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THE

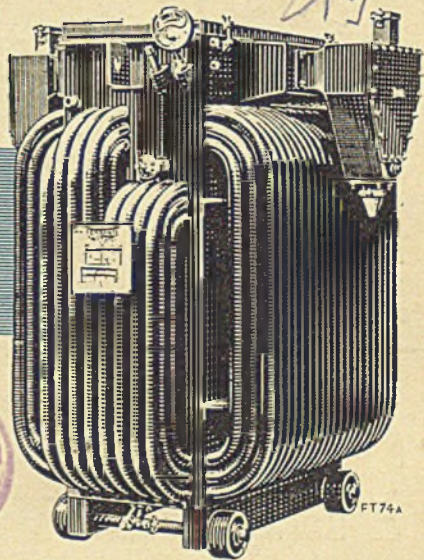
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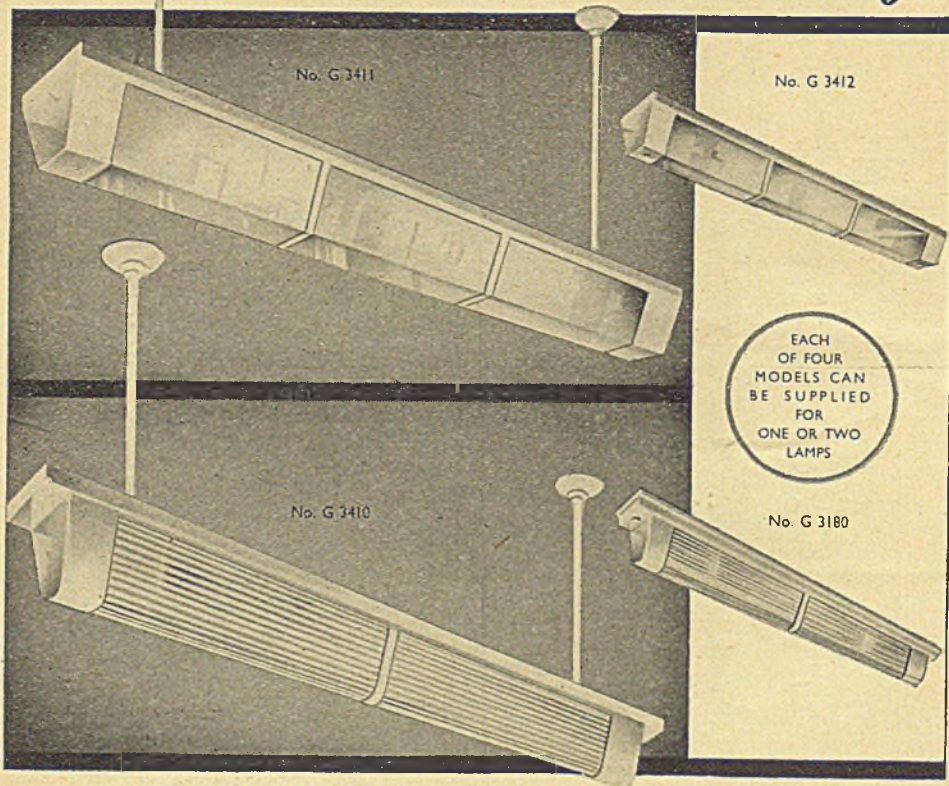
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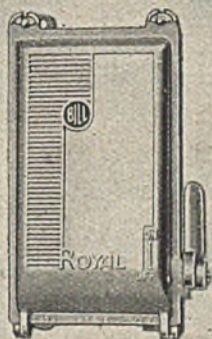
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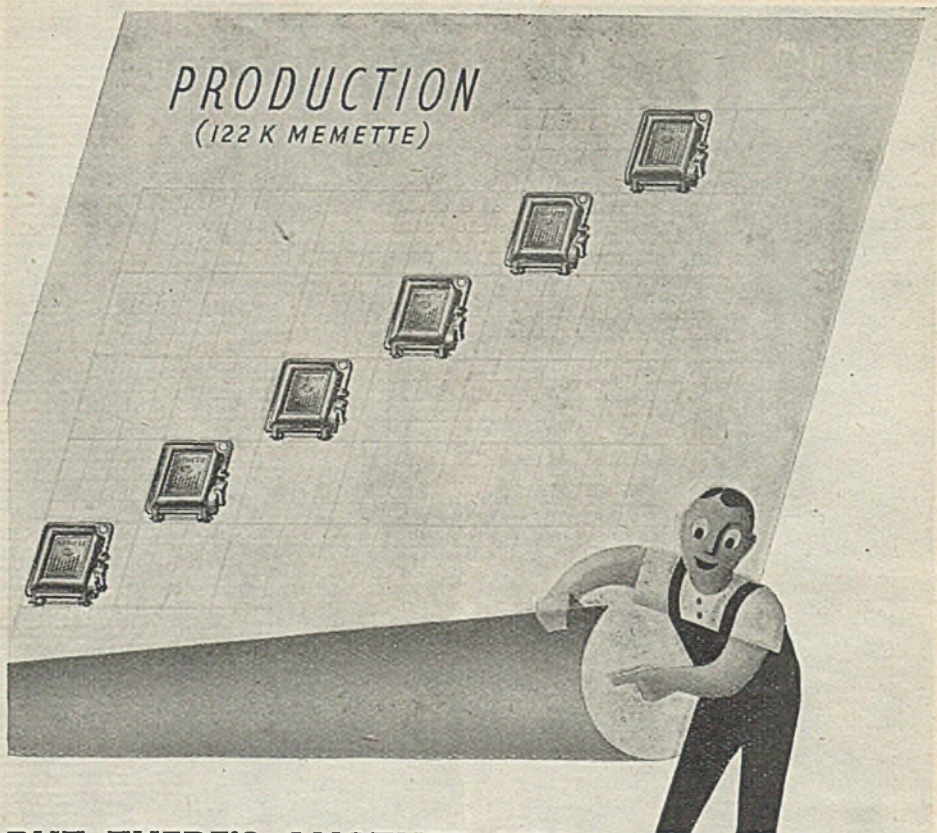
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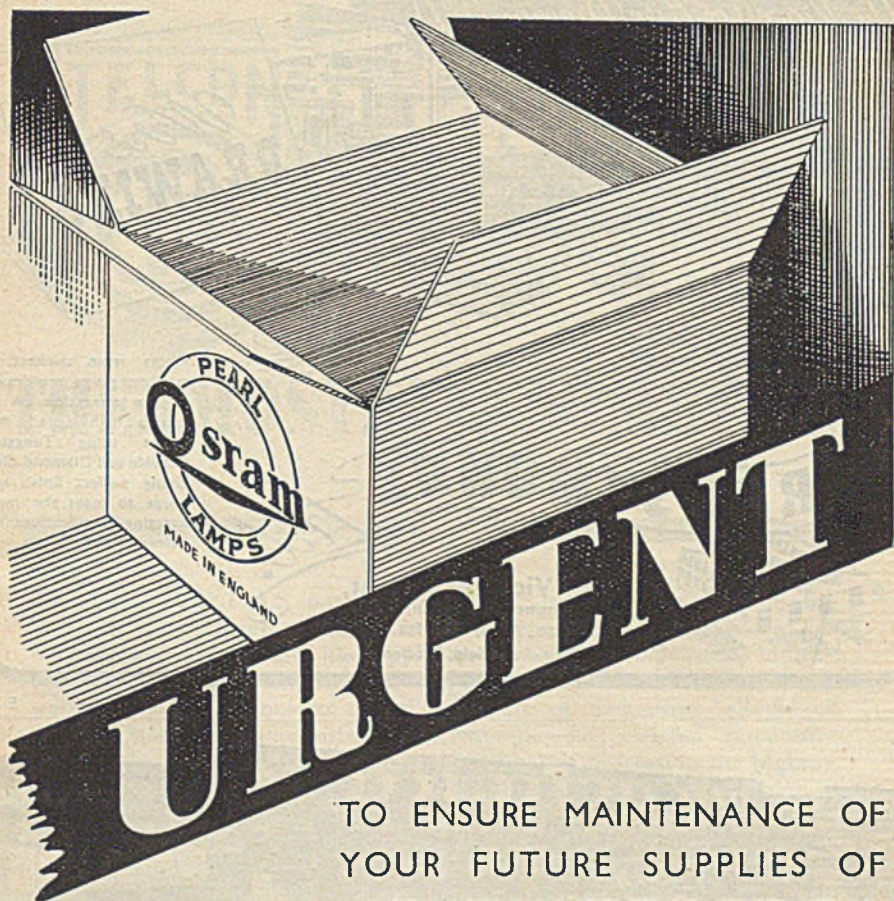
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or lose our ventures."

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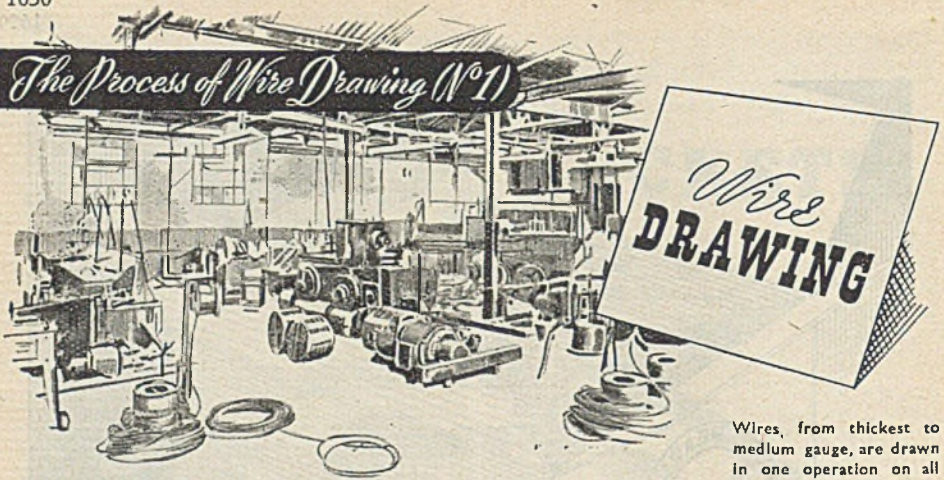
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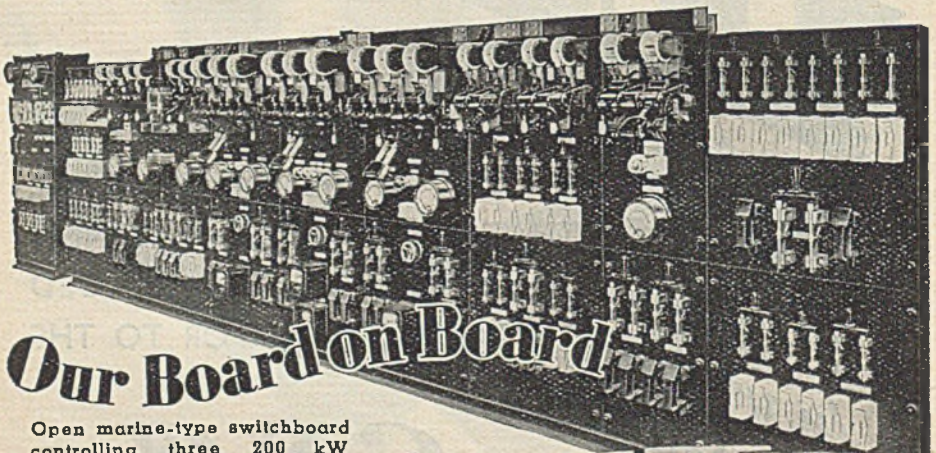
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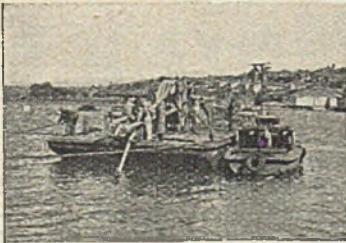
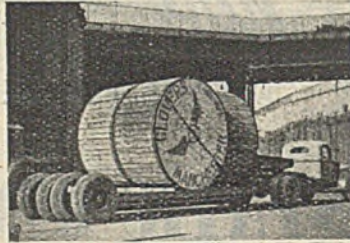
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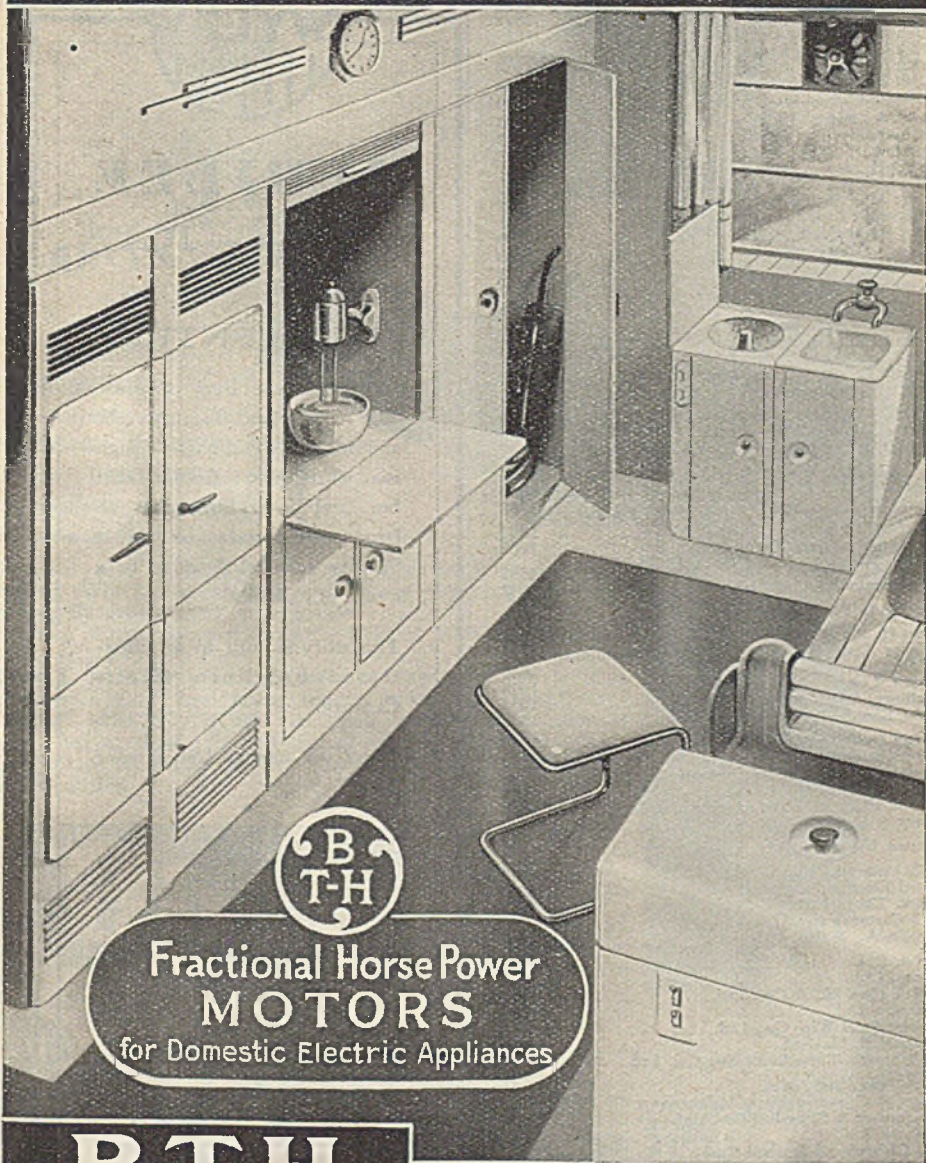
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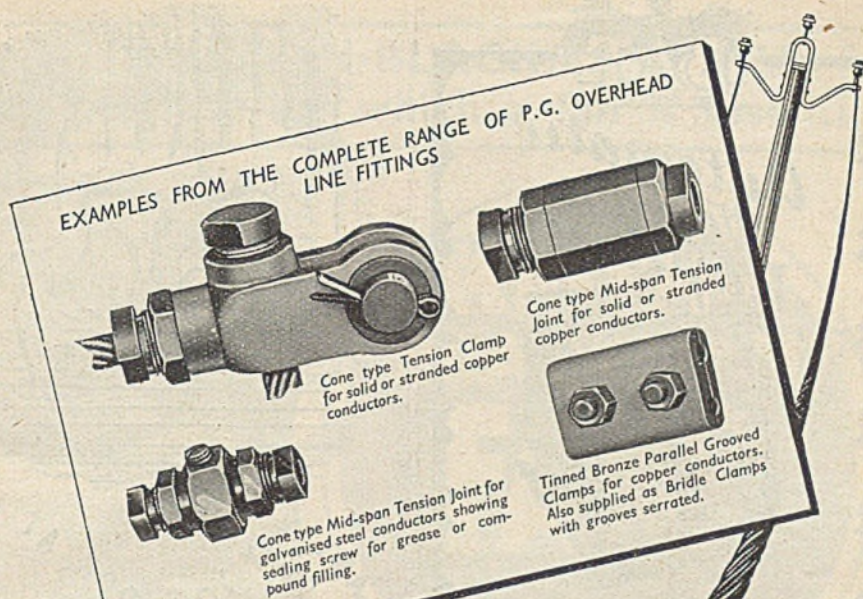
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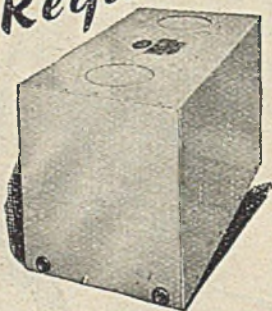
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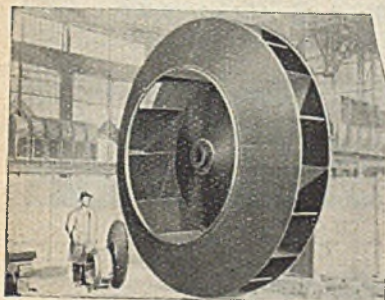
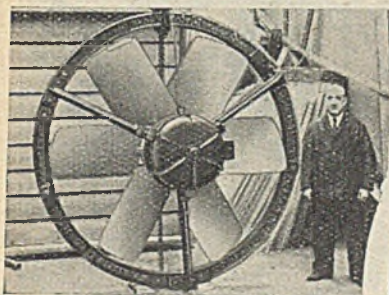
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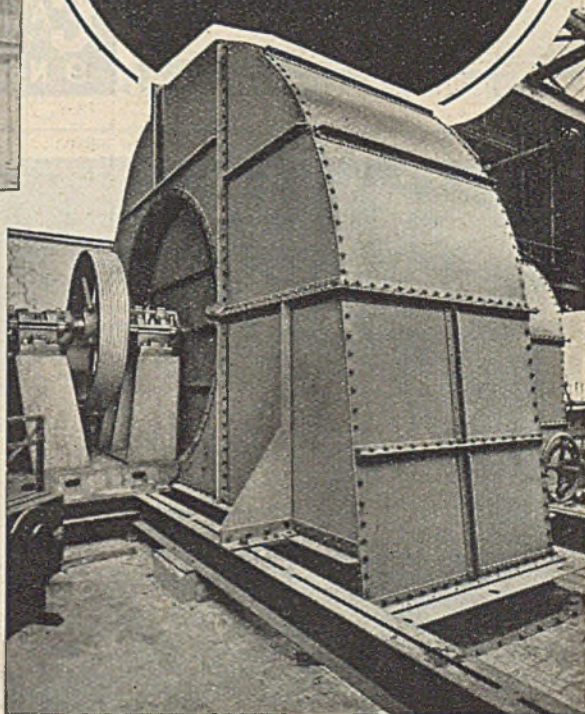
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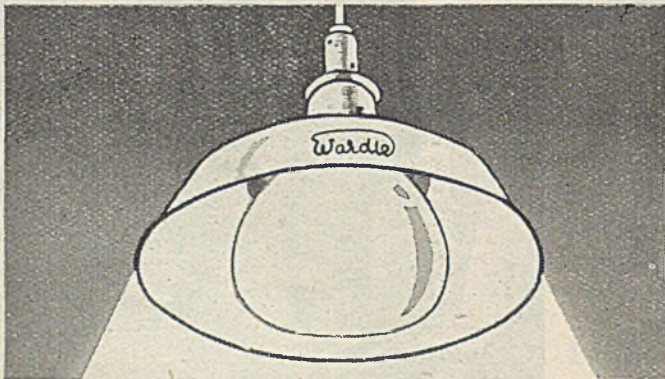
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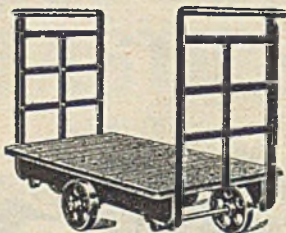
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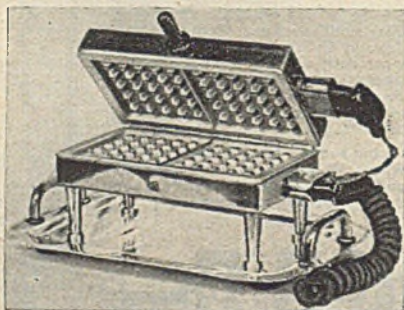
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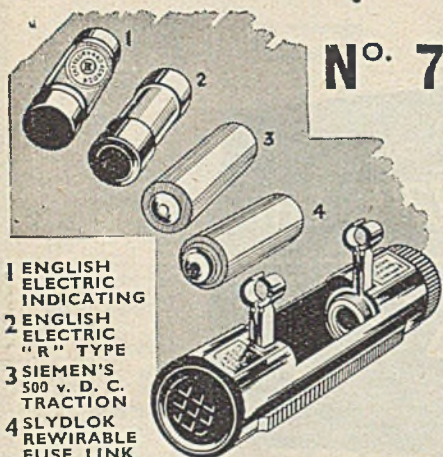
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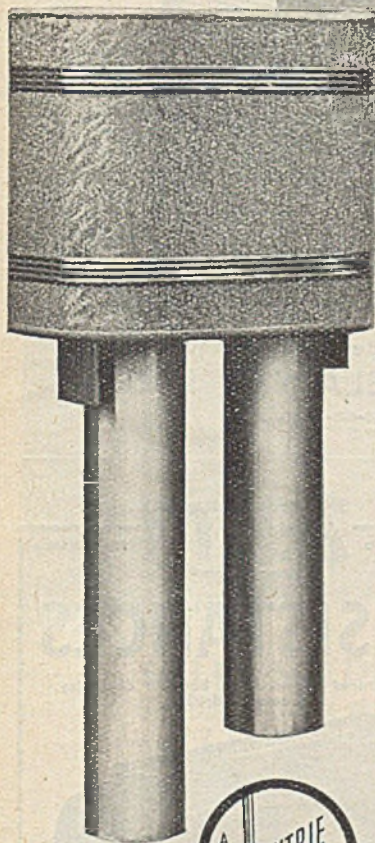
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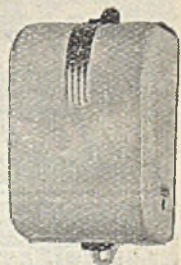
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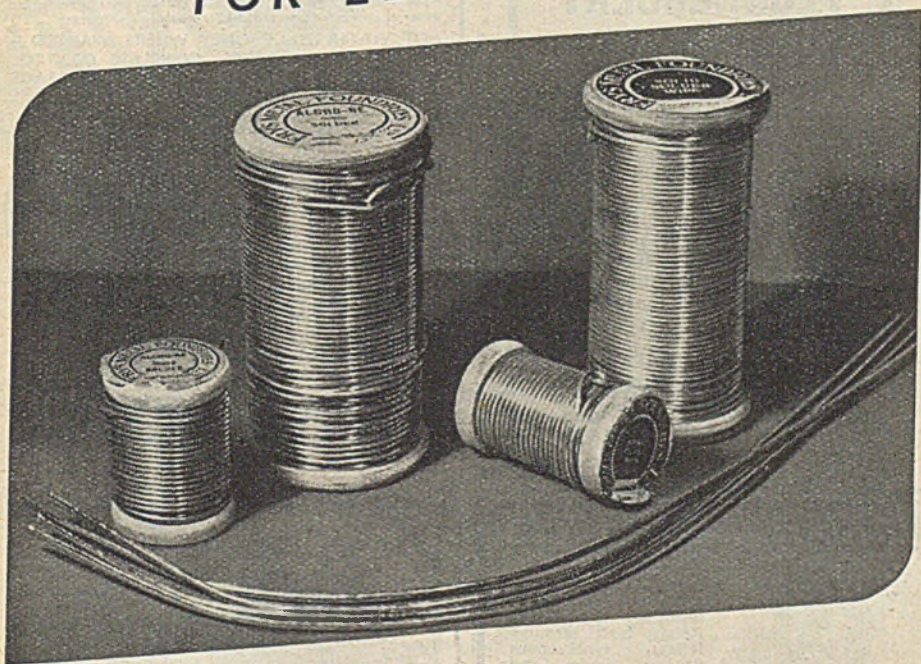
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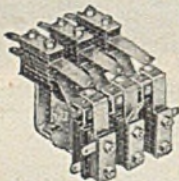
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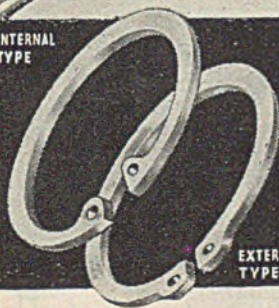
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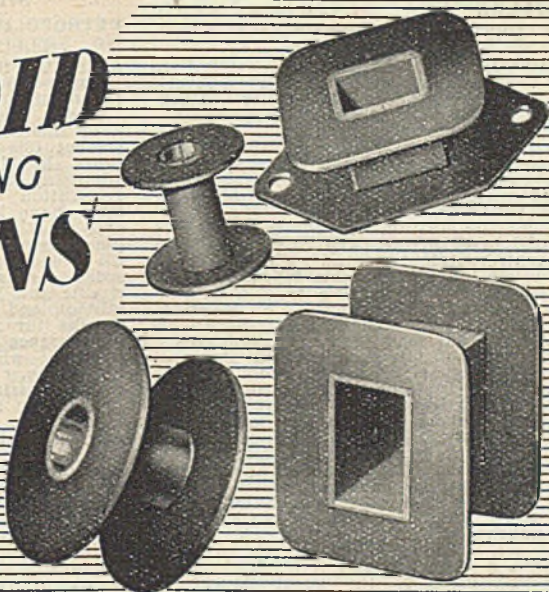
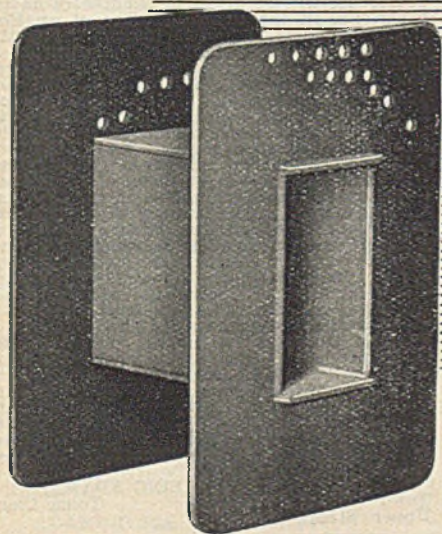
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SITUATIONS VACANT

LIVERPOOL EDUCATION COMMITTEE.—City Technical College, Byrom Street, Liverpool, 3. Principal: R. R. Butler, M.Sc., F.R.I.C.—The Committee invite applications for the appointment of a full-time Lecturer in the Department of Electrical Engineering. Applicants should possess a University Degree in Engineering, preferably including Telecommunications, and Corporate Membership of the Institution of Electrical Engineers is desirable. The position is a Senior Assistantship (£600 to £750), and will be subject to a 5 per cent. contribution under the Teachers' (Superannuation) Acts. Some teaching practice is desirable, and experience of City and Guilds Telecommunications Engineering Courses would be an advantage. Forms of Application and conditions of appointment may be obtained, on receipt of a stamped addressed foolscap envelope, from H. S. Magnay, M.A., Director of Education, 14, Sir Thomas Street, Liverpool 1, and applications should be received by him not later than Friday, 11th July, 1947. Candidates serving in H.M. Forces overseas may submit direct applications giving particulars of age, education, qualifications and experience, the number of their release group and the names of not more than three persons to whom the Local Education Authority may refer. Canvassing, either directly or indirectly, will be considered a disqualification.—W. H. Baines, Town Clerk, Clerk to the Local Education Authority.

BEDFORD CORPORATION ELECTRICITY UNDERTAKING.

APPOINTMENT OF GENERAL ENGINEERING DRAUGHTSMAN.

APPLICATIONS are invited for the above appointment. Candidates should have had previous experience in a Drawing Office associated with the layout and equipment of Generating Stations and Sub-stations, preferably with some experience of Building and Construction work.

Salary and Conditions of Service will be in accordance with Grade 9a, Class "H" of the National Joint Board Schedule, commencing at £365 per annum. The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Applications, containing full details of age, qualifications and experience, accompanied by copies of three testimonials, to be forwarded to the undersigned not later than Friday, 4th July, 1947. Canvassing, either directly or indirectly, will disqualify the candidates.

P. G. CAMPBELL, M.I.Mech.E., M.I.E.E.,
Chief Engineer and General Manager,
Electricity Offices,
Prebend Street, BEDFORD,
11th June, 1947.

ARMATURE WINDERS and Improvers wanted for General Repair Works, A.C. and D.C., Top Rates.—Phillips and Sons Electrical Ltd., 40, Waterford Road, S.W.6.

CAPABLE Electrical Alternator Designer required, thoroughly conversant with the design of modern engine driven alternators including all conditions requisite for satisfactory parallel running. State age, qualifications, previous experience and remuneration expected.—Box L.E.X., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

SITUATIONS VACANT

METROPOLITAN BOROUGH OF ISLINGTON.

ELECTRICITY DEPARTMENT.

APPLICATIONS are invited for the following permanent appointments:—

Technical Assistant.

Salary in accordance with Class G, Grade 7, of the National Joint Board Schedule, at present £518 14s.—£550 4s. per annum. Applicants should possess technical qualifications admitting to Corporate Membership of the Institution of Electrical Engineers, and must have had a sound technical training and practical experience in the technical planning associated with the development of an Electricity Supply Undertaking, with special reference to the preparation of short circuit and loading diagrams for new transmission and distribution systems and specifications for switchgear transformers, etc.

Preference would be given to applicants under 35 who hold a degree in a British University.

Mains Assistant Engineer.

Salary in accordance with Class G, Grade 7, £518 14s. rising to £550 4s. per annum. Applicants should have experience in the laying, jointing and maintenance of E.H.T., H.T. and Low Tension Underground Mains and Static Sub-stations. Applicants must be capable of taking stand-by duty in turn and preference will be given to Corporate Members of the Institution of Electrical Engineers.

Mains Draughtsman.

Salary in accordance with Class G, Grade 9, at present £399—£414 15s. per annum. Preference will be given to candidates having experience in the Drawing Office of an Electricity Undertaking. The person appointed will be responsible for the preparation of drawings and estimates required for the development of a large E.H.T., H.T., and Low Tension Distribution System. Some knowledge of building construction, with special reference to sub-stations and cable drawpits, will be an advantage.

Each of the above permanent appointments will be subject to the provisions of the Local Government Superannuation Acts, 1937 and 1939, and to a satisfactory medical examination. Candidates are required to disclose in writing, whether to their knowledge they are related to any member, or holder of any senior office under the Council. Canvassing, either directly or indirectly, will be a disqualification. The Council are unable to make any arrangements for the provision of housing accommodation for the successful candidates.

Application forms for the above positions may be obtained from the Engineer and General Manager, Electricity Department, 341/343, Holloway Road, N.7, and should be completed and returned to him, endorsed appropriately, not later than noon on Wednesday, 2nd July, 1947.

W. ERIC ADAMS,
Town Hall, Town Clerk.
Upper Street, N.1.

COUNTY BOROUGH OF BRIGHTON.

ELECTRICITY DEPARTMENT.

Meter Testers.

THERE are vacancies for two Meter Testers. Duties, Wages and working conditions will be in accordance with the N.J.I.C. Agreement for Manual Workers in the Electricity Supply Industry, present rate 2s. 6d. per hour for a 47-hour week.

Applications must be received by Mr. H. Pryce-Jones, M.Eng., Engineer and Manager, Brighton Corporation Electricity Department, Electric House, Castle Square, Brighton, not later than Monday, the 7th July, 1947.

Town Hall,
BRIGHTON, 1.

J. G. DREW,
Town Clerk.

SITUATIONS VACANT

MANCHESTER MUNICIPAL COLLEGE OF TECHNOLOGY.

(Faculty of Technology in the University of Manchester.)

APPOINTMENT OF LECTURER IN ELECTRICAL ENGINEERING.

THE Governing Body invites applications for a Lectureship in Electrical Engineering, with the title and status of Lecturer in the University of Manchester.

Candidates should have had experience of modern radio communication work, and will be expected to initiate and supervise research in this subject.

Present salary scale: £550 per annum, rising by annual increments of £20 to £725 per annum. Commencing salary according to qualifications.

Conditions of appointment and form of application may be obtained from The Registrar, College of Technology, Manchester, 1. The last day for the receipt of applications is **Thursday, 3rd July, 1947.**

Canvassing, either directly or indirectly, will disqualify a candidate for appointment.

J. E. MYERS,
Principal of the College.

SENIOR DEVELOPMENT ASSISTANT.

APPLICATIONS are invited for the appointment on the permanent establishment of "Senior Development Assistant" at a salary in accordance with Class H, Grade 5 (present scale £620-£641), of the N.J.B. Schedule. The successful applicant will be required to act as the Personal Assistant to the Planning and Development Superintendent.

Applicants must be of good address and education, with a thorough knowledge of electrical engineering. They must also have had commercial experience, a knowledge of installation work and tendering and a practical knowledge of the application of electricity to domestic and industrial purposes.

The post is subject to the conditions of service as set out in the N.J.B. Schedule, and is also subject to the provisions of the Local Government Superannuation Act, 1937. It will be necessary for the successful applicant to pass a medical examination.

Applications by letter, stating age, qualifications, experience and present appointment, with copies of two recent testimonials, to be sent to me not later than July 5th, 1947.

Any relationship to members of the Norwich City Council or its Staff must be disclosed in the application. Failure to do so will be a disqualification.

JOHN A. SUMNER, M.I.E.E., M.I.Mech.E.,

F.I.A.

City Electrical Engineer.

4, Duke Street, NORWICH.

7th June, 1947.

CAMBRIDGE UNIVERSITY.
ENGINEERING DEPARTMENT.

THE Vice-Chancellor gives notice that the Appointments Committee of the Faculty of Engineering intend to appoint several University Lecturers and University Demonstrators in Engineering. The appointments will be subject to the Statutes and Ordinances of the University. Further particulars and forms of application may be obtained from the Secretary of the Appointments Committee, Engineering Laboratory, Cambridge, to whom applications should be sent so as to reach him by Monday, 7th July, 1947.

TELEVISION Engineer for complete installations. Able to drive. Good wages and prospects. Norwest Services Limited, 1/3, Edgwarebury Lane, Edgware.

SITUATIONS VACANT

BOROUGH OF ACCRINGTON.
ELECTRICITY DEPARTMENT.

Appointment of Installation Inspector.

APPLICATIONS are invited for the above appointment. Candidates must have had experience in a similar position, must possess the Higher National Certificate in Electrical Engineering and be fully acquainted with the Regulations governing all types of electrical installations.

The salary and conditions of employment will be in accordance with the N.J.B. Schedule, Class F, Grade 8a, at present £413 per annum (inclusive of bonus). The appointment is subject to the Local Government Superannuation Act, 1937, and to a medical examination.

Applications, stating age, qualifications and experience, together with copies of three recent testimonials, should be forwarded to me not later than Tuesday, the 8th July, 1947.

Canvassing will be a disqualification.

P. D. WADSWORTH,
Town Clerk.

North Hall,
ACCRINGTON.
June, 1947.

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FLUORESCENT and Industrial Light Fittings with Protectafil Shock Absorber, Starter Switches, Chokes, Mains Transformers, Immersion Heaters, 1 1/2 and 3 Gall. Storage Heaters, Door Chimes, Wood Switch Blocks, Fire Bars, Pear Switches, 2 way Light and Heat Adaptors, Batteries. Send for list.—J. E. Wildbore, 26, Marlborough Street, Oldham.

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JUNCTION Electric Irons, superior design and quality, supplied with suitable stand. Also Junction Nickel plated Torch Cases. Supplied for home trade and export. Also large selection of household electrical appliances. Fires, Radiators, other electric 'cons. Toasters, Table Lamps, Torch cases. Dry batteries, etc. Vacuum Cleaners, various makes. Fluorescent fittings good variety with fluorescent tubes, wash boilers, actually in stock. Please write for full list.—Brooks & Bohm, Ltd., 90, Victoria Street, London, S.W.1. Tele: Vic 9550/1441.

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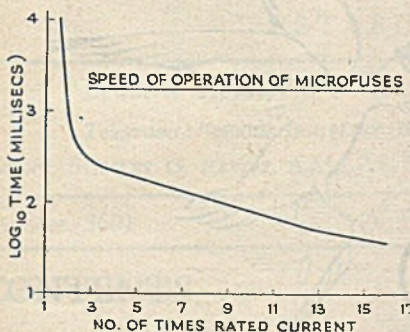
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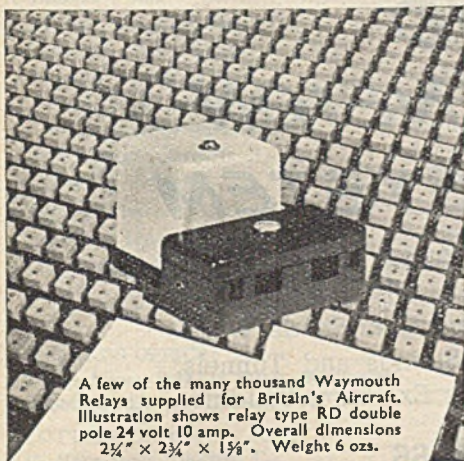
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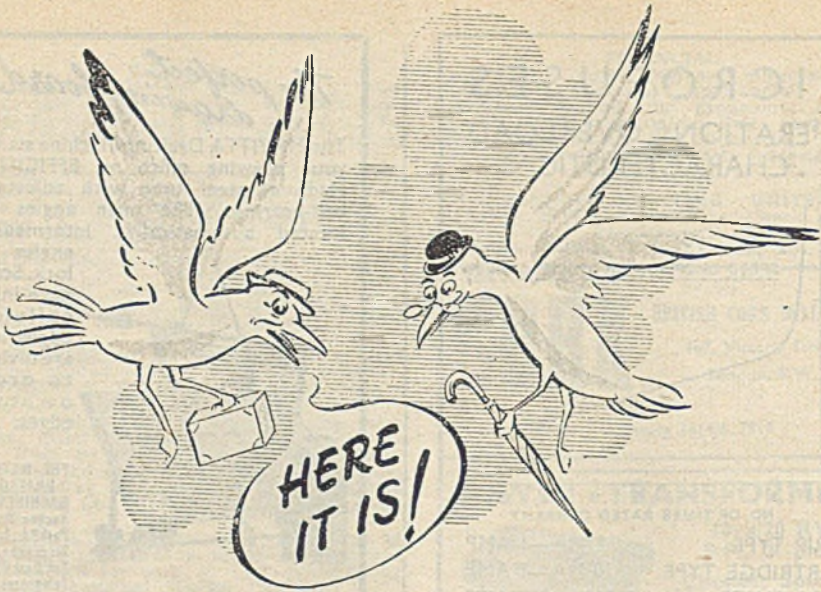
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Supply Outlook

THIS time last year the supply industry was largely in ignorance of the prospects facing it under the nationalisation plan, and hope was high that the Minister of Fuel and Power would at the I.M.E.A. Convention at Blackpool say something of a constructive nature. In the twelve months that have gone by the position has become clearer, the Electricity Bill has been published, an Organising Committee has been set up to prepare the industry for state-ownership; and whether one agrees with the proposals or not, there seems little doubt that nationalisation of the industry will become law within a matter of months.

In the same year the deficiency in generating capacity has become more marked, the industry has faced a coal crisis of a type never before experienced, and it is to-day attempting to build up coal stocks from summer delivery to a volume which will enable it to weather the storms which will come its way next winter. During this time overage generating plant has grown older, extensions have not been completed as quickly as was hoped, shortages in electrical steels and other materials are delaying the manufacture of new plant, and production in many cases is held up by the lack of some essential part. As depressing as the circumstances may be, the supply industry is, however, still holding its own and is determined that from the present difficulties it will build up an efficiency even richer in service than that offered in the days when

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cooker, water heater and other loads were not only accepted but were invited at much reduced tariffs. The supply engineer is intensely enthusiastic for the industry and possessed of a loyalty which will ensure success, no matter what the future may hold. The administration of the industry may alter in the next few months, the industry may be reorganised in such a way that it may operate under area boards and district councils responsible to a single authority, but the personnel of the industry have during the last year made it clear that supply will at all costs be directed technically with the same skill and determination as now.

Profit from Experience

FROM the point of view of advancement and from the standpoint of technical leadership the supply industry of this country bears more than favourable comparison with that of any other, and although at the present time it is suffering many inconveniences from shortages of generating plant, unsuitable fuel and so on, it is by that experience gaining operational knowledge which will, no doubt, stand it in good stead, and in solving problems which are unique in their solutions, thereby building up experience which in years to come may prove particularly valuable. A case in point was raised by Mr. W. C. PARKER, of Fulham, in *THE ELECTRICIAN* of April 4 last, and though such experiences may at the moment be accepted with mixed feelings, viewed in the light of the future, they may yet result in a train of thought which will lead to even further technical advances.

The Bournemouth Convention

THE Incorporated Municipal Electrical Association will next week hold its Annual Convention at Bournemouth, where, in addition to the usual business sessions, an exhibition of no small dimensions will also be held. The last time I.M.E.A. delegates visited Bournemouth was in 1935 when the National Electrical Convention was staged and, although the prospects facing the industry are greatly changed since those days, next week's meeting will, no doubt, be as enthusiastic as any that has gone before. The programme this year includes two papers, in addition to the Presidential Address, and both

have a direct bearing on the future of electricity supply; the first by Mr. F. W. LAWTON, of Birmingham, will review power station progress, and the second by Mr. R. BIRR, of Ealing, will deal with the legislation affecting the supply industry. In view of the anticipated changes in the administration of the industry and the programme of new building to which the industry is committed, both papers will, it is anticipated, provoke a good deal of discussion.

I.M.E.A. Report

THE report of the I.M.E.A. Council on their stewardship during the past year makes interesting reading in that there is in it much which bears upon the Electricity Bill and much which reflects the association's reactions to the proposals. The year has, as all who are connected with electricity supply will appreciate, included duties which no Council of other days has been called upon to perform and the attendance register at meetings given in the report, shows how conscientiously members have undertaken their responsibilities. A difficult year lies ahead which may culminate in a reorganisation of the association, for it is evident from the provisions of the Electricity Bill that as at present constituted the association will not be able to function. The Council has given serious thought to the future and will in due course submit recommendations for consideration in general meeting. What those recommendations might be will no doubt be the subject of individual discussion during the Convention at Bournemouth next week, while they may too be referred to at the annual meeting next Friday. In any case, the experience which the association has behind it must, if at all possible, be kept at the disposal of the industry.

Two Interesting Undertakings

TWO electricity undertakings which will be associated with next week's I.M.E.A. Convention are, first, that at Dumfries, for which the association president, Mr. J. S. PICKLES, is responsible, and second, the Bournemouth and Poole E.S. Co., Ltd., who have expressed a willingness for delegates to visit the site where reclamation work is in progress for the building of the 200 MW station at Poole Harbour. From the descriptions

given in this issue of both undertakings, it will be appreciated that each has much to interest not only the supply engineer, but also those laymen who serve the municipal side of the industry as committee men and in other public offices. The Dumfries undertaking will be of special interest to those responsible for the development of rural areas, for Mr. PICKLES has built up a network which differs in many respects from any other. As to the Poole Harbour station, the civil engineering work now going on represents an engineering achievement of outstanding example, and though the site in its present state may bear little resemblance to that of a power station, it at any rate shows a phase in the building of a station which few have the opportunity of seeing, and indicates, too, the amount of engineering work which, when a power station is completed, is hidden from view.

Birthday Honours

THE list of Birthday Honours published last week contained a number of names well-known in the electrical industry, though many we had hoped to see were absent. To mention by name any particular recipient of an award for purposes of comment would not only be difficult but unjustified, for all in their own ways are equally deserving of selection. The complete list of personalities whose names are associated with the industry and its development is given elsewhere in this issue, and readers will join with us in extending to them congratulations and good wishes. Bearing in mind that the number of awards must be limited if their honour is to be preserved at the present high standard, the list is both representative of, and complimentary to, the industry.

"Margins of Error"

IN THE *ELECTRICIAN* of June 6, reference was made to the official coal output figures issued by the Ministry of Fuel, and doubt was expressed of their value in that the figures include dirt which is mined with the coal. Questioned on the matter last week, Mr. SHINWELL said that the weekly output figures of current coal output were normally given in his Ministry's monthly Press announcement. Provisional estimates of coal output had recently been given at weekly

intervals because of the public interest in the effect on output of the five-day week. Provisional estimates of this kind, he said, were, however, subject to considerable margins of error, and it was not proposed to continue to publish them regularly.

A Unique Company Meeting?

AN example which might be followed with advantage was set last week by the B. I. Callender's Co., Ltd., when shareholders attending the annual meeting in Liverpool were invited to visit the Prescott works. The idea was conceived by Sir ALEXANDER ROGER, chair of the company, and the invitation was sent out with his statement of accounts. So popular was it, and so many were the acceptances, that the accommodation at the Adelphi Hotel, where the meeting was to have been held, proved inadequate; the meeting had to be postponed and eleven double-decker 'buses conveyed the assembly to Prescott. The largest marquee available in Liverpool was erected at short notice on the company's sports ground and there the meeting was held later in the day, followed by luncheon. The shareholders, who numbered about 500, then made a conducted tour round the works and exchanged greetings with the operatives. The shareholders were as favourably impressed with the meeting as were the works people, as Sir ALEXANDER knew they would be, and the relationship between Capital and Labour was further enhanced thereby.

Mr. Shinwell at Leyton

THE civic luncheon at Leyton last Saturday was officially a dual function, being both the jubilee celebration, postponed from September last year, and the official opening of new electricity showrooms and a service centre in the High Road. The presence of the Minister of Fuel and Power as guest of honour and the recent passage of the Electricity Bill, more or less unscathed, through the Committee stage suggested in fact, a third aspect, that of a preliminary handing-over ceremony to the forthcoming B.E.A. Mr. SHINWELL, whose remarks on this occasion were pointedly discreet, forecast that with goodwill the Bill would become law before the Recess.

Portrait—Mr. J. S. Pickles

In view of the fact that the Incorporated Municipal Electrical Association will next week meet at Bournemouth for its annual convention, the following biographical details concerning the President are of interest.

Mr. Pickles, as the notes below show, has had a wide experience of electricity supply in rural areas and in his present capacity, as county electrical engineer, Dumfries, he is responsible for an area of upwards of 1 000 square miles. As an indication of some of the exemplary work carried out under his ad-



ministration, we give in this issue a brief description of the Dumfries network. When, in 1929, statutory powers for the distribution of electricity were granted to Dumfriesshire, something of a record was made, for it is believed to be the first case of a county council taking out and operating an Order.

THIS year's President of the Incorporated Municipal Electrical Association has had the distinction of presiding over the affairs of the I.M.E.A. during a time when nationalisation has occupied much of the attention of the supply industry. During his term of office publication has been given to the Electricity Bill, the industry has been subjected to fuel restrictions as a result of the coal shortage, and other problems never presented to his predecessors have punctuated his year of presidency.

The President has for many years shown a special interest in the electrification of rural areas, and his initiative in the matter is clearly demonstrated in the description in this issue of his undertaking. His work in this connection is well-known to members of the Institution of Electrical Engineers, and in 1937 and again in 1946, he contributed papers on the subject to that body. Another outlet for his knowledge and experience has been the B.B.C., for among his activities has been the giving of broadcast talks.

Mr. John S. Pickles, as most readers will know, is the county electrical engineer at Dumfries, and was elected president of the I.M.E.A. last year.

He took his B.Sc. degree at Manchester

University in 1921, after demobilisation from the R.A.F. and joined the Yorkshire Electric Power Company, where he remained until 1931. In that year he was appointed to his present post as county electrical engineer, Dumfries, where he has been responsible for an outstanding scheme of rural electrification, covering the entire county of Dumfries, an area of upwards of 1 000 square miles.

He is a member of the Institution of Electrical Engineers, was chairman of the Scottish Centre of the I.M.E.A. from 1939 to 1941, and chairman of the same Centre of the British Electrical Development Association in 1942 and 1943.

The supply area in his charge has been visited by many well-known personalities in the industry, and all have been impressed by what they have seen. In a broadcast talk in the Scottish Home Service last November he gave a commendable description of how electricity can serve the farmer, taking his listeners on a word tour through the farmhouse, the barn, the byre and dairy, and finally discussing field work.

As relaxation from his many electrical activities Mr. Pickles plays cricket and golf and is also a keen and enthusiastic gardener.

The Dumfries Rural Network

The I.M.E.A. President's Local Undertaking

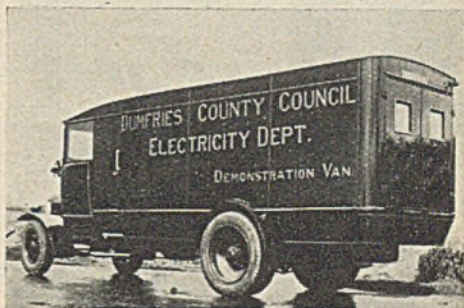
AS the pen portrait of Mr. J. S. Pickles on another page makes clear, this year's I.M.E.A. President is one of the country's authorities on rural electrification. Since 1931, he has been county electrical engineer of Dumfriesshire, where he is responsible for a rural network extending over an area of more than 1 000 square miles. A brief description of this undertaking will, therefore, be of interest.

Up to 1929, no statutory powers for the distribution of electricity in Dumfriesshire had been sought by any authority, and the County Council's decision to embark on a distribution scheme throughout their area was the first case of a County Council taking out and operating an Order. Apart from the neighbouring County Council of Kirkcudbrightshire, which has since taken out a similar Order, it remains unique.

An early stage, the Council decided that supplies should be given without any contribution towards capital cost and without the imposition on the consumer of a guaranteed minimum revenue. This bold step, intended to overcome one of the principal stumbling blocks to development, has so far been justified by results. It was also agreed that the same tariff should apply throughout the area. The present rates, which have remained practically unchanged since commencement are 5s. per room for dwelling-houses, and 7s. 6d. per room for farms, both with a fixed running charge of 3d. per unit. Practically

the whole of domestic sales are accounted for by consumers on these rates.

The growth of the load has been encouraged by full facilities for wiring



Petrol-electric demonstration van

premises and the hire-purchase of apparatus. Advice and assistance have been made freely available to prospective consumers, and the co-operative nature of the scheme has been stressed throughout.

The Dumfriesshire distribution scheme is impressive. The Council purchases a bulk supply from the Central Board at Dumfries and Gretna. From these two points, an extensive overhead distribution system, comprising 382 miles of 33 kV and 11 kV transmission lines, connects up all the principal towns and villages. Branching from these main lines are other 11 kV spur lines of a total length of 245 miles, feeding the smaller villages, hamlets and isolated consumers such as farms and country houses. There are 45 indoor sub-stations in the larger centres of population, and no less than 972 pole-type transformer sub-stations in the country districts. From these radiate a further 213 miles of low-pressure mains to the actual users. This makes in all a total of 840 miles of mains, of which only 36 miles are underground. It is worth mentioning that all the consents from landowners for the erection of those cross-country lines were given willingly and at nominal rentals.

The present area of supply is



Typical under-eave distribution mains for agricultural workers cottages

1 070 square miles in extent, and contains a population (1931 census) of slightly over 58 000. Some 24 000 of these live in six small burghs and twelve principal villages, the remainder living in smaller villages and hamlets and in isolated farms and houses scattered over the countryside.

There are 14 176 occupied dwelling houses, and the total possible number of



15 kVA pole-type transformer equipment for supply to farms

consumers is slightly over 15 000. The area, of course, is almost entirely agricultural in character, with associated industry in the form of a few creameries, sawmills, quarries and grain mills.

Against this factual background, the magnitude of the scheme which has been carried out can be measured.

To-day, a general supply has been established in every town, village and hamlet in the area, comprising 6 burghs, 91 villages (with one not supplied for special reasons) and 16 hamlets. Already 9 620 of the 11 700 premises (82 per cent.) in these places have been connected to the supply, and mains pass the thresholds of all the remainder. In those areas without any communal centre, the percentage, as would be expected, is somewhat lower. Here, there are 2 418 out of 4 700 premises (48 per cent.) already on supply.

Over all, therefore, there are 12 000 consumers, or practically 80 per cent. of the possible maximum, and a supply is immediately available to at least a further 10 per cent.

The standard of electrical development

within consumers' premises will compare favourably with any area, rural or urban, in Great Britain. Amongst the 10 000 or so dwelling-houses connected, 4 925 use electric cookers and 4 228 either water-heaters or wash-boilers. Domestic use alone, excluding any industrial consumption, is 450 units per head per annum, a figure which, Mr. Pickles admits, has greatly exceeded expectations.

Electrification on the farms has been encouraging. Of 1 321 holdings of above 50 acres, 798 are now supplied, practically all having been connected free of capital contribution and on a uniform tariff. Of these, 559 are using electric motors for various purposes, including 390 milking machines and 417 bruisers and threshers. In addition, 201 farms have electric steam raisers in the dairies.

In a persuasive broadcast to Scottish farmers last year Mr. Pickles gave typical figures for farm expenditure. "First," he said, "there are the smallholdings, very few of which pay more than £15 a year, and most considerably less. Then there are the hill farms which average about £20. Next come the mixed farms, mainly rearing stock, all using barn motors and showing a figure of £26 a year. Finally, a representative number of well-equipped dairy farms, which show a cost for electricity of £46 per farm."

"These costs," Mr. Pickles concluded, "will be sufficient to show that, compared with the total working expenses of the farm, the probable cost of electricity, even with the most liberal use, is still much less than a boy's wages."

The total capital cost of the Dumfriesshire scheme is now over £600 000. At the time of its inception, the Council was prepared to meet deficiencies from the local rates, especially on account of the decision to give all supplies without requiring capital contributions. After 14 years' working, no loss has occurred; all the financial obligations have been completely met out of revenue, and no cost has fallen on the rate fund. There is, it is true, an annual grant amounting to approximately £3 500 for a period of 15 years. This was of assistance in the early stages of the scheme, but over the whole period the aggregate amount will represent less than 3 per cent. of total revenue.

Despite vastly increased costs, Mr. Pickles is confident that ways and means will be found of connecting up a large proportion of the remaining possible consumers in the area on favourable terms. Even as it stands, the Dumfriesshire scheme is a monument to the far-sighted and progressive spirit both of the County Council and its Electrical Engineer.

At Bournemouth Next Week

Brief Biographies of the I.M.E.A. Authors — The — Vice-President —



MR. F. W. LAWTON

THE author of the first paper to be read at the Convention of the Incorporated Municipal Electrical Association at Bournemouth next week, will be Mr. F. W. Lawton, chief engineer and manager, Birmingham Electric Supply Department, who will

speak on the subject of "Some Recent Developments in Power Station Practice."

Mr. Lawton's association with the Birmingham Corporation is of long standing, and he was appointed to his present position in 1944. In addition to membership of the I.E.E. and the Institution of Mechanical Engineers, he holds an honours diploma in engineering and the full technological certificate of the City and Guilds Institute. He has been chairman of the South Midlands Centre of the I.E.E. and is now President of the Birmingham Electric Club and of the Midlands Branch of the Junior Institution of Engineers. He was awarded the Ayrton Premium of the I.E.E. for his paper on the Hams Hall Station. He is a member of the I.M.E.A. Council.

The second paper will be by Mr. R. Birt, borough electrical engineer, Ealing, who will speak on "The Law Relating to Electricity Supply."

Mr. Ronald Birt, who is a Gloucestershire man, received his technical education at the Battersea Polytechnic, and gained his B.Sc. Degree at London University. His practical training was obtained with the British Thomson-Houston Co. at Rugby. After completing his training he was appointed junior assistant electrical engineer with the Ayrshire Electricity Board. In 1926 he became junior assistant electrical engineer to the Borough of Ealing electricity department, was promoted chief assistant and deputy in March, 1932, and borough electrical engineer and manager in Janu-

ary, 1934, which position he still holds. He is a member of the Honourable Society of the Middle Temple, having been called to the Bar in January, 1939. He is also a fellow of the Chartered Institute of Secretaries.

The vice-president of the association is Mr. J. Eccles, city electrical engineer, Liverpool, whose name has recently been in the news in connection with his appointment as a member of the Organising Committee. After obtaining a B.Sc. degree in engineering in 1922, Mr. Eccles went to the Metropolitan-Vickers Electrical Co., Ltd., and after two years' post-graduate training specialised in outside construction work, becoming assistant constructional engineer for Scotland. In 1928 he went to Edinburgh Corporation as senior technical assistant and after holding various positions in the electricity department, was appointed engineer and manager of the undertaking in 1940. Four years later he succeeded the late Mr. P. J. Robinson at Liverpool.

Among the social activities of the Convention, a sea trip round the Isle of Wight, coach trips to Cheddar and Wells, to Swanage and Corfe Castle and to the New Forest will compete with the Golf Competition for the G. P. Dennis Trophy in aid of the I.E.E. Benevolent Fund. The competition will be held on the Queen's Park Links and will be open to all in possession of the Convention registration card or badge. The competition will be medal play on the handicaps adjusted under the National Handicapping Scheme and can be played in from the afternoon of June 21 until 5 p.m. June 26, by which time all cards must be returned.

The chief speaker at the banquet on June 26 will be Prof. J. D. Cockcroft, who, in addition to being a physicist, is also an electrical engineer.



MR. R. BIRT

MR. J. ECCLES,
president-elect of the
I.M.E.A.

I.M.E.A. EXHIBITION—1947

DELEGATES who visit the Convention exhibition in the Majestic House Garage during the course of the week will see, on the stands of many of the 69 exhibitors, some apparatus with which they have long been familiar and some which is entirely new, or which had reached only the prototype stage at the Blackpool exhibition, last year. The exhibits range from small domestic appliances to rural distribution transformers and heavy switchgear.

Opening Ceremony

The exhibition will be open from 10 a.m. to 6 p.m. from Monday to Friday, and on two days the general public will be admitted. Mr. Pickles, president of the I.M.E.A., will perform the official opening

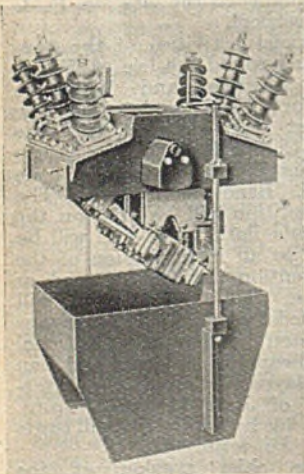


ceremony on Monday afternoon.

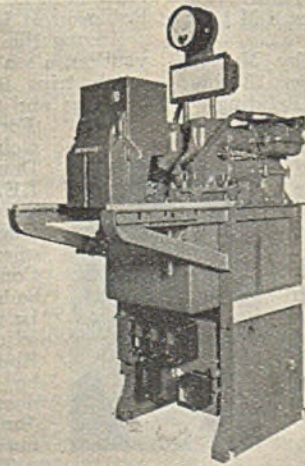
Aidas Electric, Ltd.

A selection of domestic water-heating appliances includes the "Aidas" "Circoil" heating unit, a device for utilising part of the heat normally wasted in the flues of solid fuel heating stoves. An associated apparatus is the type "C.E.L.,"

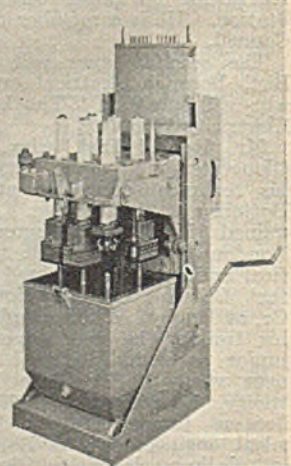
coal-electric water heater, a 30 gall. dual-purpose model designed for either wall- or floor-mounting and fitted with flow and return connections for attachment to a solid fuel boiler. The now well-known "U.B.D." contains two heaters in one to give a hot water supply for both kitchen and bathroom. A smaller type is the flat three gall. "Sadia," a small free outlet heater designed for the modern kitchen.



A pole-mounting circuit breaker made by Johnson and Phillips



A "Class C" switchgear panel manufactured by A. Reyrolle and Co., Ltd.



Crompton - Parkinson oil-circuit breaker, with tank lowered

Automatic Light Controlling Co., Ltd.

Tune switches of 5-50 A capacity, from the small domestic type to heavy mercury-break switches in watertight housings, are currently being made by this company. A switch designed for public street-lighting control, known as the "GF" type, and available with either clockwork or motor drive, may be used for circuits of up to 10 A at 200/250 V. It is available with a solar dial, a semi-solar dial which switches the lamp on at sunset and off at some pre-arranged time, and includes a hand-control. Process timers and time delays are among the company's other products.

Automatic Telephone & Electric Co., Ltd.

Their now well-known "Rhythmic" centralised control equipment for distribution networks permits apparatus connected to the supply to be switched by means of control currents injected on to the same conductors as those which carry the current the apparatus is using. Delegates to the I.M.E.A. Convention who visit the exhibition will see an illuminated map showing the location of important installations throughout the country on which, by using a standard control panel and relays, whole areas can be switched on or off at will. This particular application serves to illustrate the speed and simplicity with which the system can shed load at peak periods; switch street lamps on, off or half-off and switch change-over tariff meters and the like. The company also makes equipment for the supervisory control, indication and metering from a distant or central point of power networks, some of which may be seen in operation on a mosaic wall diagram operated from a miniature control desk.

Backer Electric Co., Ltd.

A new eight in. open tube radiant hot plate has been introduced, combining a variable simmering load, and another development is a composite grill and boiling plate. The company is also manufac-

turing air- and water-heating elements, including tubular elements for industrial use or for heavy duty cooking requirements.

H. J. Baldwin and Co., Ltd.

This company manufactures apex, arched and flat type cable protection covers, together with a selection of other products of interest to the distribution engineer, including stoneware conduits, troughing, stay blocks and marker posts. A feature of their latest cable protection cover is that, whilst the self-locking device fulfils its purpose efficiently, there is also provision for the additional use of galvanised metal staples, which ensure a more positive interlock. Among their other products, the company makes "Thermat" electric blankets and pads, for which an improved heat control has recently been adopted. A new process renders the fabric fireproof.

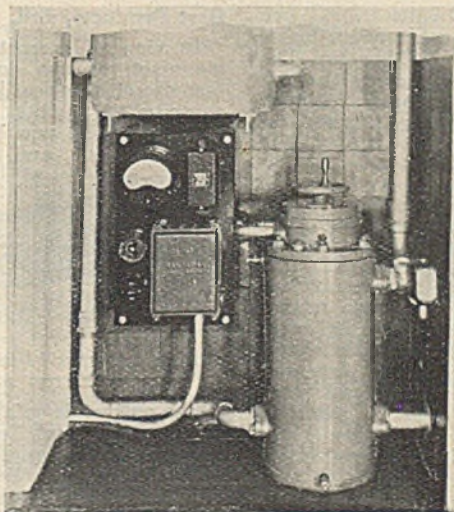
Barlow - Whitney, Ltd.

The manufactures of this company lie in the field of electrically-heated equipment for industrial and commercial applications, ranging from large-scale plants to small bench units. Some of the smaller appliances include general purpose furnaces, for annealing, hardening and tempering, and operating at temperatures up to 1100° C., and ovens for drying, baking or sample testing. The latter, which are fitted with enclosed-type

heating elements, have adjustable thermostatic control and are provided with a temperature indicator. Among melting pots designed for various purposes is a wax dropper of one pint capacity intended for filling or sealing operations, a fine stream of wax being discharged by means of a needle valve.

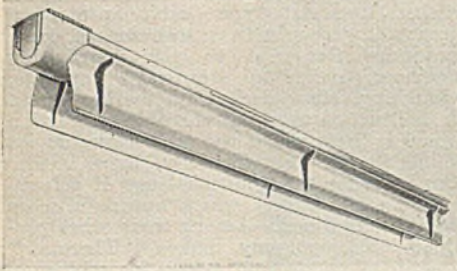
Bastian and Allen, Ltd.

Delegates to the I.M.E.A. Convention who visit the Majestic Garage will be able to see a working model produced by this company of an electrode steam boiler, standing less than a foot high and complete with miniature fittings and mountings. A special feature is the glass shell through which the interior



Typical installation of the Bastian and Allen 30 kW electrode boiler, showing control panel

is visible. The boiler and pump are arranged to be controlled from a standard full-size control panel complete with ammeter, load control relay and pump starter. The boilers in which the company specialises include a 70 kW steam boiler,



A new B.T.H. "Mazdalux" fluorescent fitting, designed for schools

fitted with a magnetic valve and two pressure regulators, and a hot water boiler capable of giving 102 000 B.T.U.s/hr. The domestic appliances made include thermostatically controlled water storage heaters and loop and other types of immersion heater elements.

Belling and Co., Ltd.

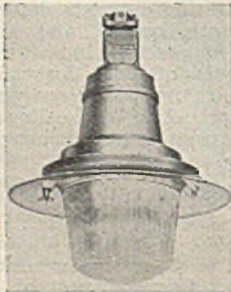
An electric cooker designed for easy conversion from two to three plates and built to the E.D.A. interchangeability specification, and fitted with thermostatic and "Simmerstat" control and other optional extras, is one of this company's newest products, as is a new "Baby Belling" cooker made especially for small kitchens, and having an auxiliary boiling plate and hob extension. Recently developed heating appliances includes fires of reflector, fire-bar, panel and corner types, convectors, warm air circulators, towel airers and plate warmers.

Benjamin Electric, Ltd.

A new fluorescent trough, known as the "Flurolier type B," and accommodating



Barlow-Whitney one pint electric wax dropper



"London Major" street lantern by Edison Swan

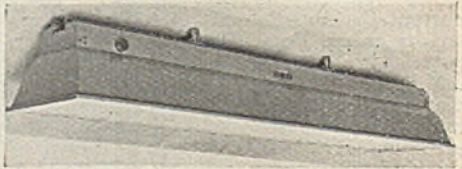
two 40 W, 48 in. lamps, has been introduced. Slim type control gear is housed along the underside of the top with the starter switches accessible from the outside. One of the novel features is a channel running the whole length of the fitting enabling the two suspensions—either chain or conduit—to be attached at any spacing. A twin lamp circuit is used to obviate flicker and give a power factor of approximately unity, and three voltage ranges are normally supplied.

Berry's Electric, Ltd.

This company, whose "Magicoal" electric fires are well-known, manufactures "Viking" switchgear in the range of 35-500 A. A number of industrial concerns, cinemas, and some of the leading universities employ in their installations "Ironsafe" switchboards, and visitors to the exhibition will be able to see one of these on the company's stand.

Best Products, Ltd.

In view of present-day conditions, this manufacturer has decided to make only one size of electrical kettle with a nominal capacity of 3½ pts. and a loading of 1 250 W. The new kettle is nickel-plated inside and out, and the plug connector is



Benjamin Electric "Flurolier type B" reflector, for two 40 W tubes

of the automatic safety ejecting type. The handle is of solid Bakelite, and a special feature of the design is the spout. Two sizes of electric kettle immersion elements, rated at 800 W and 1 250 W, and both fitted with automatic ejectors, are also in production.

Geo. Bray and Co., Ltd.

Specialising in electric heating components, this firm manufactures "Chromalox" and "Tubalox" immersion heaters, strip and ring and sheathed wire elements, the latter being bent into various forms, and small air heaters designed for fitting into the duct work of electrically heated ventilation systems. At the exhibition, there may be seen also samples of refractory insulators for cookers and low-loss statite parts for high-frequency equipment.

British Power Transformer Co., Ltd.

Engineers whose work involves rural networks will be interested in a new pole-type transformer developed by this com-

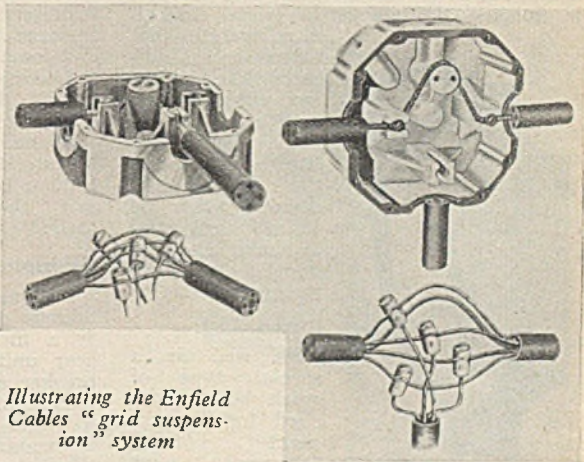
pany. Rated at 10 kVA, and wound for either 11 kV or 6.6 kV single-phase lines, it is enclosed in a special heat and acid resisting hermetically sealed stoneware container provided with supports for pole mounting. The transformer is oil-immersed and continuously rated, and capable, it is stated, of dealing with peak overloads of 15 kVA for five hours starting from cold, with ambient temperature not exceeding 25° C. Tappings are provided to compensate for variations in the supply pressure of plus 3 per cent., minus 3 per cent. and minus 6 per cent. Impulse tests to destruction have shown that breakdown occurs between 115 and 125 kV. Line and tapping terminals are mounted under the weather cowls on the side of the container. The iron loss and copper loss are given as 30 per cent. and 40 per cent. respectively, lower than the figures usually associated with a standard 10 kVA transformer of conventional design.

British Electric Meters, Ltd.

A comprehensive range of electric meters, synchronous clocks and other domestic appliances is now in production in the Government-built factory at Bangor, North Wales. The house service meters include a single-phase a.c. prepayment model, of self-contained variable-tariff pattern, and embodying a new temperature compensated electrical element. There are

B.I. Callender's Cables, Ltd.

Visitors to the exhibition who may have read the description of the new



Illustrating the Enfield Cables "grid suspension" system

pressed copper service boxes in *THE ELECTRICIAN* of June 13 will be able to study this product at first hand. The box, which is regarded as offering many advantages over the established type, will stand rough treatment, and is suitable for improvised methods of protection. Made in two halves from hot tinned copper sheet, it is available in eight sizes, to cater for all the usual sizes of branch and mains cables.

British Thomson-Houston Co., Ltd.

Lighting fixtures for fluorescent lamps which this company has recently designed include a new single-lamp fitting for schools. This is made to permit 40 per cent. of the available light to spread upward, and is fitted with side reflectors which can be supplied to give either a 45° or 30° angle of cut-off. All the necessary lamp auxiliary gear is concealed in the fitting, and the end covers which give access to the lamp conceal any lamp-end flicker. Two new Mazdalux fittings for tungsten lamps have also resulted from the special research which the company has made into the problem of school-lighting. The fluorescent street-lamp lanterns already described in this journal and which have been erected in London and some other cities, will be demonstrated during the Convention in The Square, Bournemouth. To meet the demand for smaller lanterns for minor road and side street lights, the Mazdalux rural lantern has been developed, and the Mazdalux parish lantern is a simple form of reflector for use with coiled-coil lamps.

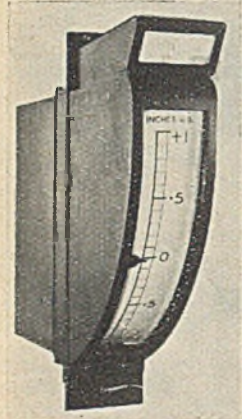


Consumers' distribution unit, made by Dorman and Smith, Ltd.

also quarterly and polyphase types employing a number of modifications recently approved by the National Physical Laboratory and accepted by the Electricity Commissioners.

J. Brittain and Son (Engineers), Ltd.

The company has recently developed a 6 cu. ft. domestic refrigerator, with a total shelf area of 8.6 sq. ft. The steel cabinet is finished throughout in white enamel. A refrigerator dial thermometer indicates the safety food zone. Fitted with a 220/250 V single-phase capacitor start motor, the refrigerator is claimed to be vibrationless and to have an economical power consumption.



Electroflo Meters' illuminated-scale draught gauge

round-type wash-boiler of ten gall. capacity and constructed with a pan of tinned copper and a casing of aluminium sheet. A re-settable cut out can be fitted to the boiler at extra cost. Another recent introduction is a cabinet-type wash boiler, which is of the same capacity as the round boiler but has foot-press three-heat switches, castors and a square detachable table top finished in white enamel.

Bulpitt and Sons, Ltd.

An addition to the well-known "Swan Brand" range of appliances is the "Royal" electric kettle, first shown at the B.I.F., but so far available for export only. It is made in three sizes, is of chromium-plated copper, and has a Bakelite handle and a quick-pouring spout. The other products of the company include an electric iron, with thermostat control-knob inset in the plastic handle, an electric coffee percolator, and a number of modern and "traditional" electric fires.

Cable Covers, Ltd.

In view of their wide range of products, this firm has decided not to exhibit a selection of their transmission and distribution equipment and accessories. Instead, a large model of the "Power Engineer's Equipment Guide" will indicate the kinds of apparatus which may be located in this comprehensive catalogue.

E. K. Cole, Ltd.

For an exhibit arranged to be representative of their products, the company have chosen five types of fitting for 80 W fluorescent tubes, and a selection of accessories, such as ballasts, starter switches, and lamp holders. A new product is the "Ekcostat," for reducing starting time in vehicle fluorescent lighting, and a pre-production model has also been made of a forthcoming kitchen fitting for two 18 in. tubes. Among space heaters are a new tubular heater, called the "Thermotube," and the well-known "Thermovent" range.

Crompton Parkinson, Ltd.

Designed for service on supply undertakings or industrial distribution systems is a metalclad vertical-isolation switch-gear unit incorporating an oil circuit-breaker and air-insulated bus-bars. The maximum service voltage is 11 kV or 6.6 kV, and the normal current 600 A, with a breaking capacity of 150 MVA. The circuit-breaker incorporates a side-blast baffle type of arc-control device, and the contact assembly, a recent development, consists of six self-aligning finger contacts arranged to form a socket for the rod-type moving contact.

Dorman and Smith, Ltd.

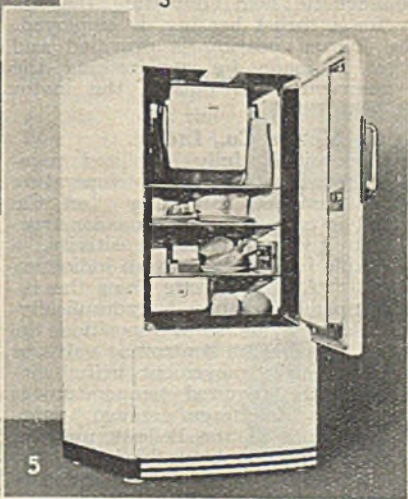
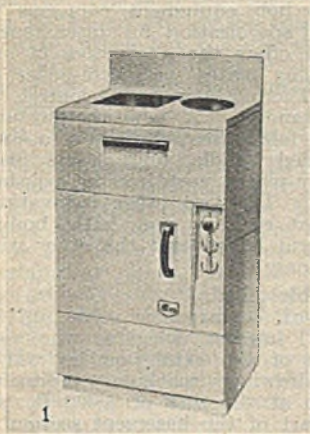
The products of this company include an open type switchboard of the marine type, a totally enclosed air-break circuit-breaker, and sub-station and flameproof gear. Amongst the lighting equipment are "Diolux" and "Dioprism" prismatic fittings, and the switch range includes the new "Sterling" switch fuse. Another innovation is a combined switch and fuse-board for the smaller home. In this unit a 60 A d.p. main switch is provided with s.p. fuses on neutral bus-bar with two 30 A and five 15 A circuits suitable for cooker, immersion heater, socket and lighting circuits.

Edison-Swan Electric Co., Ltd.

Of the many lighting appliances among this company's products may be mentioned a range of flood-lighting apparatus, such as illuminated fountains—including an installation a t

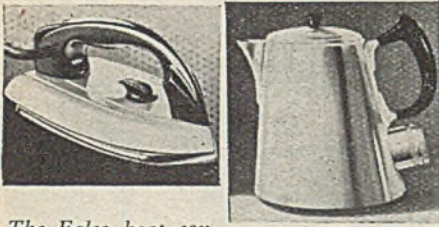


The Ferranti "F.L.P." prepayment meter



1.—Revo Type 461 cooker.
 2.—Parnall (Yate) cooker, with oven
 partly removed. 3.—A new Elexel
 "Xcel" cabinet cooker. 4.—The S.
 471 Prestcold refrigerator. 5.—The
 latest Frigidaire domestic model,
 type T4½

Bournemouth — and automatic colour-changing floodlights. A colour modification unit has been developed for those installations where conditions require



The Falco heat controlled domestic electric iron, with double thumb-rest *H.M.V. Household Appliances' "Maddox" table kettle*

artificial illumination with a colour rendering approximate to daylight and where a larger amount of light must be produced by a single source than is possible with fluorescent equipment.

Electrical Apparatus Co., Ltd.

This company has recently developed the type "EH" meter element, which is now incorporated in their credit and prepayment meters. The element is interesting in having an unusually high torque. Coupled with a flat characteristic curve, this feature is claimed to provide the meters with a stable and constant performance. Both ordinary and two-part tariff prepayment meters have devices for the easy alteration of the price per unit and price per week. In the two-part tariff model, a synchronous motor in which the energised rotor floats in the electro-magnetic field, obviating the necessity for a thrust bearing, is employed. A long journal bearing is provided and provision is made for replenishing the oiling reservoir from outside the motor casing.

Electroflo Meters Co., Ltd.

A self-contained, fully stabilised regulator for superheated steam temperature control is designed for siting "on the job" and is of heavy cast iron construction. To give maximum sensitivity, a thermocouple is connected to an indicating controller. Any departure from the required temperature causes a hydraulically-powered servo cylinder to reposition the superheat temperature controlling valve or damper, corrective movement being continued until the required temperature is restored. A diaphragm gauge using beryllium copper as the bellows material was first introduced about five years ago and has its scale and title plate internally illuminated.

Elexcel, Ltd.

Four new designs of domestic appliance

are now introduced. A cabinet cooker represents a radical departure in "Xcel" design, and is available in vitreous enamel finish. The hob equipment conforms to the E.D.A. specification for interchangeability, and offers the alternative of one or two boiling plates with grill-boiler as desired. Thermostatic oven control is fitted as standard. A new thermostatic iron has a fabric heat indicator, a one-piece moulded handle, and a sole plate of chromium-plated cast iron or polished aluminium. The two other innovations are breakfast cookers, one with boiling plate and grill boiler, and the other with grill boiler only.

Enfield Cables, Ltd.

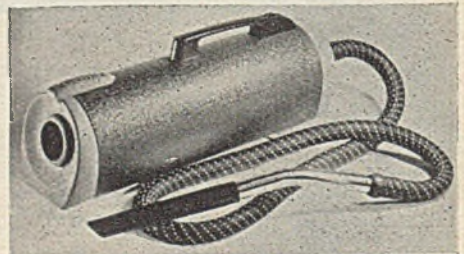
Samples of compression cable up to 264 kV will interest delegates who visit this section of the exhibition, as will a fine wire-drawing machine producing copper wire at the rate of 4 000 ft. per minute. Part of the basement section of the exhibition hall has been wired with the Enfield "grid suspension" wiring system. This is a method of installing electricity by overhead distribution, using self-contained catenary cables and connection boxes. A new development, this system has been designed for street lighting, factories and industrial installations, etc.

English Electric, Ltd.

Among the range of "Ritemp" domestic appliances are three cookers. A cabinet model incorporates a hotplate with infinitely variable simmer control with a rapid boost heater for quick heating. An interesting development is an all-aluminium cooker, built as a result of wartime experience in the use of this metal, to expedite deliveries for the national housing drive. A washing machine, water circulators, fires and plate warmers are among other products.

Falco Electrical Appliances, Ltd.

The company has designed a heat-controlled electric iron with double thumb-



Model 402 Hoover cylinder cleaner, designed especially for export markets

rest and a selector knob to set ironing temperature according to the fabric to be

ironed. The handle is of black Bakelite, and the cable is at the rear. An interesting feature of one of the company's new cookers, which has a 2 kW grill-boiler, is a utility drawer running on ball bearings, in which cooking implements can be stored.

Falk, Stadelmann and Co., Ltd.

Manufacturers of the "Raydex" series of domestic appliances, this company includes amongst its current range of products water heaters of the non-pressure type and immersion heaters for round or rectangular tanks, reflector fires, thermostatically-controlled electric irons and kettles both with and without automatic safety devices. The electric unit heater, designed for industrial use, is an appliance manufactured in sheet steel and constructed to circulate warm or cold air according to season.

Ferranti, Ltd.

The company's range of electric fires includes a new model, the "Sunera," a 1 kW, oxy-silver appliance with chromium reflector, and a 2 kW oxy-silver model with a Solium reflector. The low-level high-



Moffatt "Handi-chef"
breakfast cooker

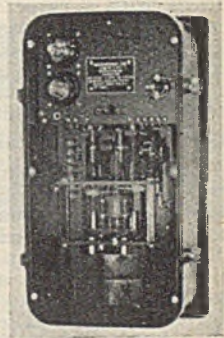
temperature radiation method of space heating has now become well known, particularly for schools and nurseries, and was a feature of the I.M.E.A. exhibition at Blackpool last year. Thermal storage water heaters and immersion heaters are among other articles for domestic use, and an electric clock recently introduced has a 24 hour alarm setting with automatic reset. An interesting feature of the a.c. and d.c. house service meters is the micro-gap prepayment switch.

H. Fisher (Oldham), Ltd.

A new product of this company is a streamlined chrome-and-black toaster, designed to take a slice of bread from a two lb. loaf and operated by a spring mechanism which automatically turns the bread and on release closes the toaster. Another development is an electric drying cabinet. In this appliance, the heating elements are mounted beneath a metal tray on the floor of the cabinet, and drying is by means of convected air rising from three distributors mounted on the tray. Outlet louvres at the top permit dispersal of the vapour and facilitate a stream of hot air over the clothes to be dried. The loading is 1 kW.

Frigidaire, Ltd.

The new "Super Freezer," which was first announced early this year, possesses a number of special features. An automatic tray release allows freezing trays to be easily removed even when tightly frozen to the shelf. The company's "Hydrator" provides "moist cold" for the preservation of fruits and vegetables, and a stainless porcelain interior lining has been developed to resist acid stains. The refrigerator maintains a temperature of less than 50° on the shelves: and for the preservation of frozen goods, ice cream, etc., frozen storage space is provided.



The "telewattmeter"
transmitter, made by
Measurement, Ltd.

General Accessories, Ltd.

Since its introduction, the "Surrey" micro-break switch made by this company has become well known. It is now made in a variety of patterns for surface or flush mounting, and in 5 A or 15 A sizes. As a result of their recent association with British Mechanical Productions, Ltd., the makers of "Clix" electrical accessories, General Accessories are now marketing the whole range of "Clix" products, one of which is a 13 A flat-pin fused-plug socket outlet.

General Electric Co., Ltd.

There are two models of the new D.C. 113 electric cooker. One is fitted with an eight in. radiant plate, "Simmerstat" and circuit fuses, and the other with the new standard G.E.C. six-heat simmering control. Each cooker has an oven measuring 2 700 cu. in. and oven elements of the tubular sheath wire type. There is also an "Ovenmaster" conversion kit for older type cookers. A multi-parabola wide-angle reflector fire has recently been



Wilkins and Mitchell
"Servis" cooker

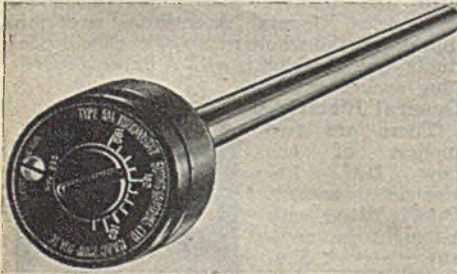
designed, heat being radiated over an arc of 120° in the horizontal plane. Other new household appliances include a cleaner fitted with a carpet nozzle which automatically adjusts itself to suit the height of the carpet, a coffee percolator with automatic cut-out, and a warming plate incorporating a warning lamp to indicate when it is on circuit.

Gillott Electro-Steam Cookers, Ltd.

Some of the products of this company were shown in prototype form at the Blackpool Convention last year, and have now reached the production stage. One of these is a water boiling equipment, designed for hotels and restaurants, etc., with a capacity of up to 260 pints of boiling water per hour. The unit is automatic in cold water supply from the main. Hot water for local washing-up from a thermostatically controlled storage tank may be drawn off without affecting the boiling water supply. The heating elements are of the twin-blade type, the total rating being 4 kW on the largest model. A cooker, with hot-plates and oven, provides also a supply of boiling water and steam, for cooking, etc.

Hague and McKenzie, Ltd.

The cooking utensils made by this company, although non-electrical, are of interest in that many have been made especially for use on electric hotplates, as, for example, saucepans designed to remain



A Sunvic water-heating thermostat

dead flat. The makers claim to have overcome the problem of loose saucepan handles by a new welding technique, which they displayed at the B.I.F.

Heatrac, Ltd.

The latest development in water heaters to be made by this company is the "JET," a model designed for that class of user who does not want a substantial quantity of hot water always available in storage. It will give a small supply within a few minutes, and sufficient for a bath after a delay of about half an hour. The heater is under the control of a thermostat,

but the normal method of control is by a hand switch, fitted with a semaphore attachment. The design of the heater is such that the full loading, approximately 3.5 kW, is applied to an inner chamber containing about 1½ gall. of water, for rapid initial heating. A valve deflects the water heated in the inner vessel so that it circulates through the main storage chamber, enabling larger quantities of water to be available for the bath. An outstanding feature, the makers state, is that both during preparation of water for a bath and immediately after drawing the bath, a small quantity of hot water can be obtained within three or four minutes. The company has recently devised an interesting dip tank for providing a flexible plastic coating for the protection of machine-finished steel parts.

H.M.V. Household Appliances, Ltd.

The "Maddox" electric kettle, first introduced at the "Britain Can Make It" exhibition, has been designed for use on the tea-tray, so dispensing with the need for a hot-water jug. The copper body has a non-drip spout, and is double-plated with nickel and chromium. The H.M.V. ribbon type immersion element is rated at 1 kW and a built-in safety device ejects the mains socket if the kettle boils dry. There are, also, several reflector fires and a heat controlled iron, the latter being fitted with a built-in signalling lamp to indicate when the iron has reached the required temperature.

Hoover, Ltd.

Associated for many years with the "external bag" type of suction cleaner, this company has recently introduced a cylinder model of unusual design. Features are a light-weight casing, plastic carrying handle and a new bag-emptying device. It is regarded as specially suitable for the export markets and for those homes where small rugs, rather than large carpets, are the order. The shaded pole motors for appliances, ventilating fans, etc., are a recent addition to the already established range of conventional F.H.P. machines.

Hotpoint Electric Appliance Co., Ltd.

The company informs us that, although it is not in a position to show any entirely new appliances at the Convention exhibition, a special feature is a cabinet washing machine fitted with a bowl-emptying pump. Other domestic appliances selected include a portable collapsible clothes drier, electric fires, toaster, kettles and automatic irons and the "Junior" bag-type vacuum cleaner. Accessories currently being made include immersion heater elements and radiant-type hot-plates.

Jackson Electric Stove Co., Ltd.

Four sizes of electric cooker, suitable for between three and ten persons, are among current products. The smallest model, which can be supplied either on legs or on a plinth base, has thermostatic oven control as a standard fitting. The cooker complies with the E.D.A. interchangeability requirements. Another model has a hob, 21 in. square, fitted with two boiling plates and a 2 kW grill boiler. An 8 in. diameter radiant boiling plate, recently modified as a result of previous experience, and a ten gall. wash boiler, are two other appliances likely to interest supply authorities.

Johnson and Phillips, Ltd.

A pole mounting circuit-breaker is an example of modern development in the rural electrification field. The special features are the employment of a single break, the use of a side blast arc control device, and the incorporation of auto-reclose mechanism. The side blast arc control pot is designed to give extremely rapid increase in the dielectric strength of the contact gap by subjecting the arc to the deionising effect of a blast of relatively cool gas and oil. This facilitates high breaking capacity and consistent short-circuit performance. British National Electrics, Ltd., are currently making water-heaters, both non-pressure and dual purpose types, and a breakfast cooker.

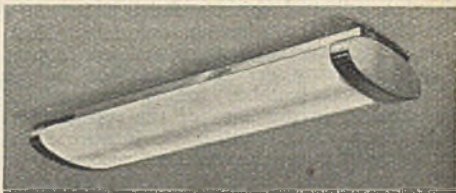
Measurement, Ltd.

The telewattmeter transmitter is an interesting example of this company's range of remote indication measuring instruments. Employing the "proportional d.c." principle, the transmitter is made without contacts, springs, motors, rheostats, rectifiers or photo-electric cells, and will give, the makers claim, a high accuracy independent of changes in resistance of the pilots or external circuit. Some of the applications are the summation of outputs from a number of generators or telemetering of voltages, power factors, etc. Another telemetering instrument is a d.c. potential balancer, which permits the remote measurement of a d.c. potential employing the null method.

Metropolitan-Vickers Electrical Co., Ltd.

The company is now manufacturing a "Ripplay" control system in which single frequency operation permits working of 12 different channels, the individual signals varying in duration. A second frequency provides for a further 12 channels. The signals are injected into the e.h.t. supply system and operate suitably tuned switches on the low voltage distribution side. Advantages claimed by the makers are immunity from interference due to

"spill-over" from neighbouring networks and less costly signal injection equipment. Street lanterns, for both discharge and tungsten lamps, include some recently de-



"Atlas" fluorescent fitting for twin 30 W tubes made by Thorn Electrical Industries Ltd.

veloped models, and radiant hot-plates and grill-boilers are representative of the company's work in the domestic appliance field. Examples will be illustrated next week.

Moffatts, Ltd.

A high level oven, fitted with a drop-down door, is a feature of the model "31-S-G" cooker. A hinged porcelain enamelled hob is fitted with three boiling plates, of either embedded or semi-radiant type, and a porcelain-enamelled cover drops down over the plates, when they are not in use, to form a table top. The cooker is fitted with "Thermo-matic" oven heat control, and other points include a separate grill compartment and a step-in base which, if desired, can incorporate two drawers for storage of cooking utensils. The Moffatt "Handi-chef" is a useful appliance for domestic use. It contains a 1.3 kW tubular heating element which supplies heat in two directions, for boiling and toasting, is portable and of streamlined appearance.

Parnall (Yate), Ltd.

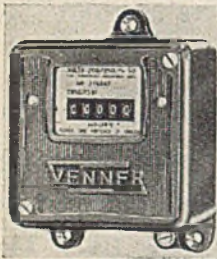
A point in the design of a new cooker made by this company to meet the urgent needs of the housing drive is the special attention which, the makers claim, has been paid to thermal insulation and lagging. This is in order to reduce external temperatures to a minimum in spite of the high conductivity of the aluminium which has been extensively used throughout in the form of die castings. Particular attention has also been paid to a new heat-resisting enamel applied to the exterior, and also to an instantly removable cast iron hob. The back stretcher bar carries standard live and earth plug sockets for the grill boiler and boiling plate connections. The oven is of the loose box interior pattern, the box being of aluminium sheet with plug-in elements of orthodox open refractory type located behind the pressed walls. The total loading is 5.8 kW.

Pressed Steel Co., Ltd.

The "Presmetic" hermetically sealed condensing unit is fitted to the "Prest-cold" refrigerators now being made by this company. On the model S471, which has an all-steel cabinet finished in white enamel, with a vitreous enamelled liner, the net storage capacity is 4.44 cu. ft. and the ice-making capacity 4 lb. of ice per freezing. A vegetable storage compartment is situated in the base of the refrigerator, and there are an automatic interior light, an extra storage compartment recessed into the door and a number of special trays. The shelf area is 8.25 sq. ft.

Revo Electric Co., Ltd.

The R.461 cooker, introduced in prototype form at the Convention exhibition last year, has been modified in minor details and is shortly to go into production. The cookers will be constructed of sheet metal and cast iron, either mottled green or grey vitreous enamel in finish. The main features, the makers point out, are clean sheer lines and absence of external hinges, projecting ledges and fixing screws.



*Venner "Cyclo"
hour-meter*

The surfaces have been made as flush as possible, and the handles on the hot cupboard and oven doors are recessed. The oven is removable in one piece. Another introduction by this firm is a four-pint kettle with heat resisting Bakelite handle and a connector-ejecting safety device.

A. Reyrolle and Co., Ltd.

New design features have been incorporated in the type C6T switchgear made by this company. It is a metal-clad compound-filled horizontal draw-out panel suitable for service up to 11 kV, the circuit-breaker having a making and breaking capacity of 250 MVA. Reyrolle "Turbulators" are fitted for arc control, and the mechanism is now equipped with dust proof covers. "Monobias" bus-bar-zone protection is a development which will be demonstrated to those visiting the I.M.E.A. exhibition. The output front summation transformers fed by bus-bar-zone line current transformers is rectified and supplied to a special biasing transformer, which operates a telephone-type relay on the occurrence of an internal fault.

Rheostatic Co., Ltd.

From their range of thermostatic control devices, the company draws attention

particularly to the "Satchwell" compensator, a device which regulates the temperature of water flowing in a hot water central heating system in accordance with weather conditions outside the building. In this way, the makers state, the heat input to the building is controlled so that it exactly balances the heat requirements, despite variations in outside weather conditions. Among their other products may be mentioned thermostats for water heating, electric ovens and space heaters.

Sangamo Weston, Ltd.

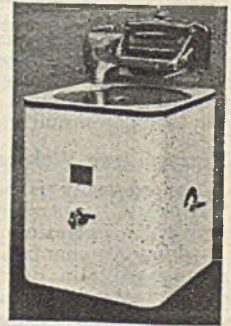
In addition to their series of service meters and time switches, the company has recently introduced a range of 12 inch scale moving-coil and dynamometer instruments, including wattmeters, ammeters and voltmeters. Special features include knife edge pointers, anti-parallax mirrors and vernier type scales. The instruments also have a spirit level, levelling feet and a thermometer to indicate the true temperature of the movement. A variety of sub-standard instruments is also made.

Santon, Ltd.

Because of the serious shortage of materials the company have adopted a policy of improving their existing products, in preference to launching out on a production programme on the development of their post-war articles. The standard lines include domestic storage water heaters, immersion heaters, and also a range of heavy-duty industrial type immersion heaters, with special emphasis being laid on heaters suitable for degreasing equipments used in connection with cooker maintenance.

Siemens Electric Lamps & Supplies, Ltd

Of the range of lighting fittings made by this company, a "Dilux" street lantern incorporating a new prismatic glass dish refractor recently designed by the Holophane Co., and suitable for use with 250 or 400 W horizontal burning "Sieray" lamps, is of interest. Fluorescent fittings suitable for 40 W and 80 W tubes are also available. The company is shortly to lay a 33 kV submarine cable in the Solent: a sample of this may be inspected by visitors to the exhibition.



*Universal Boilers
"flush action" washing
machine*

Simplex Electric Co., Ltd.

New appliances added to this company's "Croda" range include domestic cookers, water heating equipment, the new "Halo" iron, the "Brentwood" convector and a new hand dryer. The latter article has been designed for buildings with heavy cloak-room commitments, and dries the hands, it is claimed, in approximately 20 secs. It has a foot-operated switch. "Simplex" products include the new "Regent" range of switchgear, and new street lighting lanterns.

Smith Meters, Ltd.

With regard to their credit and repayment service meters, the company state that in general the meters now being made are identical with those marketed before the war. As an interim policy they have redesigned the moving element, inasmuch that the worm is cut in the spindle and not friction-tight, and the design of the fitting of both the top and bottom bearings is such as to make for greater ease in renewal. As soon as possible, it is the company's intention to bring out a modified design to conform with the anticipated modifications to B.S.S. No. 37 and to incorporate the required standardised dimensions.

South Wales Switchgear, Ltd.

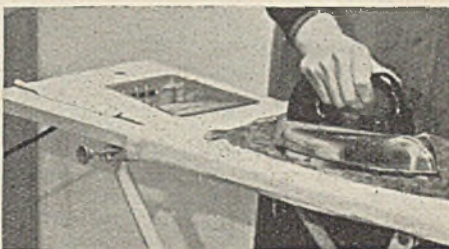
The latest product, an electric home laundry unit, was described in *THE ELECTRICIAN* of June 13, and is now in mass production at the Blackwood factory of this firm. The larger equipment made includes a standard air-insulated 11 kV, 400 A, 150 MVA ring main unit, and there are also 3 kW immersion heaters and a range of round wash boilers.

Standard Telephones and Cables, Ltd.

D.c. bias, the system of remote control through a.c. mains, is already operating many street-lighting installations in this country and is well-known by public lighting engineers and others. The principle of operation is that a d.c. signal is introduced between the star point and neutral of the l.t. supply transformer, four separate signals being available by varying duration or polarity. The signals are received by units presenting a high impedance to 50 cycles a.c. The receiving units control loads up to 10 A. Using this principle of operation, it is pointed out, control of water heating and space heating of buildings, etc., during peak periods can be centralised, thus facilitating the sale of off-peak load current. The power cable accessories made by the company include styrenated paper and styrene terminations.

Sunvic Controls, Ltd.

The "Simmerstat" is well known to supply authorities, and is fitted as a standard control device by cooker manufacturers when required. Briefly, it operates by opening and closing a quick-



A cordless electric iron and stand, made by J. and H. Walter, Ltd.

action switch in the boiling plate circuit at short, definite time intervals roughly once a minute when simmering. The Sunvic water heater thermostat incorporates the same quick make-and-break switch as the "Simmerstat." It is of the rod type operating on the differential expansion principle, and it will control 15 A a.c. at 250 V.

Thorn Electrical Industries, Ltd.

Some new types of "Atlas" 80 W and 30 W fluorescent units are now being made. The GB/2030 fluorescent fitting utilises two 30 W tubes behind a fluted Perspex diffusing cover, the control gear being contained in the spine. The domestic appliances include the "Mary Ann" automatic electric iron and the "Mary Ann Bedalax" vacuum cleaner.

T.M.C. Harwell (Sales) Ltd.

Makers of the "Temco" series of electric synchronous clocks, this company have selected for the exhibition a representative range of clocks and also examples of "Temco" wiring accessories.

Tricity Cookers, Ltd.

Three new cookers, all conforming to E.D.A. standards of interchangeability and earthing, include the two general purpose models, one with grill-boiler and eight in. hot plate and another with an additional 6½ in. plate. The latter may be fitted with ten-heat control on all elements, or with three-heat and thermostatic switches. The new "Junior" cooker, with a grill boiler, oven, hot cupboard and storage cabinet, has provision for attachment of an additional 1 kW hot plate. All models are of pressed steel construction and finished in cream and black vitreous enamel.

Universal Boilers, Ltd.

A new product is the "Verseo" flush action washing machine, in which hot suds are forced at high velocity through the wash. The impeller mechanism is fully enclosed, and clothes do not come into contact with any moving parts. A streamlined polished aluminium electric wringer, with safety release mechanism, is fitted.

Venner Time Switches, Ltd.

A new process timer and the "Cyclo" hour meter are two products which, the makers state, are finding an increasing use in the industrial field. Their other manufactures include dual-coil two-part tariff meters, hand wound, electrically wound and synchronous motor-driven time switches and a pilot wire relay system, designed to meet conditions where a centralised control of street lighting, etc., is required.

J. & H. Walter, Ltd.

A cordless electric iron fitted with thermostatic control has been developed by this company. A specially designed stand is incorporated in the ironing board, and is fitted with rollers and finders on a sloping base, so that the iron slides down when the three pins on the heel make contact with sockets at the rear of the

stand. A switch ensures that contact must be made before the current is switched on. After preliminary heating, the iron is maintained at operating temperature while it is in the stand when clothes are being turned. A pilot lamp indicates that the element is energised.

Wilkins and Mitchell, Ltd.

The "Servis" washing machine has been shown at a number of recent exhibitions. It will handle ten gall. of water and up to nine lb. of clothes and is fitted with an electric wringer—stored in a compartment at the foot of the machine—which will operate in five positions. A special spring release, permitting the rollers to fly apart, reduces the risk of accidents. An easily accessible plastic handle on the top of the machine both switches on the motor and starts the agitator.

Among the electrical organisations which will be represented at the exhibition are the British Refrigeration Association, the Cable Makers' Association, the Electric Lamp Manufacturers' Association, the Electrical Association for Women and the Electrical Industries' Benevolent Association.

The E.D.A. was responsible for the organisation of the exhibition.

Electrical Educational Films

IN view of the fact that the Ministry of Education is attaching considerable importance to visual education and the probability that the screen will be employed very largely as the medium for imparting general knowledge in schools, the British Electrical Development Association has made an early entry into the new field thus created, with the first four of a series of films which will form the nucleus of a school library.

The association has been making films of an instructional and propaganda nature for twenty-seven or twenty-eight years and the demand for these from schools—some as far away as New Zealand—and from social and political organisations has grown by leaps and bounds, while the added requirements of the Services during the war made the rising demand curve almost vertical. The demand for electrical equipment and appliances in industry and the home has increased proportionately, and an urgent need has arisen for informing the coming generation of essential facts related to the supply and use of electricity, particularly in the modern home, where it serves so many purposes. By reason of its experience and special organisation, the E.D.A. is well equipped to meet the need, and its ability to do so efficiently is demonstrated in the first four sound

films intended for boys and girls between the ages of eleven and fifteen years, of which *THE ELECTRICIAN* was afforded a pre-view on June 13.

The titles are "Generation of Electricity," "Distribution of Electricity," "Simple Home Repairs" and "The Electric Iron." The first two tell in non-technical language the story of the conversion of coal and water power into electrical energy and how it is conveyed over the grid system to domestic and other consumers. In addition to admirable photography, the animated diagram technique is employed to describe in the clearest possible manner the working of the generating plant, the transmission of electricity, the principle and functions of the transformer and the operation of the oil circuit-breaker and other switches. The third film deals with fuse replacement and minor repairs that can be carried out in the home; and the fourth illustrates constructional details of the electric iron, demonstrates its use and indicates common faults to be avoided. Five further productions will be concerned with the operation and maintenance of other domestic appliances. Silent films as well as strips, to be associated with talks, are being made for use in schools not yet equipped with sound projectors.

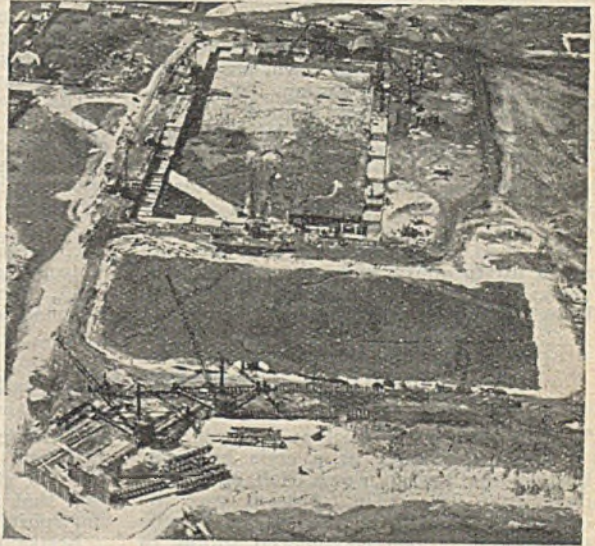
New Power Station at Poole

Site to be Open for Inspection Next Week

The Bournemouth and Poole Electricity Supply Co., Ltd., have extended an invitation to delegates at the I.M.E.A. Convention next week to visit the site of the new Poole Harbour station, where large-scale reclamation work is in progress. The ultimate capacity of the station is to be 200 MW.

MANY of the delegates to the I.M.E.A. Convention at Bournemouth next week will take advantage of the opportunity afforded them of inspecting the work in progress on the site of the £7 000 000 power station which is to be erected on the mudlands in Poole Harbour for the Bournemouth and Poole E.S. Co., Ltd.

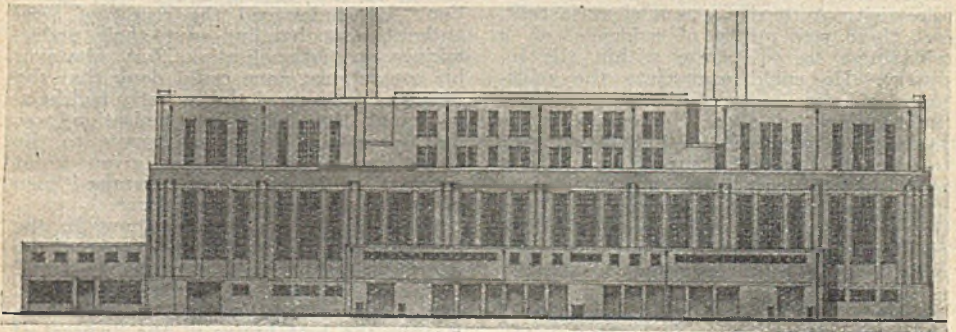
The station is designed to accommodate ultimately 200 MW of generating plant consisting of four 50 MW (m.c.r.) turbo-alternators and eight 300 000 lb./hr. boilers. In the first instance three turbo-alternators complete with condensing plant, circulating water pumps and auxiliary equipment, and six pulverised fuel-fired boiler units, each of 300 000 lb./hr. continuous duty evaporative capacity, with the necessary ancillary equipment, including high efficiency electrostatic dust precipitating plant, will be installed. Two chimneys, 310 ft. high above ground level, will serve the ultimate eight boiler units.



An Aerofilms view of the station site, showing work in progress

The station buildings, incorporating pleasing architectural features, will be steel-framed structures with supporting brick walls. They will have a southern aspect, an impression of which is given in the accompanying illustration.

The coal required for the station will be seaborne and delivered at a wharf to be constructed in the harbour alongside the deep water channel above Poole Bridge. A combination of belt and gravity bucket



Architect's drawing of South elevation of the Poole Harbour station

conveyors will carry the coal from the wharf into the boilerhouse bunkers and to the storage ground adjacent to the boilerhouse, reclaiming it from the dump as required. The ash and dust from the pulverised fuel-fired boilers may be pumped on to the mudlands, or discharged into barges at the coaling chute for sea disposal.

Two 9 ft. culverts for the intake and return of the cooling water will pass under the foundations of the station. Water will be taken from the deep channel adjacent to the coaling wharf and will be discharged into the Wareham Channel.

The work of preparing the site started in June last year. Thousands of tons of clay and silt, deposited there for centuries, had to be removed and the site made up to above high water level with chalk. The site of the main building is being excavated and filled with concrete.

To enable this to be done a coffer dam was erected. This was formed by driving two rows of sheet piling deep into the clay, about 20 ft. down. Between the piling the silt and clay was dug out by manual labour because mechanical excavators could not be used. The space thus created has been filled with concrete. Excavation of the area inside the dam is proceeding and concreting has commenced. The wrecks of many small vessels have been removed.

The magnitude of the preparatory work, which has been undertaken by Sir Robert McAlpine and Sons, the civil engineering contractors, is indicated by the aerial photograph reproduced on page 1679. The consulting engineers are Messrs. Merz and McLellan.

The main electrical contractors are the Metropolitan-Vickers Electrical Co., Ltd., C. A. Parsons and Co., Ltd., and International Combustion, Ltd.

Jubilee Celebrations at Leyton

THE Minister of Fuel and Power was guest of honour at a civic luncheon held at the Leyton Town Hall on Saturday, June 14. The occasion was the official celebration of the jubilee of the undertaking, which commenced supply in September, 1896, and during the afternoon the Minister declared open a new electricity showrooms and service centre in High Road, Leyton.

Among those present were Miss Caroline Haslett (director, E.A.W.), Sir John Kennedy (Electricity Commission), Mr. V. Z. de Ferranti (president, I.E.E.), Mr. J. S. Pickles (president, I.M.E.A.), and a number of borough electrical engineers from surrounding districts.

Proposing the toast of "The Leyton Corporation and its electricity undertaking," Mr. Shinwell said the transfer of undertakings to the contemplated British Electricity Authority was a gigantic task, but there was plenty of evidence of a willingness to co-operate within the industry. He could appreciate the reluctance of some associated with municipal undertakings to allow the assets to be transferred to the state, but if we were to expand electricity supply, provide it at the lowest cost, and in particular to bring it within reach of everybody within the country, the present system had to give way to one more co-ordinated and more capable of responding to modern needs.

Coun. W. J. Brockbank (chairman, Electricity Committee) and Mr. A. E. Morgan (Borough Electrical Engineer and Manager) replied. Recalling that the

undertaking had abolished meter rents in 1910 and had been early in the change-over to standard frequency, Mr. Morgan said that it had always shown a pioneering spirit.

Responding to the toast "The electricity supply industry," proposed by Ald. J. Fitzgerald, Sir John Kennedy said a very considerable scheme of reorganisation in the industry was essential, and the Ministry was showing courage in putting it through. Some looked at the nationalisation proposals with foreboding, and those responsible had very grave problems to face, but he was sure that all in the industry would give their wholehearted co-operation.

The Mayor of Leyton proposed "Our Guests," and Mr. J. S. Pickles, replying, remarked that the borough had been in the habit of "getting ahead" of legislation. He understood the regret of local authorities at handing over their undertakings on nationalisation, but whatever his convictions, none could deny that the technical progress of the industry had been so rapid that some reorganisation was now essential. The appointments to the Organising Committee had given great satisfaction, because they comprised men of long and practical experience.

Later, at the opening ceremony in the new showrooms, Mr. Shinwell spoke of the important place that showrooms would have under the reorganised industry. When it came to setting up the Area Boards, the best brains at the disposal of the community would be sought, and he had no doubts about the future.

THREE-PHASE RECTANGULAR CONDUCTORS

A SIMPLIFIED REACTANCE FORMULA

By W. H. MILLER, A.M.I.E.E.

IN low voltage installations, the reactance of relatively short lengths of bus-bars and connections may have an appreciable effect in limiting the value of short-circuit power to be dealt with by the switchgear and it should be taken into account when calculating the reactance of the system. The exact calculation is fairly simple in the case of circular section conductors but the application of the fundamental inductance formulae to three-phase conductors comprising groups of rectangular bars involves rather long and laborious arithmetic and, in order to eliminate this, tables have been published ⁽¹⁾ ⁽²⁾ giving reactance values for typical combinations of conductor sizes and spacings. It is, however, necessary to interpolate or extrapolate for other groups of conductors and a simple formula is therefore developed here by which the reactance of three-phase rectangular bars can be calculated quite easily with sufficient accuracy for circuit breaker selection and similar applications. It is based on the same simplifying assumptions as the tables, namely:

- (1) That the current distribution is uniform.
- (2) That the conductors are long, compared with their width and phase centres.
- (3) That they are straight and parallel and arranged in line as shown in Fig. 1.
- (4) That the spacing of multiple strip conductors is not greater than the thickness of the individual strips.
- (5) That a multiple strip conductor may be considered as a single equivalent conductor of dimensions equal to the overall dimensions of the multiple strip conductor including the spacing.
- (6) That the phase centres d are not less than the conductor width, b .
- (7) That the reactance value per phase may be taken as the average of the three phases.

These conditions apply in most low voltage installations and for such cases the reactance may be obtained approximately by:—

$$X = [4.4 \{ \log_{10} d - \log_{10} (a + b) \} + 3.3] \times 10^{-5} \text{ ohms per foot,}$$

where

X = The average reactance per phase in ohms per foot at 50 cycles.

d = phase centres.

a = equivalent thickness of single or multi-strip conductor.

b = width of conductor.

Dimensions a , b and d may be in inches or centimetres providing they are all expressed in the same units.

Derivation of Formula.—It can be shown ⁽³⁾ ⁽⁴⁾ that the average inductance per phase in a three-phase system of conductors is equal to half the average inductance of the three single-phase loops formed by the three phases taken in pairs, that is:—

$$L_{av} = \frac{1}{2} \times \frac{1}{3} (L_{12} + L_{23} + L_{13}).$$

Now the total inductance of a single-phase loop formed by two straight parallel conductors of similar section carrying the same current in opposite directions and whose length is large compared with their diameter and spacing is:—

$$L_{12} = 2.303 (4 \log_{10} \frac{D}{R}) \times 10^{-9} \text{ henrys per cm.} \quad (1)$$

where D = Geometrical mean distance (g.m.d.) of the two conductors from one another. R = Geometrical mean radius (g.m.r.) of the area of the section.

The derivation of this formula together with an explanation of geometrical mean distances are given by Gray.⁽⁵⁾

For rectangular conductors, curves showing values of D for various ratios of the spacing d to the width b are given by Levy⁽⁶⁾ based on Rosa and Grover's formula 132 (?) and reference to these curves shows that, providing d is not less than b , the g.m.d. D , may be taken as equal to d with an error of not more than minus seven per cent. For higher ratios of d/b the error is much less and it is, in any case, on the "safe" side. For circular section conductors D is exactly equal to d . The average inductance per phase may thus be written as

$$\begin{aligned} L_{av} &= 2.303 \times \frac{1}{3} (2 \log_{10} \frac{d_{12}}{R} + 2 \log_{10} \frac{d_{23}}{R} \\ &\quad + 2 \log_{10} \frac{d_{13}}{R}) \times 10^{-9} \\ &= 4.606 \left(\log_{10} \frac{3\sqrt{d_{12} d_{23} d_{13}}}{R} \right) \times 10^{-9} \\ &\quad \text{henrys per cm.} \quad (2) \end{aligned}$$

Multiplying by $2\pi f = 314$, and 30.48 cm./ft. we get the reactance in ohms per foot at 50 cycles per second:—

$$X_{av} = 4.407 \left(\log_{10} \frac{3\sqrt{d_{12} d_{23} d_{13}}}{R} \right) \times 10^{-5} \text{ ohms per foot} \quad (3)$$

This formula is of particular importance as it gives a close approximation of the reactance for symmetrical and unsymmetrical spacings of conductors of any section providing the appropriate value of R is used. For rectangular conductors of width, b, and thickness, a, the g.m.r., R, has been given by various investigators (5) (6) as approximately 0.2235 (a + b) and since, for conductors with equal spacings as shown in Fig. 1, $d_{12} = d_{23} = d$, and $d_{13} = 2d$, equation (3) then becomes :—

$$\begin{aligned}
 X_{av} &= 4.407 \left\{ \log_{10} \frac{3\sqrt{2d^3}}{0.2235(a+b)} \right\} \times 10^{-5} \\
 &= 4.407 \left\{ \log_{10} \frac{d}{(a+b)} + \frac{1}{3} \log_{10} 2 - \log_{10} 0.2235 \right\} \times 10^{-5} \\
 &= 4.407 \left\{ \log_{10} d - \log_{10} (a+b) + 0.751 \right\} \times 10^{-5} \\
 &= [4.4 \left\{ \log_{10} d - \log_{10} (a+b) \right\} + 3.3] \times 10^{-5} \text{ ohms per foot} \\
 &\hspace{10em} (\text{Approx.}) \quad (4)
 \end{aligned}$$

Comparisons and Conclusions.—In spite of its simplicity, this formula gives results which are in very close agreement with the values given in B.S. 936-1940. For example, using the formula, the average reactance per phase per 100 feet of three-phase conductors comprising two strips 4 in. \times $\frac{1}{4}$ in. per phase arranged in line on 6 inch phase centres is

$$X_{av} = [4.4 \left\{ \log_{10} 6 - \log_{10} 4.75 \right\} + 3.3] \times 10^{-3} \text{ ohms} = 0.00375 \text{ ohms}$$

which is very close to the value of 0.00384 given in B.S. 936-1940.

Lythall's table (1) covers a fairly wide range and, taking the lower and upper

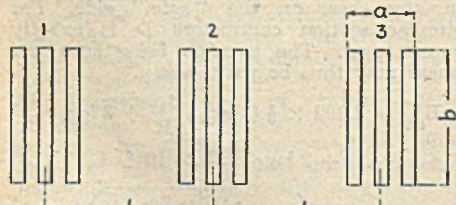


Fig. 1—Three-phase conductors

limits of his table we have the following comparisons :—

Dimensions of conductors	Reactance, Ohms per ph. per 100 ft.	
	From table	From formula
1 strip 2 in. \times $\frac{1}{4}$ in. per phase on 3 in. centres	0.00387	0.00385
6 strips 6 in. \times $\frac{1}{4}$ in. per phase on 24 in. centres	0.00527	0.00523

It is evident, therefore, that the formula may safely be used within the specified limitations for the rapid determination of the reactance of rectangular conductors for

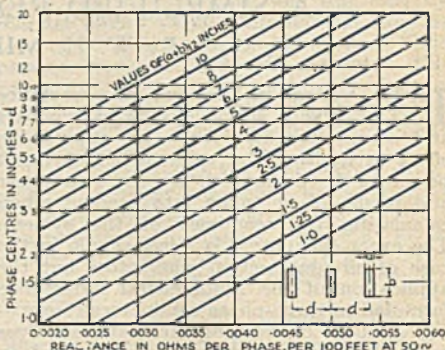


Fig. 2—Reactance of three-phase conductors circuit breaker selection. To simplify the computation still further, the values have been plotted in semi-log form in Fig. 2.

For circular section conductors the value of R to be used in equation (3) is 0.779 r where r is the radius of solid conductors or, in the case of stranded conductors, the radius of a solid conductor of equal sectional area. This equation then leads to the standard formulae and tables found in most text books and handbooks.

References

- (1) R. T. Lythall. "The J. & P. Switchgear Book," Vol. 2, Appendix A, First Edition. Johnson & Phillips, Ltd., London, 1942.
- (2) B.S. 936-1940. "British Standard Specification for Oil Circuit Breakers for Alternating Current Circuits up to and including 660 volts."
- (3) V. Karapetoff. "The Magnetic Circuit." Chapter XI. The Inductance of Cables and Transmission Lines. McGraw-Hill Book Company Inc., New York and London, 1911.
- (4) A. T. Starr. "Generation, Transmission and Utilization of Electrical Power." Chapter IV. Overhead Lines: Electrical Design. Second Edition. Sir Isaac Pitman and Sons, Ltd., London, 1942.
- (5) A. Gray. "Absolute Measurements in Electricity and Magnetism." Chapter 13. Calculation of Inductance. Second Edition. Macmillan & Co., Ltd., London, 1921.
- (6) C. C. Levy. "Calculation of Inductance and Current Distribution in Low-voltage Connections to Electric Furnaces." Trans. A.I.E.E. December, 1932. p. 903.
- (7) E. B. Rosa and F. W. Grover. "Formulas and Tables for the Calculation of Mutual and Self Inductance." Scientific Paper No. 169. American Bureau of Standards.
- (8) J. K. Sumec. "Berechnung der Selbstinduktion gerader Leiter und rechteckiger Spulen." Elektrotechnische Zeitschrift. Vol. 27, pp. 1175-1179. Berlin, December 13, 1906.

An announcement that the Government were contemplating a revival of street lighting, based generally on an over-all saving of not less than 50 per cent. of pre-war consumption, was made in the course of a written reply in the House of Commons on Monday.

MAKING CONCRETE POLES

A NEW METHOD FOR REDUCING COST AND WEIGHT

by P. F. CLARK, A.M.I.C.E., A.M.I.E.E.

THE shortage of wood poles has caused users to consider alternatives for overhead line construction, and the reinforced concrete pole is, in consequence, now in great demand.

In an attempt to reduce the high costs and heavy weight usually associated with such poles, with consequent increased cost in transport and erection charges, Clough Smith and Co., Ltd., in conjunction with Colerete Ltd., have developed a method of manufacturing by which reinforced concrete poles can be made on site adjacent to the job, provided there is reasonable access, and water is available.

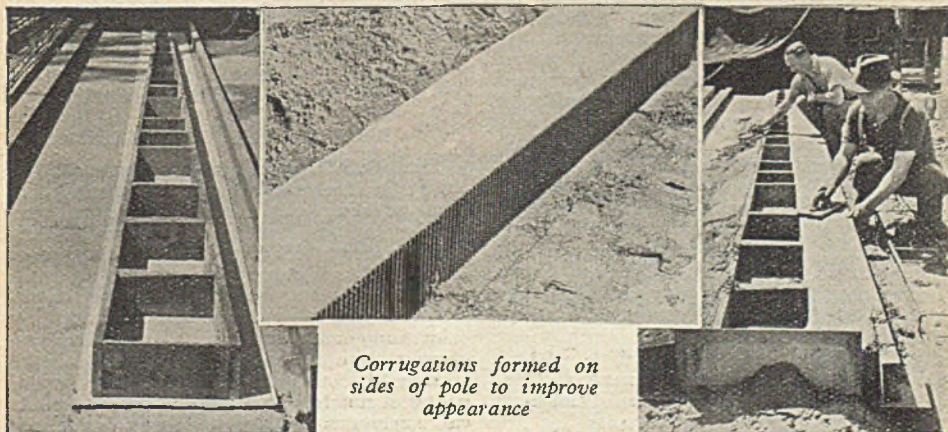
For making fifty poles it is necessary to find a level site, approximately 50 ft. by 40 ft.; the poles would be made in batches, each batch representing the quantity for a day's work.

To make a pole, a section of the site is first prepared by making a level sand bed between two channel sections. On this bed is laid a piece of corrugated paper of the correct width for making a pole. Next, a former of the exact size and shape of the finished pole is placed on the prepared bed. A piece of corrugated paper, cut to the correct size, is next wrapped round the former and sand is packed against it to hold it in position. Holes punched in the paper beforehand are used for locating steel pins which are inserted to form the required bolt holes. Next, the former is removed, leaving be-

hind a paper trough of the size of the pole backed by tightly packed sand. Small right angle pieces are then placed on each side of the trough to locate the reinforcement. This is made up in the form of a cage and is next lifted into position. The pole is now ready for grouting. No stone is used, but a 1:3 mix of cement and sand is mixed in a special Colcrete mixer. The grout is poured direct into the paper mould until this is filled, after which the top surface is levelled off with a trowel. Finally a jig is fixed in position so that the vertical bolt holes can be accurately located. If an earthwire is required, this can be placed in the pole with the reinforcement.

In practice, two poles would be made simultaneously between the two channel sections. The poles are then left to set and the paper is removed the following day. The normal 28 days is allowed for curing.

It will be appreciated from the above description that no steel moulds are required for the process, and also no delays need be caused by shortage of factory space. It is also a simple matter to alter the design of pole to meet special requirements. A simple rectangular pole, tapered from top to bottom in one plane, has been chosen as a standard. The poles are made to conform with the B.S.S. No. 607—1946, and have successfully withstood the tests laid down in that specification.



Corrugations formed on sides of pole to improve appearance

*Left: The former, made to exact size of pole, is laid on corrugated paper on sand bed.
Right: Consolidating sand against paper, around former*

I.M.E.A. Annual Report

COUNCIL PRESSING FOR AMENDMENTS TO ELECTRICITY BILL

THE fifty-second annual report of the Council of the Incorporated Municipal Electrical Association for the year 1946-47 shows that the membership of the association is 346—a reduction of two, occasioned by the resignation of the Wick undertaking upon its being taken over by the North of Scotland Hydro-Electric Board, and the resignation of Stanley U.D.C.

PERSONAL NOTES

The Council report that Mr. W. P. Litwall, who, on his retirement from the position of borough electrical engineer at Fleetwood, automatically resigned from the Council, has been elected an Honorary Member of the association in appreciation of the services he had rendered as chairman of the Bulk Supply Committee for a number of years and as president in 1944-45. The following have been elected associate members of the association: Mr. P. C. Ebner (Shoreditch), Mr. A. J. Ryan (Hastings), Mr. F. L. Ogden (Oldham), Mr. T. A. G. Margary (Wolverhampton), Mr. T. Bloore (Sutton Coldfield), and Mr. G. H. Oldroyd (Stockport), raising the total number to 19. Com. W. M. Bell Macdonald, chairman of the Dumfries County Council Electricity Committee, was elected an Honorary Member of the Council for the year 1946-47.

Dealing with the Electricity Bill, the Council state that at the meeting with the Minister of Fuel and Power, which took place on February 21, amendments suggested by the association were discussed and a number were accepted in principle. In other cases the amendments were tabled on behalf of the association during the Committee stage of the Bill and some of these were accepted. The Council regretted that up to the time of the issue of the report, the amendment making provision for a democratically controlled administrative structure below the level of area boards, in which the local authority representatives would play an important part, had not proved acceptable to the Minister. This was all the more to be deplored since in the opinion of the Council, the consultative councils which it was proposed to create, would not form suitable or efficient instruments for the satisfaction of consumers' needs, and might become a source of unnecessary friction within the industry. The Council would

continue to press by every available means for the acceptance of this and other vital amendments during the remaining stages of the Bill.

The Council approved a report from its representatives serving on the National Committee of Statutory Wiring Regulations and Registrations making suggestions for strengthening the organisation and assisting in improving the general level of installation work, and circularised members recommending the adoption of a certain course of action when advertising for tenders for installation work. The Council are in favour of compulsory registration, but the Minister of Works and the Minister of Fuel and Power had intimated that owing to the complex and controversial issues involved, they were not prepared to recommend the Government to introduce legislation for the compulsory registration of electrical contractors and operatives. Thereupon the Council decided that no good purpose would be served by continuing to be represented on the National Committee of Statutory Wiring Regulations and Registrations, and resigned. As there appeared to be disagreement between the E.C.A. and the National Register, the Council were of the opinion that attempts should be made to secure renewed co-operation.

The Generation Committee of the Council had prepared a model specification for the design and performance of cooling towers, and it was hoped to issue this to members in the near future. A considerable amount of research work had been undertaken in connection with the "constant," which it was proposed to use as a basis for the model specification.

BROADCASTING OVER MAINS

The G.P.O. was to conduct research into the technical problems involved in the question of broadcasting over electricity supply mains, and other matters arising were receiving the consideration of a special sub-committee of the Council. The technical aspects of the possible use of short-wave radio communication by electricity undertakings had also been referred to a special sub-committee of the Council for examination. The question of remote control by super-imposed currents and relevant matters had been considered by the Council, and it was hoped to submit to members a memorandum dealing with the subject in the near future.

• 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.

SIR LEONARD PEARCE, engineer-in-chief of the London Power Co., Ltd., has been elected an honorary member of the Institution of Mechanical Engineers in recognition of his great services to the institution and to the development of mechanical engineering science and practice.



SIR L. PEARCE

SIR CLIFFORD PATERSON, F.R.S., director of the G.E.C. research laboratories at Wembley, deputy chairman of the British Standards

Institution, and members of the Council of the institution, entertained Mr. Howard Coonley, the first president of the International Organisation for Standardisation, at a cocktail party in the new council room of the institution. Mr. Coonley played an active part in war production in the first world war, and during the recent war was in charge of the conservation, standardisation and specification work of the War Production Board. He spent some time in China as chief adviser to the Chinese Government in setting up the Chinese War Production Board. Mr. Coonley has filled the office of President of the National Association of Manufacturers of the U.S.A. He was instrumental in securing U.S.A. support for the B.S.I.'s plan for forming a United Nations Standards Co-ordinating Committee during the war.

This committee has now become the International Organisation for Standardisation.

MR. A. L. AYTON has been elected a director of Keith Blackman, Ltd.

MR. WILLIAM M. MCKENZIE, assistant secretary, has been appointed secretary and chief accountant of Bruce Peebles and Co., Ltd.

MR. C. DRUMMOND, a departmental head, has been appointed by the Fleetwood Electricity Committee to fill temporarily the position of borough electrical engineer, pending the appointment of a successor to Mr. W. P. Lilwall, who has retired. Mr. Drummond has been with the Corporation for 15 years.

MR. W. T. GANN, borough electrical engineer, gave a talk on British electricity undertakings to twenty-five local government officials from a number of foreign countries who, while on a three weeks' course in Southport under the auspices of the British Council, have been given "behind the scenes" pictures of the town's electricity undertaking and shown over the power station.

SIR GODFREY INCE, Permanent Secretary of the Ministry of Labour and National Service, and Mr. Alan P. Good, managing director of the British Electrical Engineering Co., Ltd., were the speakers at the opening dinner of the fifth annual conference of the Brush Foremen's Association in the staff canteen at the Falcon works of the company at Loughborough recently. The association entertained a large number of visiting foremen from other companies. Sir Godfrey Ince devoted the greater part of his address to the main problems referred to in the Economic Sur-



Group taken at the annual conference of the Brush Foremen's Association at Loughborough

vey, 1947, in particular that of the shortage of man-power, and emphasised the importance of everyone endeavouring to understand the situation as disclosed in the Survey.

SIR ALEXANDER ROGER, chairman of British Insulated Callender's Cables, Ltd., was responsible for an interesting departure from the customary procedure



SIR A. ROGER, chairman of B.I. Callender's Cables, addressing the annual meeting in a marquee at Prescot

at the annual general meeting of the company. More than 500 stockholders responded to an invitation of the directors to visit the local factories of the company, and the chairman adjourned the meeting at the Adelphi Hotel, Liverpool; the stockholders were transported by special coaches to the Prescot works, and the full annual meeting was held in a flower-bedecked marquee. At the conclusion of the business, a cold lunch was served in the marquee while the firm's silver band played. Conducted by members of the works' staff, the stockholders were then taken round the 100 acre factory where more than 8 500 workers are employed. Sir Alexander Roger said he wanted to get them together to encourage a better spirit between shareholders and workers. In the evening Sir Alexander and the directors joined 800 of the Prescot staff for the second half of the company's dinner and dance, the first part having been held the previous night.

MR. W. D. BRASSINGTON, burgh electrical engineer, Motherwell, and Mr. D. Ross, burgh electrical engineer, Paisley, have been appointed as the trade representatives on the selection committee for the domestic appliance industry, who will choose the designs of the products of that industry to be included in the

"Enterprise Scotland" Exhibition to be held in Edinburgh from August 25 to September 30.

MR. H. E. GOODY, advertising manager, lamp and lighting sales, has completed thirty-five years of service with the British Thomson-Houston Co., Ltd., having joined the advertising department in 1912 as assistant to the manager, Mr. Frank Shaw. Mr. Goody, who served in the Army and R.F.C. from 1914 to 1919, became manager in 1921.

MR. FRED C. SMITH (works manager), Mr. L. C. Ellis (chief engineer), and Mr. E. H. Hilton (secretary), have been appointed by the Visco Engineering Co., Ltd., to the board of directors, in accordance with their policy of associating experienced members of the staff with the management of the company. Each of the new directors has had nearly 20 years' service with the firm and is, therefore, fully conversant with all aspects of the business.

SIR FELIX POLE has been elected president of the Electric Vehicle Association of Great Britain, and filling other offices are Mr. A. W. Barham, chairman; Mr. A. W. Fippard, vice-chairman; and Mr. Hamlyn Drake, hon. treasurer.

MR. E. J. SUTTON, of London, has been elected chairman of the Executive Council of the Association of Supervising Electrical Engineers for the year 1947-48. Mr. L. R. Perkins was elected vice-chairman and Mr. J. J. Smith hon. treasurer.

Obituary

MR. EDWARD F. MACKAY, manager in Scotland for Dorman and Smith, Ltd., and its associate company, DS Plugs, Ltd., on June 9. He was educated at Allen Glen's School, Glasgow, and then joined James Howden and Co., Ltd., later becoming assistant district engineer with the Clyde Valley Electricity Co., Ltd., in the Coatbridge area. After some years with that company he joined Dorman and Smith, Ltd., as their manager for Scotland.

MR. PAUL EDWARD NEWNAM, at Eltham, on May 30, aged 54 years. He was a specialist engineer on the staff of the steam turbine department of the English Electric Co., Ltd., and operated from Queen's House, London. Born in Buckinghamshire, Mr. Newnam was educated at Carlisle Grammar School, and apprenticed to C. A. Parsons and Co., Ltd. During the 1914-18 war he became a captain in the 4th East Yorkshire Regiment, and served on the Somme. Later he was transferred to the Tyne Electrical Engineers. He was made manager of the London office of C. A. Parsons and Co. in 1934. During the last war Mr. Newnam spent some time with the Ministry of Works, and joined the

English Electric Company in April, 1944. He was an associate member of the I.E.E., a member of the Royal Institution of Great Britain, and of the Executive Asso-

of Great Britain, The cremation at Golders Green on June 5 was attended by a number of colleagues from the English Electric Co. and C. A. Parsons and Co.

Birthday Honours

THE Birthday Honours List contained a number of names of electrical interest, including that of Miss Caroline Haslett, founder and director of the Electrical Association for Women who has been appointed a Dame Commander of the British Empire for services to the Board of Trade and the Ministry of Labour. A list of other recipients of honours is appended:



MISS C. HASLETT

C.B.E. (Military Division): Maj.-Gen. A. W. Sproull.

K.B.E.: The Hon. Cecil J. H. Campbell, managing director, Marconi Radio Telegraph Co., of Egypt.

C.B.E.: Mr. J. E. C. Bailey, managing director, Baird and Tatlock, Ltd.; Mr. O. F. Brown, assistant secretary, D.S.I.R.; Ald. C. B. Chartres, vice-chairman of the Agricultural Machinery Board; Mr. H. L. Kirke, head of B.B.C. research department.

O.B.E.: Col. J. E. Swindelhurst, R.E. (Military Division); Mr. C. F. Booth, assistant staff engineer, G.P.O.; Mr. B. F. Browne, North-East Region, Ministry of Fuel and Power; Mr. J. Carson, director, Stewarts and Lloyds, Ltd.; Mr. L. J. Cheshire, senior engineer, English Electric Co., Ltd.; Mr. Charles F. Dickson, a director of Crompton Parkinson, Ltd., for services as chairman of the Executive Council, Stage Door Canteen, Ltd.; Mr. Douglas Hinton, financial officer, Electricity Commission; Mr. W. L. Greenwood, personnel and contracts manager, Murphy Radio, Ltd.; Mr. A. C. Knowling, Assistant Director of Telecommunications, Ministry of Civil Aviation; Mr. T. F. Lee, secretary, Telephone Exchange Equipment and Telephone Apparatus Bulk Supplies Committee; Prof. W. H. McMillan (deceased), Hood Professor of Mining, Edinburgh University; Mr. G. Smith, superintending engineer, Ministry of Works; Mr. C. E. Strong, chief radio engineer, Standard Telephones and Cables, Ltd.; Mr. H. W. Swann, Senior Electrical Inspector, Minis-

try of Labour and National Service; Mr. W. Wood, signal and telegraph engineer, L.M.S. Railway Co.; Lieut.-Col. A. T. Harpham, Postmaster-General, Southern Rhodesia; Mr. W. B. Calder, Indian Service of Engineers, superintending engineer, Communications Circle, Sind; Mr. B. O. Candy, transmission engineer, Standard Telephones and Cables, Ltd. (lately technical adviser in the Posts and Telegraphs Directorate); Mr. T. D. Boldy, superintending engineer, Burma Public Works Department (Electrical Branch).

M.B.E.: Mr. W. Bell, superintendent of signals, B.O.A.C.; Mr. J. Cunningham, general manager, boiler division, Ruston and Hornsby, Ltd.; Mr. A. H. G. Field, assistant engineer, Cardiff telephone area, G.P.O.; Mr. C. R. Fright, telephone manager, Reading, G.P.O.; Mr. W. H. Nicholls, chief electrical engineer, Aldershot district, War Office; Mr. G. C. Preston, department superintendent, Plessey Co., Ltd.; Mr. J. Williams, personnel manager, Standard Telephones and Cables, Ltd.; Mr. W. E.



MR. C. F. DICKSON



MR. H. W. SWANN

Willshaw, research physicist, General Electric Co., Ltd.; Mrs. Doreen Elphick (wife of Mr. E. de B. Elphick, agent and chief engineer, the Madras Electric Supply Corporation, Ltd.), Madras; Maj. H. Colleshaw, executive engineer, internal, Calcutta telephones district, Posts and Telegraphs Department; Mr. D. H. Franklin, assistant engineer, Posts and Telegraphs Department, Palestine.

B.E.M.: Miss M. M. Wallace, stranding machine operator, Standard Telephones and Cables, Ltd., North Woolwich.

Electricity In Northern Ireland

Proposed Transfer of Government Stations

PROPOSALS affecting electricity development in Northern Ireland are made in a White Paper published last week by H.M. Stationery Office. Distribution in Belfast and Londonderry is in the hands of municipal undertakings and the White Paper expresses the view that the requirements of co-ordination necessitate the remainder of the country being placed within the area of supply of the Electricity Board for Northern Ireland. The Government - owned generating stations, it is proposed, should be transferred to the Board, which would have the effect of reducing the generating authorities to three—two major and one minor.

THE LONDONDERRY UNDERTAKING

Concerning the Londonderry undertaking the White Paper says that whether the Londonderry station should be included in or excluded from any co-ordination scheme is a matter of local rather than of general concern. The Government is advised that substantial economies could be secured both for Londonderry and for the Electricity Board by linking the city with the h.t. network served by the base-load stations at Belfast and Ballylumford, while by connecting Londonderry in a h.t. ring, feeding into the city both from north and south, a degree of immunity against interruption could be assured equal to that which the city has enjoyed under local generation.

The Government proposes that the primary responsibility for co-ordinating generation should be entrusted to a Joint Electricity Committee with statutory powers, made up of a Chairman to be appointed by the Minister of Commerce, the Belfast City Electrical Engineer and the Chief Engineer of the Electricity Board. The functions of the Committee would be: (1) To direct the day-to-day operation of the generating stations owned by Belfast and the Board in so far as the quantity and rate of output and allocation of load are concerned; (2) to frame generation development schemes to be submitted for the approval of the Ministry of Commerce; (3) to pool for distribution purposes all the current generated at the stations named and to sell energy to the distributing authorities; (4) to arrange with the Eire Electricity Supply Board for the purchase, sale or exchange of supplies

of energy should this prove desirable; (5) to determine what proportion of the annual cost of main transmission lines should be included in the joint cost of production.

It is pointed out in the Paper that rural electrification is already well developed in the area of the Electricity Board. Fifty-eight out of sixty of the small towns and villages with a population of 500 or over throughout the rural areas have already a supply of electricity. What remains to be accomplished is the more difficult task of supplying farms and dwellings outside these towns and villages.

Discussing the present guarantee of 12½ per cent. for five years, required by the Electricity Board, the White Paper says that the Government is of opinion that the guarantee should be discontinued.

Having stated that the next few years will be a period of restricted rural development, conditioned by the supply position, the Paper points out that at the end of this period the Board will be undertaking heavy capital commitments in advance of any certainty of obtaining corresponding revenue. New h.t. lines will be required. Distances on the average will be longer, both between consumers and between each consumer and for h.t. transmission lines. The average cost of connecting consumers will consequently be higher and there is no reason to suppose that consumers at a distance from h.t. lines will on the average consume more electricity, and consequently produce more revenue, than those who are adjacent to them. The Board, therefore, bound by its statutory obligations to balance its accounts, might find it necessary at this stage, to limit development and only to extend *pari passu* with the expansion of revenue. Should such a situation arise the Government will take such steps as may then appear necessary to enable development to continue.

LOANS FOR EQUIPMENT

As a further step towards the development of rural electrification the Government proposes to institute a system of loans on easy terms for the purchase and installation of the special agricultural equipment for electrical operation and to enable farm buildings to be wired for power. This system will be administered by the Ministry of Agriculture.

Industrial Information

B.I. C.C. Sales Conference

B.I. Callender's annual sales conference under the chairmanship of Mr. F. Waine, director and manager (commercial), and attended by senior members of the sales management, was held recently at the Hotel Metropole, Brighton. A number of the company's directors were present at the dinner which followed at the Grand Hotel.

B.E.A.M.A. Contract Price Formulae

For purpose of calculating variations in (a) rates of pay, the rate of pay for adult male labour at June 14 shall be deemed to be 110s.; (b) costs of material, the index figure for intermediate products last published by the Board of Trade on June 14 is 222.9, and is the figure for the month of May, 1947.

N. Wales Power Co. Outing

The North Wales Power Co., Ltd., gave their employees an outing on Friday, June 13, when a party of 650 visited Llandudno, the programme including a trip on the s.s. "St. Trillo," and an evening entertainment at the Pier Pavilion. The principal office and district offices were closed for normal business, although an essential maintenance staff was available.

New Wages Agreement

Under an agreement between the N.F.E.A. and the E.T.U., the wage rates established in the agreement dated April 6, 1946, are to be continued from the third pay day in January last until a date to be determined by the N.J.I.C., except for the area at present included in Grade "C" which is to be up-rated to Grade "B" on and from the third pay day in June. The resultant hourly inclusive rate

for journeymen electricians is as follows: Grade "A" area, 2s. 9d.; Mersey district, 2s. 7d.; Grade "B" areas (including areas formerly in Grade "C"), 2s. 6d. A joint special committee is to be appointed to consider the wages structure of the industry; the application of the E.T.U. for an increase in the basic rate; wages in relation to production; and hours of work.

Inaugural Dinner

The inaugural dinner was given by the directors of Cyc-Arc, Ltd., to celebrate the launching of the new company. Present were the board of directors, the whole of the works, office and sales staffs and visitors.

Change of Address

In a paragraph on page 1610 of our last issue it was announced that the new address of the Mazda lamp and lighting department of the British Thomson-Houston Co., Ltd., is 9, Langley Road, Watford, Herts. This is the new address of the advertising department; the lighting department remains at Bridle Path, Watford Junction.

Refrigerators for "Prefabs"

The Minister of Health states that the Ministry of Works are now in a position to begin supplying a.c. refrigerators to those temporary bungalows which, although otherwise completed and handed over to local authorities, still lack this appliance. Arrangements have been made with the local authorities concerned for the carrying out of necessary modifications to the kitchen unit, and it is important that the Regional Surveyor of the Ministry of Works should be advised as soon as these have been completed. It is anticipated that the production required



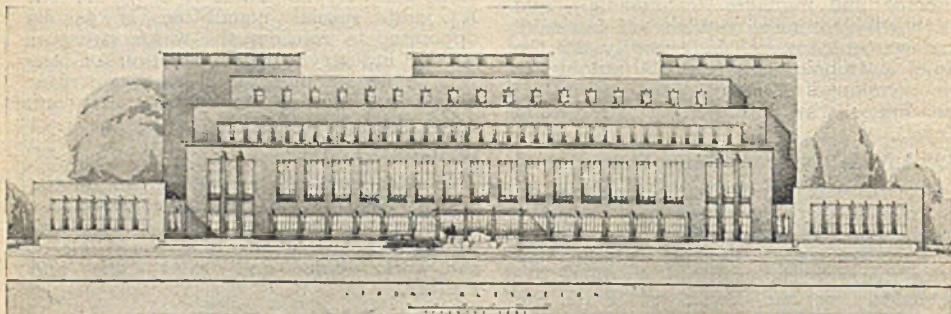
General view of the British Insulated Callender's Cables sales conference at the Hotel Metropole, Brighton

for the whole programme will be completed by next spring.

E.R.A. Establishment at Leatherhead

Among the exhibits in the Architectural Section of the Royal Academy's Exhibition

ciated that a scheme of this dimension cannot be envisaged in a detailed final form at this stage, so that the plans exhibited represent an ultimate aim which may have to be modified as the scheme develops. Nevertheless, the association is proceeding



A drawing of the proposed E.R.A. establishment at Leatherhead

now being held in London is a drawing by the architect, Mr. H. J. Rowse, F.R.I.B.A., of the proposed new E.R.A. establishment to be erected at Leatherhead. As indicated at the association's last annual general meeting, these designs are of considerable magnitude, and the erection of the complete establishment is to take place in appropriate stages, spread over a number of years. It will be appre-

with the Leatherhead scheme and the Council is now giving consideration to the financial implications involved. The plans which are being made for realising the capital required for the scheme, essentially involve a direct appeal to the electrical industry for funds, coupled with the expectation of a considerable grant by the Government. Details of these proposals will shortly be put before the industry.

Measurements Section

AN informal dinner was held by the A.I.E.E. Measurements Section in London, on Monday, when some 250 members and their friends attended. The chairman of the Section, Mr. L. J. Matthews, presided, supported by, among others, the President of the Institution and the Chairmen of the other Sections.

At the invitation of Mr. Matthews, Mr. V. Z. de Ferranti spoke and said that as President of the Institution he followed the activities of the Section with great interest. He congratulated the Section on its achievements during the session, particularly in staging the Servo Convention. With regard to the latter, applications for copies of the papers delivered were still being received, an appreciable number from the United States. Though the Section was the smallest so far as the Institution was concerned, it had the distinction of attracting the largest number to its dinners.

Mr. Matthews, in reply, said that the activities of the Section had increased and more meetings were held this Session than before. The membership had also grown, for whereas when Mr. E. H. Miller was chairman, it had been his ambition to see the membership figure reach 1 000, it was

to-day 1 347. The Section Committee had this year decided to renew the custom of a summer visit and they would on July 5 go to Cambridge. With regard to the next Session it was hoped that the informal dinner might be held earlier in the year, possibly January, and as no further nomination for chairman other than that made by the Committee had been put forward, Mr. D. C. Gall would be elected.

Mr. E. W. Moss proposed the guests, and Professor Willis Jackson replied to the effect that measurements might be looked upon as the core of the Institution. As chairman of the Radio Section, he had noticed, and possibly the Chairmen of the other Sections, shared the experience, that the standard of papers submitted to the Institution was in many cases lower than he would wish them.

During the course of the evening the Section maintained its reputation for after dinner entertainment, and the diners were treated to singing by Miss Lilian Keyes, piano solos by Madame Violette David, and a conjuring performance by Mr. F. Stanley. Messrs. G. F. Shotter, F. Miller and A. Ailes also entertained. The M.C. was Dr. G. A. V. Sowter.

Electricity Supply

Clydebank.—When, as a result of the heavy damage caused by the war, it was found that some 10 000 new houses would be required under the burgh re-planning scheme, it was decided that all should be fully equipped with electricity. Reporting on this decision, which they believe to be one of the first of its kind in Great Britain, the Clyde Valley Electrical Power Co. state that re-housed old age pensioners, who had been visited by the company's demonstrator, had all expressed extreme satisfaction with the results obtained from the electrical equipment installed, which consists of a cooker, wash-boiler and a two-bar fire. Their attitude, the company considers, seems to refute the assertion that elderly people view electricity with disfavour.

Generation of Electricity.—The official Returns rendered to the Electricity Commissioners show that 3 092 million units of electricity were generated by authorised undertakers in Great Britain during the month of May, 1947, as compared with the revised figure of 3 237 million in the corresponding month of 1946, representing a decrease of 145 million or 4.5 per cent. During the first five months of 1947 (i.e., up to the end of May) the total number of units generated by authorised undertakers was 18 814 million, as compared with the revised figure of 17 719 million

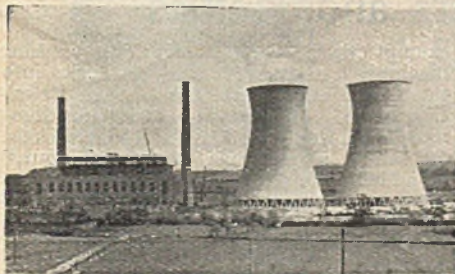
million, as compared with the revised figure of 3 049 million in May, 1946, a decrease of 134 million, or 4.4 per cent. During the first five months of 1947 (i.e.,



A view of the electrical exhibition now being held in the new showrooms and service centre of the Leyton Corporation, which were opened by the Minister of Fuel and Power on June 14

up to the end of May) the total number of units sent out from the generating stations of authorised undertakers was 17 766 million, as compared with the revised figure of 16 728 million for the corresponding period of 1946, an increase of 1 038 million units or 6.2 per cent.

North of Scotland.—The North of Scotland Hydro-Electric Board have published the Storr Lochs Constructional Scheme in the Island of Skye—the first hydro-electric scheme in the Western Isles. The project, which will cost about £247 000, will be developed in two stages. Initially it will have an annual output of 1½ million units, rising finally to 5½ million units to serve the 10 500 people of Skye. Distribution, which will be by 178 miles of h.v. and 151 miles of l.v. distribution lines, will make electricity available to over 70 per cent. of the population of the island (647 square miles). The site of the project is a valley, south of the precipice of Storr, between Portroe and Staffin. The generating station will consist initially of one 800 kW set and the second stage will increase the total installed capacity to 2 400 kW.



The new station of the North-West Midlands J.E.A. at Meaford, a few miles south of Stoke-on-Trent, now nearing completion. The station was started some years ago, and the first 30 MW set will be commissioned shortly

for the corresponding period of 1946, an increase of 1 095 million or 6.2 per cent. The total number of units sent out during May, 1947 (i.e., units generated less units consumed in the stations by auxiliary plant and for lighting, etc.), was 2 915

Sheffield Boiler Inquiry

EFFICIENT ACTION BY STAFF COMMENDED

ON the morning of January 16, 1946, an explosion occurred on No. 5 boiler at the Blackburn Meadows No. 2 generating station, Sheffield. As a result, two stokers died of multiple scalds and five men received minor injuries. The report of the preliminary inquiry conducted under the Boiler Explosions Acts of 1882 and 1890 is now available (H.M. Stationery Office, 4d. net).

The boiler was of the Stirling water tube type and consisted of three drums. It was designed for a maximum pressure of 710 p.s.i. and a normal rating of 150 000 lbs. of steam per hour, and was fired by means of a twin chain grate stoker. It was first put into service in March, 1936.

At the time of the explosion, the boiler was steaming at approximately normal rating and the steam outlet pressure was about 625 p.s.i. The end of the front downcomer pipe expanded into the furnace left-hand side water wall bottom header was blown out of the header, and the boiler water was discharged at full bore on to the firing floor of the boiler house.

The explosion, the report finds, was caused by constraint imposed on the downcomer pipe by the furnace side casing plates, the clearance present at the pipe hole cut in these plates being insufficient to permit the pipe to conform freely to the normal thermal movement

of the header. The joint between the pipe and the header was consequently subjected to the action of abnormal stresses which in time fractured the end of the pipe at the bellmouthing until the joint was unable to withstand the working pressure of the boiler.

Two days before the explosion occurred, a slight leakage of steam was seen at firing floor level in the vicinity of the left hand front corner of No. 5 boiler. The leakage did not appear to get worse as time went on and, apart from recording it in the log book, no action was taken.

Later examination of the front downcomer pipes in No. 5 and two other boilers, it is stated, revealed signs of disturbance or fracture. Alterations and repairs were then made to all three boilers, which have functioned satisfactorily since returning to service.

When the explosion occurred, the boiler house became quickly filled with steam but, in spite of this, "excellent precautionary measures were taken by various persons to minimise the possibility of damage to No. 5 boiler by overheating and to safeguard the other boilers under steam at the time. The material damage which resulted from the explosion was not extensive, due, in large measure, to efficient action on the part of the boiler room staff."

P.T. Off Cookers and Kettles

DURING the resumed committee stage of the Finance Bill on Wednesday, Mr. Dalton announced that electric cookers, kettles, boiling rings, hot plates, grillers and wash-boilers are to be exempt from purchase tax. Tax paid on such appliances since Budget day will be refunded.

Mr. Dalton said it was essential to retain the tax on space heaters. It was here that the greatest waste occurred and people were most improvident. He was very doubtful about water heaters, which were apt to be very wasteful, and his mind was set against making a concession. The case was quite clear regarding cookers, and he accepted the argument that there should be a remission from tax. Freedom from tax should also be applied to the electric kettle and ancillary items such as boiling rings, hot plates and grillers.

A case had been made out for washing boilers and he was inclined to

exempt them. As to various washing machines, he would like to look into them and see where the line of definition came. "There is a case for doing something there, and about electric irons, for which a case has been made out," he added. He asked for a period of reflection on more debatable articles like refrigerators and vacuum cleaners, on which he would suspend judgment.

Taking all these into account, he would be giving away in revenue about £8 000 000 this year and £12 000 000 in a full year. This relief would be made retrospective from Budget Day.

The Bradford Corporation has approved a scheme for the equipment of a new transforming station at Oakenshaw Mills, Cleckheaton Road, and for the laying of high and medium voltage cables in connection therewith at a total estimated cost of £4 467.

Why it pays to specify "SANTON"

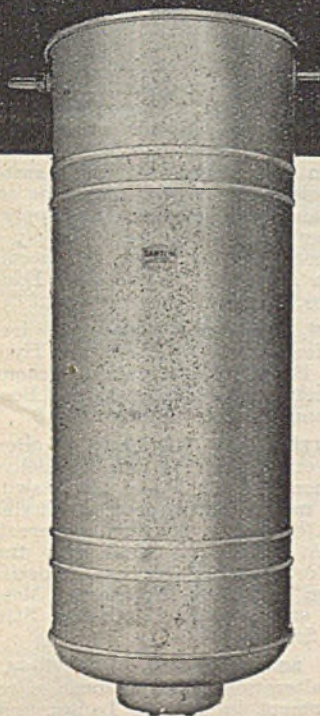
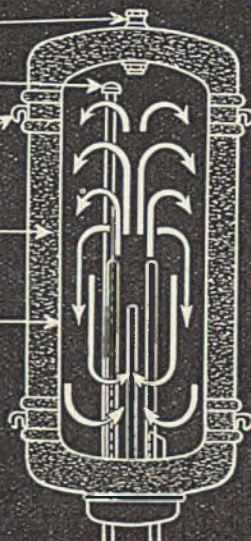
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Contracts Open

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

Manchester, June 23.—Supply and delivery of 24 415 V a.c. sub-station switchboards and supply, delivery and erection of two mercury arc rectifier equipments at Mount Road and Gorton sub-stations. Specifications from Chief Engineer and Manager, Electricity Department, Town Hall, Manchester, 2; deposit, £1 ls.

Exeter, June 25.—Supply, delivery and erection of 6.6 kV metal-clad feeder switchgear. Specification from City Electrical Engineer, Electricity Offices, 46, North Street, Exeter.

Manchester, June 27.—Supply, delivery and supervision of erection at the water-works hydraulic power station of one electrically-driven submersible borehole pump with starting and control gear, etc. Specification from the Secretary, Water-works Offices, Town Hall, Manchester, 2; deposit, £1 ls.

Belfast, June 27.—Supply, delivery and erection of mercury arc rectifier equipments. Specification from City Electrical Engineer and General Manager, East Bridge Street, Belfast; deposit, £2 2s.

Bury, June 28.—Supply of fluorescent fittings for public library and reading rooms. Premises may be inspected on application to the Librarian, Public Library, Silver Street, Bury.

Warrington, June 30.—Supply of transformers. Specifications from Borough Electrical Engineer, Electricity Works, Warrington; deposit, £1 ls.

Chester, June 30.—Wiring of 148 houses on Blacon housing estate. Specification from City Engineer and Surveyor, Municipal Offices, Chester; deposit, £1 ls.

Manchester, June 30.—Supply, delivery and erection of lifting gear for i.d. fans for Nos. 71 and 72 boilers at Stuart Street generating station. Specification from Chief Engineer and Manager, Town Hall, Manchester, 2; deposit, £1 ls.

Kingston-upon-Hull, June 30.—Purchase of one railway wagon side tippler and one gravity bucket type coal elevator, including d.c. motors and drives. Seen at Seuloates power station. Tenders to General Manager, Kingston-upon-Hull.

Birmingham, July 1.—Supply and delivery of one 20 MVA, 32/11 kV, outdoor O.N. type three-phase transformer. Specification from Chief Engineer and Manager, Electric Supply Department, 14, Dale End, Birmingham, 4; deposit, £2.

Pretoria, July 1.—Supply, delivery and erection of one 180 000 lb. and one 27 000 lb. overhead electric travelling crane. Specifications from City Electrical Engineer in Pretoria or from Messrs. Merz and McLellan, Carlisle House, Newcastle-on-Tyne, 1; deposit, £2 2s.

Birmingham, July 1.—Supply, delivery, erection, testing and putting to work of cast iron water pipework (up to 8 in. diameter) and associated valves, hydrants, fittings, etc., required at Hams Hall "B" station. Specification from Chief Engineer and Manager, Electric Supply Department, 14, Dale End, Birmingham, 4; deposit, £2.

Burnley, July 1.—Work and equipment in connection with new electrical laboratory at the Municipal College: (a) Supply and installation of bus-bar assemblies in suitable trunking system; (b) supply and installation of wiring, conduit, switchgear, panels, etc., between machine sets, bus-bars and test benches; (c) supply of transformer equipment; (d) supply of various measuring instruments. Specifications from Director of Education, Education Offices, Burnley.

Scotland, July 2.—Supply of transformers for North of Scotland Hydro-Electric Board's distribution schemes. Specifications from Offices of the Board, 16, Rothesay Terrace, Edinburgh, 3.

Edinburgh, July 5.—Work at Portobello power station: (a) supply, delivery and erection of 3 300 V and 415 V switchgear and motor control gear for auxiliary services; (b) supply, delivery and erection of 5 MVA, 6.6/3.3 kV dual ratio transformers for auxiliary services. Specifications from Consulting Engineers, Messrs. Kennedy and Donkin, 12, Caxton Street, London, S.W.1.

Heston and Isleworth, July 7.—Conversion, alteration or adjustment of wireless equipment in part of Lampton area owing to change-over of supply from d.c. to a.c. Specification from Borough Electrical Engineer and Manager, 11, Staines Road, Hounslow.

Chesterfield, July 11.—Supply of 75 kW glass bulb mercury arc rectifier. Specification from Borough Electrical and Manager, Corporation Electricity Department, 172, Chatsworth Road, Chesterfield.

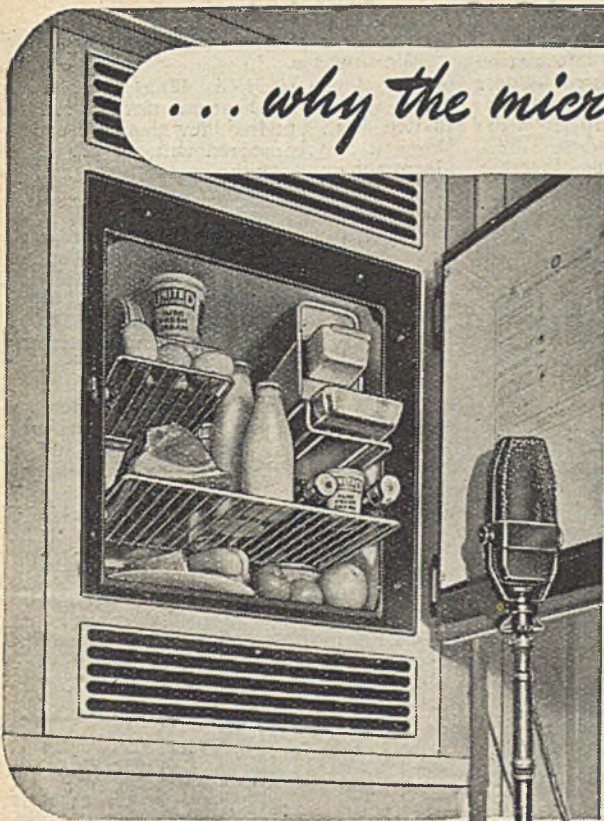
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Company News

SIEMENS BROTHERS AND CO., LTD.—Div. 7½% on £2 450 000 ord. Net prft., 1946, £364 888 (£290 888). Bal. struck after prvdg. £200 000 (£150 000) for income tax and crediting £410 000 (£215 000) E.P.T. recoverable.

LIGHTFOOT REFRIGERATION CO., LTD.—Gross prft. for 1946, £37 526 (£108 056); add E.P.T. repayable £15 681 (nil); res. for subsid. co.'s losses no longer reqd. £420 (£2 586), bank int. nil (£129); less deprecn. £11 974 (£11 265), fees £1600 (£1425), res. for E.P.T. nil (£56 183), inc.-tax £16 765 (£17 236); fin. 3% on Ptg. Pref. mkg. 8% (5%); lin. 5% on Ord., mkg. 8% (5%); fwd. £28 819 (£19 510). In addition, last yr. 2½% paid on Pref. and Ord. out of cap, res. not subject to tax. Owing to fire at Wembley wks. out-put durg. last 4 mos. of yr. was consid. curtailed

BROADCAST RELAY SERVICE, LTD.—Ordinary capital is to be raised from 6½

to 8 per cent., tax free. This makes, with the larger interim, a total distribution of 13 per cent., tax free, for the year ended March 31, as compared with 10 per cent. for 1945-46. Group trading profits, according to the preliminary statement, were £450 848 (against £387 913). Depreciation takes £22 949 (£18 335), reserve for replacements and general contingencies £127 000 (£77 000), tax £150 455 (£194 155), directors' fees £2 137 (£1 787), bank and debenture interest £12 691 (£3 648), minority interests in subsidiary companies £1 256 (£4 510), leaving £134 360 (£88 478), to which is added £5 380 (£5 123 retained) distributions by subsidiary companies from previous un-divided profits, making £139 740 (£85 355). The dividend on the 4 per cent. cumulative preference (less tax) takes £6 187, interim of 5 per cent. (3½), tax free, on ordinary £40 405 (£28 283), the proposed 8 per cent. (6½), tax free, final to be paid on June 28 £65 648 (£52 527), leaving £70 761 (£42 261) to be carried forward. Issued capital is £1 558 100 in £750 000 4 per cent. cumulative preference and £808 100 in 5s. ordinary.

Coming Events

Monday, June 23

I.M.E.A. CONVENTION.—Bournemouth. Issue of Badges, 10 a.m.; Official Opening of Exhibition, 3 p.m.; Reception and Dance, 8 p.m.

UNIVERSITY COLLEGE.—London. At the I.E.E. "The Presentation of Technical Information," the fourth in a series of lectures by Prof. R. O. Kapp. 5.30 p.m.

Tuesday, June 24

I.M.E.A. CONVENTION.—Bournemouth. Civic Welcome and Presidential Address (Mr. J. S. Pickles), 10.30 a.m.; "Recent Developments in Power Station Practice" (Mr. F. W. Lawton), 2.30 p.m.; Reception and Dance, 5 p.m.

I.E.E. LONDON STUDENTS' SECTION.—At the Polytechnic, Regent Street. Miniature Rifle Shooting Contest. 7.30 p.m.

Wednesday, June 25

I.M.E.A. CONVENTION.—Bournemouth. Coach and steamer trips, all day.

INSTITUTE OF WELDING.—London. At the Institution of Civil Engineers. Annual General Meeting, 2.30 p.m. At Grosvenor House, Park Lane. Annual Dinner, 7 p.m.

I.E.E. SOUTHERN CENTRE.—South Farnborough. At the Queen's Hotel. "The Development and Study of a Practical Spaced-Loop Radio Direction-Finder for High Frequencies," by W. Ross. 6.30 p.m.

Thursday, June 26

I.M.E.A. CONVENTION.—Bournemouth. "The Law Relating to Electricity Supply" (Mr. R. Birt), 10 a.m.; E.A.W. Lunch, 1 p.m.; Banquet and Ball, 7.30 p.m.

Friday, June 27

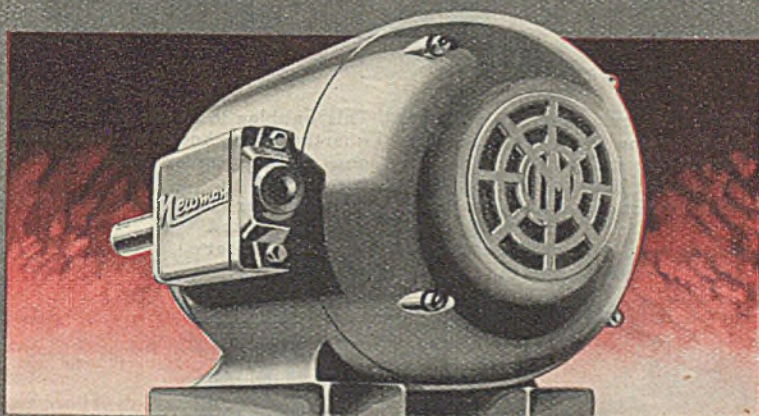
I.M.E.A. CONVENTION.—Bournemouth. Council Meeting, 9.30 a.m.; Ordinary General Meeting, 10 a.m.

Metal Prices

	Monday, Price	Ino.	June 16 Dec.
Copper—			
Best Selected (nom.)...per ton	£135 10 0	—	—
Electro Wire bars	£137 0 0	—	—
H.C. Wires, basils	£155 0 0	—	—
Sheet	£178 10 0	—	—
Bronze Electrical quality			
1½% Tin—			
Wire (Telephone) basils per ton	£177 15 0	—	—
Brass (80/40)—			
Rod basils	1s. 2¼d.	—	—
Wire	1s. 6½d.	—	—
Iron and Steel—			
Fig Iron (E. Coast Hematite No. 1) ...per ton	£8 19 0	—	—
Galvanised Steel Wire (Cable Armouring) basils 0.104 in.	£34 5 0	—	—
Mild Steel Tape (Cable Armouring) basils 0.04 in.)	£21 15 0	—	—
Lead Pig—			
English	£91 10 0	—	—
Foreign and Colonial... ..	£90 0 0	—	—
Tin—			
Ingot (minimum of 99.9% purity)	£410 10 0	—	—
Wire, basils	per lb. 6s. 6¼d.	—	—
Aluminium Ingots ...per ton	£80 0 0	—	—
Spelter	£70 0 0	—	—
Mercury (spot)	per bott. £17 3 6	—	—

Prices of galvanised steel wire and steel tape supplied by O.M.A. Other metal prices supplied by B.I. Callender's Cables, Ltd. The latter prices are nominal only, and do not include any allowances for tariff charges.

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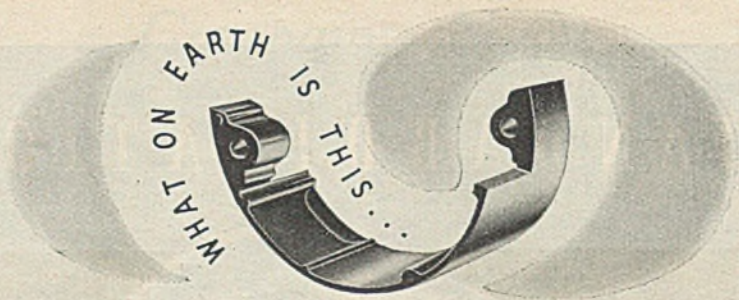
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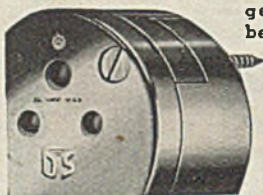
London Office 32 Victoria St. Westminster, S.W.1.

Cogent



The rather rummy looking object above is one section of the new DS skirt for surface mounting the DS conduit box type socket. The other section is an absolute twin, and they get together as shown below.

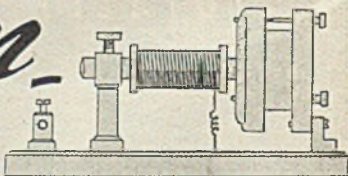
This enables the skirt to be fixed after the wiring has been completed and means greater ease for the wireman. Just another ingenious addition to the DS Fused Plug and Socket range.



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Announcement of DS Plugs Ltd., Manchester - London - Glasgow.

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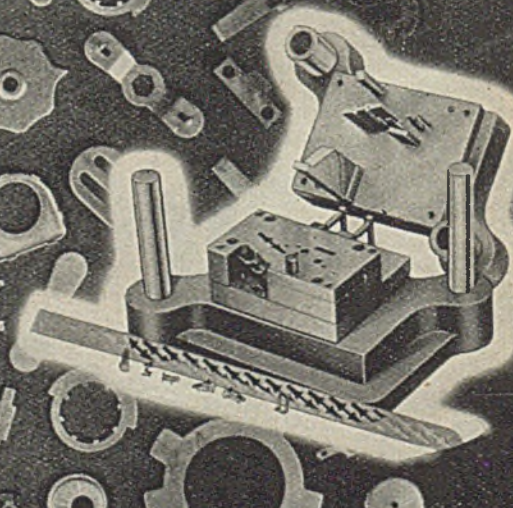
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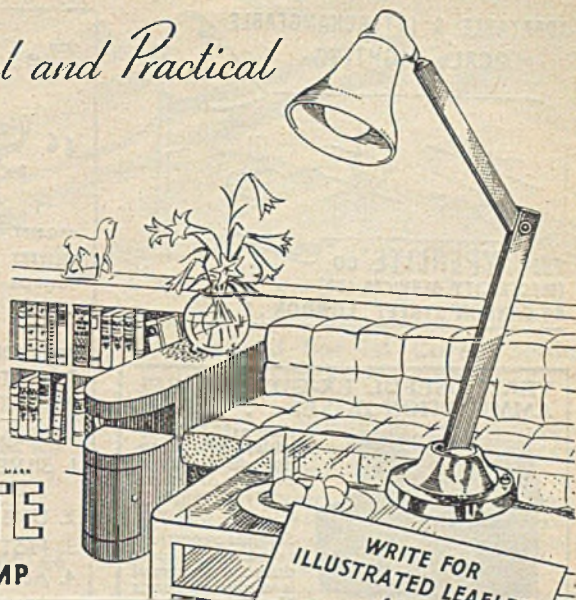
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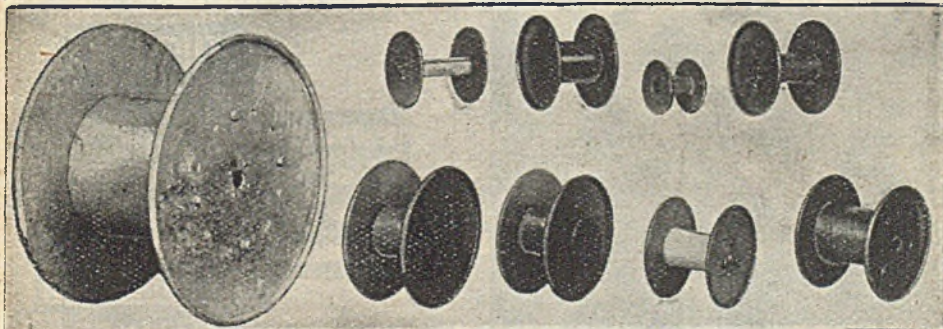
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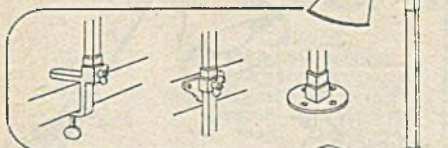


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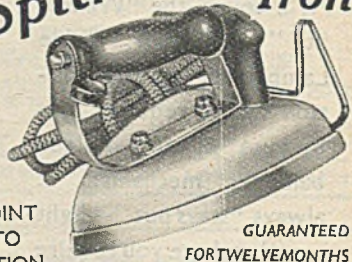
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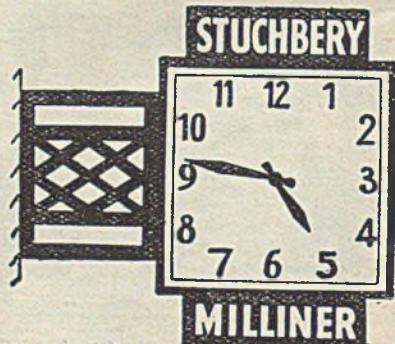


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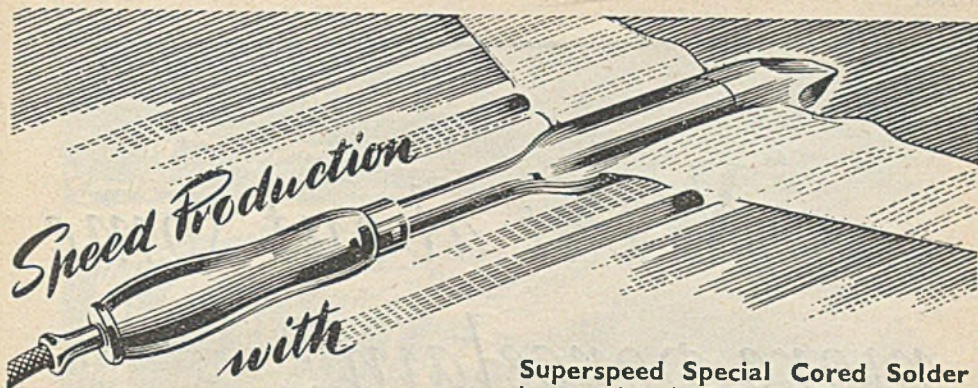
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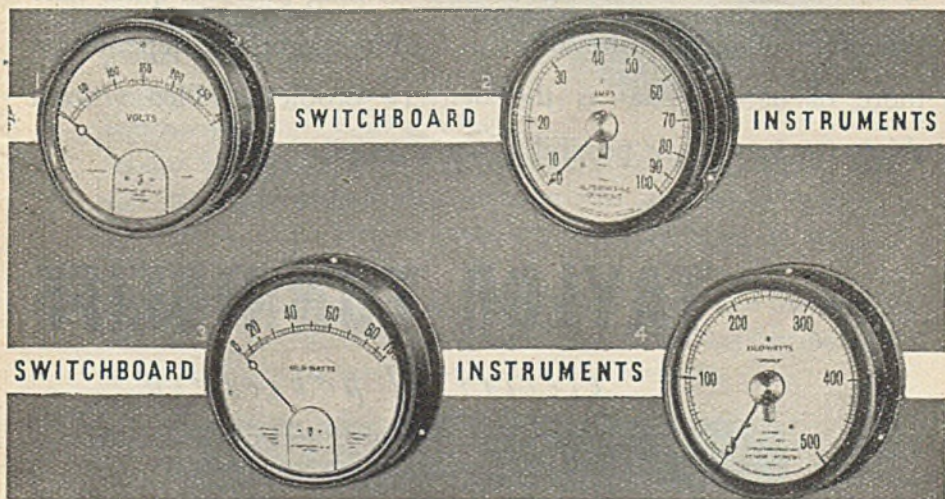
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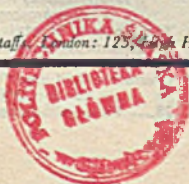
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TAS/Tx59



HOW LONG DOES IT LIVE ?



The Salmon

The salmon spends the greater part of its life in the sea and although it has been credited with a very long life, it rarely exceeds 8 or 9 years. Size is by no means a certain indication of age—the largest salmon being those that have spent a long time at sea, where food is more abundant, before returning to the river for spawning.

There is no problem about the life of a Westinghouse Metal Rectifier. It has established itself as the most reliable rectifier and many are still in use after 20 years' continuous service.



METAL RECTIFIERS

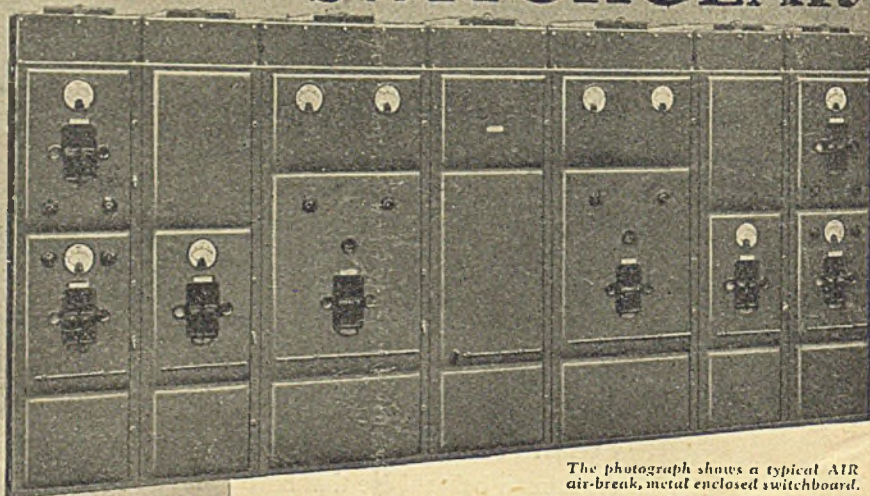
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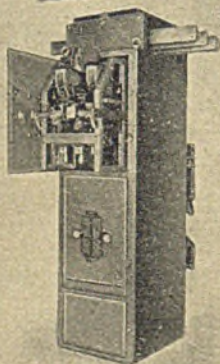
Type

AIR

AIRBREAK SWITCHGEAR



The photograph shows a typical AIR air-break, metal enclosed switchboard.



RATINGS:

Max. Volts 660. Max. Current 3,000 amps.
Breaking-capacity up to 43 kA, 3 phase,
symmetrical.

APPLICATIONS:

For heavy duty installations in industrial works
and for power station auxiliaries.

SPACE SAVING:

Up to 600 amps. a two tier unit is available
permitting two circuits to be controlled from
one panel width.

Type AIR 600 amp. circuit-breaker unit showing upper circuit-breaker drawn forward into the maintenance position.



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F/A 701