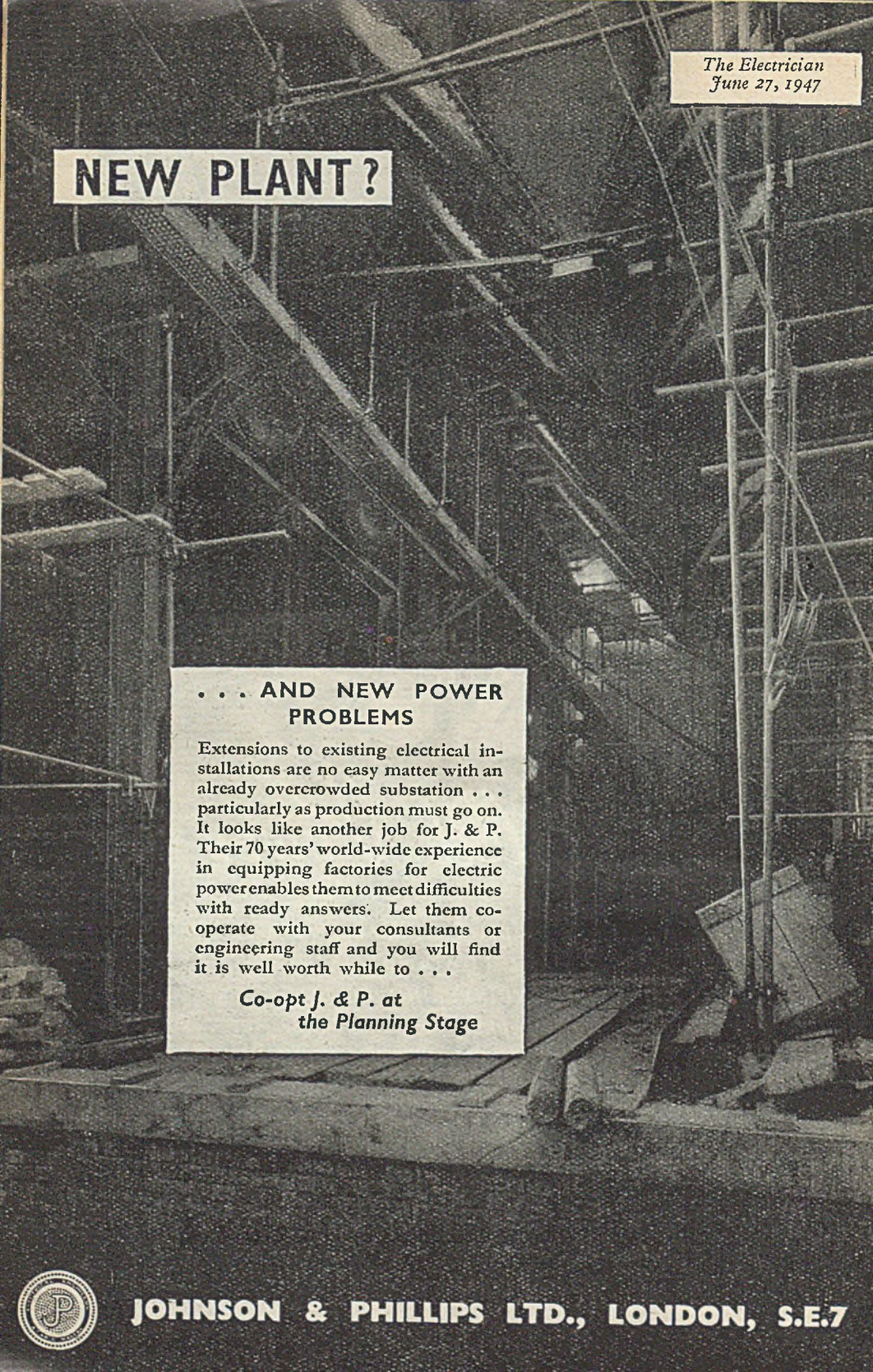
THE
ELECTRICIAN

THE TECHNICAL NEWSPAPER OF THE ELECTRICAL INDUSTRY

JUNE 27 1947
SIXPENCE



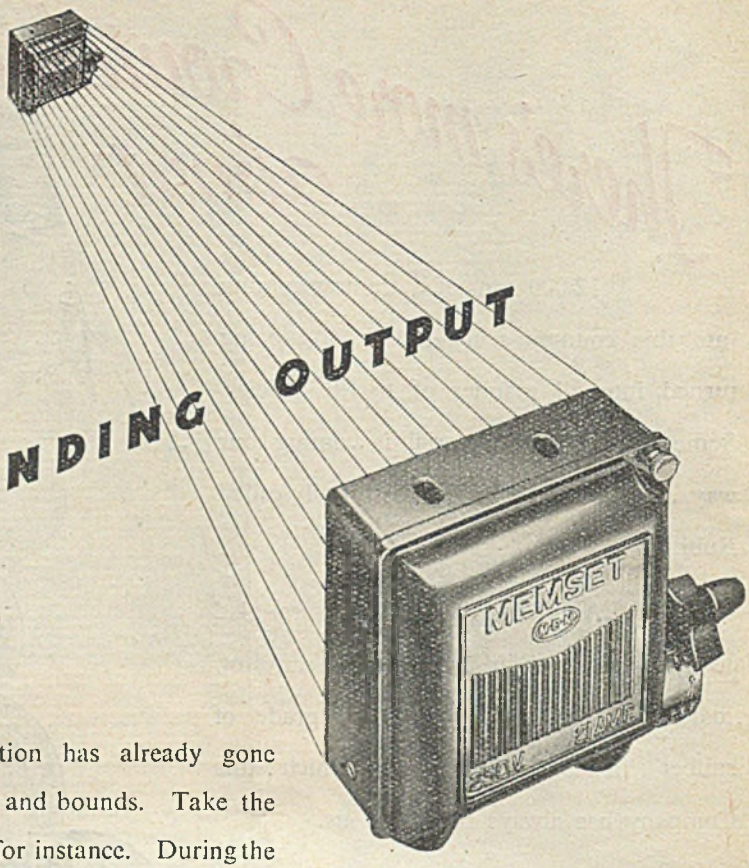
NEW PLANT?

. . . AND NEW POWER PROBLEMS

Extensions to existing electrical installations are no easy matter with an already overcrowded substation . . . particularly as production must go on. It looks like another job for J. & P. Their 70 years' world-wide experience in equipping factories for electric power enables them to meet difficulties with ready answers. Let them co-operate with your consultants or engineering staff and you will find it is well worth while to . . .

Co-opt J. & P. at the Planning Stage

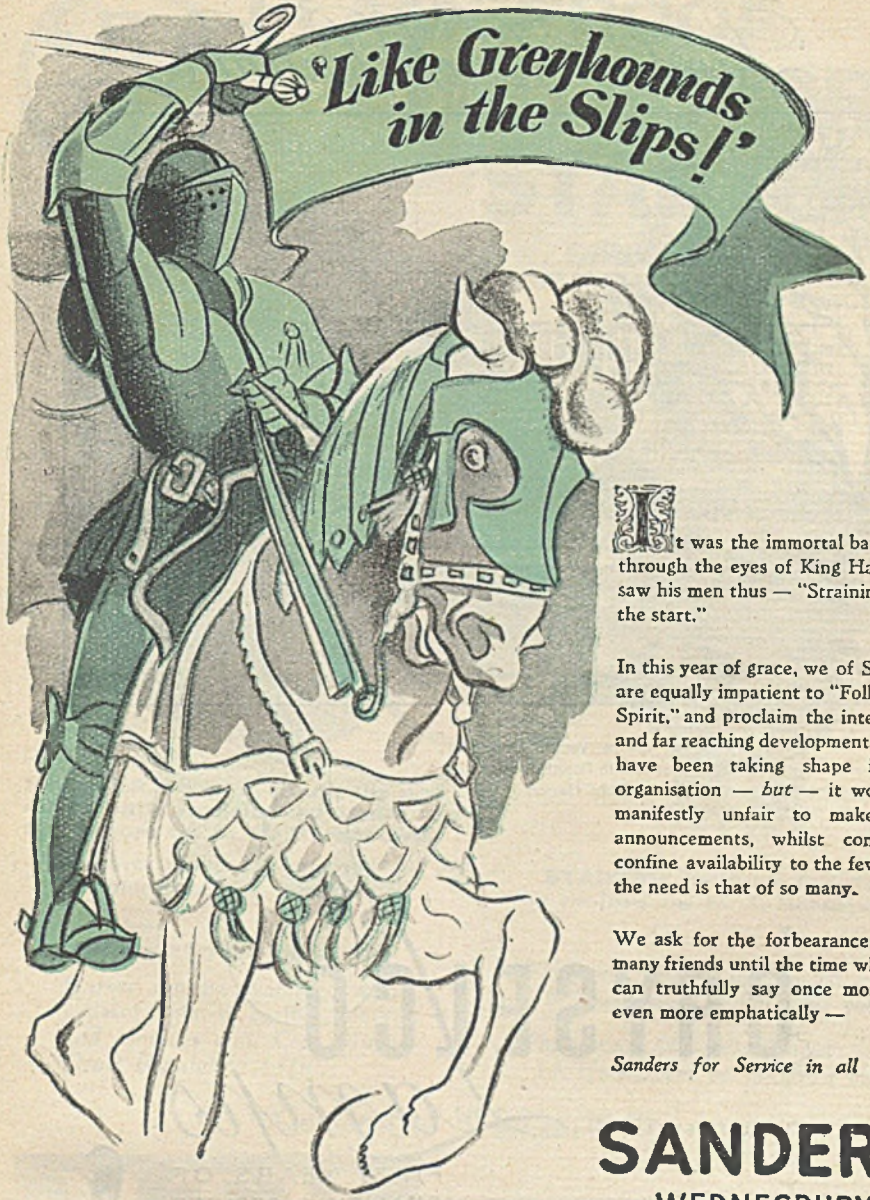
JOHNSON & PHILLIPS LTD., LONDON, S.E.7



MEM production has already gone ahead by leaps and bounds. Take the 124K splitter, for instance. During the last six months production has increased fivefold. With other lines, too, we are going all out to catch up with the heavy demand both for housing and for industrial purposes. But demand is still greater than supply, so that MEM goods are still hard to come by. To make sure you get a fair share of available supplies, it is still the best plan to keep in touch with your wholesaler.

MEM Switch, fuse and motor control gear, electric fires and localised lighting equipment

Midland Electric Manufacturing Co. Ltd., Birmingham, 11 : Branches in London & Manchester



It was the immortal bard who, through the eyes of King Harry V., saw his men thus — "Straining upon the start."

In this year of grace, we of Sanders, are equally impatient to "Follow our Spirit," and proclaim the interesting and far reaching developments which have been taking shape in our organisation — *but* — it would be manifestly unfair to make such announcements, whilst conditions confine availability to the few when the need is that of so many.

We ask for the forbearance of our many friends until the time when we can truthfully say once more and even more emphatically —

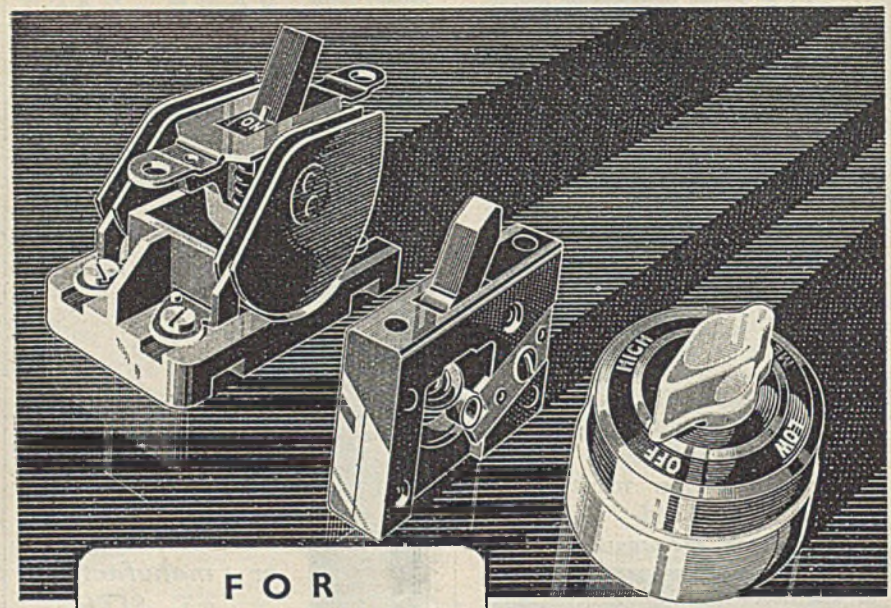
Sanders for Service in all Senses.

SANDERS
WEDNESBURY

MAKERS OF GOOD SWITCHGEAR FOR OVER FIFTY YEARS

WM. SANDERS & CO. (WEDNESBURY) LTD. WEDNESBURY, STAFFS.

INDEX TO ADVERTISERS IN THIS ISSUE



FOR DOMESTIC APPLIANCE CONTROL

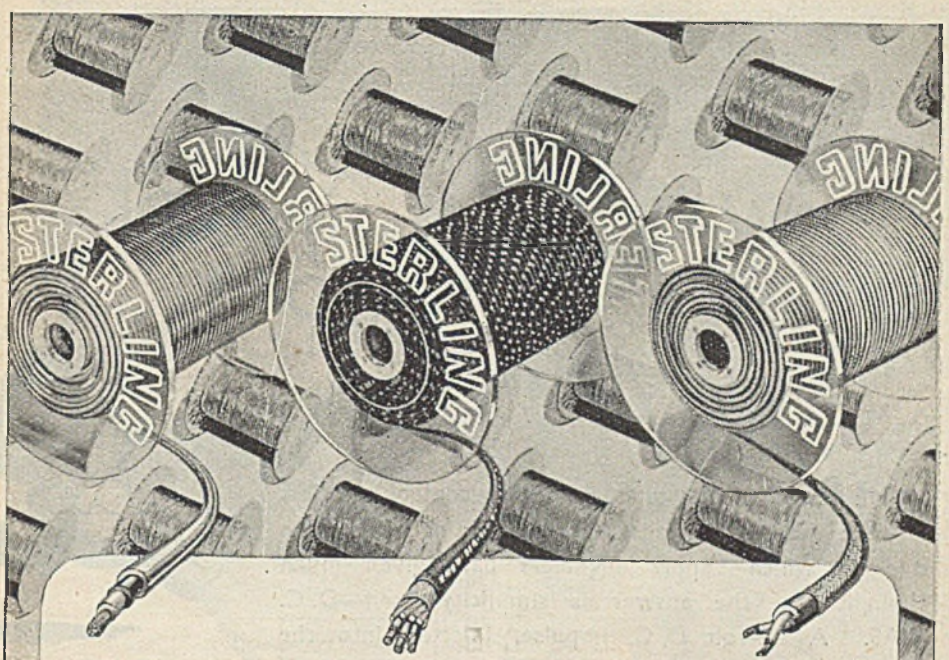
Arrow offers the largest range of Precision Built Switches for every specific need in the industrial and domestic field.

Tumbler switches from 1 to 60 amp. rating, and rotary switches in all circuit combinations from 5 to 35 amps. 250 volts.

Arrow Switches are quick make and break. They have been carefully designed and manufactured to give long trouble-free service.

ARROW

ARROW ELECTRIC SWITCHES LIMITED, HANGER LANE, LONDON, W.5



1826

Made to British Standards and G.D. specifications, STERLING Insulated Cables and Flexibles are available in a wide range to fulfil all domestic and industrial applications. Any STERLING Flexible can be made up into "ready-to-fit" leads to meet individual requirements. We will gladly send you samples and fullest information on request.

Sterling Cable Co. Ltd.,
Queensway, Ponders End,
Middlesex.
Telephone: Howard 2611
and at Aldermaston, Berks.

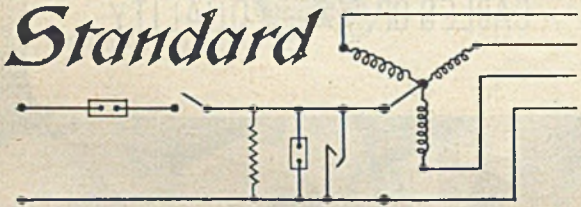
STERLING
CABLES OF QUALITY

"How much 'Off-Peak' current do you sell?"

THE problem of "off-peak" load control, no less than that of centralised street lighting control, is one to which supply engineers have given much thought—yet the answer is simplicity itself—D. C. BIAS. A six-volt D. C. impulse, injected into the star point of supply tension transformers, will exercise any degree of control which may be required. The simplicity of the system and its great flexibility permit of gradual change-over from obsolescent systems and of extension to any degree which increased demand may require.

The "*Standard*" D. C. BIAS SYSTEM OF REMOTE CONTROL is entirely independent of load, and the very nature of the control signals obviates the possibility of export to neighbouring networks. First cost is surprisingly low, maintenance costs negligible, yet the system is amazingly efficient.

Our publication, "City Lights" by D. C. Bias, gives additional details and will be sent at your request.

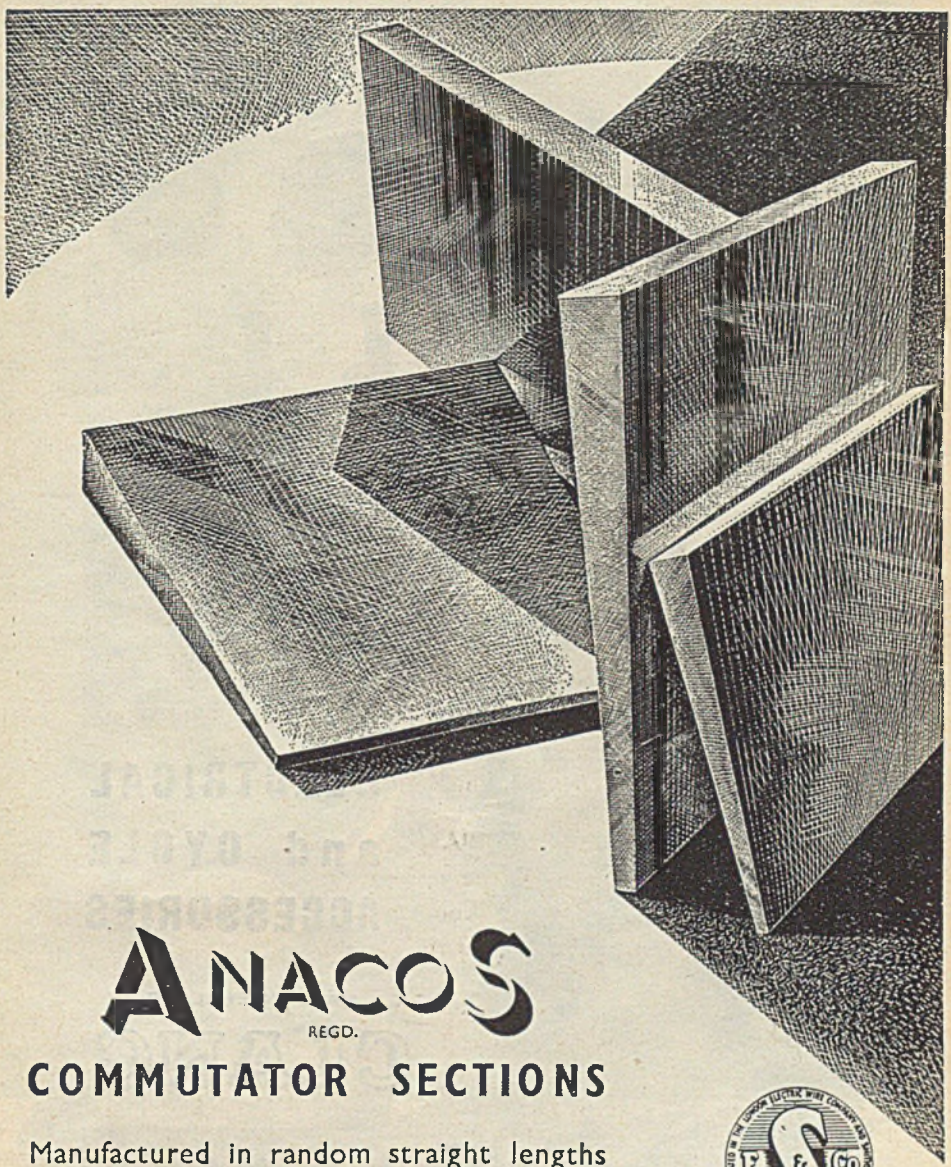


Standard **D.C.BIAS REMOTE CONTROL**

Standard Telephones and Cables Limited

(Remote Control Section)

Oakleigh Road, New Southgate, N.11. **Telephone: Enterprise 1234.**



ANACOS
REGD.

COMMUTATOR SECTIONS

Manufactured in random straight lengths or in cut pieces to meet your requirements.

We should be glad to have your enquiries.

FREDERICK SMITH & COMPANY

(Incorporated in The London Electric Wire Company and Smiths, Limited)

ANACONDA WORKS . SALFORD 3 . LANCS

THE

ELECTRICIAN

ESTABLISHED 1861

Bouverie House - 154 Fleet Street - London EC 4

Telegrams: "BENBROTRIC FLEET LONDON" *Telephone*: CENTRAL 3212 (*12 lines*)

Editor: STANLEY G. RATTEE, A.M.I.E.E. *Publisher and Manager*: JOHN VESTEY

Number 3602 27 JUNE 1947 *Vol CXXXVIII No.* 24

CONTENTS

MIDLANDS OFFICE:
Daimler House, Paradise Street, Birmingham
Telephone: Midlands 0784—5

SCOTTISH OFFICE:
116, Hope Street, Glasgow, C.2
Telephone: Central 3970

The offices of THE ELECTRICIAN *are closed on Saturdays in accordance with the "Five-day Week" plan adopted by Benn Brothers, Ltd.*

SINGLE COPY (FRIDAY) - - - 6d.
(BY POST) - - - - 8d.

ANNUAL SUBSCRIPTION
HOME AND OVERSEAS - - - 30s.

I.M.E.A. Convention

THE chief interest in the electrical industry this week has been the I.M.E.A. Convention at Bournemouth, and the attention of the supply side in particular has been concerned with first, reactions to the nationalisation plans, and second, the future of the association. With regard to the first there is nothing new which can be said at this stage, beyond the fact that the President of the association made reference to the Electricity Bill in his Address, and that there will, no doubt, be some ventilation of opinion on the matter at to-day's ordinary meeting.

The ideals which it is claimed by the politicians can be reached or established by nationalisation, cannot be attained by putting into effect the provisions of the Electricity Bill alone. Whatever success may follow the reorganisation of the industry will depend, as much as it has in the past, on good management, a maintenance of the right spirit within the industry and public goodwill. It cannot, therefore, be too strongly argued that unless the enthusiasm which created the industry is carried into the new organisation, then the provisions in the Electricity Bill will, as the President pointed out at Bournemouth this week, be meaningless. In the view of the I.M.E.A. President, the biggest difficulty which will face the industry in the next few years will not be concerned with administration, but in preserving that spirit which has led electricity supply to its present success:

that spirit which has kept the industry practically free from labour troubles by promoting good fellowship among the staff at all levels. Nationalisation is a theory which has yet to be proved, but it is a theory upon which the future facing electricity supply is based. If that future is to be one wherein its personnel, its public and industrial consumers may enjoy all the benefits which electricity supply can offer, then the theory—no matter what the personal view upon it may be—must be made a practical success. There is no predictable limit to the applications of electricity and though the nationalisation proposals are not in the supply industry's unanimous opinion the best way in which to give them maximum scope, there appears to be no option in the matter. That being so the industry must ensure that the initiative and experience of its personnel are given free play so that the proposals may at least be shaped into engineering possibilities.

Stimulus of Competition

A SPECIAL point touched upon in the I.M.E.A. Presidential Address and deserving of serious consideration by the Ministry of Fuel, is that concerned with the stimulus of competition. In the past, electricity supply has not only had to compete with rival fuel interests but there has also been rivalry between municipal and company undertakings, and between the various authorities in each of these groups. These conditions have acted as a stimulant, and all the fuel industries have been healthier in consequence. Unless something is done under the nationalisation proposals to maintain that competition, the fuel industries will in time find little outlet for their initiative, and enthusiasm will die. As the I.M.E.A. President sees it, the district units operating in a nationalised industry must be encouraged to develop a corporate spirit similar to that prevailing in most undertakings to-day. This can only occur if among the staff there is genuine interest and pride in the technical practice and the operating results of their own district units, coupled with the intimate personal interests developed by suitable social activities. Similarly rivalry between areas should also be encouraged. It is essential that at every level an energetic outlook should be maintained, and initiative and enterprise continue to be suitably rewarded.

Future of the I.M.E.A.

WITH regard to the future of the I.M.E.A., this is, at the time of writing, by no means clear, although during to-day, Friday, when the association's ordinary meeting is being held, some idea of the rôle which the association will play in years to come may emerge. It is assumed that there will be a future for the organisation in some form or another, in that the experience which its members can put at the disposal of the industry when nationalised, will be of inestimable value in guiding the area boards and district councils through the many new administrative channels which are bound to be difficult to navigate. The Council have obviously given serious consideration to the effects which the Electricity Bill has upon the constitution of the association, and any recommendations which they have to make will become known for the first time at to-day's meeting. Whether there will be a convention next year or not, or if held, whether it will be the first of a new series depends upon the construction of those recommendations and their adoption by the main body at to-day's meeting. It is for the association itself to decide.

Steel Prospects

ONE of the many shortages from which the electrical manufacturing industry is suffering is in steel supplies, which in their turn are governed by shortage of coal. The steel industry has so far been operating under conditions, in the matter of fuel, as depressing as those obtaining in the electricity supply industry. In the circumstances therefore, the announcement last week by Mr. H. Morrison, that the allotment of coal and coke to the iron and steel industry for the summer months is to be increased, raises the hope that electrical steel may shortly be in greater supply and some, at least of the present bottlenecks in production widened. Steel plays a very appreciable part in the manufacture of much needed generators, in the building of boilers and other power station plant, and while the present shortage obtains the power station building programme must lag. At the same time the arrange-

ments made by the Ministry of Supply for the manufacture of Diesel-electric sets for use by those in industries of national importance, are not at present operating as smoothly as they might if steel was made readily available. While it is agreed that the increased coal and coke allocation will not have any appreciable effect upon steel output for some time, it is a step in the right direction and should be followed by another of wider stride at the first opportunity.

Purchase Tax Amendments

THE decision of the Chancellor of the Exchequer, referred to in THE ELECTRICIAN last week, to exempt electric cookers and a number of other domestic appliances from purchase tax represents a victory not only for those who so ably argued the case for the all-electric home during the House of Commons debate but also for those numerous local authorities and organisations who, since the Budget speech, had passed resolutions opposing the new taxes. Imposed solely to restrain the growth of the domestic load while shortages of fuel and generating plant remain, the taxes seemed to be an effective, if rough and ready, means of achieving that object. But, apart from the debatable ethics of a system which rationed essentials according to the dimensions of the purchaser's pocket, the cooker tax, at least, was hard to defend. Unlike space-heaters, cookers of all forms are used strictly on a scale of one per household, and it must be presumed that those who bought them had a strong case for doing so. Yet, it must be conceded that the prevention of a breakdown of supply next winter (and after) is the paramount consideration. It seems likely, therefore, that some of the "marginal" appliances will be taxed indefinitely. If so, there might be a case for exemption where an appliance is bought as a *bona fide* replacement, as, for instance, by handing in the old appliance in return for a tax remission certificate from the retailer.

Economy by Persuasion

WHILE the Treasury has been applying fiscal remedies to the fuel and power problem, the Ministry of that name has embarked on a national publicity campaign to achieve the same result by means of Press advertisements. The most enthusiastic supporter of that insituation could hardly claim the attempts so far made to be impressive. One recent advertisement, for instance, invites consumers to "see what are the heavy power users among your appliances," and lists a number of the more usual electrical articles, placing alongside each the hours it may be expected to run on one unit. It would be interesting to know who were the technical advisers responsible for the figures given, for while the immersion heater and wash-boiler may be quite accurately rated at 3 kW, the statement that a sink storage heater uses two units per hour would be true in the unlikely event of its being continuously in use, but ignores the effect of the thermostat. In any case, the publicity campaign would probably be more effective if, instead of somewhat academic trifling with the rating of appliances which will continue to be used, crisis or no crisis, it concentrated on avoidable waste, of which the heating up of a relatively massive hotplate to boil a saucepan covering perhaps a third of the total plate area is one example.

Fall in Electrical Exports

THE total value of British metal goods exported in May reached the record figure of £42 600 000 and the increase was shared by all groups except that of electrical goods and apparatus, according to the Board of Trade returns published last week-end. Electrical exports fell in value from £5 778 944 in April to £5 425 367 last month—a decrease of £353 577. Last month's total was also lower, by £156 313, than that for May of 1946. Whether this is due to a falling-off in the demands of overseas buyers, or the setback in production caused by the fuel crisis is not indicated, but it is a matter for some concern. The fact that Australia and some other countries which depended largely on outside sources for electrical goods and appliances before the war are now making those things in increasing quantities, should cause our manufacturers to consider very seriously whether they are turning out goods of the type and quality that will secure for them an assured place in markets where there is competition with local products. The possibilities of attractive packaging should also be taken into account.

THE 1947 I.M.E.A. CONVENTION —AT BOURNEMOUTH

THE pavilion at Bournemouth, illustrated above, may this week be the scene of electrical history, for with nationalisation of the supply industry in prospect, the future of the Incorporated Municipal Electrical Association, at the time of writing not clear, may be indicated.

This year's Convention, which was as well attended as its predecessors, opened on Monday, and during the day many delegates had assembled in time for the official opening of the exhibition at the Majestic House Garage, performed by the president, Mr. J. S. Pickles, supported by many of the Council members. The exhibition itself is up to the usual high standard always enjoyed at the Convention, and as will have been gathered from our description last week of the exhibits much that is new is to be seen.

On Monday evening the President and Mrs. Pickles held a reception, followed by dancing and refreshments, the effect of which was to introduce into the proceedings that atmosphere of friendliness and sociability which has always permeated the I.M.E.A. Convention.

The business of the meeting opened on Tuesday morning when the Mayor of Bournemouth, Coun. J. W. Moore, accorded the delegates a Civic Welcome. This was followed by the delivery of the Presidential Address by Mr. J. S. Pickles, and the attention which the audience gave to the address, and the appreciation expressed at its end, were, as will be gathered from our abstract on the opposite page, well deserved.

On Tuesday afternoon the first paper, "Recent Developments in Power Station Practice," was read by Mr. F. W. Lawton, chief engineer and manager, Birmingham Electric Supply Department, and the discussion which ensued will be reported in our next issue. During the afternoon the ladies took tea at the invitation of the Chairman and members of the Dumfries C.C. Electricity Committee and to meet Mrs. Pickles. In the evening there were a reception and dance held by the Mayor and Mayoress of Bournemouth.

Wednesday was given over to social activities, the chief event being a trip round the Isle of Wight in the "Bournemouth Queen," with a stay at Ryde long enough to permit the visitors to gain an impression of the town. Other trips included motor coach drives to Cheddar and Wells, to Swanage and Corfe Castle, and to the New Forest. All the delegates were back in Bournemouth in the early evening.

The proceedings opened yesterday, Thursday, with the reading of the paper, "The Law Relating to Electricity Supply," by Mr. R. Birt, borough electrical engineer, Ealing, the discussion of which will be given next week.

At the conclusion of the morning session, delegates attended a luncheon organised by the Electrical Association for Women, and in the evening the Convention banquet and ball were held. Reports on these functions will also be given in the next issue.

To-day, Friday, will open with a Council meeting, which will be followed by the ordinary general meeting of the association, when, among other things, the report of the Council will be received and discussed. It is not possible at the time of writing to say what will transpire at the meeting, but it is reasonable to expect that the future of the association will be discussed, and its intentions disclosed.

Presidential Address

Mr. John Pickles on Preserving the Spirit of the Industry

THE importance of preserving under nationalisation the spirit which has made the supply industry so successful was emphasised by Mr. John S. Pickles in his Presidential Address, which followed the civic welcome by the Mayor of Bournemouth on Tuesday morning.

At the commencement Mr. Pickles said the ravages and aftermath of war had been slowly and painfully unfolded. True, the national demand had risen so rapidly as completely to outstrip the available generating capacity; but gone was the vision of an abundance of materials, of new designs and appliances, of free competition, and of freedom from irksome restrictions. New words and phrases, many of them mere euphemisms, had crept into their correspondence and their technical vocabularies, such as load shedding, load spreading, percentage cuts, staggered hours, and short supplies. That situation had gradually emerged during the year and it was against this rather sombre background that a few of the more important events might be considered briefly.

Load shedding was one of the new problems which to the consumer involved all the inconvenience of being deprived of supply, usually when it was most needed. It was a legacy of war which would be felt in some degree for several years, during which period it might also be necessary to refuse or restrict the connection of certain types of new load. For an industry which had taken such a pride in reliability of service, that deliberate cutting off of supply was a severe blow to prestige. Pending relief from the present shortage of generating plant, the demand could only be kept within bounds by the voluntary co-operation of consumers. Every undertaking should examine the position carefully with each industrial consumer. With regard to domestic load, greater sacrifices still might be necessary on the part of householders and other non-industrial users.

The supply industry had a special interest in the extent to which nuclear energy was likely to prove suitable for the generation of electricity. The present position appeared to be that scientists forecast the possible replacement of coal burning boiler plants by atomic piles, with steam driven turbines and other generating conditions remaining on conventional lines. The capital expediture of £500 million on the war-time atomic energy project in five years equalled that of the whole electricity supply industry of this country in its first 50 years.

The shortage of generating plant capacity, and also the anxiety felt about coal supplies, would be greatly relieved by the completion of some of the hydro-electric schemes at present under construction.

Mr. Pickles protested emphatically against the assumption so frequently made that this country lagged behind others in rural electrical development and said such statements were an injustice to the supply industry, whose achievements in that matter had been substantial and commendable. It would appear that, with the possible exception of one or two small and compact countries, there was none in which rural development was superior to ours, having regard to degree of penetration, adequacy of mains, and service provided.

After making reference to the work of kindred bodies and to the extent of the liaison between them and the association during the year, Mr. Pickles proceeded to indicate some aspects requiring earnest consideration in the coming

period of change-over and reorganisation following nationalisation of the industry.

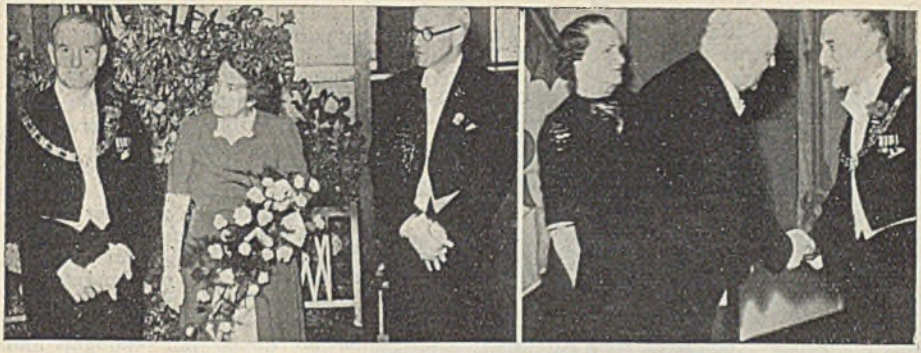
By its very constitution and objectives, he said, the association had always stood four-square for public ownership. Therefore, as a fundamental issue, the association could not but welcome re-organisation on a basis of public ownership. The association was concerned, however, and deeply concerned, as to the form that such re-organisation should take and as to the part which local authorities would be expected to play in it. When it became clear that under the Government's proposals, local authorities were not to be entrusted with ownership, the utmost efforts had been made by the committee of the association to secure for them an administrative responsibility at local or district level. Though pursued diligently by memorandum and interview over a long period those efforts had so far failed and, as members were now aware, it was anticipated that local authorities would have only a consultative rôle in the structure.

Nationalisation would not of itself work miracles. It could do no more than provide the framework and the necessary facilities, but real success depended on human factors, the most vital of which were good management, the right spirit within the industry and public goodwill. In all industries, large or small, whatever the type of organisation, success ultimately depended on the man on the job—that was why it was so necessary to have the right spirit in the industry. Further, the ultimate test of all these schemes was their effect on the ordinary consumer—that was why it was so necessary to retain public goodwill.

In brief, the general impression of the new structure given by the Bill was of a rather tightly geared machine in which it seemed imperative that flexible couplings should be introduced to ensure smooth running. That flexibility could and would be provided if full advantage was taken of the knowledge and experience available in the industry.

The Bill appeared to contemplate the ultimate separation of responsibility for generation and main transmission from that of distribution. Opinion varied as to the necessity or wisdom of that separation, it being argued by some that it would be more efficient for generating stations to be operated by the Area Boards, provision for which was also made in the Bill. An obvious possibility, however, was that the generation organisation might be based on

The enthusiasm behind this year's Convention is typified by this view of some of the assembled delegates at one of the sessions



At the reception. Left: THE PRESIDENT, MRS. PICKLES, *and* COUN. W. M. BELL McDONALD (*Dumfries*). *Right: The* MAYOR *and* MAYORESS *of Bournemouth being greeted by the* PRESIDENT

the same areas as those of the Area Boards possibly in the same headquarters, thus facilitating co-operation.

On the distribution side, it appeared probable that the Area Boards would establish an executive staff at area level and would then decentralise by the formation of self-contained district units responsible for the day to day operation and routine in much the same way as the larger of the existing undertakings worked to-day. Areas previously served by companies might in that respect be more readily dealt with than those of local authorities where the separation of closely knit staff, particularly on the commercial and legal side, and of joint arrangements of various kinds might well take time. The present higher executive staff would ultimately find their responsibilities enlarged in some aspects and restricted in others. At lower level the staff would not feel the change so early and perhaps not to the same degree.

Some general standardisation of technical practice should be possible fairly quickly. Similarly, broad uniformity of general policy would be practicable within a comparatively short time but elimination of many existing detailed variations might take an appreciable time.

As to the future of their own association, it was obvious that the association could not possibly continue under its present constitution. Further, it would appear that any reconstitution would have to embrace all local authorities since those that hitherto had not had an electricity undertaking would in future have a vital interest in the nationalised industry. Whether such an association would be justified, or whether it was more practicable for existing local authority associations to cater for those interests, was a matter for early consideration by the local authorities themselves.

No industry, no matter how well organised, could be wholly successful unless it possessed the right spirit. That was an intangible but powerful factor, without which many a venture had failed or fallen short of expectations. It could not be too strongly emphasised that, unless the spirit which had created that industry was carried forward into the new organisation, then the rather hackneyed words of unification, co-ordination, and integration would be meaningless. Fortunately, it was not a case of creating a new spirit but of maintaining that which already existed. The industry had always been a happy one. Among workers that was proved by the fact that serious labour troubles were practically unknown. Among the staff at all levels the utmost good fellowship prevailed. Due to the relatively small number of the industry's personnel, any personalities which emerged quickly become well known. Technical staff who had chosen that industry for their careers were fortunate and, in passing, he would say that those who had chosen municipal service had been doubly fortunate.

Some of the reasons for that satisfactory state of affairs were:—(a) The intrinsic interest of a profession based on a natural science. (b) The uninterrupted expansion and prosperity of the industry. (c) The excellent technical Press. (d) The stimulus of competition and rivalry. (e) The reward of intiative and enterprise.

The question was how were those features to be retained? There was no problem with (a), nor possibly with (b) except perhaps that restrictions on the use of electricity which might be imposed by the planned integration with the gas and solid fuel industries would tend to take

the edge off sales enthusiasm and initiative.

With regard to the technical Press, it was doubtful whether the industry fully

MR. *and* MRS. SUTCLIFFE *being received by the* PRESIDENT *and* MRS. PICKLES

realised how admirably it had been served in that respect. Each week, or month in some cases, these periodicals gave a full account of all matters affecting the industry both technical, parliamentary and administrative. Editorial comment was interesting and incisive. Articles on controversial subjects, concerned both with general policy and technical practice, were contributed by individual members of the industry. With most of those matters in future determined at a high level, the field for the individual contributor would be narrowed. The absence of the annual accounts and statistics of individual undertakings would deprive journals of another source of past interest—consolidated accounts were not nearly so interesting. Another possibility was the establishment of an official journal for the industry. The technical Press, though in one way part and parcel of the industry, had preserved that independence of outlook and comment which was so necessary and which it was hoped would be retained.

A happy group at the reception. Left to Right: MR. *and* MRS. R. H. HOWAT, MRS. MCINTOSH, MRS. J. A. FRASER, *and* MR. J. A. FRASER

What was undoubtedly the most important matter was the retention of the stimulus of competition and rivalry, which had been healthy and fruitful. Deliberate steps should be taken to see that it was not lost. Furthermore, engineers and administrative staff had in the past obtained their positions mainly by competition after advertisement. Possibly promotion would in future be on a selective basis which was no doubt fair enough, and might even be more accurate than some present methods, but was not nearly so exciting or interesting. Unless staff were to be allowed some freedom of choice, including opportunity to transfer from one area to another, a vital element in the present spirit of the personnel might be lost.

Official opening of the I.M.E.A. Exhibition at Bournemouth by the PRESIDENT

Believing that those were some of the very human considerations on which the success of all commercial organisations depended they felt that they deserved the serious attention of the new authorities. Equally all existing personnel should endeavour individually to carry forward into the re-organised industry the same enthusiasm and spirit that had made the industry so successful in the past.

Their industry had a great past, and even greater possibilities for the future. There was no foreseeable limit to the part it could play in assisting all forms of production, eliminating drudgery, promoting health and alleviating suffering, and innumerable other applications. The object of re-organisation was to make those benefits more readily and more widely available. It must be the wish of everyone to see that that aim was realised. Provided free play was allowed to the initiative and experience of those in the industry he felt confident that all would enter on the task with the vigour and enthusiasm which would make for success.

Power Station Practice

Changed Conditions Since 1938—Boiler Availability

THE proceedings at the I.M.E.A. Convention at Bournemouth opened on Tuesday afternoon with a paper, "Recent Developments in Power Station Practice," the author of which was Mr. F. W. Lawton, chief engineer and manager, Birmingham Electric Supply Department.

MR. F. W. LAWTON

Since Mr. H. C. Lamb and Mr. K. Baumann presented their paper on this subject in 1938*, he said, the principal developments in power station practice had been concerned with higher steam conditions, higher turbine speeds, boiler availability, higher generation and transmission voltages.

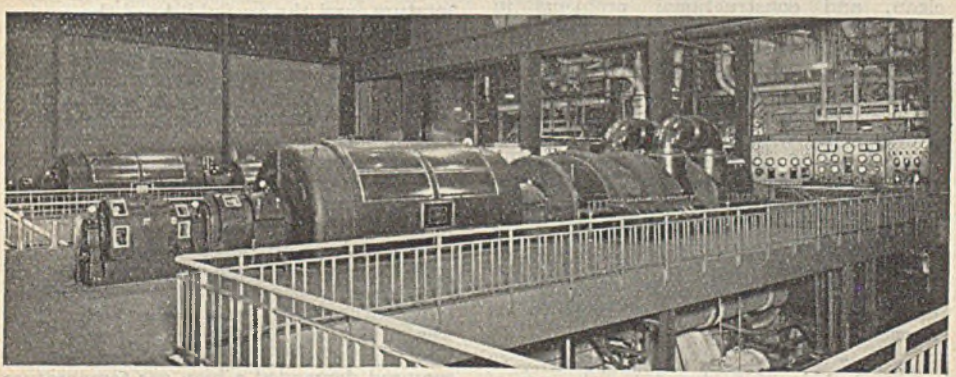
The growth of the national peak load from 1938 to 1945 had increased by 33 per cent., reaching nearly 9 000 MW, and the units sent out had increased by 60 per cent., resulting in an increase in load factor from 36.8 per cent. to 43.8 per cent., and notwithstanding the cessation of hostilities and neglecting load shedding, this high load factor was being maintained. During this period the average overall power station efficiency had remained practically constant, due to deterioration in the calorific value of coal supplied of about 7 per cent., and the large proportion of obsolete plant remaining in service. High efficiencies had, however, been obtained at two riverside stations, notably Battersea, 28.82 per cent., and Dunston, 27.85 per cent., and at Hams Hall "B," a cooling tower station, 27.3 per cent. Since 1938 the average cost of coal had increased by not less than 114 per cent., and the average cost of new plant by 87.5 per cent., the present cost per kW of installed plant being approximately £40.

Both here and in America the storage system of pulverised fuel was falling out of favour, and the unit system was almost invariably being adopted for boilers having an evaporative capacity exceeding 250 000 lb. Below this size stoker fired boilers were most common, and it would be interesting to see how far the spreader stoker invaded the field now covered by existing methods of firing.

Turbo-alternators of 50 and 60 MW running at 3 000 r.p.m. could now be regarded as usual in this country, also hydrogen cooling could be justified with these sizes at load factors upwards of 40 per cent. With fuel at 55s. per ton and plant at present prices, steam conditions of 900 lb. and 900° F. could be justified, at local factors exceeding 40 per cent. With higher steam conditions higher load factors were necessary to show any financial saving.

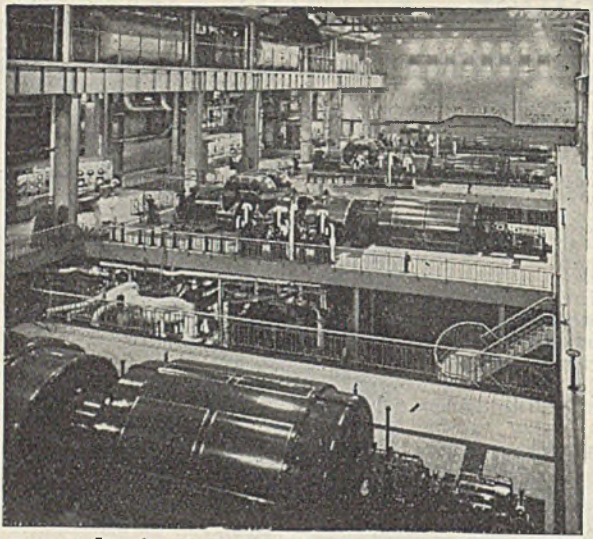
During 1945 fifty-five stations were operating with total works costs below 0.45d. per unit sent out, the lowest works cost being 0.2510d. Fuel prices varied from 14s. 0d. to 50s. 0d. per ton and calorific values from 9 200 to 13 200 B.Th.U's per lb. These variations made any useful comparison between stations

* THE ELECTRICIAN, May 27, 1938.



General view of the turbo-alternators at the Llynfi power station

impossible. The highest yearly load factor was 83.28 per cent., the average being of the order of 45 per cent. Out of eight stations which were examined in detail it was found that the costs other than fuel varied from 0.03d. to 0.08d. per unit sent out, and the total number of men engaged in operation and maintenance per 1 000 kW of m.d. from 1.3 to 3.3.



Interior of the Little Barford station

High thermal efficiency boiler plant had long been a characteristic of British power stations, and it was unequalled in any other country. The two principal factors which had contributed to this were the high degree of perfection achieved in combustion and the low gas loss from the plant. Both factors were essential ingredients of a highly efficient plant, and both had created problems in availability which even now had not wholly been solved.

Before the war boiler sizes rarely exceeded 200 000 lb. evaporative capacity. The present trend, however, was towards larger units, and it appeared to be the general experience that the larger the boiler the more difficult it was to keep clean, and constructional problems in locating cleaning equipment effectively became more acute.

As far as furnaces fired by stokers of the travelling or chain grate type were concerned, probably the most outstanding development was associated with the increased use of secondary air at pressures sufficiently high to complete combustion of the gases at a reasonable height above the grate. The experience gained during the war with the so-called "archless" setting of furnace had confirmed that this type of setting was most effective in enabling a wide variety of fuels to be burned efficiently.

A new conception of stoker practice was now being introduced by the use of the spreader type of stoker. This consisted of overfeed injection of the fuel to the furnace by suitable mechanism, the finer grades being burnt in suspension and the larger particles falling on to the grate which might be of the fixed dumping or moving pattern according to size. The essence of the combustion on the grate was that the bed was thin and sublimation of the metallic constituents of the ash avoided. Thus it was expected that high temperature bonded deposits would be avoided.

With regard to pulverised fuel fired furnaces, the majority of units in this country were of the type known as the dry-ash-bottom with open-mouth hopper. Only one slag-tap furnace was being constructed in this country, though a new American development of it was to use coarse crushed fuel as opposed to pulverised fuel. This furnace was installed in 1944 in the Calumet station in America, the burner furnace being of 8 ft. dia. and 11 ft. long, on a boiler unit of 150 000 lbs./hr. evaporative capacity. The coal used was crushed Illinois coal of high volatile content and low ash fusion temperature, and the availability of the equipment was 76 per cent. over a period of two years service, forty-eight service interruptions having occurred in this period; further modifications and experiments were being carried out. The advantages claimed were 25 per cent. reduction in floor area, reduction in building costs and the saving in capital cost of 30s. per kW compared with the orthodox pulverised fuel equipment.

With regard to boiler design, one safeguard against fouling was the practice adopted of spacing the tubes in the higher temperature zones at a wide pitch. This was also true of the superheater, particularly where the steam temperature required demanded a high gas temperature and where the fuel was, due to its ash

characteristics, prone to give trouble. Wide pitching was generally restricted to the first few rows of tubes.

An outstanding feature of present day boiler design was that ample access was provided to all parts of the boiler unit where trouble due to fouling was most likely to occur. This feature, probably far more than any other consideration, had been responsible for the fundamental features of present day design. The recent development of welding for all pressure parts had been a stimulating factor in the adoption of high steam pressures.

Forced circulation boilers had been built in this country recently for 1 500 lbs. per sq. in. working pressure and 350 000 lbs. evaporative capacity. With few exceptions, however, the modern power station still relied on natural circulation boilers even for the highest pressures.

Two large capacity pulverised fuel fired boiler units were now under construction for evaporations above 500 000 lbs. per hour in this country, whereas in the United States out of a total of 50 units, two were of 1 000 000 lbs./hr. or over, 13 in the range 500 000 lbs./hr. to 850 000 lbs./hr.; eight in the range 350 000 lbs./hr. to 500 000 lbs./hr.; and 27 below 350 000 lbs./hr. This high proportion of small units was remarkable, but was confirmed from published tables in the Edison Electric Bulletin for 1944, the latest available information.

As regards the practice of reheating the steam, there appeared to be little disposition to proceed with this on any appreciable scale; two important plants were under construction in this country, notably at Littlebrook "B" and Dunston "B"; both represented a slight advance over previous installations in that the steam and reheat temperatures were 850° F. In the United States, Port Washington and Twin Branch represented outstanding examples of the use of the reheat cycle and it was interesting to note that the most recent extension at Twin Branch was with a straight condensing cycle. In general, in America there was a tendency towards a pressure level of around 950 lbs. per sq. in., the temperatures varying from 900° to 950° F.

STEAM TEMPERATURES

A reasonable amount of experience had been obtained in this country with operation at steam temperatures in the region of 900/960° F., and with the advances in metallurgy there seemed to be no reason why these temperatures should not be increased with a corresponding pressure level of the order of 1 000/1 150 lbs. per sq. in. pressure.

It had now been established that to suppress the dust nuisance from power station chimneys some form of dust arresting apparatus had to be installed, and the chimneys had to be not less than 2½ times the height of the power station roof or adjacent buildings. It had always been considered that even with high chimneys p.f. fired boilers should be equipped with dust arresting apparatus, since at least 70 per cent. of the ash in the fuel might otherwise pass to the atmosphere and result in a dust emission of 2.8 to 3.5 grains per cu. ft. of gas leaving the chimney when burning a coal containing 15 per cent. of ash.

ELECTROSTATIC PRECIPITATION

Electrostatic precipitators were installed on each of the boilers at Hams Hall guaranteed to give an efficiency of 96.5 per cent. when a boiler was operating at maximum continuous rating (320 000 lb.) and with 4 grains per cu. ft. of dust in the gases entering the arrestors. No accurate tests had yet been carried out on the plant, but it was obvious from the appearance of the gases leaving the chimneys (400 ft. high) that there was very little dust, and what there was was of an extremely fine nature, which was proved by the nature of the material caught, which was 99 per cent.-100 per cent. 63-microns and less, and 75 per cent. to 95 per cent. 20-microns and less. It was highly improbable that any dust over 20-microns size left the chimney.

As steam temperatures advanced towards 900° F., the creep resistance of ordinary pipe material decreased rapidly with a proportionate decrease in the allowable working stress, until at such temperatures pipe thicknesses became great. The effect of high temperature was equally important in the case of flange-bolts, leading ultimately to the abandonment of ordinary flanged joints for the higher steam conditions. These developments, therefore, had been reflected in the design and technique of manufacture of power station pipework since the years just prior to the war.

Up to 1938 steam conditions were in the region of 650 lb. sq. inch and 850° F. and for these, mild steel was satisfactory, but since that date two higher sets of conditions had been employed, i.e., 900 lb. and 900° F. and 1 200 lb. and 950° F. Whilst, metallurgically, mild steel would be satisfactory for pipes for the 900 lb. range, the calculated pipe thicknesses, particularly in the large sizes, were such as to render it almost impossible to provide a flexible arrangement, so that low alloy steels had been adopted.

With the development of welding technique, it was now customary for the principal pipework systems to be provided with

welded joints. Where suitable examination after welding could be carried out, flanges had been dispensed with sometimes on valves. This had resulted in the all-welded type of joint now being supplied without flanges for steam conditions up to 1 500 lb. sq. inch and 950° F.

Modern steam conditions necessitated a complete review of pipe-insulation specifications both from considerations of conductivity and the form or construction of the lagging. Higher temperatures rendered necessary a greater thickness and a higher quality of heat resisting compositions in order to render the magnesia or other main insulator immune from deterioration.

As the upward trend of working conditions had affected production methods, much more so had erection technique advanced. Elaborate stress calculations would be ineffective if due regard were not paid to gaps for cold pull in erecting closing lengths. In flangeless pipe-lines it was now customary to weld the whole of the joints and to stress-relieve these prior to fitting the closing lengths, and the gap for " cold pull " in the latter was pulled up by means of special clips which were retained in position until the welding and stress relief of the " closer " joints was completed. Electric welding for pipe joints was the usual method adopted, and gave uniformly good results.

The present tendency in steam turbine design was towards higher steam conditions and higher speeds, and also towards standardisation of terminal conditions. These developments had brought into prominence the necessity for interstage drainage and erosion protection of low pressure turbine blades, as wetness factors of over 12 per cent. were now being experienced with modern steam conditions.

The practical success of high steam conditions coupled with high speeds much depended on effective drainage to improve the efficiency of the low pressure stages and also to avoid heavy and expensive maintenance on the low pressure blading. Higher temperature and pressures in steam turbine plant had accentuated thermal expansions of rotor and cylinder. The higher the operating conditions the greater would be the mass of the cylinder relative to the rotor, and this meant a deferred procedure at starting up and often shutting down to avoid excessive distortion. In the past the judgment and skill of the operating staff were depended on; now instruments were available to register axial expansion and eccentricity, the detectors being electromagnetic. The fact that reheating had not been more frequently adopted must be attributed to the general requirement that plant had to be suitable for two-shift working. Advances in steam conditions made it more difficult to attain and maintain in practice a high level of turbine efficiency.

It had become general to employ three-cylinder turbines for large units on high steam conditions. This limited the temperature range of each individual casing and kept the expansions which had to be accommodated relatively small so that closer running clearances could be maintained. It was now general practice to support the turbine cylinders at or near the horizontal centre line so that radial expansion occurred symmetrically about the centre line of the shaft.

General view of the I.M.E.A. Exhibition at Bournemouth this week

The small rotating masses, the relatively short and stiff shafts and the limited temperature range for the individual casings of a three-cylinder 3 000 r.p.m. turbine were factors that resulted in a very flexible design and therefore one particularly suitable for two-shift working where it was important that the daily routine of running to speed and getting on to load could be accomplished quickly.

For these conditions it was essential to provide electrically-driven turning gears. These were used during the shut down period to avoid uneven cooling that would cause the shafts to become bent and out of balance and they were also used on starting up to avoid the necessity of suddenly admitting a large quantity of steam to start the turbine turning.

Higher steam temperatures had caused considerable research to be made into the properties of alloy steels to be used for stressed parts operating above 800° F. Four types of material were generally considered, i.e., (1) carbon steel, (2) carbon-molybdenum steel, (3) molybdenum-vanadium, and (4) chromium molybdenum, the last two alloys having superior creep properties. For turbine blading low carbon stainless steel had been found satisfactory up to 900° F.; for higher temperatures austentic steels containing about 18 per cent. chromium and 8 per cent. nickel were coming into use.

Condenser design had undergone comparatively little change. As the size of turbine units had increased, so had the condensing surface required and modern condensers usually had tubes of considerable length.

There was a growing tendency to instal vertical spindle circulating water pumps driven with constant speed a.c. motors at 3 300 V, particularly when these pumps were associated directly with each turbo-alternator.

COOLING TOWERS

A review of continental and American practice with respect to cooling towers indicated that we had little to learn, though data was fragmentary and inconsistent. The correct size of cooling tower for any given conditions was a matter of some importance and one not easily determined, so many were the variables concerned. In brief, having first ascertained the heat to be dissipated in the condenser under vacua varying from, say, 28 to 29 in. Hg., the problems to decide were: (a) the most economic vacuum; (b) the quantity of circulating water to be used; (c) the heat-load for which the towers must be designed; (d) the average atmospheric conditions.

It would be found that the condenser design and the cooling tower size were so fundamentally related that it was impossible to decide on one without reference to the other.

For every change in conditions a new set of calculations had to be made afresh, and only by painstaking effort could an economic solution be reached.

For example, under atmospheric conditions of, say, 60°F. dry-bulb temperature, cooling towers for a vacuum of 29 in. Hg. would be impracticable.

HAMS HALL STATION

The cooling towers at Hams Hall "A" were designed for a vacuum of 28 in. Hg. with average atmospheric conditions of 60°F. (dry-bulb temperature) and 80 per cent. humidity, necessitating a flow of 31 500 gall. of circulating water per min., with a condenser cooling surface of 65 000 sq. ft. for each 50 000 kW machine operating at maximum rating under feed-heating conditions, and when supplied with steam at 350 lb. per sq. in. pressure and 730°F. temperature. At an economic rating of 40 000 kW, when feed-heating, the vacuum obtained was about 28.25 in. Hg. These conditions were about the economic limit for an average station load factor of about 30 per cent. The problem was again reviewed when the Hams Hall "B" station was being designed, and it might be interesting to record that with a station load factor of 40 per cent. under similar atmospheric conditions to that previously referred to, and with a cooling water quantity of 40 000 gall. per min. and condenser cooling surface of 60 000 sq. ft. the economic vacuum was 28.5 in. Hg. when a 53 500 kW machine was developing its economic rating of 42 800 kW under feed-heating conditions and when supplied with steam at 650 lb. per sq. in. pressure and 845°F. temperature.

From the evidence available it appeared that an average vacuum of 28.5 in. Hg. was about the economic limit for the conditions considered, for even a further increase of 0.25 in. Hg. nearly doubled the cooling tower capacity required, assuming that 75°F. might be taken as a reasonable outlet-water temperature from the cooling system.

Each of the cooling towers at Hams Hall "B" station was designed to cool 3 600 000 gall. of water per hour under normal operating conditions, and the irrigation system was designed to allow the passage of 4 500 000 gall. per hour under emergency conditions with a rise of re-cooled water temperature of the order of about 5°F. These towers, which were of hyperbolic shape, were the largest yet constructed anywhere, and measured: height 310 ft., diameter at base 218 ft., diameter at throat 112 ft., and diameter at top 121 ft.

The results of carefully conducted tests on one of these towers gave the following data :—

Circulating water to tower—gallons per hour	3 610 700	3 612 300
Mean temperature of water to tower	89.6° F.	84.7° F.
Mean temperature of water from tower	76.1° F.	71.2° F.
Cooling range	13.5° F.	13.5° F.
Heat rate—B.Th.U. per cu. ft. of cooling stack	435	435
Wet-bulb temperature of atmosphere	61.4° F.	53.6° F.
Approach of outlet water temperature to wet-bulb temperature	14.7° F.	17.6° F.
Dry-bulb temperature of atmosphere	65.9° F.	60.5° F.
Calculated humidity of atmosphere	78.0%	63.3%

The tendency was towards fewer and larger cooling towers to reduce capital costs.

Almost every electrical engineer knew of the ever growing controversy concerning auxiliary drives and how opinions differed on this subject. In the paper, the sources of auxiliary electrical supply were then summarised.

The operation of alternators designed for direct generation at 33 kV had been entirely satisfactory in recent years and although the tendency in large power stations in this country was now to use an 11 kV alternator and step-up transformer for transmission at 132 kV, the high voltage alternator was still used extensively for 33 kV systems.

In the last decade no outstanding development was made in the design of automatic voltage regulators for alternators; in general the existing equipment operated satisfactorily and the provision of such equipment became standard practice for new plant.

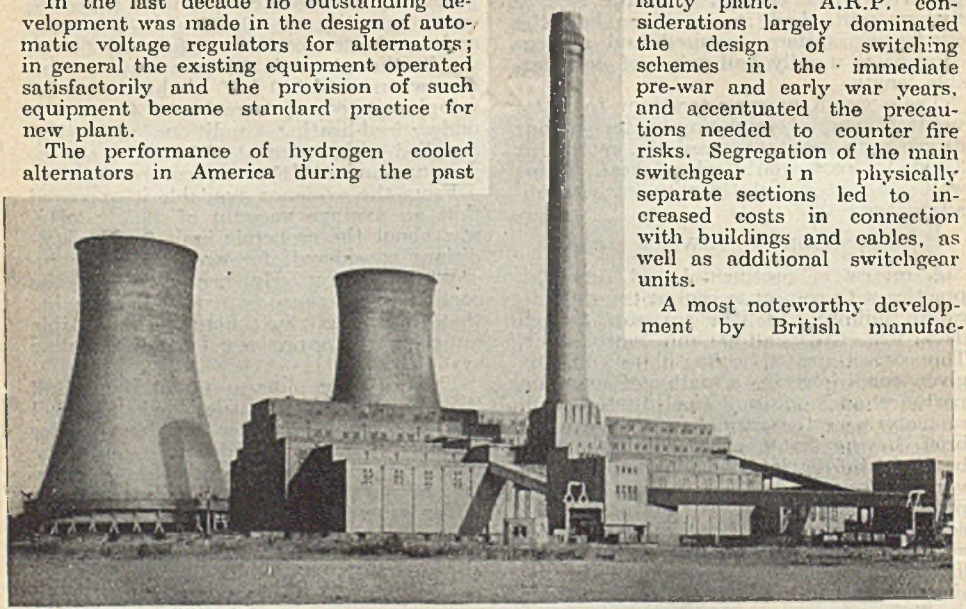
The performance of hydrogen cooled alternators in America during the past decade was, in general, satisfactory and no major difficulties were experienced in operation. The latest American Standards recommended that hydrogen cooling should be adopted for alternators of 20 000 kW and upwards, but recent prices quoted in this country for hydrogen cooling suggested that 50 000 kW was the lowest economical size for this type of cooling. The hydrogen pressure for normal operation was ½ lb./sq. in. above atmosphere and the sets were designed to operate at 15 lb./sq. in. giving an overload capacity of 15 per cent.

In addition to the gain in efficiency and the possibility of higher outputs at 3 600 r.p.m., it was claimed in America that hydrogen had the advantage of giving an increased life to the insulation, reduced maintenance and lessened the fire hazard. It was also considered that the increase in capacity obtained by raising the hydrogen pressure to 15 lb./sq. in. was an important advantage.

In this country a number of 60 000 kW alternators at 0.8 p.f., 11 kV, running at 3 000 r.p.m., were now under construction but up to the present none had been commissioned.

With regard to switchgear, noteworthy developments both in principle and in practice could be traced to: (a) increased breaking capacity to meet increased growth of system; (b) reduction in fire risks; (c) increased speed of operation to secure more rapid isolation of faulty plant. A.R.P. considerations largely dominated the design of switching schemes in the immediate pre-war and early war years, and accentuated the precautions needed to counter fire risks. Segregation of the main switchgear in physically separate sections led to increased costs in connection with buildings and cables, as well as additional switchgear units.

A most noteworthy development by British manufac-



General view of the Hams Hall station

turers was air blast switchgear for service at the highest voltages and at the heaviest ratings. Most of the British manufacturers now had a limited number of such

E. K. Cole's striking display at the I.M.E.A. Exhibition

breakers in commercial service, but it was too early to say whether this type would ultimately supersede its oil counterpart.

Where switching was carried out at 11 kV or 33 kV, alternators built for these voltages were commonly used, but the trend toward switching at 66 kV or 132 kV led to the use of large step-up transformers directly connected to the alternator terminals, and the alternators were then usually designed for a terminal voltage of from 11 kV to 15 kV. In general these transformers presented no special difficulties from the designer's point of view, other than those already encountered in similar large units installed on the grid system.

Direct generation at 33 kV had brought high voltage cables into the power station, and many stations stepped up from generation voltage to 132 kV, thus requiring underground cables working at this pressure to be laid between the transformer and the switching station. The oil filled cable was successfully used before 1938, but the impregnated pressure cable had since been introduced.

After a brief review of power station layout and a short discourse on district heating, Mr. Lawton said with respect to gas turbines that their possibilities for power stations had attracted attention for many years. The formidable difficulties which stood in the way of practical realisation had been eased by the large scale development work carried out during the war on gas turbines for the propulsion of military aircraft. Problems of axial flow compressors, of combustion chambers, and of high temperature turbines had been solved in the first place for highly rated aero engines of short life, but the basic information obtained was applicable to the design of gas turbines of all kinds. The new high temperature materials developed for turbine blading has not yet been used in prolonged commercial service, but creep test information in conjunction with knowledge of the properties of established materials enabled the stress and temperature conditions which would give economic life with these new materials to be estimated to a fair approximation.

Gas turbine plant was flexible in design, since with one basic engine it was possible to build for a considerable range of performance, the plant for higher thermal efficiency being also higher in capital cost per kW. The readiest means of increasing thermal efficiency was to instal a heat regenerator; the larger the generator, the better the thermal ratio of regeneration and the higher the thermal efficiency. At present gas turbine plant for power stations could only be offered for thermal efficiencies not exceeding those for new steam power stations. Steam power plants could be adapted to burn a wide range of fuels, while gas turbines were as yet only suitable for oil or gas. It was, however, possible to obtain gas turbine power plants lower in capital cost than steam power plants. There was, therefore, an economic case for gas turbine plant when oil or gas fuel was very cheap (as in oilfields), or in the case of power stations for peak load or low load factor operation in which capital charges predominated over fuel charges. The case for gas turbines was strengthened by the ease and rapidity with which load could be built up in starting from cold.

With regard to atomic energy, Mr. Lawton said that if developments were confined to the use of uranium alone, then the impact on present methods of power production would not be such as to render them all obsolete, as it was estimated that if all power were produced from this element, the known uranium deposits would be exhausted in less than a hundred years. American engineers who had been closely associated with recent developments in atomic applications to power production were, as yet, unable to make any reliable predictions.

Aggregate coal stocks at power stations at the end of May had risen to double the level of the same time last year. The monthly statistics issued by the Ministry of Fuel and Power for May, 1947, show that stocks were 2 485 000 tons, compared with 2 006 000 tons at the end of April and 1 208 000 tons at the end of May, 1946. Basing their calculation on an estimated winter consumption of 710 000 tons a week, the Ministry point out that stocks held at present are sufficient for 3.5 weeks' winter supply. Consumption by electricity undertakings during May, 1947, was 449 000 tons, compared with 503 000 tons in April and 474 000 in May, 1946.

Portrait—Mr. J. Eccles

In our last issue was given a brief biography of the President of the Incorporated Municipal Electrical Association, and the subject of our portrait this week is the President-elect.

* * * * * *

Mr. Eccles, who is city electrical engineer and city lighting engineer at Liverpool, is the author of a number of papers on engineering, economics and management, read before audiences of wide and varied interests. He was, last March, appointed vice-chairman of the British Electrical Development Association and was more recently appointed a member of the Committee sitting under the chairmanship of Lord Citrine and engaged in preparing the industry for nationalisation. Before going to Liverpool, Mr. Eccles was at Edinburgh, becoming engineer and manager of that undertaking in 1940.

MR. J. ECCLES, who was born and educated in Ulster, enlisted as a private soldier in 1914, and during his service in France was awarded the Military Medal and a commission on the Field.

At the end of hostilities he resumed his technical studies, and obtained a B.Sc. degree in Engineering at Queen's University, Belfast, in 1922.

From there he 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 entered the service of Edinburgh Corporation as senior technical assistant in the electricity department, and after holding the positions of construction engineer, generating engineer and deputy manager, was appointed engineer and manager of the undertaking in 1940.

Four years later he succeeded the late Mr. P. J. Robinson, C.B.E., as city electrical engineer and city lighting engineer of Liverpool.

Mr. Eccles is a member of the three senior engineering institutions, and is also a member of Council of the Institution of Electrical Engineers. He is, of course, Vice-President of the Incorporated Municipal Electrical Association.

His many activities in the field of engineering science, economics and human management can perhaps be epitomised by reference to the range of subjects on which he has contributed the following papers:—Before the Institution of Electrical Engineers: "The Starting and General Performance of Rotary Converters"; "The Rating and Disposition of Apparatus on High Voltage Urban Systems"; and "Electricity Tariffs." I.M.E.A. papers: "The Design and Operation of Static Substations" (joint author with Mr. Seddon); and "The Management of a Municipal Electricity Supply Undertaking." Other papers include "Sources of Energy," before the Institute of Fuel; "Engineering Tools," Liverpool Engineering Society; "Some Economic and Social Consequences of the Development of the Useful Arts," Royal Scottish Society of Arts.

Mr. Eccles played Rugby football until about 1926, and now enjoys a game of golf whenever possible.

A man of charming personality, with an unassuming manner and an air of quiet confidence, Mr. Eccles, who impresses one with his capacity for giving a sound and unbiased opinion on any problem concerned with his profession, is likely to achieve still greater eminence in the supply industry.

ELECTRICITY SUPPLY LAW

CHANGES AND ADDITIONS RESULTING FROM THE BILL

IN a paper entitled "The Law Relating to Electricity Supply," read at the morning session of the I.M.E.A. Convention in the Pavilion concert hall, Bournemouth, on Thursday, June 26, Mr. R. Birt, borough electrical engineer and manager, Ealing, who is a barrister, dealt with the history and development of the law relating to electricity supply up to the time when the Electricity Bill, 1947, was published, and also outlined important amendments and additions to electricity law resulting from the provisions of the Bill.

MR. R. BIRT

The general law relating to electricity supply, he stated in the paper, was contained in no fewer than fourteen public general Acts of Parliament. In addition, there were over two hundred private Acts of Parliament and approximately five hundred provisional and special Orders dealing with the supply of electricity.

The history of legislation relating to electricity supply dated from the time when the industry itself was started, the first statutory electricity authorities being set up for the purpose of conducting experiments in the lighting of large open spaces with electric light. When the first Public General Act relating to electricity was passed in 1882 the gas industry was already seventy years old, as it was by a Private Act passed in 1812 that the first statutory gas undertaking, the London Gas Light and Coke Company, came into being with powers to make and distribute "inflammable air."

In 1879 Parliament appointed a Select Committee under the chairmanship of Dr. Lyon Playfair "to consider whether it was desirable to authorise municipal corporations or other local authorities to adopt any schemes for lighting by electricity; and to consider how far, and under what conditions, if at all, gas and other public companies should be authorised to supply light by electricity."

The Committee heard much evidence to show that "electric light had established itself to illumine large places such as squares, public halls, railway stations and the like," but the Committee could express nothing more than an opinion as to whether electricity would be widely used as a source of power as well as light. Scientific witnesses "considered that in future the electric current might be extensively used to transmit power as well as light to considerable distances, so that the power applied to mechanical purposes during the day might be made available for light during the night." These opinions, together with those of other witnesses, led the Committee to express the view that no legislative restrictions should be imposed likely to interfere with development, although so far as evidence went, "no system of central origin and distribution suitable to houses of moderate size had hitherto been established."

The Committee pronounced against the notion that gas companies should be considered as the future distributors of electric light, but thought it "desirable that local authorities should have power to give facilities to companies or private individuals to conduct experiments."

Finally, the Committee suggested that "it might be expedient to give to the municipal authority a preference during a limited period to control the distribution and use of electric light, and failing their acceptance of such a preference, that any monopoly given to a private company should be restricted to the short period required to remunerate them for the undertaking, with a reversionary right in the municipal authority to purchase the

The Royal Bath Hotel, used as headquarters during the period of the Convention

plant and machinery on easy terms."

During the three years following the report of the Committee seven private

The MAYOR OF BOURNEMOUTH *according the civic welcome on Tuesday, supported by the* PRESIDENT *on his left, with the* PRESIDENT-ELECT *on his right*

Acts of Parliament were passed giving local authorities power to supply electric light and to raise money for the purpose.

In 1882 the Government introduced the Bill which was the foundation of electrical legislation in this country, and on August 18 the Electric Lighting Act, 1882, received the Royal Assent. The preamble read: "An Act to facilitate and regulate the supply of electricity for lighting and other purposes in Great Britain and Ireland." The Act represented an attempt to cover the whole subject of the control of electricity supply. The authors, taking their stand upon the report of the Committee of 1879, declared it to be one of their guiding principles that "provision should be made to prevent electricity becoming the subject of a monopoly in private hands." Accordingly the Act made provision (Section 27) for local authorities, after the expiration of a certain number of years from the confirmation of the Provisional Order, to call upon the undertakers to sell their lands, buildings, works, materials and plant, without any compensation for past or future profits, terms for which the Tramways Act, 1870, provided a precedent. At the same time the Act aimed at preserving the freedom of any person to generate electricity for his own use or to supply to other persons so long as there was no interference with public rights or other people's property.

The provision in the Bill which evoked most discussion was that enabling the Board of Trade to grant a licence for the supply of electricity during a limited period without the parliamentary sanction that is necessary in the case of a Provisional Order. This was an entirely new departure and was justified by the Government on the ground that electricity was still in its experimental stages.

The consent of the local authority was made a necessary preliminary to the grant of a licence under the Act. Should a local authority refuse its assent to the proposal, there remained to the undertakers the power of going to the Board of Trade for a Provisional Order, such Order requiring parliamentary confirmation. The promoters were enabled under this provision to obtain their powers without the consent of the local authority.

In return for the privileges granted by the Act, undertakers were laid under weighty obligations, *e.g.*, (i) no overhead wires were to be placed over any street save with the consent of the local authority, (ii) any person within the authorised area could require a supply of electricity, (iii) charges for current must be within the limits imposed by the licence, order, or special act; but no such

MR. J. ECCLES (*President-elect, I.M.E.A.*), MR. *and* MRS. ALEX GARDNER *and* COUN. G. W. ADAMS *have an informal chat*

Looking forward to an interesting day. MR. J. ENTWHISTLE, MR. *and* MRS. E. A. NEWBURN *and* MR. *and* MRS. DONALD HOLT

limitations of dividend were laid down as are imposed upon gas and water companies.

Such were some of the provisions of the Statute which enabled electricity undertakers to obtain their necessary powers without being compelled to resort to the cumbrous and expensive Private Act procedure.

The author reviewed subsequent legislation and said the Electricity (Supply) Act, 1926, was a great step forward in the unification of the generation and bulk transmission of electrical energy, but many of its provisions, particularly with regard to tariffs, had come in for criticism from time to time. The compromises inherent in sections 7 and 13 had been referred to in a Fabian pamphlet on " Fuel and Power " as " heads I win, tails you lose " terms and the Parliamentary Secretary to the Ministry of Fuel and Power in his reply to the second reading debate on the Electricity

On the way to the Exhibition. Back row : MRS. C. GILLOTT, MR. *and* MRS. E. M. HARPER *and* MR. D. R. WILLIAMS. *Front row :* COUN. H. JOYNES, ALD. C. H. WILKINSON *and* COUN. G. H. ATKINSON

Bill, 1947, referred to the same subject matter as " refined horse dealing."

Dealing with events leading up to the introduction of the Electricity Bill, the author recalled that the McGowan Committee rejected the idea of complete public ownership and control of the industry, but recommended a considerable reduction in the number of authorised undertakers by transfers and amalgamations.

In April, 1937, the Ministry of Transport issued a confidential " Outline of Proposals " on " Electricity Distribution " to interested parties and it was afterwards published as a White Paper, providing for the amalgamation of undertakings on one of three bases :—(i) Acquisition by one undertaker of other undertakings in an area ; (ii) Transfer of all existing undertakings to a new distribution authority ; (iii) Transfer of the undertakings of local authorities to a Joint Board in accordance with Section 8 of the 1909 Act.

In 1932 the Labour Party issued a report entitled " The Reorganisation of

MR. C. BASEDEN, MRS. P. G. CAMPLING, MRS. C. BASEDEN, MISS Y. BASEDEN, ALD. W. E. SOWTER *and* MR. P. G. CAMPLING *take a stroll*

Electricity Supply Industry," and a motion based on their report was tabled on November 25, 1936, by a Labour Member (Mr. R. J. Taylor) in the House of Commons. Members who had read the debate on that motion would agree that it portrayed with remarkable accuracy the content of the Electricity Bill, 1947.

In July, 1943, a report " Post-War Planning for the Electricity Supply Industry " was issued by the Electrical Power Engineers' Association couched in very similar terms to the 1932 Report of the Labour Party. In November of the same year the Incorporated Association of Electric Power Companies, after withdrawal from the joint Committee of Electricity Supply Associations, issued a memorandum entitled " Memorandum with regard to the Electricity Supply Industry in Great Britain."

In 1944 a Report was presented to, and

Seen at the I.M.E.A. Convention. Back row : DR. H. H. BALLIN, MR. J. P. TUCKER *and* MR. COVENTRY. *Front row : The* MAYOR OF BACUP, *and* MR. D. P. TAYLOR

confirmed by, the Labour Party Conference entitled " Coal and Power," which re-

affirmed the contentions of the 1932 Report. In 1944 the *ad hoc* Committee of the Joint Committee of Electricity Supply Organisations issued its " White Memoran-

Stand o. the British Thomson-Houston Co., Ltd., at the I.M.E.A. Exhibition

dum." At the same time the I.M.E.A. issued another memorandum, the " Brown Memorandum." Both were submitted to the Minister of Fuel and Power.

The repeal and amendment of the Electricity Supply Acts was contained in Part IV of, and the Second and Third Schedules to, the Electricity Bill. Under Part IV the Minister had extensive powers granted to him with respect to the making of orders and regulations, and the provisions of that part of the Bill were a somewhat striking example of legislation by reference.

The Electricity Commissioners would continue to function with limited powers. The Minister might by order dissolve the Electricity Commissioners and transfer their rights, property, liabilities and obligations to himself. The Minister might also split up their functions between the Secretary of State for Scotland, the North of Scotland Board, the Central Authority and himself.

Clause 56 gave the Minister wide powers to include in regulations provisions for the determination of questions of fact and law which might arise in giving effect to the regulations made in accordance with powers conferred under the Bill.

The Central Authority would appear to derive its powers and duties from three sources:—(i) From the attenuated statutory provisions remaining under the Electricity Supply Acts, as amended by the Bill. (ii) From the provisions of local enactments of undertakings transferred to the Central Authority. (iii) From the provisions of the Bill. Similarly, the powers and duties of Area Boards would appear to derive from the same sources.

It had been the constant desire of the I.M.E.A. to obtain the codification and simplification of the Electricity Acts. The author was of the opinion, and that view was shared by many representatives of members of the association, that in local enactments there were provisions of general application which could, with advantage to all concerned, be extended throughout the area of the electricity supply industry in Great Britain. An early opportunity should, and he was sure would be taken to codify the various Electricity Acts, into one comprehensive enactment.

Many and varied would be the problems facing those representatives of members of the association who were permitted to serve the industry after the vesting date and some of those problems would no doubt be legal ones. On behalf of those representatives of members who would continue to serve, he made an appeal to the Minister of Fuel and Power that the Government provide for use during the period between the vesting date and the date when it was possible and opportune to codify the Electricity Acts: (i) A reprint of the Electricity Acts, as amended by the Bill. (ii) A comprehensive index or explanatory memorandum for use with the Electricity Acts, as reprinted and the Electricity Act, 1947, with adequate cross-referencing of substitute provisions. That cross-referencing could, with advantage, be incorporated in the reprinted Acts, in addition to the index or memorandum.

All members of the I.M.E.A., whilst they possibly disagreed to a greater or lesser extent with some of the provisions of the Electricity Bill, would be united in their endeavours to ensure that the new

Part of the stand of the General Electric Co., Ltd., at the I.M.E.A. Exhibition

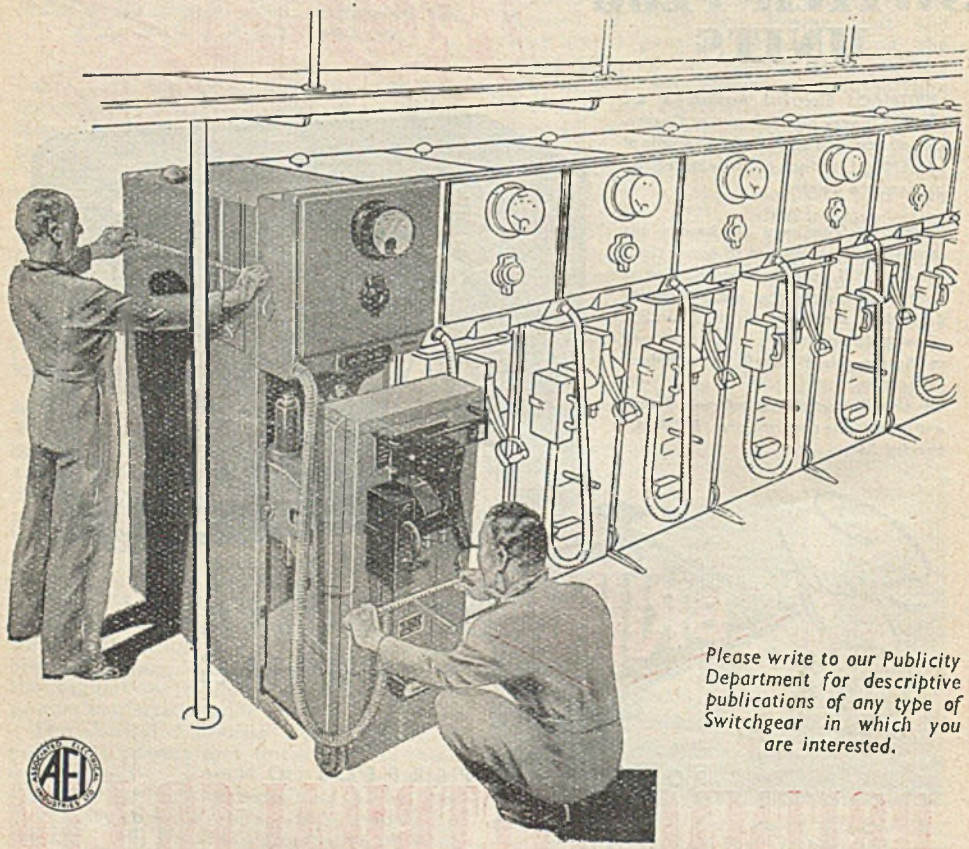
Authorities set up under the Bill were successful in the task they had to perform in carrying on the traditions of a great public service which members had striven to evolve and maintain in the fifty years of the association's existence.

A perfect fit assured—

THE design of 'FERGUSON, PAILIN' "B.V."

Switchgear is the result of thorough research and manufacturing experience to ensure that a minimum of space is occupied — allowing always, of course, for adequate clearances INSIDE the unit.

Our Engineers are at your call at any time to discuss your own particular problems.



Please write to our Publicity Department for descriptive publications of any type of Switchgear in which you are interested.

FERGUSON, PAILIN LIMITED

MANCHESTER, 11 ENGLAND

phone: DROYLSDEN 1301 (8 lines)
BIRMINGHAM: Erdington 3775

LONDON: Temple Bar 8711/2
GLASGOW: Central 5080

Electrical Personalities

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

MR. F. C. BARFORD, who has been appointed district manager for the British

MR. F. C. BARFORD

MR. J. CLEMENT

Thomson-Houston Co., Ltd., at Newcastle-on-Tyne, was previously with them at the Glasgow office until the commencement of hostilities when, as a T.A. lieutenant in the R.A.O.C., he joined his unit. He was demobilised with the rank of lieut.-col., R.E.M.E., in 1945, since when he has been at the Manchester office. Mr. J. Clement has been transferred from Newcastle to take up the position of district manager, Midlands area, at the Birmingham office. Mr. Clement, who has been in Newcastle-on-Tyne for the last 17 years, is taking over all the commercial work for the Midlands, including that carried out by Mr. D. J. Strutt, who retired recently.

MR. E. G. BISSEKER is resigning from the board of the General Cable Manufacturing Co., Ltd., and Mr. Ralph A. Pantlin has been elected a director from July 1.

MR. RONALD HACKER, managing director of Dynatron Radio Co., Ltd., was married at Bray Church recently to Miss Rose Gwendoline Jones, of Maidenhead.

MR. W. C. THORNTON CRAN and Mr. N. J. B. Sabine have been appointed joint managing directors of Broadcast Relay Service (Overseas).

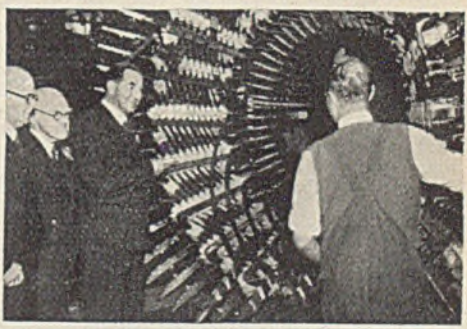
MR. F. T. EDMONDS, engineer-in-charge, has been appointed to the position of senior engineer-in-charge in the Hammersmith electricity department.

MR. R. S. EVANS has been appointed lighting sales manager of Ekco-Ensign Electric, Ltd., the recently-formed sub-subsidiary of E. K. Cole, Ltd., operating from the main Southend offices. Mr. F. L. Cator becomes manager of the illuminating engineering department, located at the London offices.

MR. G. SUMNER, for the time being, will handle the representation in Scotland of Dorman and Smith, Ltd., and DS Plugs Ltd., at 135, Wellington Street, Glasgow. Owing to the death of Mr. E. F. Mackay, the company's manager in Scotland, it has become necessary to reorganise the administration of the Glasgow office.

MR. F. R. BANCROFT, for nearly twenty years Midland electrical representative for Falk Stadelmann and Co., Ltd., has joined the staff of Frank Westerman (Wholesale), Ltd., in a similar capacity. The internal management of the electrical department of the latter company is in the hands of Mr. Arthur Skidmore, late of Electrical Components, Ltd., whilst Mr. Henry Ford continues in his capacity of sales manager.

MR. ARTHUR WOODBURN, M.P., Joint Parliamentary Secretary to the Ministry of Supply, saw a 30 000 kW, 3 000 r.p.m., turbo-alternator being wound



MR. A. WOODBURN, *Joint Parliamentary Secretary to Ministry of Supply, at the Witton engineering works of the G.E.C*

when he visited the Witton engineering works of the General Electric Co., Ltd., on June 19. He was accompanied on his tour of the works by Dr. C. C. Garrard, resident director, and Mr. J. A. Lacey, works manager.

MR. A. RAMSEY MOON has resigned his position as director of the British Welding Research Association with effect from August 31 next. Mr. Moon has been largely responsible for the development of

the association in his present post and formerly as secretary of the Institute of Welding and director of research under the Welding Research Council.

MR. J. A. BIMBLEY, retiring from Blackburn electricity department on his 65th birthday, after 39 years' service, was presented with a clock by Mr. J. B. Ashworth, sales engineer, on behalf of the staff and employees.

MR. S. J. PATMORE has been appointed managing director of the Vanguard Engineering Co., Ltd., as from July 1, from which date the management of the company will be under the direction of S. J. Patmore and Partners.

MR. LEONARD G. ASTON, who has been appointed electrical engineer to Dorchester Borough Council, went to Brierfield (Burnley) as electricity manager eleven months ago. For five years Mr. Aston served the Admiralty at Bath, and was formerly assistant mains engineer at Willesden.

MR. FREEMAN HORN, on reaching the retiring age at the end of June, is relinquishing his position as intelligence officer and manager of the special products department of the British Aluminium Co., Ltd. He is being retained in a consultative capacity until the end of the year. Mr. L. V. Chilton has been appointed manager of the intelligence department. Responsibility for the sale of special products is being transferred to the sales division under Mr. R. M. Warrington, an assistant sales manager. Mr. S. F. Derbyshire, manager of the alumina department of production division, will be responsible for technical matters affecting special products.

MR. G. FERNSIDE, late of Ellis and Mort, Blackpool, won the medal in the main competition, over 18 holes, for the Broadcaster Cup, held by the Lancashire and Cheshire Radio and Electrical Golfing Society at the Preston Golf Club, Fulwood, on June 11. His score was 91 less 15—76 net. The subsidiary 9-hole greensome competition, for prizes presented by Mr. H. Richardson, was won by Mr. A. E. Underwood and Mr. W. Roberts with a score of 3 down. During the dinner a presentation was made to Mr. A. E. Underwood, the hon. secretary of the society since 1935, who has resigned on moving to the South.

SIR GEORGE USHER, speaking at a complimentary dinner given by Aberdare Cables, Ltd., of which he is chairman, and their associated companies in honour of executives and keymen who are leaving for South Africa to open a new cable factory to be operated by Aberdare Cables of South Africa, Ltd., said he was confident that there was a great future before that country, which in his opinion would eventually rival the U.S.A. as an industrial nation. The chairman was Mr. J. Wignall general manager of the company, and present were Mr. A. J. Nicholas, general manager of South Wales Switchgear, Ltd.; Mr. H. de C. Falle, general sales manager, London; and Captain F. Thompson-Schwab, a director of the new company. Mr. W. B. Cox, general manager, and Mr. A. Bullivant, secretary of the South African company, responded to the good wishes extended by officials of the parent company.

Obituary

MR. WILLIAM NICKLIN, a pioneer in the electrical industry and one of the first electrical engineers of Accrington, aged 75 years.

MR. E. C. PRICE, manager of F. Wingfield, Ltd., Croydon, since 1918. Mr. Price was a member of the Electrical Contractors' Association, and the Electrical Circle of Croydon.

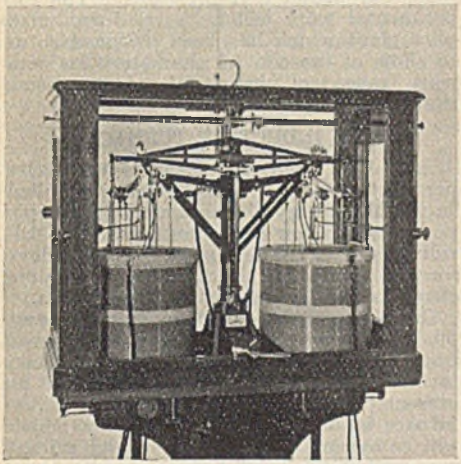
MR. T. A. G. MARGARY, borough electrical engineer at Wolverhampton until his retirement towards the end of the late war, at Bournemouth, on June 24. He was an associate member of the I.M.E.A., whose annual convention opened at Bournemouth on Monday, and a member of the I.E.E.

Delegates of the company-owned undertakings at the N.A.L.G.O. Conference at Southport, recently

National Physical Laboratory

INTERESTING INVESTIGATIONS IN THE ELECTRICITY DIVISION

THE progress in the design and construction of an absolute voltmeter for very high voltages was illustrated in the high voltage section of the Electricity Division at the National Physical Laboratory, Teddington, during an exhibition, with



(*Crown copyright*)

The Ampere Balance for determining the unit of current, in the Electricity Division

demonstrations, extending over Wednesday, Thursday and Friday last week, of scientific work carried on and apparatus used in the various divisions of the laboratory.

The aim of this investigation is to provide an instrument which will measure high voltages directly by making use of the mechanical attraction between plates, which results from the application of a voltage between them. The attracted disc voltmeter will be housed in a compressed gas chamber to reduce the size of the equipment. It is hoped to acquire experience of the properties of compressed gases as high voltage dielectrics.

Plant provided by the E.R.A. for the production of impregnated dielectrics for experimental purposes is to be used in investigations of the surge breakdown voltage of combined dielectrics, e.g., pressboard in oil, and wrapped wires in oil or varnish. More fundamental breakdown properties of dielectrics in which performance is not influenced by failure in associated gaseous or liquid media have already been determined, and the present programme extends the work to practical conditions where solid dielectrics cannot be considered apart from associated liquid or gaseous dielectrics.

Another exhibit in this division illustrated progress in research on surge corona phenomena and showed the experimental arrangement for recording surge current. In this investigation it is hoped to obtain more fundamental information concerning the nature of surge corona, e.g., magnitude and duration of surge currents, energy associated with surge corona, and the relation of the phenomena to that of gaseous discharge.

Work on centimetric electric waves and cavity resonators during the war has resulted in the development of an apparatus for determining the velocity of electromagnetic waves. This was on view in the Electricity Division. It having been established within the limits of experimental error that the velocity of electromagnetic waves is the same as that of light, the value of the constant has become of greater practical importance recently because it is required in some methods of aerial navigation involving the use of wireless signals. One of the possibilities of determining the constant by electrical means, which promise to be more simple and more accurate than the methods previously used, consists of the measurement of the frequency of electrical resonance of a hollow copper cylinder about 8 cm. long and 8 cm. diameter. The frequency depends only on the dimensions of the cylinder and the velocity of propagation of the waves, so that when the frequency and the dimensions have been measured the velocity can be calculated. The cylinder employed in the apparatus displayed at the N.P.L. was made with the greatest care and its dimensions were measured to three hundred thousandths of a centimetre. The frequency of resonance was measured with an accuracy of a few parts in a million, the cylinder being in an evacuated enclosure during the measurement. It is estimated that the velocity is determined by this means with an accuracy of 9 km/s. The value obtained from the measurements made so far is 17 km/s. greater than the accepted value for the velocity of light. The work is being continued with electrical resonators of different shapes.

In connection with the study of the dielectric properties of the atmosphere and its constituents, particularly water and water vapour, in relation to the effect of atmospheric conditions on the propagation of centimetre waves, the reflection and transmission coefficients of water, from

which its dielectric constant can be deduced, have been measured in the Radio Division at wavelengths down to as short as nine millimetres. This was done by using miniature horn-type directional transmitters and receivers provided with means for giving a numerical measure of the received field intensities, the waves being reflected from or transmitted through very thin plane sheets of water. Similar measurements on the effect of salt in solution have enabled a comparison to be made between the properties of sea water and pure water at high frequencies.

A photoelectric colorimeter with an adjustable spectrum template, in the Light Division, has a wider range of application than the spectrophotometer, which will measure only absorption either on coloured glasses, or paper and textiles, etc. This type of colorimeter will measure, in addition, illuminants such as discharge lamps, or arcs, and any colour illuminated by them. The advantage of having the template adjustable is that it is not necessary to make the difficult measurements of the photocell response and the absorption in the spectroscope in advance. By adjusting the template in position all these effects can be taken into account simultaneously and without previous knowledge of them.

The accuracy with which a combination of a photoelectric cell and a colour filter will give the same results as the average eye is being investigated in the Photometry Section. The sensitivity of a photoelectric cell to light of different spectral distributions is not the same as that of the normal eye. In the photo-electric photometry of such light sources as mercury or sodium discharge tubes and the like, therefore, it is necessary to correct the sensitivity curve of the cell by means of a colour filter.

PROTOTYPE DIFFERENTIAL ANALYSER

Some idea of the possibilities of the electro-mechanical differential analyser, which the staff of the Control Mechanisms Section, in collaboration with the Mathematics Division, are developing, was gained by visitors who saw a prototype model working. The machine contemplated will have mechanical integrators and gear systems interconnected by electrical remote control position servo-mechanisms, all controls being brought to a central switchboard. The final aim is to provide a flexible machine with twenty integrators, which can be used either as a single unit or, when required, be subdivided so as to permit of the simultaneous solving of several problems, and one of the chief objects of the design is to reduce to a minimum the time required for the setting up of problems on the machine. Attention is also being given to the possibility of developing a differential analyser with six or eight integrators which could be used for obtaining solutions to medium accuracy of differential equations arising out of general research work and which would be relatively inexpensive to manufacture.

In the Control Mechanisms Section, the fundamental principles of automatic control are being investigated with the object of obtaining basic data for the design and synthesis of automatic controllers for industrial plants and processes. The experimental work will be carried out on a pilot plant which has been designed so as to allow of the control characteristics of a wide range of industrial plants being simulated.

NEW INDUCTION FURNACES

A 30 kVA high frequency (5 000 cycles per sec.) motor generator has been installed in the Metallurgy Division, and will supply power to two new induction furnaces which will be used in the first place to make alloys for the study of the effects of alloying elements on the properties of pure iron.

One furnace, designed to melt at least 50 lb. of iron in air, has already been installed, and a second furnace designed to melt 25 lb. of iron in vacuo is at present under construction. This latter furnace is built into a large drum which will be evacuated by high capacity pumping equipment and arrangements have been made so that alloy additions can be made to the charge of molten iron and the furnace can be filled inside the drum to enable the metal to be cast into ingots whilst the drum is still evacuated.

Traditional work in Metallurgy Division is investigation of the internal constitution of alloy systems to determine the structure and free constituents likely to exist, depending on composition and heat treatment, on which the properties and behaviour in service depend. Work of this nature is in progress on the iron-nickel-chromium system.

Research into the high temperature behaviour of steels used for the superheater headers, steam pipes and superheater tubes of steam power plants for the generation of electricity aims to provide new materials able to withstand higher temperatures than are now used in these plants and thus give increased efficiency with a greater output of electricity from the consumption of the same quantity of fuel.

The summer outing of the Birmingham Electric Club will take place on Friday, July 4, when members will visit Hams Hall power station on the invitation of the City electric supply department.

Association of Consulting Engineers

Plea for More Publicity of Achievements—Staff Problem

THE annual luncheon of the Association of Consulting Engineers was held in London on June 18, with Mr. G. Howard Humphreys in the chair.

The chief speaker was Mr. A. Barnes, Minister of Transport, who said that though the association was born in 1909 and therefore perhaps inclined to middle age, the future facing it was such that its members would not be allowed to relax in their energies. He could not recall any period in the history of the world when the skill of the consulting engineer was more greatly needed, nor a time when his initiative was more important. The world was to-day in such a condition that the consulting engineer by his civil and other engineering works could go a long way towards allaying unrest born in the war years, and in carrying out his projects was in a position to bring about both economic and social stability. By our engineering skill this country, more than any other, had emerged from the war period on a plane equal if not higher than was enjoyed before the war, and in order that we might advance further, he appealed for even greater co-operation between the association and the Government.

CO-OPERATION IN NATIONAL EXPORTS

Mr. Humphreys, in reply, said that not until the history of the 1940 war period was written would the co-operation which had existed between the engineer and the national effort be fully appreciated. He made a strong appeal for more publicity in the matter of our engineering achievements, by some body removed, however, from the engineering industry. There was in some of the Dominions an opinion that this country did not do enough for them, whereas the engineering projects carried out on their behalf by British engineers were enormous in their magnitude and should be fully publicised. Consulting engineers were among the first to become aware of overseas contemplations of new projects, and with their co-operation not only would such projects become more easily realisable, but with their co-operation our export trade would expand. At the present time the consulting engineers of this country were experiencing difficulties in finding adequate staffs, and as a result in organising their practices on a peace-time footing. The war years had given to many of their former employees experience and knowledge which made it difficult to place them in the present scheme of things, while younger men, uncertain of their military commitments in the immediate future, were not finding in the profession the attractions they otherwise would. As to the association, he drew attention to the fact that though its membership was relatively small, it should be remembered that each member had behind him a staff which, if regarded as a whole, represented a high percentage of the available skill of the engineering world.

Mr. J. F. Crowley also deprecated the lack of publicity given to the work of the engineer, as the reports based on investigations into German industrial practices showed that so far as this country was concerned there was nothing to learn from that source. The time was long overdue for the world to be told of the lead which this country held in engineering achievement, so that our Dominions and others might be made better aware of it and avail themselves of our ability.

Mr. J. A. Beasley, High Commissioner for Australia, pointed out that Australia proposed spending £91 000 000 on public works, of which £11 000 000 would be spent on electrical expansion. In 1945, the installed capacity of power stations in Australia was 1 946 000 kW; there were 86 main power stations, with the biggest at Bunnerong of 325 000 kW capacity. The plant capacity in New South Wales was 355 000 kW, and new power stations aggregating 300 000 kW were being built. The State of Victoria had a 10-year plan in project which involved raising station plant capacity from 439 000 kW to 710 000 kW.

Mr. W. J. Binnie proposed the health of the chairman and Mr. Humphreys made suitable reply.

Many industrial and residential premises in Darwen may be linked up with a district heating scheme within four years. An Electricity Committee decision to proceed with the plan, at an estimated cost of £500 000, was approved at a recent meeting of the Town Council. Mr. A. Watson (the electrical engineer) told our correspondent that the scheme would involve a new generating station. It was proposed to have back-pressure generators which would supply the electricity required. The steam would be mainly for industrial purposes, and might be utilised afterwards to heat water to high temperature for circulation on secondary pipelines for private houses and small commercial premises.

ELECTRICAL OVERSEAS TRADE

EXPORTS FOR MAY FALL IN VALUE BY £353 577

THERE was a fall of £353 577 in the value of electrical exports for last month below the total for April. The aggregate of £5 425 367 was also less than that for May of last year, which was £5 581 680. Imports of electrical goods for May showed an increase in value of over £13 000, compared with the return for April. For the first five months of this year the value of electrical goods and machinery shipped overseas was £27 180 720, compared with £18 618 111 for the corresponding period last year and £9 145 999 for five-twelfths of 1938, while the imports over the same periods were of the value of £915 186 this year, £1 424 635 last year and £1 640 561 in 1938.

There was an encouraging increase in the number of radio receiving sets exported, the total for May being 40 492, value £431 469, as against 26 755, value £287 262, in April; 30 908, value £276 810, in May of last year; and 7 053, value £36 755, the monthly average for 1938.

The value of electronic valves sent to overseas buyers increased from £86 380 in April to £129 609 in May, but the figure for May, 1946, was £167 914. The monthly average for 1938 was £41 272. The number of lamp bulbs despatched in May was 11 000 less than in April and nearly a million fewer than in May last year; there was a drop in the quantity of generators, a slight increase in the number of motors, and a fall in other electrical machinery. There were substantial increases in the shipments of vacuum cleaners.

	Imports			Exports		
	Monthly average, 1938	Month ended May 31, 1946	1947	Monthly average, 1938	Month ended May 31, 1946	1947
	£	£	£	£	£	£
Submarine cables	—	—	—	17 289	56 083	33 068
Other telegraph and telephone wires and cables	—	—	—	71 803	354 235	162 606
Electric cables, wires, &c.—						
Rubber insulated	31 246	1 162	6 436	117 533	279 302	328 737
With other insulation				153 256	451 417	400 294
Radio and television transmitters (and radar) equipment	—	—	8 632	28 296	129 849	141 634
Radio receiving sets	10 148	10 458	1 104	36 755	276 810	431 469
Radio long distance telegraph and telephone equipment	9 243	7 533	11 518	242 716	400 630	519 206
Other descriptions	47 870	95 860	32 203	57 848	128 416	182 856
Transmitting and industrial valves	10 893	862	18 802	41 272	54 402	44 053
Other valves					113 512	85 556
Electric furnace carbons	4 054	448	35 163			
Other electric carbons	2 301	4 238	1 305			
Electric bulbs and discharge lamps complete	10 265	8	4 225	49 440	124 010	108 690
Other lamps, lighting appliances and fittings	38 662	1 288	5 637	48 565	183 703	226 798
Batteries and/or cells, primary	3 549	686	992	13 572	65 251	40 566
Accumulators	—	—	—	48 647	153 031	159 148
Parts and accessories	—	—	—	—	49 522	42 784
Heating apparatus and elements	—	—	—	14 064	81 699	160 087
Other heating equipment	—	—	—	16 600	43 330	83 457
Commercial electrical instruments and parts	32057	8 091	11 511	15 878	53 715	77 856
House service meters	—	—	—	15 791	41 756	59 284
All other descriptions of instruments	—	—	—	9 612	46 369	58 913
Electro-medical apparatus	—	—	—	3 038	14 955	30 276
X-ray apparatus, vacuum tubes and parts	9 734	22 614	24 132	4 881	67 305	49 611
Insulating cloth and tapes	—	—	—	7 038	40 049	38 058
Other insulating materials	—	—	—	12 305	90 554	61 525
Other articles	52 980	10 577	22 347	108 083	293 005	209 676
Generators and parts	—	—	—	157 150	788 716	361 269
Motors and parts	26 033	9 517	9 757	145 045	266 780	367 516
Other electrical machinery	14 455	2 551	45 719	355 663	646 905	594 362
Vacuum cleaners and parts	—	—	—	26 662	93 708	221 751
Other portable appliances	24 627	2 056	6 293	10 394	46 151	18 971
Welding machinery (including electrodes) other than tube making	—	8 963	8 045	—	146 490	125 277
Total	328 117	186 911	213 822	1 829 198	5 581 680	5 425 367

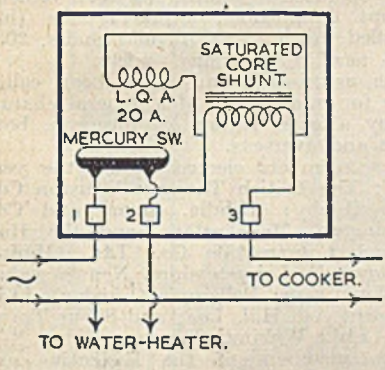
Equipment and Appliances

Low-Consumption Ventilator

The "KB Extravent," made by Keith Blackman, Ltd., of Mill Mead Road, Tottenham, London, N.17, is a small easily-fitted unit, claimed to ensure good ventilation of offices, industrial buildings or kitchens. It operates on any normal voltage single-phase electric supply and is said to displace 11 500 cu. ft. of air an hour for the consumption of only about 15 W. The unit can be mounted on any ordinary form of seating or directly on to window glass. Normally it is arranged to extract foul air, but it can be supplied to blow in fresh air. The unit is of aluminium alloy construction, and weighs approximately 7½ lbs. net. The totally-enclosed shaded-pole induction type motor is flexibly mounted and built into an aluminium alloy case, and has grease-packed ball bearings. The aluminium alloy fan wheel has blades of true aerofoil section, and the external dome, forming an efficient protection against wind and rain, prevents back-draught when the fan is stopped. The unit is supplied with all the necessary rubber mounting rings, clamp ring, bolts, nuts, washers, etc., and fixing instructions.

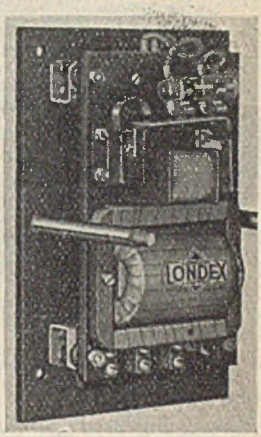
Peak Load Switch

An automatic change-over switch, designed to limit the domestic peak load, has recently been developed by Messrs. H. C. Allen and A. Anderson, of the Wimbledon electricity department, and is being made by Londex, Ltd. The unit consists



Theoretical circuit of the Londex switch

of a choke which saturates at 5 A, developing approximately 1.5 V, and a 20 A heavy-duty mercury relay. As shown in diagram above, the choke is placed in series with one of the cooker supply leads, while the supply to the water-heater passes through the mercury switch. When the cooker current rises to 5 A, the relay operates and the water-heater is automatically switched off. By virtue of the saturated core in the choke, the voltage applied to the relay does not rise appreciably above 1.5 V, the makers state, even when the cooker current rises to 35 A, and there is thus no danger of the relay coil being overloaded. The same relay can be used in conjunction with a room heating circuit, or has applications in factories. The mercury switch has a melted-in china liner for arc suppression.

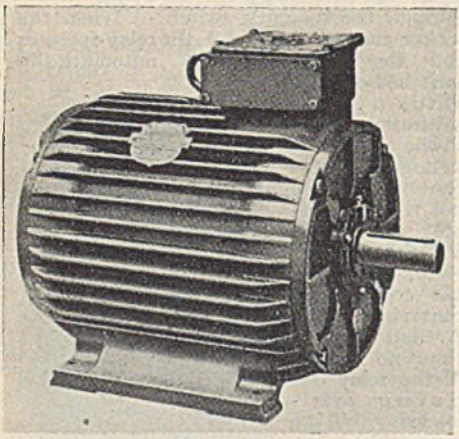


The "peak-load" relay

Gas-Works Motors

In THE ELECTRICIAN of June 6 was published an abstract of a paper on "Electricity in the Gas Industry." We have since received from Lancashire Dynamo and Crypto, Ltd., of Trafford Park, Manchester, details of their special gas-works electric motors. Mechanically, all the parts of these motors are of sufficiently large size to ensure that they are not overstressed by arduous loading conditions and no light sheet metal enclosures are permitted. The removable cover plates and access doors are of heavy boiler plate or cast iron. Immunity from dust is provided by the use of wide machined joints on all cover plates which are bolted into position, and the bearings are protected by special dust excluders around the shaft. Since it is not possible, the makers state, to render every motor "fumeproof" by enclosure, special care is taken in the protection and insulation of all internal parts. The insulation has a mica foundation, and windings are vacuum-dried and impregnated under pressure. After impregnation, the windings are given three coats of a special enamel. The d.c. machines have large removable bolted-on inspection doors at the commutator for maintenance purposes, and a glass inspection window is also provided. The a.c. slip-ring motors have

totally enclosed external slip-rings, inspected by removal of a cover.



Typical L.D.C. gas-works motor

New 5A a.c. Switch

Now being used in municipal and other housing schemes is a range of a.c. switches and sockets recently developed by Hi-craft Electrical Products, Ltd., of 25, Manchester Square, London, W.1. Besides meeting the specific requirements of an a.c. switch, it is stated, the new switches incorporate features making for increased working efficiency, improved appearance, longer life and reduced installation costs. Basically, the switch consists of a moulded body and a toggle-operated slider with floating shoe contacts of heavy gauge silver-clad copper. At the beginning of its travel, the slider is restrained by the compression of its two toggle springs. Once past dead centre, however, the springs accelerate the movement and cause the shoe to make a butt contact with the cable terminals. Life tests have been carried out by an independent examiner with satisfactory results. With the surface models, no wood mounting blocks are required, since the back of each switch or socket is deeply recessed to take up the cable slack. With all flush models, special anchoring clips are available to permit the switch or socket to be rotated through 10° should the assembly be out of vertical.

Electrical Vehicle Association's Report

THE approximate number of electric vehicles in use in this country increased from 7 009 in 1945 to 7 765 at November 30 last year. In 1938 the number was 4 156. This is stated in the report presented at the annual meeting of the Electric Vehicle Association at the Connaught Rooms, London, this month.

Inquiries failed to produce an authoritative figure of the number of electric road vehicles in use in the U.S.A., but it was clear that it had declined steadily, the low price of petrol being given as a major reason. On the other hand, official statistics showed that the production of electric industrial trucks had increased considerably, there being some 40 000 in use in 1945. In France the number of electric road vehicles increased from approximately 1 000 in 1939 to 4 500 in 1946, the majority being of four, five and six tons payload, in spite of a ban on their production.

The Ministry of Supply stated that the production of electric road vehicles (excluding " prams ") totalled 2 300 in 1946. A small percentage of the difference between that figure and the number of registrations was accounted for by exports. Production increased each month during the year, the December figure being nearly six times that of January.

The monthly returns of the Ministry of Transport for Great Britain showed new electric vehicle registrations last year as follows: 12 cwt., unladen weight, 186; 12 cwt. to 1 ton, 642; 1 to 1½ tons, 446; 1½ to 2 tons, 22; 2 to 2½ tons, 10; 2½ to 3 tons, 4; 3 to 5 tons, 5; 5 tons, 1; pedestrian operated " prams," 1 042; vehicles exempt from Road Fund licence (unspecified weights), 98; invalid chairs, 203; total new registrations, 2 660.

The association had again been called upon for information of a general character by a wide variety of interests, both home and overseas.

New members elected during the year were: The British Thomson-Houston Co., Ltd., Rugby; Hindle, Smart and Co., Withington, Manchester; and the Harborough Construction Co., Ltd., Market Harborough, Leicestershire. New associate members were: Bellamy's (London), Ltd., 2, Burnt Ash Hill, Lee; and Silent Transport, Ltd., Woking, Surrey.

The members of the Executive and Finance Committee for the year are: Messrs. A. W. Barham (chairman of the Association), A. J. Fippard (vice-chairman), H. M. Drake (hon. treasurer), R. Birt, A. W. Bonell, W. B. G. Collis, H. W. Heyman, J. Parker Garner, P. Rochs, H. V. Schofield, J. Wilkie, W. E. Wilkins, W. E. Willday, H. G. Wilson, and A. Hamilton Young.

Television Radio Links

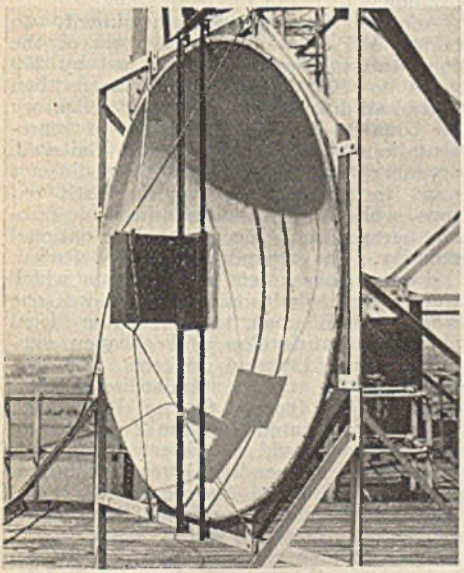
Demonstration of Retransmission Over Distance of 24 Miles

IT was announced in THE ELECTRICIAN on June 13 that the B.B.C. had placed a contract with the Marconi's Wireless Telegraph Works Co., Ltd., for a new television station, the location of which has not yet been decided, and the Marconi Co. staged a demonstration on June 17 to show how television signals from Alexandra Palace can be picked up and retransmitted by radio link without appreciable loss in clarity and fidelity.

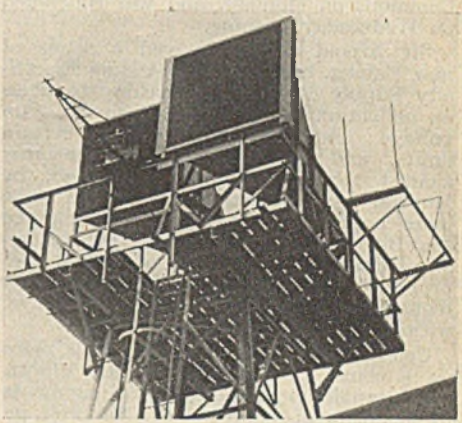
In the system demonstrated vision and sound were relayed at very high frequencies by means of frequency modulation.

For purposes of the demonstration, a retransmitting station was set up on Danbury Hill, near Chelmsford, consisting of a receiver and a transmitter. Here, transmissions from the London television station at the Alexandra Palace—a distance of 31.5 miles—were received and relayed to Great Bromley (6 miles east of Colchester), a distance of a further 24 miles.

In the vision receiver at the relay point, Danbury, normal television receiver technique was employed, as the signal received direct from Alexandra Palace was within optical range at Danbury. The vision signal, having been received, was then employed to modulate a 60 cm. (510 Mc/s) transmitter, by means of frequency modulation. The output of the transmitter was conveyed to a special type of transmitting aerial (shaped like a horn and constructed of metal) which was mounted on a mast 40 ft. from the ground. This aerial re-radiated the vision signal to the second station at Great Bromley.



Close-up of part of the receiving system at Great Bromley



The receiving and transmitting aerials at Danbury Hill

The sound transmission was re-transmitted in the same way, but at wavelengths which differed slightly from those used for the vision carrier.

At Great Bromley the energy was picked up by a similar aerial—this time in the form of a parabola or dish—mounted on a mast at a height of 200 ft. For reasons of efficiency, the 60 cm. receiver was placed near the aerial and its output taken down the mast to the receiver in the demonstration hut. The received image was shown on a receiver using normal technique.

The method of modulation used is the subject of a recent Marconi patent, in which the frequency of a quartz crystal is controlled by the application of the sound voltages to the circuit. This method is claimed to represent a big advance in economy of apparatus and in technical performance, and is to be incorporated in the new B.B.C. 25 kW frequency-modulated broadcasting transmitter now under construction.

New possibilities in radio communication are opened up by the use of the technique demonstrated, including telegraphy and facsimile transmission.

The Electricity Bill

Debate on the Report Stage — Safeguarding Consumers

THE debate on the Report stage of the Electricity Bill began in the House of Commons on Monday, and was concluded on Wednesday evening.

Sir Arnold Gridley moved a series of new clauses, based on the existing Electricity Supply Regulations, seeking to place an obligation on Area Boards to maintain voltage and frequency within certain limits, and to safeguard the consumer against stoppage of supply. To these, the Minister replied that such matters were more appropriate to regulations than to the Bill itself, and he would give assurances that the substance of the clauses proposed would be embodied in the new regulations. The clauses were, by leave, withdrawn.

Considerable discussion then took place on a clause put forward by Mr. Elliott, which sought to prohibit tax-free payments to members of boards. Mr. Shinwell replied that when he made appointments to the board he would announce salaries to the House, but no responsible Minister would suggest that they should not be subject to tax deduction. The clause was negatived by 231 votes to 99—Government majority, 132.

A clause was next moved by Mr. Boyd-Carpenter, the object of which, he said, was to provide protection for those engaged in the industry who, in the course of the controversies on the Bill, had expressed opinions adverse to it. If the Minister did not accept the clause, he would leave in the minds of people outside the suspicion that some degree of victimisation was intended.

APPOINTMENTS TO BOARDS

Replying, Mr. Shinwell said it would be quite improper to appoint a person to the boards who was definitely opposed to the nationalisation of the industry, but they would not inquire, nor allow the boards to inquire, into the political opinions of any employee. Chairmen or directors of boards of supply companies who possessed the necessary qualifications would have an opportunity of serving the industry under nationalisation, irrespective of their political views or of any opposition they had displayed towards nationalisation. That did not mean he would appoint them to boards of management. How was it possible for him to appoint a person who had declared over and over again that nationalisation was going to prove a failure? The clause was negatived by 258 votes to 95—Government majority, 163.

Mr. Elliott proposed an amendment to leave out Scotland from the provisions of the Bill, saying that Scotland should be administered by a Scottish board for the benefit of the Scottish people as a whole. Mr. Shinwell said an integrated British Electricity Authority would be better for Scotland in the long run, and the amendment was accordingly negatived, by 256 votes to 94—Government majority, 162.

MEMBERS OF COUNCILS

When Mr. Shinwell moved an amendment providing for the representation of agriculture, commerce, industry and labour on the consultative councils, Opposition speakers complained that the Minister should also have included housewives. Mr. Shinwell replied that if housewives were included he would be immediately challenged by spinsters and single persons who would claim the right to be represented because they, too, were consumers of electricity. The E.A.W., he said, would be consulted. The Government amendment was carried without a division.

Another Government amendment, to permit M.P.s to become members of the consultative councils, was carried by 279 votes to 105, and Mr. Pickthorn then moved an amendment making it obligatory for councils to keep a register of representations made to them. Mr. Gaitskell, opposing this, argued that they did not want to strangle the councils with red tape, while it might be undesirable to publish certain facts for reasons of national security. The amendment was defeated.

Among Government amendments which were agreed to without a division was one which placed upon the boards a legal obligation to develop and cheapen supplies, to avoid undue preference, to simplify charges and to standardise systems of supply and types of fittings. Previously, the Bill had stated that the " policy " of the boards should be directed to these ends: in the amended clause, the boards " shall be directed to securing " them. Another amendment provided that boards should have power to install, repair, maintain or remove electrical plant or fittings not only in the case of plant supplied by themselves, but of plant purchased elsewhere.

The conclusion of the debate will be reported in our next issue.

Britain's Export Trade

HOPE IN WORLD ECONOMIC UNITY AND QUALITY PRODUCTION

THE importance of world economic unity was emphasised by Mr. Leslie C. Gamage, vice-chairman and joint general manager of the General Electric Co., Ltd., and president of the Institute of Export, in his address on " Britain and Her Export Trade " at the country conference of the Chartered Institute of Secretaries at Leamington on Friday, June 13.

The results of our one-time industrial supremacy, stated Mr. Gamage, had, like a rich wine, clouded outlook to the extent that many of us were really unaware of where Britain really stood in her export trade to-day. By initiative, vigour and enthusiasm we would, by ourselves, regain some degree of prosperity, but we had reached a stage in world affairs where no nation could by itself and without collaboration and co-operation with other nations continue to exist in complete peace and prosperity. In the long run it was just as important to the United States and Russia as it was to us now that world economic unity should prevail.

EUROPEAN RECONSTRUCTION

He was very glad to read extracts of the speech made by Mr. Marshall, U.S. Secretary of State, on June 5, in which he suggested that America might underwrite a joint European programme of reconstruction. Mr. Marshall displayed the kind of statesmanship and leadership which the world had been waiting for from America. It offered to solve many problems almost at one stroke, and it should go far to ease the situation at Geneva, where the International Trade Organisation was facing some difficulties.

The two world wars had encouraged the growth of industries in non-industrial areas of the world, which used to form our principal markets, and the old idea that world trade was an exchange of goods from the industrial countries for primary products from the non-industrial countries had completely changed. In fact, we had got to the stage before the last war where the world was full of sellers and few buyers. We were fast reaching that stage again. The I.T.O. had the unenviable but essential task of working out a solution. That was our greatest hope, but we also had to set our own house in order. Against the grim background of our own industrial troubles we had been set an export target of 75 per cent. in volume over pre-war exports. With exports of coal and cotton eliminated, the figure of 75 per cent. must be increased to over 100 per cent. We were also told, rather vaguely, that we must direct our exports more particularly to " hard currency " countries. In pre-war days three-quarters of our exports went to the soft currency countries and one-quarter to the hard currency areas, whereas two-thirds of our imports came from the soft currency countries and one-third from the hard currency. To-day, the direction of our exports was the same as pre-war, but the hard currency areas now supplied half of our imports. That represented a big increase in imports from hard currency areas to be paid for out of meagre funds, a situation which was further aggravated by the fact that the cost of imports had risen relatively much higher than the cost of exports. The obvious remedy would be to buy more of our imports from soft currency countries. Some of them were not in a position to supply our wants—but quite apart from that, we were apparently debarred from doing so by the non-discrimination conditions attached to the American loan.

It was useless, even with all the great assets we possessed and the training we were undertaking, if we did not make the right products. The best British products were without compare, but, particularly since the end of the war, far too many British goods sent overseas were poor in design, construction and materials—some of them a disgrace to the legend " Made in England."

WASTED ENERGY

There was a very real truth in our slogan " Export or Die." While we had many invaluable assets in the form of the Empire, our national character, our skilled workers, managers and scientists; while we were taking steps to train our export administrative staff and to improve the quality and appearance of our products, we would still fail unless we got a change of heart, first among the nations by realising that the well-being of all nations was more important than the short-term prosperity of the few; and secondly, a change of heart in our own people. Far too much energy was being squandered and valuable time lost by unofficial strikes over paltry disputes; by the Government introducing legislation dividing the nation rather than unifying it, and by the failure of the Government to formulate a strategy and leave industry to carry it out. Among the nations and among our own people there was too much bickering and squabbling. We needed, more than anything else, a return to the principles of the Christian faith; a return to a sense of decency and fair dealing; a return to the satisfaction of hard work in which we gave of our best.

Industrial Information

Visit to Southend

Mr. Sam Woodhead, an Ekco dealer of Lincoln, took his staff by special coach to Southend-on-Sea, where, in addition to enjoying the pleasures of the town, they were entertained at the works of E. K. Cole, Ltd. Mr. Woodhead, senr., who formed the business thirty-four years ago, accompanied the party. The photograph reproduced on this page shows the visitors grouped on the steps of the Ekco offices, with Messrs. "Dan" Godfrey, Bentley Jones and R. A. Drummond.

Group of visitors to Ekco works at Southend

Lisbon Fair 1947

For the Lisbon Fair, now in progress, Leacock and Co., Ltd., the London and Lisbon exporters and importers, designed and built a special pavilion covering nearly 3 000 sq. ft., in which will be exhibited a selection of the products of the British manufacturers for whom they act as agents and distributors. The range of British exports will include a cross section of electrical and radio products and domestic appliances. The lighting for the British pavilion has been designed by the illuminating engineering department of Thorn Electrical Industries, Ltd., the equipment being standardised on the Atlas 80 W fluorescent tube and fittings.

E.I.B.A. Campaign

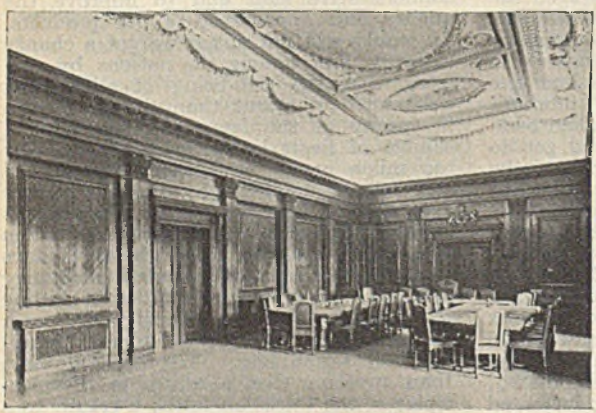
The Electrical Industries' Benevolent Association already has over thirty branches throughout the country, and as part of a campaign to get the rest of the country so covered, a meeting for the purpose of inaugurating a branch in Devon and Somerset is being held in the Electric Hall, Town Hall Annexe, Torquay, at 3.30 p.m., on Wednesday, July 2. All electrical people in the area are invited to attend.

New Address

As from Monday, June 23, 1947, the address of the head office of Hopkinson Motors and Electric Co., Ltd., will be Birchgrove, Cardiff. This will be the address of the company's new works and offices, to which all correspondence should be addressed.

Town Hall Lighting

An interesting fluorescent lighting scheme for the Council Chamber at the St. Marylebone Town Hall, planned by Thorn Electrical Industries, Ltd., is illustrated on this page. The installation consists of twenty-eight pairs of Atlas "daylight" and "warm white" tubes, the resultant illumination being 6.5 ft. candles, compared with 2.5 ft. candles when 156 60 W gas-filled lamps were used previously. The load has been reduced from 9.3 to 4.4 kW.



Atlas fluorescent lighting in the Council Chamber at St. Marylebone Town Hall

Edinburgh Trades' Holiday

Bruce Peebles and Co., Ltd., Edinburgh, announce that their works will close on Friday evening, July 4, for the Edinburgh Trades' Holiday, and will re-open on

Monday morning, July 14. No goods will be received or dispatched during the holiday period.

Status and Salaries of Demonstrators

In a memorandum issued to members, the British Electrical Development Association recommend for the consideration of and adoption by electricity supply undertakings a minimum scale of salaries for women engaged in demonstration and allied work in electricity showrooms. It is in line with the recently negotiated salaries for administrative, professional and technical employees in local government. This basis has been put forward as meeting the immediate need for a scale, and it is now widely adopted by local authorities for showroom staffs. The Informal Committee, appointed by the E.D.A. Council, dealing with the matter, consisting of Miss Caroline Haslett, Mr. F. Newey, with Mr. H. J. R. Randall (chairman of the Council, 1946-47), and Mr. V. W. Dale, the general manager, had several meetings with Sir William Walker as chairman of the employers' representatives of the National Board and the National Council.

Electrical Dredger Equipment

A contract has been placed with the British Thomson-Houston Co., Ltd., for the supply of the complete a.c. electrical equipment for five floating dredgers which will be used to cut a canal between Donjere and Mondragon, in the south of France—part of an extensive project to exploit the possibilities of hydro-electric power on the Rhone. The supply to the dredgers will be at 13 500 V, taken from an overhead land-line running parallel to the projected line of the canal, the low tension supply of 380 V, three-phase, 50 cycles being obtained from the secondary of a 1 000 kVA transformer mounted on each dredger. The electrical equipment, which has special features, also includes h.t. switchgear with protective equipment, l.t. ironclad distribution switchboards, control gear, and a.c. induction motors, most of which are the slipring induction type. The a.c. motors total 1 080 H.P.; the bucket chain motor is of 350 H.P., and several motors ranging from 50 H.P. to 140 H.P. are required for the conveyor belt system. The automatic control gear will be supplied by Brookhirst Switchgear, Ltd., Chester.

Electric Seed Conditioner

With reference to the Ferranti-Jeans Spear Seed Conditioner described and illustrated in our issue of June 6, we are asked by Ferranti, Ltd., to point out that although a 30 A plug is required for the equipment, it is not supplied by that company. The cost of running at 1d. per unit was inadvertently printed as 1½d., whereas it is obvious from the details given previously in the text that the cost is 5¼d., dependent on the type of seed being conditioned and its moisture content. The conditioning time, like that of cost, is dependent upon the same two factors. Further details of times and running costs can be obtained from Ferranti, Ltd.

Electric Mobile Butcher's Shop

A few months ago the St. Helen's Industrial Co-operative Society, Ltd., which has operated horse-drawn travelling butchers' shops for serving the scattered outlying districts of St. Helens, not catered for by any other means, decided to try out a battery electric vehicle equipped with a special body. The one now in service is shown in the illustration. It consists of a "Morrison-Electricar" chassis manufactured by Crompton Parkinson, Ltd., powered by a Young

Morrison-Electricar vehicle equipped as a butcher's shop

armoured traction battery and fitted with a body designed and built by the C.W.S. motor trade department. The interior is equipped with steel rails and hooks, and the other fitments common to a retail butchery. Counter and shelves are readily removable for cleaning. Sliding windows in both sides of the body allow the meat to be displayed. Interior lighting provided by four roof lights enables the service to be maintained during hours of darkness. To protect the meat against hot weather, a false roof, about 6 to 8 in. deep, gives heat insulation, and the interior is air-conditioned by a fan fitted flush on the roof inside the body. Customers are protected by the rear panel of the vehicle which opens upwards to form a canopy. A wash bowl and towel rack fitted in the rear side of the cab enable the driver to wash his hands before serving meat.

Fun at Sea

Over 700 members of the E. K. Cole organisation, including friends and relatives, left Southend Pier in the morning of June 14, on the charter vessel "Queen

of Kent " for the first post-war Ekco annual outing to Margate. Although the weather was dull the programme of entertainment arranged by the Ekco Social and Sports Club, including a " crossing the line " ceremony, provided plenty of fun and enjoyment.

A.S.E.E. Visit to Works

The Plessey Co., Ltd., granted facilities for 30 members of the A.S.E.E., to visit

Members of the A.S.E.E. examining an electrical actuator during their tour of the Plessey Co.'s works

their extensive works at Ilford on June 18. The party was conducted on the tour of the various departments by Mr. G. A. T. Burdett, and Mr. R. G. Sandeman. Of particular interest was the mass production of loudspeakers, and the assembly of telephone instruments. The section dealwith the manufacture, ageing and testing of electrolytic condensers and the extensive metal finishing department, where various components are plated, also engaged close attention.

Works Symphony Concert

During the lunch hour, in the Ekco works canteen, at Prittlewell, on June 18, the Social and Sports Club presented a short concert by their own Symphony Orchestra. Sixteen players, under the conductorship of Mr. R. K. Spencer of the E. K. Cole development and engineering division, revealed a high standard of musical talent and their programme was enthusiastically received by hundreds of their colleagues.

Liner's Radio Installation

When the Canadian Pacific liner, " Empress of Canada," sets out on her first post-war voyage, she will be equipped with some of the latest Marconi marine wireless equipment for the comfort and safety of those who sail in her, and also one of the most elaborate sound-reproducing installations. The latter will comprise two separate systems. One will be for entertainment, and will relay speech or music over a network of 32 loudspeakers, and the second, an " order " system, is designed to assist in the efficient running of the ship by supplying immediate two-way communication between the bridge and certain key-points throughout the ship.

Battery Prices in Eire

Owing to increased production costs, the Minister for Industry and Commerce in Eire has revised the maximum prices of certain dry batteries. The maximum prices of accumulators remain unchanged.

Isle of Man T.T. Races

All the 14 motor cycles to finish the course in the senior race on the Isle of Man recently, were fitted with B.T-H. magnetos. Of the 51 machines completing the course in the junior, lightweight and senior races, 41 were fitted with B.T-H. magnetos, including those making the fastest lap times in the lightweight and senior races.

G.E.C. Receivers for Malayan School

Tests were carried out recently under the auspices of Radio Malaya, the Government operated radio network for Singapore and the Malayan Union, in order that the organisation might be in a position to recommend receivers for use in schools. After the final test it was unanimously decided that the G.E.C. Overseas 7 receiver, B.C.4672 was the most suitable.

Institute of Welding

In their twenty-fourth annual report, the Council of the Institute of Welding state that during the year the library lent 1 152 publications and 97 slides to 587 borrowers. The total membership on March 31, 1947, was 4 811—a decrease of 304 compared with that of the previous year, due to the bringing into force of new membership regulations. A new branch at Southampton and another in the East Midlands were opened during the year.

E.I.B.A. Extraordinary Meeting

In order to facilitate the legal conveyance of Broome Park, Betchworth, Surrey, which has been given to the Electrical Industries' Benevolent Association as a home for old people, the association gives notice that, at the extraordinary general meeting to be held immediately following the annual general meeting at the Institution of Electrical Engineers, Savoy Place, W.C.2, at 11.30 a.m., on Thursday, July 24, a resolution will be proposed to add to the powers of the association to enable it to acquire land, buildings, and other property.

Annual Meeting of the A.O.E.C.

Views on Pensions, Compensation and the Electricity Bill

At the annual meeting of the Association of Officers and Staff Members of Electricity (Power and Supply) Companies of Great Britain, on June 11, Brig.-General R. F. Legge delivered an address, abstracts from which are given below.

Since the last annual general meeting, an Electricity Bill which concerns every member of the association has been introduced by the Government. From the time when the Government's intention to introduce the Bill was first made known, the executive committee of the association have given constant attention to the matter, particularly with respect to the provisions in regard to pensions and compensation for loss of employment or worsening of conditions.

Representatives of the Ministry of Fuel received representatives from the committee shortly before the Bill was published, and this was followed by correspondence between the Chairman of the association and the Ministry.

On March 4 a statement of the position as at that date was circulated to all the members of the association. Since then, the Bill has passed through the Committee stage and in the course of the debate on Clauses 48 and 49 the points raised with the Ministry by the committee were amongst the questions asked by one member or another of the Bill Committee.

Although amendments which had been tabled by the Government were made to these two clauses on certain matters (being improvements from the point of view of employees), no amendments were made on questions raised other than by the Government; but the Minister promised to look at the clauses again in the light of the debate, and it is hoped that amendments will be tabled by the Government for the consideration stage, towards the end of this month, which will remove all doubt as to fair treatment of employees as regards pensions and compensation.

The committee feel, in common with various other parties, and have so informed the Ministry, that the making of pensions regulations should be mandatory and not merely optional; that it should be competent for every officer who suffers loss of employment or loss or diminution of emoluments or pension rights, or whose position is worsened in consequence of the vesting of an undertaking, to claim compensation, and that the right to claim should not be limited—as it may be by the literal interpretation of Clause 49 as originally drafted—to cases specified in the Regulations; that in any case where a holding company's undertaking is not taken over because that company hold less than the qualifying 75 per cent. securities in statutory companies, an employee who suffers loss because the statutory company or companies' undertaking which absorbed part of his time, is taken over, should be eligible to claim compensation. As the Bill stands such an employee would be debarred from even attempting to establish a claim for any compensation.

One of the amendments tabled by the Government and now incorporated in Clause 49 was first raised by the committee, namely, the addition of a sub-clause which extends the benefit of the compensation provisions to officers who would have been within those provisions but for any war service.

The committee had hoped that the basis of compensation would have been prescribed in the Bill itself; they were, however, given to understand that procedure by regulations was settled policy. The Minister has given an undertaking that before settling the regulations, there will be consultations with representative organisations, and the committee have expressed to the Ministry the hope that an opportunity will be afforded to them of offering assistance from the point of view of their constituent members.

Fuel Economy

On June 13, sixty members from the north and south portions of the S.E. England Area of the E.A.W. attended a Fuel Economy Festival in London, opened by Ald. Mrs. Armitage, president of Watford branch. The Director addressed the conference, and was followed by Miss Grange of the Ministry of Fuel, who spoke on the background history of fuel economy. A demonstration of meter reading and current consumption was given by means of dialogue and models by Mrs. E. E. Edwards and Miss M. Reading, E.A.W. area organisers. A talk on Cookery and Fuel Economy was given by Miss A. M. Pilkington, E.A.W Housecraft Lecturer, and a representative of Easiwork Cookers, Ltd., spoke on Pressure Cookery. Fuel Economy in Home Washing was explained by a representative of Messrs. Crosfield, Watson and Gossage.

First prize in the competition for the best Fuel Economy Hint was won by Miss M. Bennett, of Walthamstow, while the second prize was awarded to Mrs. E. J. Harrington, of Erith.

Book Reviews

International Road Transport, Postal, Electricity and Miscellaneous Questions. By Brig.-Gen. Sir OSBORNE MANCE. (London: Oxford University Press.) Pp. viii+218. Price, 12s. 6d. net.

This is the fourth of a series of five volumes dealing with various forms of transport, issued under the auspices of the Royal Institute of International Affairs, which was founded in 1920 to encourage the scientific study of international affairs. The section on the international transmission of electricity relates the technical agreements of the past to possible political settlements of the future, and is of particular interest at this time in that it envisages an economic structure welded by electricity.

The author points out that the growing need for power in connection with the industrial development of many countries, the pressure to utilise water power where coal is not readily available, the improvement in the technique of long-distance transmission of electric power and, latterly, its value as an export, have all tended to expand the distribution and supply of electric power from the national to the international field, in spite of the nationalistic tendencies of the inter-war period.

He discusses the establishment of an electric power grid over the greater part of Europe, with the political and economic problems involved, and suggests that it might be best to separate the political aspects from the technical administration of such a grid by having a European Electricity Council—a sort of European Electricity Commission—to decide questions of general policy and arrange for arbitration on disputes, and a European Electricity Board like the British Central Electricity Board to manage the grid undertaking. The Council would consist of nominees of Governments and would take its place in the future organisation for transport and communications under the United Nations Economic and Social Council.

Sub-Station Practice. By T. H. CARR. (London: Chapman and Hall.) Pp. 396. Price, 32s. net.

A sub-station comprises a building, transforming and converting plant, switchgear, protective gear and various miscellaneous equipment, so that a book on the subject has to deal with a large number of different items. Great detail regarding any one is not expected, but the relationship between them and their behaviour on assembly is, however, important. The present volume adequately fulfils these requirements. The book commences with a discussion of the general lay-out of the plant and its building or enclosure and includes a valuable chapter on the necessary building constructional and erection work.

Succeeding chapters deal with switchgear, transforming and converting plant, regulators, reactors and protective equipment. Each item is discussed from the operating engineer's aspect, with clear schematic connection diagrams and with many practical notes regarding installation and operation. Underground mining substations are given special attention in the various sections but little is said about supervisory control—this latter might usefully be covered more fully in the next edition. A chapter on technical calculations gives worked problems relating to short-circuit and voltage drop calculations, surges, several economic investigations, and reinforced-concrete building construction. The voltage drop calculation for a three-phase line treats it as a single-phase line carrying half the power, which seems unnecessarily confusing, but the economic calculations may be said to be particularly useful.

The final section deals with organisation and control and each chapter contains a useful bibliography. There are some minor blemishes indicating, perhaps, some haste in the final stages of the work, for instance, "Petersen" coil and "Solkor" protection are wrongly spelt, gauss per sq. cm. is used as a unit of flux density, the temperature of the cathode spot of a mercury arc rectifier is variously given as 600 ° C, 2 000° C and 3 000° C, and it is stated that the moving coil of the moving-coil regulator carries no current; also it is inconvenient to have the diagrams, in very many cases, several pages from their relevant letterpress. On the whole, however, the book will form a very useful addition to the library of any power supply engineer; it is very easily readable and, as books on this subject are very few, it gives much useful information which is not easily accessible elsewhere and is a sound review of the best British practice in sub-station design.—E. O. T.

The opening of the London-Malta radiotelephone service on June 16 is part of a big scheme being developed by Cable and Wireless and the Post Office to inter-link many parts of the British Empire by telephone.

Answers to Technical Questions

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

A Correspondent has asked for details regarding the use of a choke in series with a transformer for protecting the latter against surges.

The effect of an inductance placed in series with a transformer is to reduce the steepness of the front of the wave transmitted beyond the choke into the transformer winding; the amplitude of the wave is not appreciably reduced. At the first moment of impact the choke acts as an open circuit to the incoming wave so that the transmitted wave starts from zero and gradually builds up, as the back e.m.f. of the choke subsides, to a value fixed by the surge impedance of the circuit beyond the choke, and not by the inductance of the choke itself. At the same time a reflected wave is returned along the incoming transmission line.

The conditions are illustrated in Fig. 1, the actual shapes being calculated from the known initial wave shape by the use of the circuit constants and Heaviside's operational calculus. The effect of different values for the inductance of the choke is shown in Fig. 2, where it is assumed that the incoming wave is rectangular in shape, i.e., a very steep wave front.

The commonly used type of choke, consisting of 10 or 12 turns, has an inductance

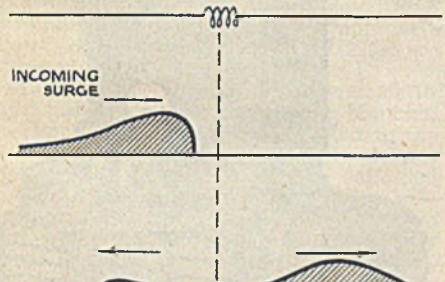


Fig. 1—Transmission of voltage surge past choke

of 30 to 40 microhenries (μH) so that it is of little value in flattening the front of the wave or reducing its magnitude.

It may also be noted that a choke has a very small capacitance to earth or between turns while a transformer has a considerably higher value—at certain frequencies, corresponding to the steepness of certain wave fronts, the choke may be acting as an inductance and the transformer as a capacitance causing resonance to occur with consequent voltages which may be even higher than that of the incoming surge.

On account of their ineffectiveness simple choke coils are now rarely used

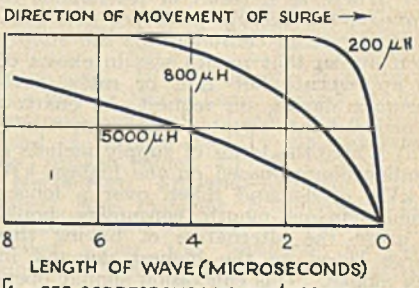


Fig. 2—Effect of inductance of choke on flattening of wave

on modern power systems. In a few cases fairly large chokes may be employed in conjunction with a lightning arrester, the former limiting the magnitude of the incoming surge and the choke being sufficiently large to flatten the wave front.

E. O. T.

London Students' Section

THE report of the Committee of the I.E.E., London Students' Section for the 1946-47 session shows that the total membership of the section was 3 353, compared with 3 301 last year. On September 30 last there were 173 graduates over 28 years of age who, on that date, ceased to be members of the section. This year the membership of 3 353 includes a few students over 28 who have been specially exempted from the age-limit rule; last session there were 3 128 members under 28. Arrangements have been made for a joint summer tour to Belgium. The party will leave London for Brussels on August 4, there staying in the University hostel until August 16, the intervening days being occupied with visits, arranged by the Belgian Society of Engineers and Industrialists, to places of varied engineering interest. Proposed social activities include a river day on July 6 and a dance on November 1.

Restrictions of Supplies

Undertakers to Consider Tariff Adjustments

FOLLOWING consideration by the Ministry of Fuel and Power and the Electricity Commissioners of representations by industrial consumers, the Commissioners have requested all undertakers to give favourable consideration to the following proposals:—

(i) Where as a result of restrictions in February, the average price per unit paid by an industrial consumer for the supply taken during that month was in excess of the appropriate flat rate or rates, such consumer should, on request, be charged on such flat rate or rates for that month.

(ii) Where the terms of supply include a standing charge based on the highest kW or kVA of demand taken over a longer period than one month, consumers should be given the alternative of having this charge based on the highest demand in each month. This concession should operate for any future twelve-month period at the request of the consumer and the monthly charge per kW or kVA should not exceed one-twelth of the existing annual charge, plus 10 per cent., or such higher figure as may be agreed with the Commissioners.

(iii) Where industrialists install private generating plant whilst maintaining connection to the public mains for standby purposes, the charge made for this standby connection should not exceed the capital charges appropriate to the distribution capacity reserved for such a connection, supplies actually taken being charged for at the normal standard tariffs.

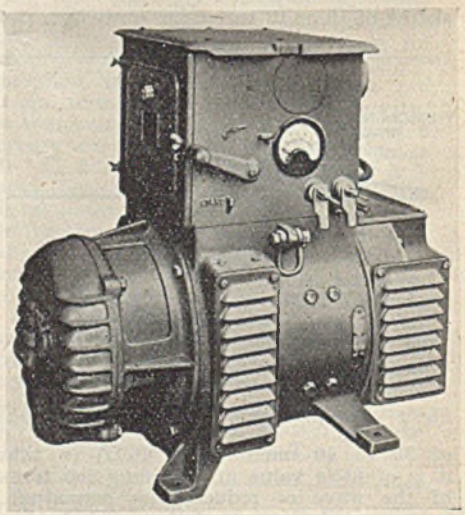
(iv) Where the terms of supply limit the installation or use of private generating plant, such terms should be waived, while present circumstances obtain, except in so far as they may be necessary on technical grounds.

The Metrovick Stand at Bournemouth

STAND No. 25 at the I.M.E.A. Convention exhibition, where the Metropolitan-Vickers Electrical Co., Ltd., are showing a number of their products, was briefly described in our review of the exhibition last week. One of the main features of the stand is a demonstration of "Ripplay" audio-frequency remote control.

Another interesting exhibit is the portable welding set of the "Paradyne" range. These are made in various sizes for use with welding currents up to 500/600 A and are available for either a.c. or d.c. supply. A specially designed generator field circuit ensures that a high reserve voltage is available, resulting in suitable static and dynamic characteristics for good welding with ease of operation. The applications of welding sets of this type to power stations, the makers state, include the erection and flanging of pipe work and ventilating ducting or miscellaneous repairs. Alongside is shown a number of welding electrodes, including rods suitable for copper-bearing, high manganese and stainless steels, cast iron and monel metal.

The company has recently introduced to industry a new type of silica-gel transformer breather, in which a transparent plastic casing for the silica-gel readily permits inspection of its condition. The new breather, which is 8⅝ in. high, has a labyrinth oil seal at the bottom to prevent contact between the gel and the atmosphere except when breathing is taking place.



The Metrovick "Paradyne" arc-welding set

Electricity Supply

Morecambe.—A site on the East side of Woodlands Drive is to be acquired for the erection of a new sub-station.

Sheffield.—Five electrically propelled refuse collection vehicles, costing £3 665, are contemplated by the Corporation.

St. Marylebone.—Seventeen fluorescent lighting units are to be fixed to existing standards in Marylebone Road. The fittings, which will cost £2 712, will be made by the General Electric Co., Ltd.

Blackpool.—The Corporation has approved the recommendations of the Borough Electrical Engineer involving expenditure of approximately £3 000 for the current year on maintenance of generating plant, and for the placing of orders to the value of not more than £14 000, for repairs and replacements to be effected next year.

Warrington.—The Corporation are to make application to the Electricity Commissioners for consent to carry out work of a capital nature amounting to £5 918, on the provision of low tension mains for a new housing site at Elms Farm, Lymm, and high tension mains for supply to the works of Monks Hall and Co., Ltd.

Glasgow.—The Electricity Committee has approved a drawing prepared by Sir Alexander Gibb and Partners, showing a perspective view of the proposed new generating station at Braehead, and has authorised the preparation of the final drawings for submission to the Royal Fine Art Commission for Scotland for approval. Mains extensions costing £11 222 are proposed.

St. Pancras.—To meet load demands in the South-Eastern corner of their borough, the Borough Council has suggested to the neighbouring borough of St. Marylebone that a bulk supply should be afforded from the St. Marylebone Council's sub-station in Hanway Place. The maximum load would be 600 kVA and the supply would be taken on the basis of the C.E.B. two-part tariff.

Hampstead.—The annual statement of accounts for the year ended March 31, 1947, shows a total net income for the year of £360 769, compared with £296 046 for 1945-46, giving a net profit of £3 539 (£11 154). With 29 602 (28 396) consumers, and a maximum demand of 27 108 kW (23 340), the undertaking purchased 74 645 300 units (57 255 200) and sold a total of 63 376 183 (47 741 851). Units used on works amounted to 497 320, and units lost in distribution to 10 771 797, this being 14.43 per cent. of units purchased. The load factor on units purchased was 31.43 per cent., compared with 28 per cent. in the previous year.

Liverpool.—The Electric Power and Lighting Committee is to carry out the following extensions and new works: New sub-station, Seaforth, £7 795; supply of electricity to Pinehurst Avenue district, £12 982; electrical work for new sub-station in connection with supply of electricity to municipal annexe and municipal buildings, £10 295; new sub-station, Speke area, £6 610; supply of electricity to works in Bridle Lane, Aintree, £3 979; new sub-station for factory in Vauxhall Road, Liverpool, £3 471; and additional low voltage cables, £3 893.

North-West England.—Mr. C. T. S. Arnett, area manager, North-West region C.E.B., stated recently: "We are disturbed about the prospects for next winter. There is the prospect of a greater risk of load shedding next winter than we have had at any other time." Increased consumption was general throughout the area, he said, Liverpool's consumption, for instance, had shown an increase of 21 000 000 units during the six months compared with the same period last year. The only real solution was to move the winter day load to the night.

Sunderland.—The report and accounts of the undertaking for the 52nd year of operation ending March 31, 1947, shows an increase in units sold for the year of 8 196 405 to 105 361 055 units, or 8.44 per cent. The largest increase in sales took place in heating and cooking supplies which rose by 28.2 per cent. from 2 700 573 units to 3 460 887 units. The revenue for the year from the sale of electricity was £440 528, compared with £413 337, an increase of £27 191, or 6.58 per cent. Expenditure rose by £50 282 to £363 477, this being partly accounted for by the increase in cost of energy purchased from the C.E.B. and partly by increased costs of distribution and management expenses arising from arrears of maintenance accumulated during the war. Of the net trading surplus of £32 690 (£47 194), an appropriation of £12 500 has been made in aid of the general rate fund. Reviewing the year's working, the Borough Electrical Engineer and Manager, Mr. W. A. Royle, says that although both sales of electricity and revenue established records for the undertaking, the results were not as good as had been expected, owing to the restrictions imposed during

the fuel crisis resulting in a drop in sales of approximately one million units and in revenue of £8 300. Serving an estimated population of 146 500, the undertaking registered a maximum load of 31 160 kW (28 970 kW) and a load factor (units sold) of 38.6 per cent. The average price per unit sold amounted to 1.003d. and the average cost per units sold .966d., compared with 1.021d. and .934d. for 1946.

Jubilee Dinner at Hammersmith

NEARLY three hundred guests assembled at Hammersmith Town Hall on Friday evening, for a civic dinner on the occasion of the jubilee of the electricity undertaking. The principal guest was Sir Cyril Hurcomb, chairman of the Electricity Commissioners, and among those present were Sir Alan P. Herbert, M.P., (as a resident of the borough), Sir Guy Nott-Bower (Ministry of Fuel and Power), and Mr. Henry E. Goodrich, M.P. (chairman, London and Home Counties J.E.A.). Mayors and members of neighbouring borough councils also attended.

Proposing "The Electricity Supply Industry," the Mayor of Hammersmith (Ald. R. J. Buckingham) said the growth of electricity had been the most outstanding event of recent years. The industry had grown up in a very haphazard fashion, however, and complete public ownership was imperative if the country were to hold its own in the markets of the world. During his speech, the Mayor made a comparison between the tariff rates in Hammersmith and those in a well-known company undertaking.

Replying, Sir Cyril Hurcomb thought that controversy was not a suitable subject for after-dinner speeches, but it was not altogether fair to compare the charges in scattered rural districts with those of an urban area. There was, however, a real need in the industry for radical reform, and 500 separate undertakings were too many. Parliament had now given the answer, although many would regret the change, and it would be a mistake to overlook the spirit and hard work of local undertakings and companies. One of the advantages of nationalisation would be greater uniformity of tariffs, and although consumption was now restricted, before many years we should be on the path of progress again.

The toast of "The Hammersmith Electricity Undertaking" was proposed by Sir Alan Herbert in his characteristically amusing style, and Councillor G. Mason (chairman of the Electricity Committee) replied. He spoke of the decision of the Hammersmith undertaking 50 years ago to give a 50 cycles supply, and said two other wise decisions had been the interconnection of the undertaking with those of Fulham and Battersea, in 1920, and the sectionalising of the distribution system.

Councillor W. J. Field, M.P., proposed

The scene in Hammersmith Town Hall last Friday evening, when the undertaking celebrated its jubilee

"Our Guests" and Mr. Henry Goodrich replied.

In conclusion, a plaque was presented to a representative of one of the nine original consumers.

I.E.E. Conversazione

THE first post-war conversazione held by the Institution of Electrical Engineers at the Science Museum, South Kensington, on Thursday, June 19, was attended by about 2 000 guests and members, among whom was a number distinguished in science and engineering. The String Band of the Royal Artillery played during the reception by the president, Mr. V. Z. de Ferranti, Mrs. Ferranti and the Council of the institution, and also provided a varied programme of light music in the East Hall throughout the evening. There was a concert on the third floor and in one of the galleries on the first floor, demonstrations of television and radar were watched with close attention. A large number of exhibits of electrical and general interest were on view. Refreshments were served from buffets.

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:—

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 1s.

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

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 1s.

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 Sculcoates power station. Tenders to General Manager, Kingston-upon-Hull.

Tredegar, June 30.—Supply and delivery of wooden poles, hard drawn copper conductors, galvanised steel wire, insulators, stay rods, transformers and a kiosk with e.h.t. and l.t. control gear. Specifications from Electrical Engineer, Bedwellty House, Tredegar, Mon.

Manchester, June 30.—Supply of 100 single-pole and 100 double-pole contactors. Specification from Chief Engineer and Manager, Electricity Department, Town Hall, Manchester, 2; deposit, £1 1s.

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.

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.

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, Carliol House, Newcastle-on-Tyne, 1; deposit, £2 2s.

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.

St. Pancras, July 4.—Tenders invited for purchase and removal of one 1 500 kW Brush turbo-alternator complete with condenser and auxiliaries. Particulars from Town Clerk, St. Pancras Town Hall, Euston Road, London, N.W.1.

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.

Reigate, August 22.—Supply of: (a) six units, each comprising three oil-immersed, 11 kV, 300 A switches and six eight-way isolator and fuse units; (b) six 500 kVA, three-phase, 50 cycles, oil-immersed transformers. Specifications from Engineer and Manager, Electric House, Linkfield Corner, Redhill, Surrey.

Company News

GENERAL CABLE MANFG. CO., LTD.—Int. div. for year to September next announced as 20% (8).

MORGAN CRUCIBLE CO., LTD.—Fin. div. of 8¾% (7½%), mkg. 12½% for year to March 31 (11¼%).

ALTRINCHAM ELECTRIC SUPPLY, LTD.—Prft. for 1946 £27 111 (£21 069), plus £12 817 (£15 583) brt. in. Divs. pd. £17 834 (same). Fin. divs. on ord. £3 000 (same), on dfd. £3 000 (same); fwd. £16 094.

LISBON ELECTRIC TRAMWAYS, LTD.—Net prft. for 1946 after allocating £61 200 (£55 000) to gen. and dep. res. £59 790 (£54 240); fin. div. 2½%, tax free, mkg. 5%, tax free (same); fwd., £33 565 (£35 370). Operatg. receipts. were £154 847 higher, while incr. in wkg. exes., incldg. dep. and Portuguese tax, was £149 297.

ELECTRIC AND GENERAL INVESTMENT CO., LTD.—Rev. to May 31 £19 341 (£17 845) less dirs.' fees £1 858 (£1 708), gen. expenses £1 504 (£1 488), tax £7 167 (£6 828), deb. int. £3 044 (£2 913), deb. redemp. £719 (£686), lvg. £5 049 (£4 222), fin. ord. 7%, mkg. 10% (same), fwd. £23 486 (£21 737). Invests. appr. at £180 656 (£177 477).

HYDRO-ELECTRIC SECURITIES CORPORATION, LTD.—Revenue 1946, after tax, $672 337 ($568 112), less exes. and fees $51 770 ($42 420), lvg. net inc. $620 567 ($525 692). Prefd. divs. $330 035 ($330 160), earned surplus $2 542 129 ($2 251 597). No divs. paid on common shares since 1940. Invests. stand at $21 792 401 ($21 454 888), deduct blce. at credit spec. res. and invest. res. $5 381 936 ($4 914 214), lvg. net book val. $16 410 465 ($16 540 675), exclusive of any val. in respect of invests. in prev. occupied territory above book val. at date of accts. had market val. in Canadian currency $17 096 234 ($19 117 582). Break-up val. of common $17.68 ($8.76).

WEST DEVON ELECTRIC SUPPLY CO., LTD. Blce. from rev. acct., 1946, £28 290 (£34 162), int. £489 (£450), div. from sub. £1 100 (£1 000), from res. for war insur. nil (£8 750), brot. in £17 070. To int. £273 (£270), inc. tax £15 513 (£16 516), div. on pref. £3 300, res. for future tax £1 500 (£5 000), gen. res. nil (£2 000), div. 7½% on ord. (div. 5% and bonus 2½%), fwd. £11 925.

MID-CHESHIRE ELECTRICITY SUPPLY CO., LTD.—Net rev. 1946, incldg. div. from Mersey Power and after bank int., £86 931 (£78 624), less tax £18 131 (£30 978), depreen. £16 716 (£15 272), E.P.T. £25 000 (nil), employees' bonus acct. £2 800 (£2 500), lvg. £49 878 (£55 127). To pref. divs. £9 206 (£8 368), fin. ord. 4%, mkg. 8% (same) £23 281 (£21 165); fwd., £17 391 (£25 594).

RHEOSTATIC CO., LTD.—Net prft. yr. to September 30 £13 493 (£9 425). To pref. div. £2 205 (£1 500), ord. div. already annod. 14% (12) £7 238 (£5 096), gen. res. £3 500 (£2 000), invest. res. £421 (nil), fwd. £5 128 (£4 999).

MERSEY POWER CO., LTD.—Net rev. (bef. tax) for 1946, incldg. £15 411 (£15 995) from C.E.B. on final settlemt. of costs of production at Percival Lane power station for 1943 to 1945 and after int. on overdraft and deb. stk., is £370 506 (£390 348). To inc.-tax £100 000 (£110 000), E.P.T. £20 000 (nil), depreen. and renewals £124 755 (£199 772), employees' bonus accts. £3 000 (£2 873), 6% div. on pref. £18 150, 8% (same) ord. div. £21 845; fwd. £189 556 (£106 000).

BRITISH ELECTRIC TRACTION CO., LTD.—Rev. to Mar. 31, £823 261 (£795 422). To exes. £63 799 (£52 433), staff fund £1 986 (£2 598), dirs.' fees £7 000 (same), tax £305 005 (£316 350), deb. int. £79 479 (same), lvg. £365 992 (£337 562). To defd. ord. divs. int. 15% (same), fin. 35% (30%, plus Jubilee bonus 10%), mkg. 50% (55%); fwd. £2 399 628 (£2 340 809). Invests. £6 872 925 (£6 890 945), curr. assets £761 273 (£692 627), comprising debtors £137 158 (£128 529), cash £624 114 (£564 098); curr. liabs. £306 845 (£315 367), res. and undivided prfts. £2 919 628 (£2 860 809).

EDWARD MACBEAN AND CO., LTD. (manufacturers of insulating cloths, etc.).—Profit to March 31 last incl. £8 510 (£24 369) for Govt. contract price adjustments relatg. to prev. yrs., and after prvdg. £2 352 (£2 438) for depreen., and £250 (£200) for dirs.' fees, amnts. to £81 035 (£34 510). Expenditure of £768 (nil) on conversion to a public company has been written off and a provision of £51 000 (£18 500) has been made for taxn., lvg. a net prft. of £29 267 (£16 010). Dirs. have transferred £10 000 (nil) to div. equalisation reserve, £4 000 to reconstruction res. (£5 000 to stock res.), and £5 000 (£4 023) to gen. res., and recommend div. of 15% and a bonus of 2½% for year (15%), lvg. to be carried fwd. £8 776 (£5 487).

RUSTON AND HORNSBY, LTD.—Combined trdg. prfts. for yr. March 31 last, after charging dep. and all exs. of wkg. and mngmt. and after reserving for E.P.T. and prfts. tax, of the co. and wholly owned subsidiaries, tog. with divs. from subsidiary not wholly owned and from

associated cos., £499 717 (£351 932). Deduct. deb. int., etc., £21 738 and retentions in subsidiary cos.' accts. for inc.-tax £15 751 and subsidiary cos.' res. and prft. and loss accts. £30 282, prft. of parent co., before deduct. inc.-tax, £431 946 (£281 853). Inc.-tax £147 297 (£132 686), £15 000 (£10 000) to pension reserve. Dirs. recommend transfer of £60 000 (nil) to general cont. res., £60 000 (£37 812) to gen. res., div. of 12½% (same) on ord., and usual div. on the 5% and 6% pref., lvg. carry-fwd. at £100 324 (£76 350).

W. T. HENLEY'S TELEGRAPH WORKS CO., LTD.—A final dividend for 1946 on the £1 300 000 ordinary stock of 10 per cent. and bonus of 5 per cent., making, with the 5 per cent. interim, 20 per cent. for the tenth year in succession, has been announced. It is proposed to pay the dividend and bonus on July 18. Income-tax will be deducted at the rate in force at the date of payment. The net United Kingdom rate payable by the company in respect of this dividend is 8s. 8½d. in the £. Net profits for the year, subject to audit, after making full provision for taxation, are stated as £253 553, compared with £213 436 last year. The company points out that this year the accounts have been prepared on the basis of showing dividends net, instead of gross, and the comparative figures of last year have been adjusted accordingly. On last year's basis net profits would be £374 603 for 1946, against £337 893. The sum of £75 000 is again being transferred to post-war contingencies reserve and £10 000 (against nil) is allocated to staff pension fund. The carry-forward is £413 822, against £393 219 brought in.

WHITEHALL ELECTRIC INVESTMENTS, LTD.—Inc. from sub. cos. to Mar. 31 £68 000 (£59 500), from other invests. £74 433 (£75 422), and fees £169 (£130), mkg. £142 602) (£135 052). Deduct fees, exes., int., lvg. £130 328 (£126 551). Inc. tax £58 546 (£59 552). Pref. div. £41 250 (£37 500), blce. £30 532 (£29 499), mkg. £454 451 (£423 919). Cash £134 414 (£67 207). Consd. inc. W.E.I., Hallminster Investments and Whitehall Canada £274 283 (£269 530)—from invests.: West of England £68 000 (£59 500), Amer. and Foreign Power £111 547 (£151 482), other £91 600 (£57 386), fees £3 136 (£1 162). To dirs. fees and mgt. exes. £17 153 (£16 312). Net loss on invests., realised £99 773 (£74 936), to deprcn. of invests. £19 188 (£60 659), blce. £138 169 (£117 623). To inc. tax—U.K. and Canada —£66 387 (£76 308). Pref. div. £41 250 (£37 500), to blce. sheet £30 532 (£3 815), mkg. £454 451. Cons. net floating assets —debtors £61 922 (£62 001), cash £295 872 (£74 884), less creditors and pref. div. £59 832 (£67 277), lvg. £297 962 net (£69 608). Valuation of assets excluding any valuation of Athens and taking West of England at cost is £5 055 772 (£4 922 633), of which £4 879 722 is attributable to Whitehall Electric Investments.

Company Meeting

British Electric Traction

Efficient Transport Services

The 51st ordinary general meeting of the British Electric Traction Co., Ltd., was held on June 20.

Mr. H. C. Drayton, the chairman, said that the gross revenue for the year to March 31, 1947, was £823 000, and constituted a record in the history of the company. The net profit was £366 000 against £337 000, and the directors recommended a dividend on the deferred ordinary stock of 50 per cent. Reserves and undivided profits totalled almost £3 000 000. That was the amount which they had ploughed back into the company.

As to their businesses which were in danger of nationalisation, electricity supply and road passenger transport, when the war started it had meant a lot of hard work and much money had been lost. To-day they were in a prosperous condition brought about by the company's work over a great number of years in building up and giving an efficient service to the public. He did not think anyone, even the Government, could deny that their road passenger transport organisation was among the most efficient and economical in the country. With the exception of two companies, they had not increased their fares since 1934, although they had had a considerable rise in the cost of labour and operation.

It might be argued that as road passenger transport as a whole was profitable and there was no guarantee that it would remain so indefinitely now would be a good time in the interests of the stockholders for them to be nationalised, but a business such as that of this company had not been built up on expediency. They were in the business to provide the most efficient service to the public in the interest of the nation as well as of stockholders, and they must take good times with bad times. The capacity for going into a business and working at it because he believed it was in the interest of the country had been one of the great factors in building up the character, integrity and high standard of the British business man, not only in this country but throughout the world, and therefore he could not accept the argument that because they were prosperous now was the time they should cash in. The board also held the view that it was not in the interests of the public that their transport system should be nationalised, and this company, together with others engaged in transport, were fighting those nationalisation proposals.

He thought stockholders would like to know the total wage bill of the companies with which they were associated. Last year they had paid out in wages £12 500 000; the car miles run by the transport companies in 1946 were 321 700 000, and the number of passengers carried was 1 800 000 000. The companies had paid in fuel tax and vehicle duty, in addition to income tax, approximately £1 750 000.

The report was adopted.

Commercial Information

Mortgages and Charges

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

CHILDWALL RADIO CO., LTD., Liverpool.—May 9, debenture, to Barclays Bank, Ltd., securing all moneys, due or to become due to the Bank; general charge. *——. February 16, 1945.

J. AND J. COUCH, LTD., St. Ives (Cornwall), wireless engineers, etc.—May 7, mortgage, to Midland Bank, Ltd., securing all moneys due or to become due to the Bank; charged on land and premises near Back Road, St. Ives, with fixtures.

KRESTA ELECTRIC, LTD., Warwick.—May 7, debenture, to Martins Bank, Ltd., securing all moneys due or to become due to the Bank; general charge. *Nil. January 14, 1946.

County Court Judgments

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

SHEARLEY, L. (male), "Acacia," Firs Avenue, Shripney, Bognor Regis, electrical contractor. £26 17s. 10d. April 15.

DENTON, Mr., 129a, Woodhouse Street, Leeds, radio dealer. £22 6s. 5d. April 16.

KERSHAW, Eric G., Dale View, Luddenden Foot, radio and electrical engineer. £24 10s. 8d. February 21.

DUNCANSON, Clifford. 87, King Street, Whittington Moor, Derby, electrician. £26 2s. 9d. April 9.

RUNCIMAN, Jens. (formerly trading as General Electric Services), 281, Finchley Road, Hampstead, electrical dealer. £18 6s. 11d. Apr. 9.

LONDON ELECTRICAL CONTRACTORS (a firm), 109, Great Russell Street, W.C.1, electrical engineers. £21 14s. 8d. Apr. 9.

RADIO SERVICES (a firm), 40, Palmer Street, Westminster, electrical engineers. £14 16s. 3d. Mar. 26.

MURFITT, J. C. M. (male), Evelyn, Fishpool, electrical dealer. £40 3s. 2d. Mar. 31.

MURFITT, Joseph Cyril Marshall, Evelyn, Main Road, Fishpool, electrician. £45 6s. 3d. Apr. 10.

DELHOMME, D. J. (male), 38, Brook Drive, Kennington, electrical dealer. £21 15s. 9d. Mar. 29.

BLAKE, C. (male), 105, Alma Street, Aston, electrician. £11 11s. 10d. Mar. 28.

SMITH, Howard, 124, Twickenham Road, Kingstanding, Birmingham, electrician. £10 8s. Mar. 20.

Application for Discharge

BLAKE, Frederick Charles Stanley (described in the Receiving Order as F. C. Blake (Male)), 6, Berkeley Road, Tunbridge Wells, Kent, wireless dealer, and lately carrying on business at 19, Vale Road, Tunbridge Wells, Kent. Court: Tunbridge Wells. Hearing: July 17, 1947, 11 a.m., at the Court House, Crescent Road, Tunbridge Wells, Kent.

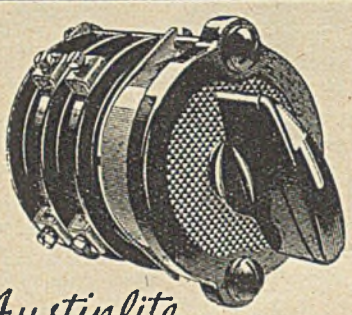
Intended Dividend

PEACOCK, Cyril, residing at 93, Lowther Street, York, and carrying on business at 51, Gillygate, as an electrical engineer. Court: York. Last day for receiving proofs: July 2, 1947. Trustee: Snowball, John Stanley, Lantern Tower Chambers, Coppergate, York, Official Receiver.

Metal Prices

	Monday, Price	Inc.	June 23 Dec.
Copper—			
Best Selected (nom.)...per ton	£135 10 0	—	—
Electro Wire bars ... „	£137 0 0	—	—
H.C. Wires, basis ... „	£155 0 0	—	—
Sheet ... ... „	£178 10 0	—	—
Bronze Electrical quality 1% *Tin*—			
Wire (Telephone) basis per ton	£177 15 0	—	—
Brass (60/40)—			
Rod basis ... ... per lb.	1s. 2¼d.	—	—
Wire ... ... „	1s. 6½d.	—	—
Iron and Steel—			
Pig Iron (E. Coast Hematite No. 1) ...per ton	£8 19 0	—	—
Galvanised Steel Wire (Cable Armouring) basis 0.104 in. ... „	£34 5 0	—	—
Mild Steel Tape (Cable Armouring) basis 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) ... „	£442 10 0	£2	—
Wire, basis ... ... per lb.	5s. 6¾d.	—	—
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.



Austinlite
ROTARY SWITCH

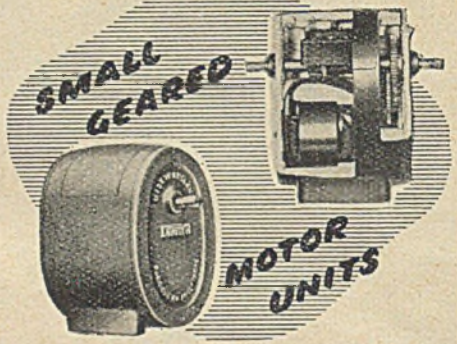
A new, heavy-duty 80 amp. switch of robust construction suitable for multi-circuit operations and capable of giving a long and trouble-free life. Can be built up into 1, 2, 3, 4 or 5-coil units providing a large range of contact combinations. Send for folder giving full particulars.

Made by
Austinlite Ltd.
(Department C)
Lighthouse Wks.
Smethwick
Birmingham

A Chance PRODUCT

Proprietors: CHANCE BROTHERS LTD

Drayton



Drayton "RQ" motors are available unidirectional or reversing, with or without self-switching for 100/110 or 200/250 volts A.C.

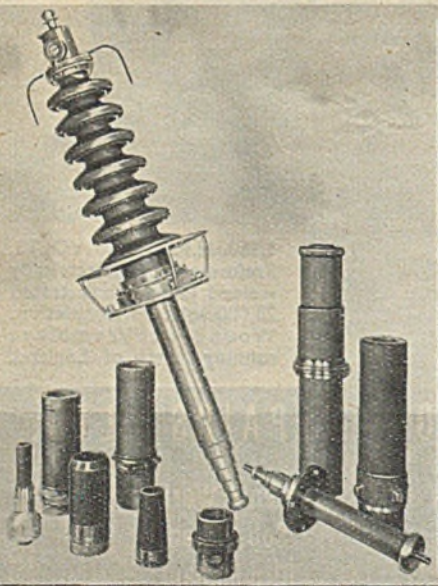
FINAL SHAFT SPEEDS:
Reversing Max 600 R.P.M. 27 min. per rev.
Unidirectional Max 280 R.P.M. 60 min. per rev.

TORQUE: Reversing 60 lbs. in. max.
Unidirectional 37 lbs. in. max.

Typical applications:—Operating valves, dampers or rheostats actuating Geneva movements for drum type switches, rocking baths, work movement, e.g. soldering and welding fixtures, continuous turning, feed of light strip under process.

Send for List No. 302-1 A

DRAYTON REGULATOR & INSTRUMENT CO. LTD.
WEST DRAYTON *West Drayton 2611* MIDDLESEX



BUSHINGS INSULATORS TUBES

TEXOLEX LAMINATED PLASTICS COMBINE MECHANICAL STRENGTH AND HIGH ELECTRICAL INSULATION PROPERTIES

THE BUSHING CO. LTD. TEXOLEX HEBBURN ON TYNE

THE BUSHING CO. LTD.
HEBBURN-ON-TYNE

TELEPHONE: HEBBURN 32241
TELEGRAMS: BUSHING HEBBURN

LONDON OFFICE: IMPERIAL HOUSE
KINGSWAY, W.C.2. Tel-TEM. BAR 9584

All our wires are drawn through diamond dies, thus we are able to obtain a very high degree of accuracy.

STAINLESS STEEL WIRE

All Austenitic and Martensitic Types

Sizes 22 to 47 S.W.G.

HARD DRAWN-POLISHED

up to 120 or 130 Tensile

BRIGHT ANNEALED-POLISHED

Dead Soft—Good Elongation

NICKEL CHROME RESISTANCE WIRE

80/20 or 65/15 qualities

ALL BRIGHT ANNEALED

to B.S.S. Standards or to your resistance specifications

HIGH SPEED DRILL RODS

18% Tungsten

BRIGHT DRAWN

Perfectly round Dead to size
No decarbonisation

.076 to .0076 in. diameter. Cut to usual lengths

STAINLESS STEEL Wire CO. LTD

The Barracks • Langsett Road

Sheffield 6 ——— **Tel 44241**

FOR ALL ELECTRICAL USES

MADE IN STALYBRIDGE CHESHIRE BY Aerialite Ltd.

The New KANGO "S" TYPE HAMMER

The new "S" Type Kango Hammer has been introduced to fill an essential need for a light, handy, yet powerful hammer designed to stand up to hard and continuous work within its very useful capacity.

A most important feature of this new "S" type hammer is that owing to its light weight it can be used for all ceiling work where the much heavier hammers are outside the physical capabilities of the workman to operate, furthermore its use will, in the majority of cases, dispense with the elaborate staging that the work usually entails.

SPECIFICATION

Length - -	19 inches
Weight - -	12 lbs.
Number of blows	1,550 per min.

Drilling in Concrete, Depth 2".

No. 6 -	12 Secs.	No. 12 -	23 Secs.
No. 8 -	18 "	No. 14 -	26 "
No. 10 -	21 "	No. 16 -	30 "
		No. 18 -	32 Secs.

The current consumption of the "S" type is less than 360 watts.

For heavier work, either the Kango C or D type Hammers, of which we have good stocks, are recommended.

BUCK & HICKMAN LTD

Electric Tools Division

ALBEMARLE ROAD, BECKENHAM, KENT

Head Office:- WHITECHAPEL RD. LONDON, E.1.

Branches:- ALPERTON-BIRMINGHAM GLASGOW-MANCHESTER

MISCELLANEOUS ADVERTISEMENTS

TENDER

BOROUGH OF ACCRINGTON.

SALE OF ELECTRICAL EQUIPMENT.

THE Corporation invite tenders for the purchase of the following electrical plant, viz.: One 2 000 kW British Thomson-Houston Curtis Turbo-Alternator, 3-phase, 50 cycles, 6 600 volts, 3 000 r.p.m., with Cole Marchant Condensing Plant.

Further particulars and permission to view may be obtained from the Borough Electrical Engineer, Corporation Electricity Works, Hyndburn Road, Accrington. Tel. Nos. 2002 and 3374.

Tenders, enclosed in plain sealed envelope and endorsed "Tender for Electrical Equipment," should be forwarded so as to be received by the under-named not later than Thursday, 31st July, 1947.

P. D. WADSWORTH,
Town Clerk.

Town Hall, ACCRINGTON.
18th June, 1947.

SITUATIONS VACANT

COUNTY BOROUGH OF OLDHAM.

ELECTRICITY DEPARTMENT.

Appointment of Assistant Mains Engineer.

APPLICATIONS are invited for the above position. Applicants must have had sound practical experience in the installation and maintenance of high and low voltage underground and overhead mains, sub-station plant and distribution equipment and possess suitable technical qualifications. Salary in accordance with the National Joint Board Schedule, Grade 8, Class "H."

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937. The successful applicant will be required to pass a medical examination, and to comply with the condition as to residence to which appointments under the Corporation are subject. Canvassing will be a disqualification.

The age limt for new entrants to the Local Government Service is 45 years unless a transfer value in respect of superannuation is payable. For the purpose of this application the age of applicants who are serving or have served in H.M. Forces will be regarded as being reduced by the number of years of their war service. Applications, endorsed "Assistant Mains Engineer," stating age, full details of education, training and experience, with copies of not more than three testimonials, to be forwarded to the Chief Engineer and Manager, Corporation Electricity Department, Greenhill Offices, Oldham, not later than the 7th July, 1947.

THOMAS ALKER,
Town Clerk.

Town Hall, OLDHAM.
20th 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

BOROUGH OF RADCLIFFE.

ELECTRICITY DEPARTMENT.

Mains Assistant.

APPLICATIONS are invited for the above position at a salary in accordance with Class "E," Grade 8, of the N.J.B. Schedule, at present £413 per annum.

Applicants must possess technical qualifications not less than Higher National Certificate and have had experience in the construction, maintenance and operation of E.H.T. and L.T. 3-phase A.C. and 3 wire D.C. Distribution Systems, and with A.C. static sub-stations and equipment. Some experience in D.C./A.C. change-over and fault localisation is desirable.

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. Canvassing will disqualify, and candidates must disclose in their applications any relationship to any member or officer of the Council.

Applications stating age, qualifications and experience, together with copies of not more than three recent testimonials, must reach the undersigned, endorsed "Mains Assistant," not later than Tuesday, 15th July, 1947.

H. A. FOX,
Town Clerk.

Town Hall,
RADCLIFFE, Lancs.
20th June, 1947.

BOROUGH OF RADCLIFFE.

ELECTRICITY DEPARTMENT.

Class I Plumber Jointer.

APPLICATIONS are invited for the above position. The rate of pay and working conditions will be those of the National Joint Industrial Council, at present 2s. 6d. per hour for a 47-hour week. Applicants must be fully experienced in high tension and low tension jointing work, network boxes, and sub-station H.T. and L.T. boards.

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. Canvassing will disqualify, and candidates must disclose in their applications any relationship to any member or officer of the Council.

Applications stating age, and details of practical experience, together with copies of not more than three recent testimonials, must reach the undersigned, endorsed "Plumber Jointer," not later than Tuesday, 15th July, 1947.

H. A. FOX,
Town Clerk.

Town Hall,
RADCLIFFE, Lancs.
20th June, 1947.

WOLVERHAMPTON AND STAFFORDSHIRE TECHNICAL COLLEGE.

ASSISTANT (MECHANICAL) and SENIOR ASSISTANT (ELECTRICAL) required in the Engineering Department of the above. Salaries on the appropriate Burnham Technical Scale. Particulars, etc., on application to:—

F. LONSDALE MILLS,
Clerk to the Governors,
Education Offices, North Street,
WOLVERHAMPTON.

NORTHAMPTON POLYTECHNIC,

St. John Street, London, E.C.1.

LECTURER IN ELECTRICAL ENGINEERING.

APPLICATIONS are invited for a post as full-time lecturer in the Electrical Engineering Department.

Salary in accordance with Burnham Scale for technical teachers in London

Further particulars and form of application can be obtained from the Secretary.

SITUATIONS VACANT

COUNTY BOROUGH OF PRESTON.
ELECTRICITY UNDERTAKING.

Appointment of Control Engineer.

APPLICATIONS are invited for the position of Control Engineer (Shift Duties) at the Ribble Generating Station.

Applicants must have had previous experience of the duties appertaining to the operation of an E.H.T. Control Room in a modern Power Station, and possess suitable technical qualifications.

Salary and conditions of employment in accordance with the National Joint Board Schedule, Class "J," Grade 9 (at present £425 rising to £445 per annum).

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

Applications, stating age and giving full particulars of technical qualifications, training and experience, accompanied by not more than two testimonials, and endorsed "Control Engineer," must be received by the undersigned not later than Saturday, the 5th July, 1947.

G. A. ROBERTSON,
M.Sc.Tech., M.I.E.E., M.I.Mec.E.,
Borough Electrical Engineer.

40 and 41, Lune Street,
PRESTON.
19th June, 1947.

STOKE-ON-TRENT CORPORATION.
ELECTRICITY DEPARTMENT.

Assistant Meter Engineer.

APPLICATIONS are invited from suitably qualified persons under the age of 45 for the appointment of Assistant Meter Engineer in this Department's Class "A" Polphase Meter Testing Station.

Applicants must have had a sound technical and general education and a wide experience of meter work. They should be capable of organising and supervising the testing and repair of all classes of electricity supply meters. The person appointed will be required to carry out all sub-standard instrument tests and to maintain all records in accordance with the Electricity Supply (Meters) Act, 1936.

The conditions of employment will be those of the National Joint Board Agreement, and the salary will be in accordance with Class H, Grade "8a," of the Schedule to this Agreement, at present £455 p.a. gross.

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

Application forms and further particulars may be obtained from the General Manager, Electricity Department, 31, Kingsway, Stoke-on-Trent. Applications must be completed and returned in the envelope provided, to reach the General Manager not later than the first post on Wednesday, 16th July, 1947.

HARRY TAYLOR, Town Clerk.

ELECTRIC CABLE PLUMBER JOINTERS required by a British Company for work in India. Permanent or short term engagement available. Must be prepared to train native labour in cable jointing.—Write stating age and experience to Box L.F.B., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

ENGINEERS and Draughtsmen required for development work on Automatic Telephone Exchange Equipment. Apply in writing giving particulars of qualifications, experience, age and salary required to: Ref. 634, Siemens Brothers and Co. Limited, Woolwich, S.E.18.

SITUATIONS VACANT

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 appliaction 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.I.A.,
City Electrical Engineer.

4, Duke Street, NORWICH.
7th June, 1947.

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.

Town Hall, ACCRINGTON.
June, 1947.

TELECOMMUNICATION Engineers required with some technical training, good knowledge of auto telephone exchange practice and experience with circuits or apparatus or equipment. Also men with some technical training and practical knowledge of exchange wiring for preparing Wiring Drawings. Applicants should give full details of age, training and experience and state salary required.—Ref. 424, Siemens Brothers and Co. Limited, Woolwich, S.E.18.

PLANNING engineer with experience of coil-winding. Applicant should be capable of complete layout of all types of coil-winding. —State age, experience and salary to Box L.F.I., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

DRAUGHTSMAN with experience of factory lay-out required by large engineering company in London area.—Write stating age, experience and salary required to Box L.F.C., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

SITUATIONS VACANT

SALES MANAGER (Electrical) experienced in organisation of Trade Counter and Warehouse Supervision. A permanent position with excellent prospects. (Applicants without experience will not be considered.) —State experience, salary required and references to Box L.F.H., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

FOREMAN required for coil-winding department of large engineering concern in London area. Suitable applicant must have experience of simple and multi-spindle machines, and must be capable of controlling male and female labour.—State age, experience and salary to Box L.F.J., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

FOR SALE

18 000 PORCELAIN Wheel Insulators, ¼ in. dia., 3/32 in. hole; 14 500 ⅜ in. Beads, 3/32 in. hole (porcelain); 4 000 7/16 in. by 3/32 in. ditto; 3 000 Porcelain Collets and Rings, ⅛ in. by 1/32 in. hole; 10 000 Asbestos Washers, ¾ in. by 1/16 in. by ⅜ hole; 300 1-kW Glowray Spirals; 330 1½-kW Spirals. Samples on application.—Mosaic Electric Ltd., 29, Quilter Road, Felixstowe.

AIR COMPRESSORS, electrically driven, vertical or horizontal type, capacity 3 to 58 cu. ft. Enquiries invited, home or export.—A. M. Craig and Son, Boscobel Road, Walsall.

3 PETROL-DRIVEN, 110 v., 50-cycle, single phase, 1.5 kVA Motor Alternators; also 3 Garrard Turntables and Pick-ups; also 3 Portable Cinematograph Screens, approx. size 8 ft. by 6 ft.—Circuit Electrical Co. Ltd., 4, Wakeman Road, London, N.W.10.

OFFERS wanted for quantity two hundred and forty air-conditioning and heating INSTALLATIONS, comprising motor blower, filters, heating elements, ducts, silence cabinet, spares and maintenance kit. 200-250 volts, 50 cycles supply. New and unused in the maker's original packings. Ideal lines for export market. Offers may be made for either the whole or part of total quantity ex our Leeds warehouse.—Wireless Instruments (Leeds), Ltd., 54-56, The Headrow, Leeds, 1. Tel.: 22262.

METRO-VICK Mains TRANSFORMERS, new and unused, ex-Ministry of Supply. 4 kVA oil-filled. Input 230 volts, 50 cycles, output 18 000 volts. Packed in manufacturer's crate. £15 carr. fwd. 3½ kVA oil-filled, input 230 volts, 50 cycles; output 21 000 volts, £15 carr. fwd. Substantial discounts can be given for quantity orders. — Wireless Instruments (Leeds), Ltd., 54-56, The Headrow, Leeds, 1. Tel. 22262.

MACKFIELD Electric MOTORS. Early deliveries still obtainable, but place your orders now, production being taken up very rapidly. This is an opportunity to solve your Electric Motor worries. Distributors—Douglas, Oliver and Co. (Scotland), Ltd., Prestonfield, Edinburgh, 9.

20 NEW Searchlights (Leigh Lights), 24 volts, packed in original wooden cases. Can be inspected. Price £25 each.—Max Propp Ltd., 120, Moorgate, E.C.2.

C.T.S., 60/018, 3-core Heavy Sheathed Cable, in 120-yard and 250-yard lengths.—The Forest City Electric Co. Ltd., 4, Longford Road, Stretford.

450 SATCHWELL thermostats, tubular type, W.O, variable 10 degs.-90 degs. C. 3 000 wire wound potentiometers by Fox and B.E.R. 50 watt 50 ohm and 500 ohm 20 watt loading. All brand new tested stock offered, substantially discounted for quantities.—Partridge, Wilson and Co. Ltd., Davenset Electrical Works, Leicester.

FLUORESCENT Starter Switches, 80 watt, glow type S.B.C.—Parkinson and Worden, Ltd., 49, King Street, Blackburn.

FOR SALE

H.S.L. (ELECTRIC), 29, Grosvenor Road, Ilford, Essex.—Radio and electrical wholesalers since 1930; stock lists always available.

10 000 METAL Lamp Shades, ex Government surplus, pre-war quality, each 1s. Galleries 9d. sample dozen 27s. Quantity of Bakelite Accessories.—Suplex Lamps Ltd., Suplex House, 239, High Holborn, London, W.C.1.

3 FLUORESCENT 80w. outfits, containing batten fitting, starter, choke, tube, all new, £7 each set; D.C., Ayominor, as new, £3, with case and leads.—J. T. Timmis, Buerton, Audlem, Crewe.

SWITCH Block Specialists. Polished Wood Blocks, imitation walnut. Unlimited quantities of all sizes in round, square, and built-up with lock-jointed corners.—Alfred J. Patterson and Son, 196a, Wellington Street, Grimsby.

5 -H.P., 1 450-r.p.m., 400/440-volts, 3-phase, 50-cycles S.C. Motors, new and guaranteed. A quantity for immediate delivery; short deliveries most other sizes.—Alec H. Fuller, A.M.I.E.E., 27, Watford Road, Kings Langley, Herts. Kings Langley 7834.

PENCIL Bars, Boiling Rings, Flat Bars, wired to customers' requirements. Large stocks. Quality guaranteed. Spirals wired and dispatched by return. Special elements to customers' requirements supplied.—New Products (Nottingham) Ltd., 6a, Peas Hill Road, Nottingham.

1 —SECOND-HAND Wild Barrfield Furnace, 400 volts 3 phase 50 cycles. Type 1612.H., complete with all control.—Oldfield Engineering Co. Ltd., 96, East Ordsall Lane, Salford, 5.

DELIVERY, ex stock. Die-cast ¾ in. conduit male hooks, suitable for industrial and fluorescent reflectors. Write for sample and price.—Newey and Eyre Ltd., 18, Newhall Hill, Birmingham, 1.

WE can supply all types of Presspahn Insulating Pieces to your specification. Your enquiries are appreciated.—Tradex Manufacturing Co., 92, Station Road, Swindon. Swindon 3696.

2 AND 4 way Fuse Boxes, 5 and 15 amp., 5 000 Multi Range Meters, Large quantity of Radio Components. Fluorescent Fittings, 5 ft. and 4 ft., from stock at keenest prices. Fluorescent Spares, 5 000 Chokes in stock, 40 and 80 watt., Power-Factors, 2's, 4's, 8's and 10's, thousands in stock. Starter Lamps, Thermal and Glow, Suppressors, 4 and 5 ft. Tubes, etc.—Phone or call, L. Goodman (Radio) Ltd., 9, Percy Street, Tottenham Court Road, W.1. MUSeum 0216.

FLUORESCENT LIGHTING UNITS, 4-ft. and 5-ft. Self Contained and complete with tubes. Write for new illustrated trade list. Enquiries invited from buying agents for export.—MOSS BROS., 53, Goodge Street, W.1. MUSeum 5385.

550 -WATT Lyon-Norman CHARGING AND LIGHTING SETS, completely self-contained with switchboard, silencer, spares, etc., for immediate delivery, £35 each.—Cross and Sankey, Ltd., 96-100, Victoria Street, London, S.W.1.

EXCELLENT GENERATING UNIT available. Comprising 112 h.p., 750 r.p.m., slip-ring Motor, direct-coupled to a 60 volt, 1 000 amp. Generator. Mounted on cast-iron bedplate and complete with exciter, oil-immersed Switchgear and D.C. controlling Switchboard. Available for immediate delivery.—Cowards (Engineers), Ltd., Stoke Gifford, near Bristol. Phone: Filton 2053.

BLOCKS, best quality, polished wood, imitation walnut. All standard sizes in stock at current prices.—B.E.M. Co., 25-27, Berners Street, London, W.1.

FOR SALE

CIRCUIT BREAKERS: 15 amp. 250 v., Single Pole; complete with automatic overload cut-out; robust moulded construction. Accepted by most supply undertakings as efficient switch fuses if used in conjunction with our Distribution Boards. DISTRIBUTION BOARDS: 5 and 15 amp.; 2, 3, 4 or 6 way; D.P. or S.P. and N.P.; wood cases; improved design and finish. No permit required. EKCO and SMITHLITE FLUORESCENT FITTINGS: Complete; ex stock. Large quantities available; carriage paid. ELECTRIC MOTORS: 1 h.p. Squirrel Cage Induction Motors (Tilling-Stevens), 400/440/3/50, 1 430 r.p.m.: new. INSULATORS: Suitable for overhead service cables. Bakelite, brass inserts; screwed P.O. thread for pin mounting; vertical type with drip groove, 5⅜ in. high, 3½ in. dia. Large quantities available; sample 2s. per return. Discount on quantities. WOOD SWITCH BLOCKS: 3½ in. round and square. 6 in. by 3 in. by ½ in.; 9 in. by 3 in. by ½ in. and 6 in. by 6 in. by 1 in. White Enamelled and Walnut Finish from 6s. 6d. to 6s. 3d. per dozen respectively. Discount on quantities and for natural finish.—Metropolitan Distribution Ltd., Truro.

1 000 000 YARDS Plastic Lighting FLEX (single) 3 029 to 18 gauge. Also BELL WIRE. Price 1s. per lb., approx. 16 yds. to a lb. Any quantities supplied. Samples free.—Apply 629/631, High Road, Leytonstone, E.11.

FLUORESCENT and Industrial Light Fittings with Protectafil Shock Absorber, Starter Switches, Chokes, Mains Transformers, Immersion Heaters, 1½ 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.

ELECTRIC toaster elements (first class mica) 230/250 v. available at 1s. 6d. each. Samples on application.—Brooks and Bohm, Ltd., 90, Victoria Street, S.W.1.

ELECTRIC HOIST BLOCKS, capacity 5-cwt. to 7 tons. Reasonable delivery.—A Morgan and Co., 50, Wilkin Street, London, N.W.5. 'Phone: GUL. 1147.

LEATHER FINGER STALLS.—Made of Chrome Hide. Very strong and hard wearing. Length 3 in. Price 4s. per doz. Prompt delivery. Sample on application.—Willson Brothers, Industrial Clothing Manufacturers, Epsom, Surrey.

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 Irons, 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.

LADDERS, Trestles, Steps and Hand Carts from Ramsay and Sons (Forfar) Ltd., Forfar.

ELECTRIC MOTORS. A.C. and D.C. We supply all types and sizes of Electrical Machinery—Slow Speed Reduction Gears can be supplied to customers' requirements with short deliveries. Send your enquiries to The Electro Power Co. Ltd. (formerly Be-Be, Eng.), 3, Retreat Close, Kenton, Middlesex. Tel.: WORdsworth 4923.

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

FOR SALE

HEAVY-DUTY ARC-WELDING PLANTS.—200 amps. Price £36 10s. complete. Also Spot Welders. £48 10s.—John E. Steel, Clyde Mills, Bingley. 'Phone 1066.

TIME SHEETS.—Our stock-printed Time Sheets are remarkably cheap compared with specially printed ones. On decent quality 8 in. by 10 in. paper:—100, 3s. 6d.; 500, 15s.; 1 000, £1 7s. 6d. Post Free. Send for sample.—F. H. Brown Ltd., P.O. Box 26, Burnley, Lancs.

SACKS and Bags in excellent condition for all commodities, as low as 4½d. each. Write: John Braydon Ltd., 230, Tottenham Court Road, W.1. Tel. No.: Museum 6972.

A.C./D.C. Motors can be supplied from stock or at short notice.—JOHN PHILLIPS AND CO. ELECTRICS, 31, Fortune Green Road, N.W.6. Hampstead 8132.

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

RUBBER STAMPS can assist in many ways. Are yours satisfactory and in good condition? W. L. Boughton maker of all kinds, 53, Kenley Road, Merton, London, S.W.19.

FLUORESCENT lighting fittings, 4 ft., 40 watt, Flush and Trough complete with tubes and guaranteed control gear from stock.—Apply:—Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. GER. 1461/2/3.

FLUORESCENT LIGHTING.—CHOKES, extra quality, elongated, 4 ft., 40 W, tapped 200/250 v, silent working, each unit guaranteed, measurements 1⅜ in. by 1⅜ in. by 8½ in. Price £1 5s. each net. Carriage extra.—Write Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Tel.: GER. 1461/2/3.

FLUORESCENT LIGHTING.—Daylight and Warm White. 30 watt fittings complete with self-contained control gear and 36 in. tubes. Immediate delivery with guaranteed component and tube replacement service.—Apply Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Tel.: GER. 1461/2/3.

FLUORESCENT LIGHTING: See our stand No. 99 at the Public Works, Roads and Transport Exhibtion at Olympia—July 21st-26th. Send for Catalogues and complimentary ticket. Scemco Ltd., Scemco House, 6/7, Soho Street, Oxford Street, London, W.1. Telephone: Gerrard 1461/2/3.

FLUORESCENT FITTINGS. — Trough or Flush type fitted "Constead" or Hi-Craft Ballast control gear, complete with tubes. Delivery from stock.—Apply:—Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Tel.: GER. 1461/2/3.

FLUORESCENT LIGHTING.—1 000 Fittings complete with tubes always in stock, for immediate delivery. Send for our 15 page List Price Illustrated Catalogue. Generous discounts to Export, Wholesale and Trade.—Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Telephone: GERrard 1461-2-3.

BI-UNI.—The New Push-Button Flush-Fitting Domestic Switch. Wholesale Enquiries Only. Send for details—Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Tel.: GER. 1461/2/3.

FOR HIRE

FLUORESCENT LIGHTING UNITS FOR HIRE, WITH TUBES, per week or per month. State requirements.—MOSS BROS., 53, Goodge Street, W.1. MUSeum 5385.

AGENTS

WELL-KNOWN and influential importing house having very good connections and a vast field of clientele desires sole representation of all electrical goods. Please contact Vyas Brothers, Post Box 2036, 33, Nanabhai Lane, Churchgate Street, BOMBAY.

SALES BY AUCTION

G. R.

By Order of the Minister of Supply.
MINISTRY OF SUPPLY DEPOT, FEATHERSTONE.
Six miles from Wolverhampton, Staffordshire.
NOCK AND JOSELAND
are instructed to sell by Auction without reserve, at the above Depot, on
TUESDAY, WEDNESDAY and THURSDAY, 29th, 30th and 31st JULY, 1947, at 11 a.m., each day, a large quantity of Valuable
INDUSTRIAL ELECTRICAL EQUIPMENT and PORTABLE POWER TOOLS,
including about:
3 200 MOTORS various h.p., and voltage, A.C. and D.C., including geared and flame proof types and 200 Electric Fan Motors.
262 MOTOR ALTERNATORS, standard A.C and D.C. voltages.
250 CONTROL GEAR UNITS motor driven and friction drive; 140 Boosters for voltage control, 120 Electric flex shaft Polishers and Grinders, 80 Suds Pumps and Sump Pumps.
570 GENERATORS up to 72 K.W.
127 TRANSFORMERS up to 114 K.V.A. 20 Riveting and Etching Machines, 9 D.C. Spot Welders 40 K.V.A., complete with Transformers, Circuit Breakers and Rectifiers, and other Arc Welding Equipment. 6 Static Condensers 20 K.V.A., 170 Starters and a large quantity of small Industrial Switchgear.
Also **A Large Quantity of Equipment,** including: Control Panels, Contactors Panels, Furnace Control Panels, Testing Panels, Frequency Changers, Switchboards, Distribution Boards, Fuse Boards, Rectifier Units Dynamos and Super-Charges. Pneumatic Grinder (Holman).
120 **Drill Steel Bits.** Quantity of Copper Strip and Copper Bus Bar.
A Large Quantity of T.R.S. and P.V.C. Multi-Core Cable.
ON VIEW Tuesday, Wednesday, Thursday, Friday and Monday, 22nd, 23rd, 24th, 25th and 28th July, 1947, between the hours of 10 a.m. and 4 p.m.
ADMISSION to View and Sale by Catalogue only. Each Catalogue will admit two persons on View Days and one person only on Sale Days.
CATALOGUES One shiling each (post free on receipt of Post Order) may be obtained from the Auctioneers:
NOCK AND JOSELAND, 48, Queen Street, Wolverhampton, Staffordshire (Tel.: 20670).

G. R.

By Order of the Minister of Supply.
IMPORTANT ONE-DAY SALE, BY PUBLIC AUCTION (without Reserve), of
GOVERNMENT SURPLUS STORES,
Comprising:—
ELECTRICAL, PLUMBING, and GENERAL ENGINEERING SUPPLIES, Aircraft Instruments and miscellaneous parts, Electric Generator Sets, Electric Motors, Compressors and Air Receivers, 5 Therm and 20 Therm Gas Producers, Electric Fans, Starters, Switches, etc., Lifting Jacks, Chain Blocks and Lifting Slings, Tecalemit Grease Guns, Lot Small Trucks, Ballard After Cooling Unit, Water Purification Plants, Heat Treatment Furnaces, Small Benches, Inspection Cabinets with Surface Plates, Surface Tables, Straight Edges, Telescopic Gauges, Depth Gauges, Steel Squares, Vices, Dawson Washing Machines for cleaning engine parts, Centrifugal Pumps, Rawlplug Outfits, Assorted Leather Straps with Buckles, Spray Paint Containers, Galvanised Tanks, Leather Tool Cases, Tachometers, Hand Tools, Quantities of Rubber Hose, A.R.P. Equipment, Hammers, Shovels, Picks, Axes, Crow Bars, etc., Canteen Equipment (including Soup, Desert, Meat, and Tea Plates), Two-compartment Refrigerator (6 ft. 3 in. by 5 ft. 2 in. by 2 ft. 6 in.) with motor, Pressure Gauges, Demagnetisers, Hydraulic Pushers, Shorter Flame Hardening Machine with Electric Gear Burners (14 ft. by 12 ft. by 3 ft. 6 in.), etc., etc. (About 500 lots in all.)
To be held within
THE CENTRAL HALLS, 25, BATH STREET, GLASGOW, C.2 (opp. Municipal Transport Offices),
On THURSDAY, 10th JULY, 1947,
ADMISSION BY CATALOGUE ONLY.
at 10 a.m. Prompt.
The Sale is Catalogued in Five Parts where the equipment is located:—
Part 1—Located at M.O.S. Depot, No. 73, Gatend Farm, Giffen, near BEITH, AYRSHIRE.
Part 2—Located at Messrs. ROLLS-ROYCE FACTORY, HILLINGTON, Block B. 1.
Part 3—Located at M.O.S. Transit Depot, DUNDONALD AERODROME, adjacent to Drybridge L.M.S. Station.
Part 4—Located at Messrs. MOND NICKEL CO., LTD., THORNLIEBANK, GLASGOW.
Part 5—Located at Messrs. YOUNG WINDOWS, LTD., Claydon Works, off Caledonian Road, WISHAW, LANARKSHIRE.
View Days—Monday 7th, Tuesday 8th, and nesday 9th July from 10 a.m. to 4 p.m. each day.
Admission to View will he by Catalogue only (Price Sixpence), each Catalogue admitting Two Persons to View and One only to Sale.
Catalogues will be the only means of admission to the Five Depots and also to the Central Halls, and can be had on application to the Auctioneers.
Light Refreshments will be provided on Sale Day.
NICOL AND HALLIDAY, Auctioneers and Valuators,
31, Argyle Street, Glasgow, C.1.
Telephone: Central 8560.

BUSINESS FOR SALE

RADIO and Electrical, main road, Reading. Rent £100. Lease 21 years. Corner premises, shop, 6 rooms, yard. Trade £25, neglected. £950 s.a.v.—Call Lansley, 53, Friar Street, Reading.

RADIO Electrical Public Address Service. Bucks town. Rent £86. Modern D.F. shop, office, workshop. Net profit over £3 000. Present hands 20 years. £2 750. — Call Lansley, 53, Friar Street, Reading.

SITES TO LET

BLACKPOOL DEPARTMENTAL STORE—in best position in town—has sites to let for individual traders. Rental includes site, light, heat, modern fittings and equipment and service. Unique opportunity for small trader to enjoy store popularity in finest holiday resort of the North. The Electrical Department is still available for occupation.—Write to K and K Store, 7-11, Victoria Street, Blackpool.

AUCTIONEERS AND VALUERS

RICHARDS & PARTNERS,
Auctioneers and Valuers of
PLANT AND MACHINERY AND INDUSTRIAL PROPERTY,
Granville House, Arundel Street, London, W.C.2
Telephone: TEMple Bar 7471.

BUSINESS OPPORTUNITIES

NEW LINES REQUIRED FOR HOME TRADE AND EXPORT.—London wholesalers and exporters with agents throughout the world are prepared to conduct extensive advertising scheme to introduce new lines.—Send details to Box L.E.Z., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

ELECTRICAL wholesalers and exporters require continuous supplies of wide range of electrical appliances for home trade and export. Permanent business guaranteed.—Box L.E.A., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

SCEMCO, LTD., Fluorescent Lighting Specialists, announce their AGENCY SERVICE to Electrical Traders and Electrical Contractors. Applicants for "Selling Rights" of "SCEMCO" Fluorescent products in their individual districts are invited to apply for further details. Two Trade References must accompany initial enquiry. Applicants will be treated in rotation, priority being given to the 5 000 Electrical Traders and Contractors already on our Mailing List. Summary of "SCEMCO" Agency Service:—(1) SCEMCO LTD. will forward to their Accredited Agents, all Direct Consumer orders and enquiries they receive as a result of the SCEMCO Advertising Media. (Trade Press, Local Press, Exhibitions, Mail Order.) (2) SCEMCO Accredited Agent to receive,, apart from Trade Discount of 25 per cent. and Cash Discount of 2½ per cent., an additional Agency Commission of 5 per cent. on all Sales in the allotted territory. (3) SCEMCO Accredited Agent to receive full benefits of the "Scemco Guarantee" regarding the replacement of Fittings and Components. (4) SCEMCO LTD. retain the right to nullify an Agency Agreement by one month's notice in writing should the Accredited Agent's service in any way prove unsatisfactory, and SCEMCO LTD. agree to the Accredited Agent having the same facility. This notice inviting Agency Applicants from Electrical Traders and Contractors will be closed on or before 30th July, 1947.—Scemco Ltd., 6/7, Soho Street, and at 18, Soho Square, London, W.1. Tel.: GERrard 1461/2/3.

WANTED

WANTED.—Auto Electrical Test Bench for 200/250/1/50 A.C. mains.—S.E.B. and E. Co., 375, Queens Road, New Cross, S/E.14. New Cross 0667.

FOUR each 300-amp. ammeters, panel fixing and pedestal, 300-amp. knife switches DP and 6-way 100-amp. IC Disn.-boards DP.—Details to John Shaw and Co. (Elec.) Ltd., Vane Street Works, Hull.

10-15 K.W. 230-volt 50-cycle Diesel Engine fully automatic lighting plant.—W. H. Smith and Co., Electrical Engineers, Ltd., 12, York Street, Manchester, 2.

WANTED.—60 yds. of .4 4 core, or 3½ core, P.I.L.C. S.W.A. and S. 660 volt grade CABLE. Or two 30 yd. lengths.—Bignell and New, Uxbridge. Phone: Uxbridge 2424.

WANTED.—D.C. Generator, 1 800 r.p.m. minimum speed, but 2 000 r.p.m. preferred. Minimum output to be 75 kW, maximum 100 kW. Voltage anything above 200. Also switchboard comprising C.B. Voltmeter, ammeter and field regulator.—Quote price and advise where plant can be inspected to Southern Areas Electric Corporation Limited, "Silverlands," 37, Alexandra Road, Epsom, Surrey.

A.C. MOTORS, 1-100 h.p., 500-1 500 r.p.m. Any make fitted with ball and roller type bearings. Must be good machines, such as you yourselves would buy. Alternatively motors for rewinding will be considered.—Oldfield Engineering Co., Ltd., 96, East Ordsall Lane, Salford, 5.

WANTED

A.C. MOTORS, all sizes and voltages, best prices offered.—JOHN PHILLIPS AND CO. ELECTRICS, 31, Fortune Green Road, Hampstead, N.W.6. Hampstead 8132.

ELECTRICAL steel sheet or laminations of reputable make, .014 in. to .020 in. thick will be purchased for cash in any quantity by Davenset Electrical Works, Leicester.

AN unlimited number of modern A.C. motors urgently required for essential work. Highest cash prices paid for suitable units. We also want all types of motors for conversion and rewinding. Send details to Sales Dept., A. P. Watson, 104, Upper Brook Street, Manchester, 13,

WORK WANTED

ARMATURES.—For vacuum cleaners, all types rewound.—32s. 6d. Complete overhaul of MOTORS our speciality, estimates free. Reconditioned Machines from £8. Vacuums, all makes.—From 201, Hope Street, Glasgow, C.2. Tel.: Douglas 6234.

21/- ARMATURES. 11/6 COILS.—We are the specialists in VACUUM CLEANER REWINDS and REPAIRS. Prompt delivery and work GUARANTEED. — County Vacuum Cleaner Service, 215, London Road, Mitcham.

VACUUM CLEANER REWINDING SERVICE, commutators and Bearings. Prompt delivery and full guarantee.—Thomas Anderson, 117, Bowes Street, Blyth, Northumberland. 'Phone: Blyth 405.

REPAIRS

RUNBAKEN ELECTRICAL REPAIRS.—Rewinding to trade. Fractional h.p. motors a speciality, a.c. and d.c. Prompt service. Guaranteed work.—45, Oxford Road, Manchester. Tel.: ARD. 2507 (3 lines).

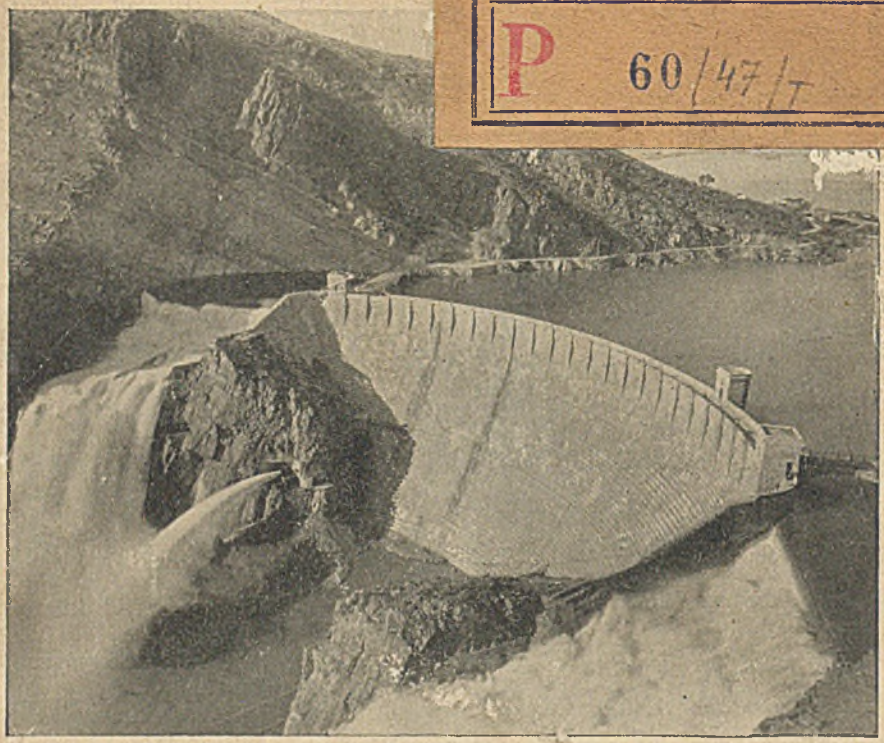
COOKERS.—We can give good deliveries of Sheet Metal Vitreous Enamelled Electric Cooker parts.—JOHN KING & SON (ENAMELLERS), LTD., PYRO WORKS, CHESTERFIELD. Phone: 5305.

PATENT AGENTS

MEWBURN, ELLIS & CO.,
PATENTS, DESIGNS AND TRADE MARKS,
70 & 72, Chancery Lane, London, W.C.2.
Grams: "Patent, London." 'Phone: Holborn 0437 (2 lines)
And at—NEWCASTLE: 3, St. Nicholas Buildings.

CORK
BRITISH CORK MILLS LTD.,
167, Victoria Street,
London, S.W.1.
Phone: VICtoria 1414/6. 7913

PRESSPAHN, LTD.
Electrical Insulative Material Manufacturers
REGISTERED ELECTRICAL WELLSTEAD INSULATION TRADE MARK
EST. 1900
Telephone: BRADFORD 5050
Telegrams & Cables: "PRESSPAHN" BRADFORD
REGISTERED OFFICES:
38 WELL ST., BRADFORD, England



FAMOUS HYDRO-ELECTRIC STATIONS.

The Roosevelt Dam, Arizona (built 1905-11), is truly picturesque and unusual in its design and composition of rubble masonry and concrete. Constructed in a narrow rocky gorge, it is supported each side by natural rock abutments. With a capacity of 533,500,000,000 gallons, it supplies water to 250,000 acres in the Salt River Valley, known as the American "Valley of the Nile." The power-house at the foot of the 286 feet high dam develops 20,000 H.P.

Printed in Great Britain by STRAKER BROTHERS LTD., 194-200, Bishopsgate, E.C.2, and published by BENN BROTHERS, LTD., at Bouverie House, 154, Fleet Street, London, E.C.4. (Registered at the General Post Office. Entered as Second Class at the New York, U.S.A., Post Office.)—Friday, June 27 1947.