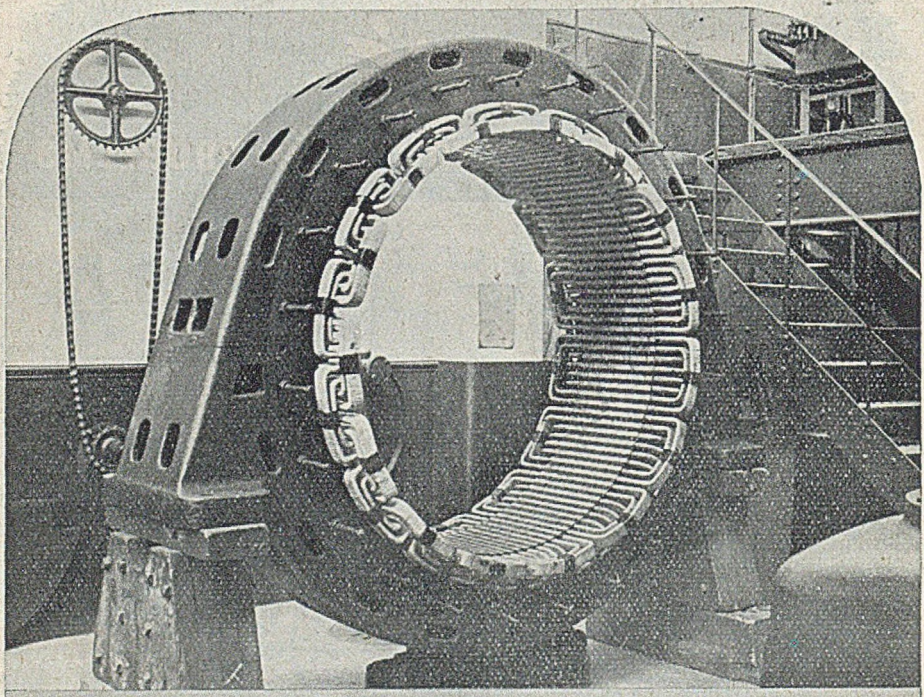

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