

2448/II

THE

P. 60/47/II

# ELECTRICIAN

THE TECHNICAL NEWSPAPER OF THE ELECTRICAL INDUSTRY

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№ 351



The largest aircraft assembly hall in the World is now being built at Filton for the erection of 125 ton giant "Bristol" Brabazon Aircraft. This immense structure, 1,052 feet wide and 420 feet deep, is wider than the length of the "Queen Mary" or the Houses of Parliament and covers 7½ acres. More than 5,000 yards of high and low tension cables for the complex electric power system and 450 main lighting groups are being supplied and installed by B.I. Callender's.

ARCHITECT: Eric Ross, A.R.I.B.A.  
CONSULTING ENGINEERS: Brian H. Colquhoun & Partners.  
ELECTRICAL ENGINEER: A. N. Irens, A.M.I.E.E.



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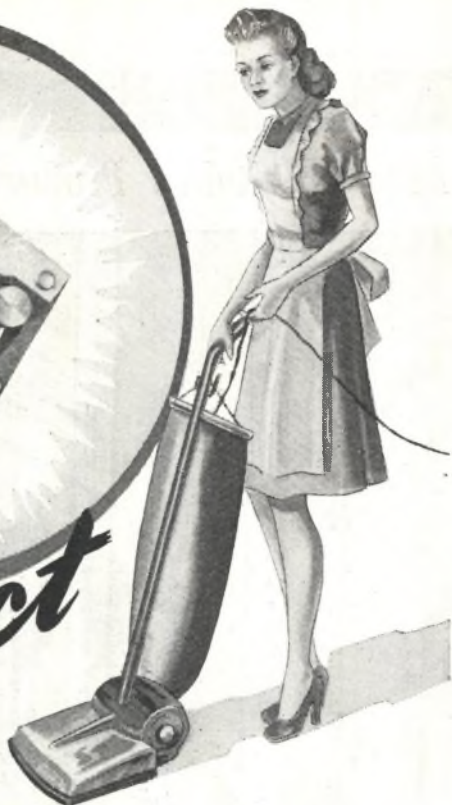
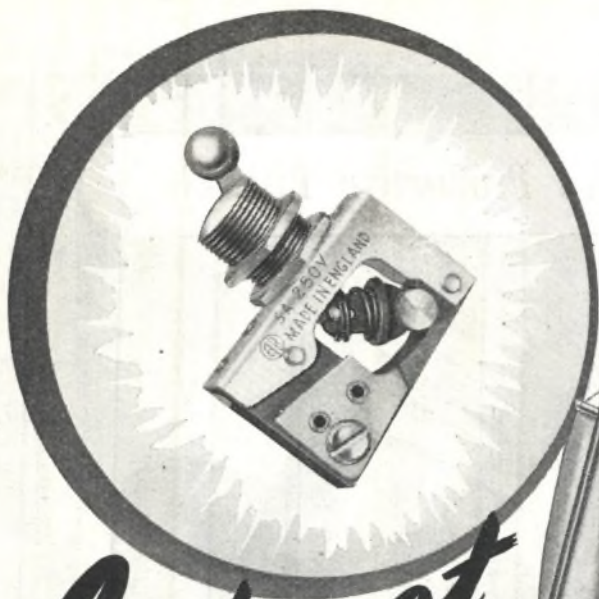
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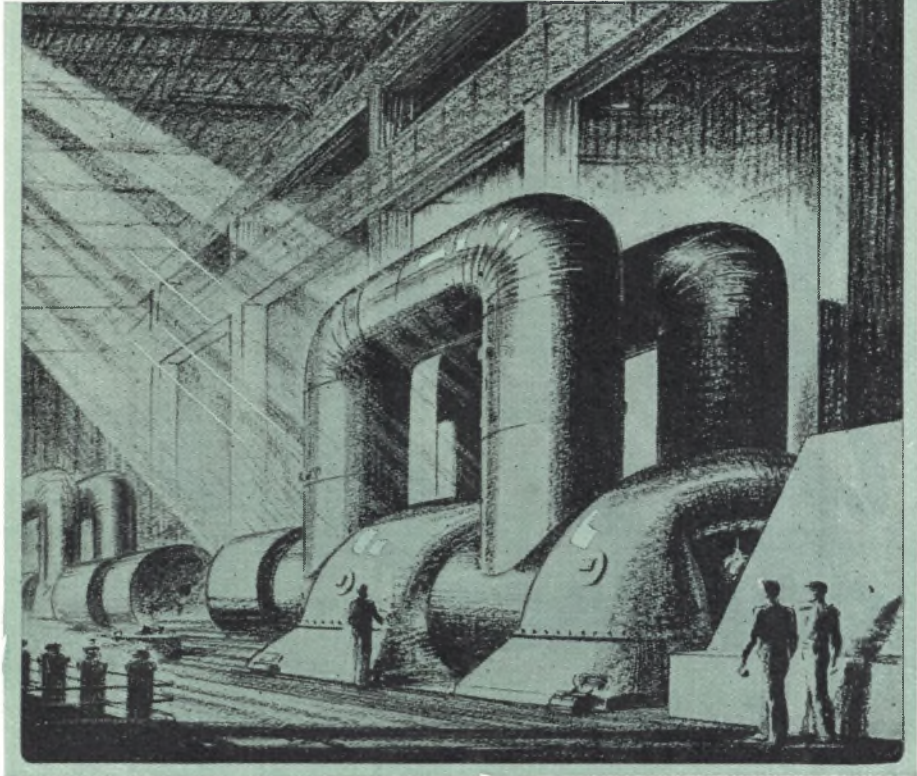
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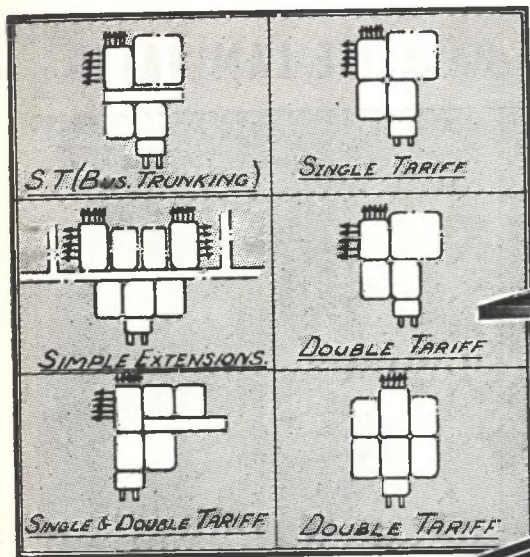
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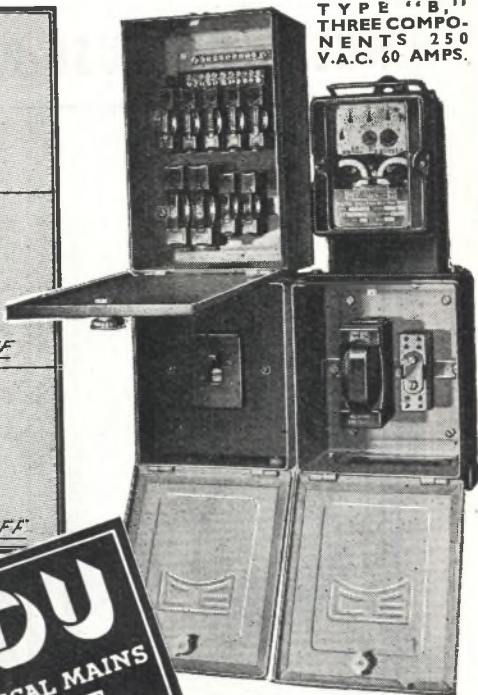
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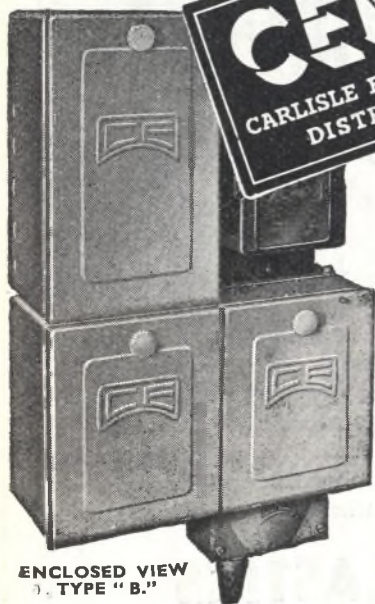
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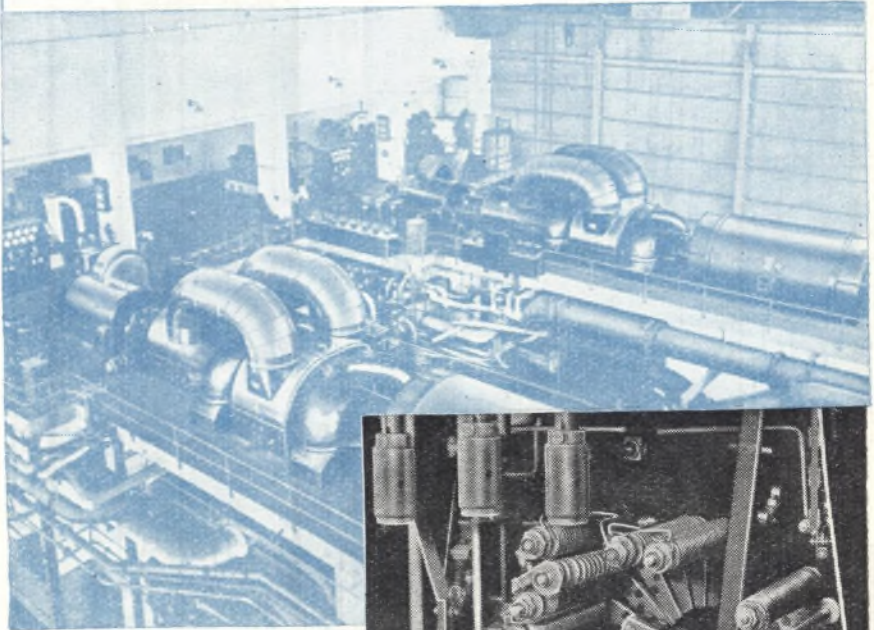
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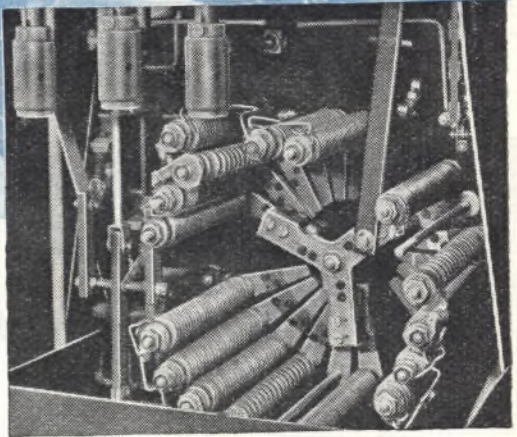


*Photo by courtesy of C. A. Parsons & Co. Ltd.*

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AND ROTOR STARTER**

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Our photograph provides an interior view, with oil tank lowered, of the 'SRIA' type hand-operated combined stator and rotor starter produced by Messrs. Allen West & Co. Ltd. The stator contactor operating links, the rotor starter operating arm, and the interlock switch actuating

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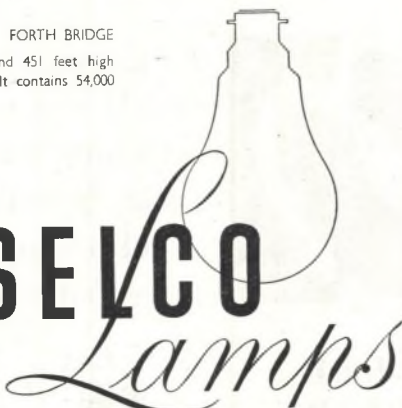
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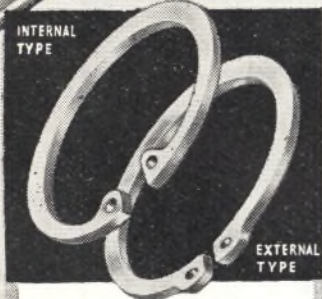
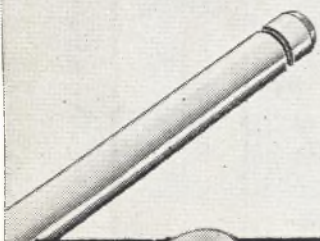
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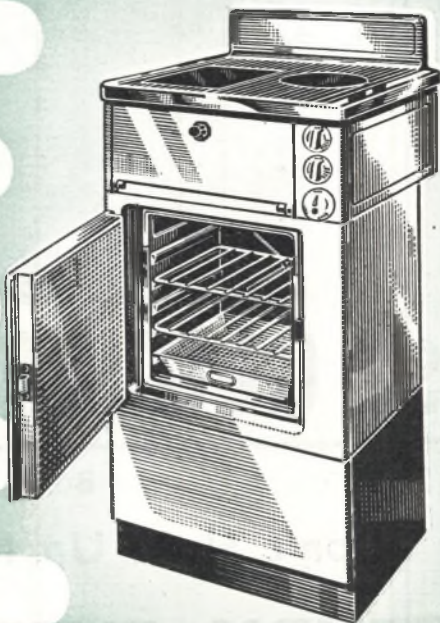
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THE ELECTRICIAN



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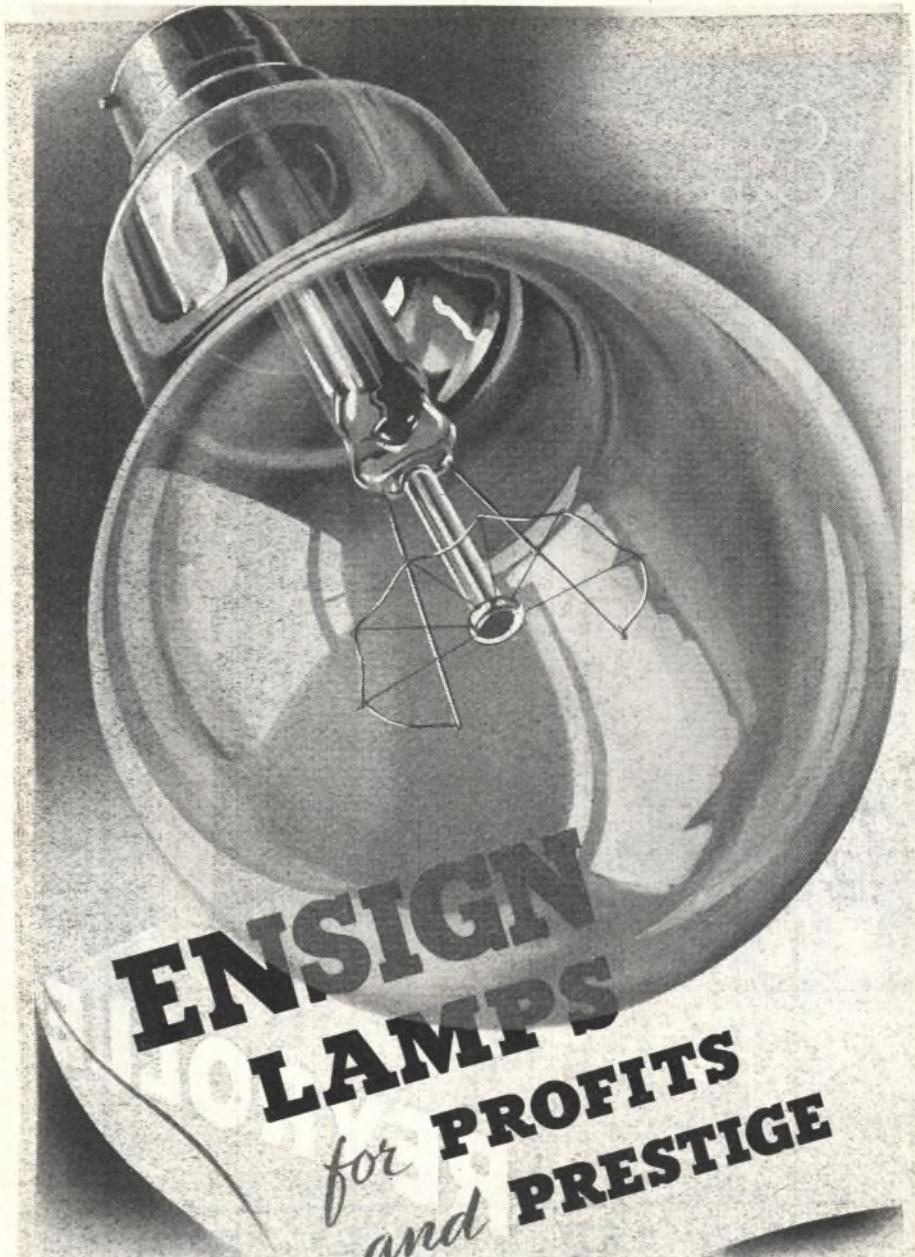


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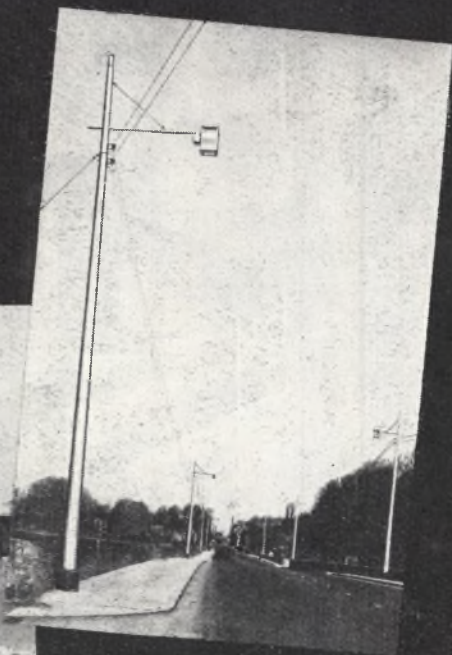
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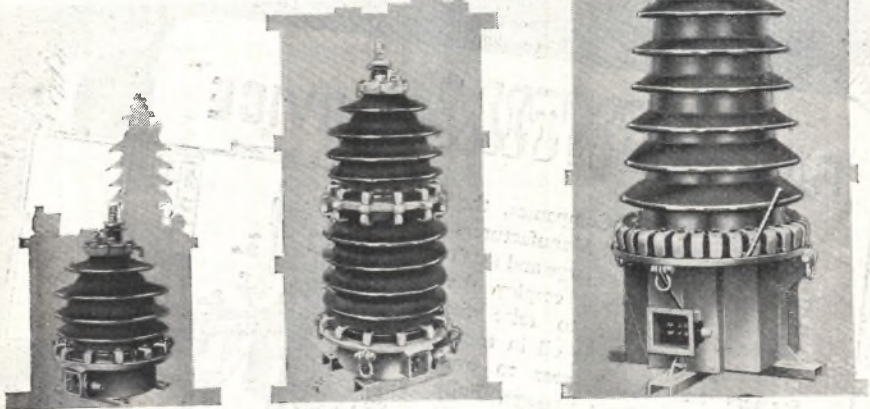
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# C&H

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yielding place to new."  
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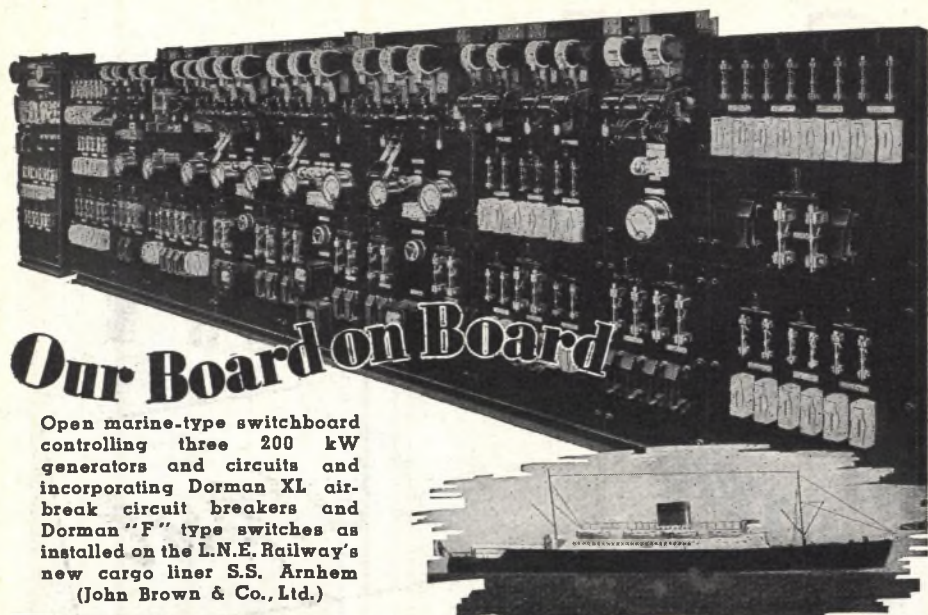


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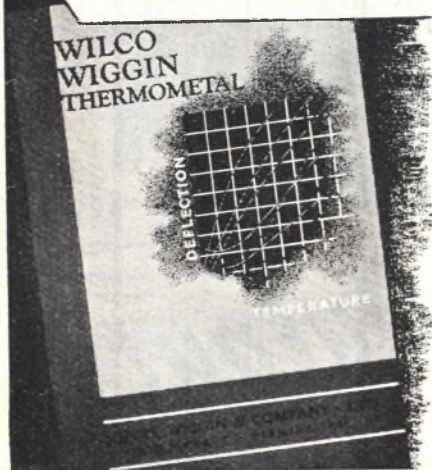


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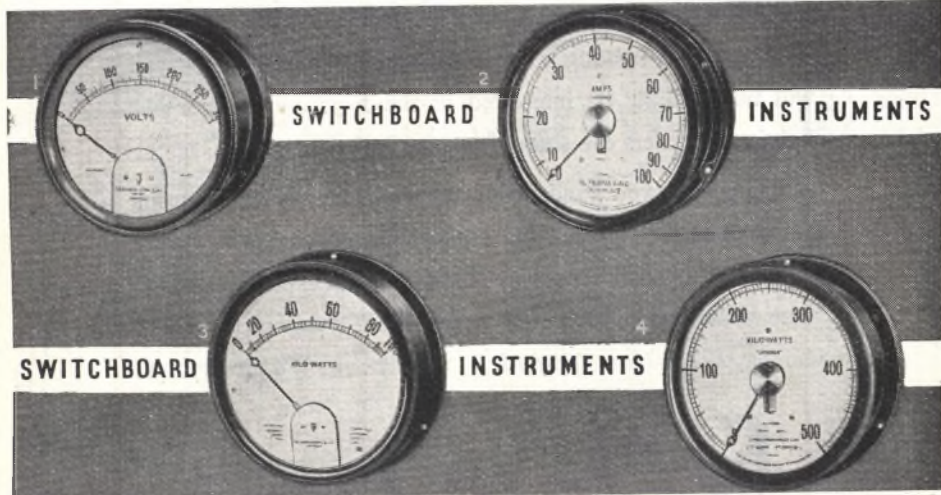
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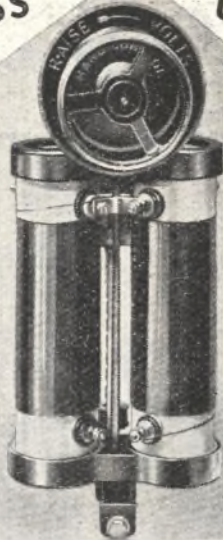
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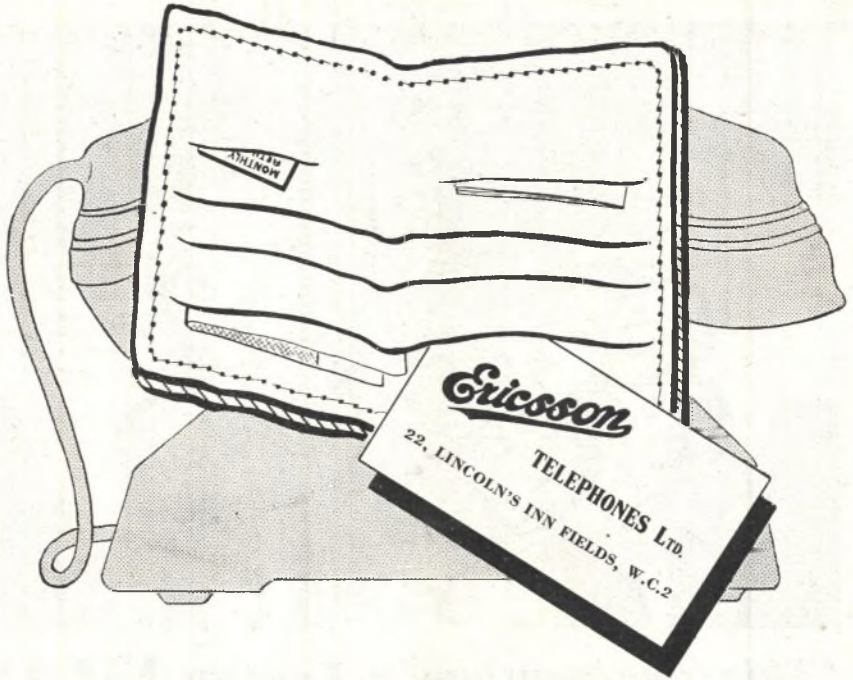


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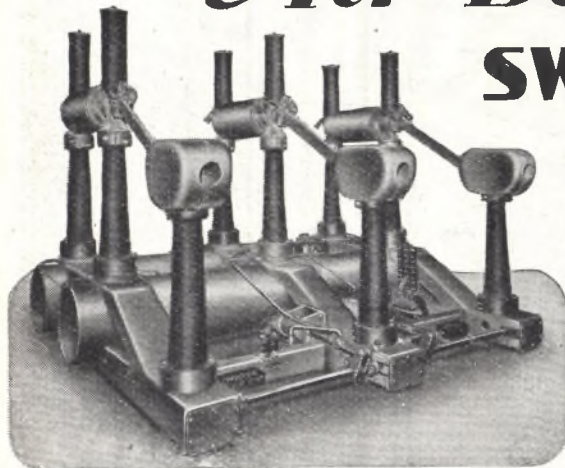
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## *Air-Blast*

### SWITCHGEAR

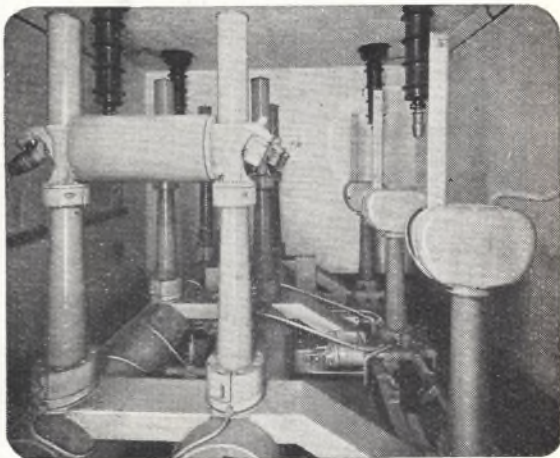


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Publication SG/105B obtainable on request from Switchgear Dept. Stafford.

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London Office: QUEEN'S HOUSE, KINGSWAY, LONDON, W.C.2

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THE

# ELECTRICIAN

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*19 SEPTEMBER 1947*

*Vol CXXXIX No. 12*

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THE Government's latest plan for bringing about a balance of overseas trade will inevitably involve a substantial re-direction of industrial effort, and, relating this to the electrical industry, what do we find? What are the factors likely to affect the export plan?

In the first place, before the plan can be put into operation, the maximum supplies of electricity within the nation's generating capacity must be readily available, and the coal stocks held by the power stations must be of a volume adequate to meet all emergencies, should deliveries break down or be delayed by weather conditions.

With regard to coal, what is the position? One of the blackest periods in the history of that industry so far as output is concerned, was that covering the summer of 1946 and the winter months that followed. Despite this bad record, however, the Ministry of Fuel persists in using last year's figures as a criterion. The coal produced so far this year, when compared with that in the same period of 1946, is admittedly higher in volume, but in view of last year's record is nothing more than a percentage of what it ought to be if the dangers of last winter's crisis are to be avoided. At August 16 the total output of coal was 121.4 million tons, since when and up to September 6, a further 11 million tons have been raised, making a total of 132.4 million. The target set for this year is 200 million tons, but simple arithmetic shows that—even taking into account the output during the three weeks of this month—the

present rate of production will quite possibly leave us short of the target by over a million tons.

## Electricity and Coal

RELATING the above figures to the supply industry, we find that at the end of August the average coal stocks held by electricity undertakings amounted in volume to 5.3 weeks' winter supply, whereas from an engineering point of view a minimum of 6 weeks is regarded as necessary at this time of the year, in order to meet the seasonal factors of the next six months. In these circumstances the difficulties which may face the supply industry this winter appear to be almost as formidable as were those last year, in that the demand for power during the coming months will require generating capacity to meet peak loads over long periods of time each working day, with a heavier coal consumption in consequence. It is true that there is more coal in hand at the power stations than there was at this time last year, but bearing in mind the fact that during the eight months of this year so far, the total units generated amounted to 27 269 million, or 4.6 per cent. more than during the corresponding period of 1946, and that this figure reflects the artificial saving imposed by the domestic space heating ban shortly to be removed, together with the restrictions on street lighting obtaining during recent months—unless coal deliveries are sufficient to meet current needs, the 5.3 winter weeks' supply built up during the summer may have to be drawn upon at an uneconomical rate from the safety point of view.

## Generating Plant

THE Government recognises that the export drive will make demands upon the electrical industry, and appreciates the need for capital expenditure on such things as new buildings and machinery. In the circumstances, the programmes for power station extensions will be proceeded with in the normal way in an effort to make good the shortage of some 200 MW of plant now obtaining, and to replace the over-age machines which are each year growing in number. The completion of such programmes must be regarded as a first essential to the success of the export drive and are a

guarantee of an early betterment of conditions in the supply industry. The programmes to date are proceeding as best they can in the circumstances, but the time required to complete extensions—compared with pre-war—is a factor yet to be reckoned with, especially where civil engineering is concerned. The latest plant to be added to the national generating resources is the 45 MW extension at the Valley Station of Bradford Corporation, where the ceremony of starting-up will be carried out to-morrow, Saturday.

## New Power Stations

OF special interest in relation to the export drive are, too, the programmes prepared by the Central Board for power station extensions for 1951 and 1952, which provide for the installation of additional plant amounting in the aggregate to 3 923 500 kW and involving an expenditure of nearly £190 000 000. The programmes, which include the construction of 14 further new stations—seven in each year—comprise over 60 separate projects, and provide for 2 306 500 kW to be in commission by the winter of 1951 and 1 617 000 kW by the winter of 1952. Hitherto, it has been the practice of the Board to plan additional generating plant four years ahead and, as far as possible, to arrange for work on new stations to be begun five years ahead. In view of the longer periods now required for the completion and commissioning of new plant, however, the Board have this year extended their plans to cover in respect of extensions as well as new stations not only the fourth, but also the fifth year ahead. At present, work is in progress at varying stages on earlier extension programmes which provide for the installation of about 6 000 000 kW of additional plant, including 17 new stations, by the winter of 1950 and these, with the extensions planned to meet the anticipated needs between now and 1952, thus envisage the provision of nearly 10 000 000 kW, including 31 new stations, at an estimated cost approaching £450 000 000.

## Electrical Export Target

THE statement made by Sir STAFFORD CRIPPS when announcing the export plan last week, charged the electrical manufacturing industry with the task of

raising the monthly shipments of electrical apparatus by 215 per cent. by the end of 1948, when compared with the monthly rate of 1938. According to the Board of Trade returns on overseas trade, goods classed as electrical apparatus do not include heavy electrical machinery but range from wires and cables to domestic radio, from house service meters to lamps, and include such other equipment as batteries and accumulators, telephone apparatus and so on. Shipments of such goods by the end of 1948, should, if the Government target is to be hit, reach a value of £4.3 million each month, which compares with £3.7 million in June last and £4.9 million in July; the average monthly value of exports of this type for the first half of this year was £3.5 million.

### **Dead Hand of Bureaucracy**

THAT the industry will respond to the export appeal made to it is not in doubt, but success or failure of the plan must be shared with the Government, in that without a more willing co-operation on the part of officialdom in hastening the issuing of licences of every kind, the wheels of industry cannot run at their maximum momentum. An important factor affecting present production, and one which the Government alone can overcome, is the number of departments which have to be consulted before decisions on priorities can be reached. If the export drive is to be made at that tempo which industry would attain if freed from bureaucracy, the Government must cut its production of red tape for home consumption in favour of facilities for export.

### **Load Staggering**

THE scheme evolved by the Central Board in association with the Commissioners and the Electricity Joint Committee, whereby each supply undertaking will have a target maximum demand to which the load must be reduced when called upon to do so, becomes effective next month, and in view of the export plan the time for our various industries up and down the country to adjust themselves to the scheme is, therefore, in some cases becoming urgent. Industry, generally, has been left in no doubt as to what is expected of it in the expansion of export trade, and though setting

target figures where overseas shipments are concerned may be theoretical, that relative to maximum demand upon electricity generating capacity can be embarrassingly real. In the circumstances, if load shedding of the type experienced last winter is to be avoided, production programmes based upon the demand for stepping up exports must be drawn up in such a way that the local electricity authority knows what its demand is likely to be and when, and in a way that any particular industrial organisation may know when its maximum demand upon the undertaking may be made. Given that co-operation, the supply industry will not only be able to meet the demands within the capacity of the generating plant available, but do so with a minimum of inconvenience to its consumers in the form of load shedding.

### **Public Lighting and Export Trade**

THE attention of a large section of the industry has this week been focused on Southport, where the Association of Public Lighting Engineers to-day, Friday, concludes a very successful five-day conference. Apart from the interest roused by the various speakers on lighting subjects, no fewer than ten demonstrations of street lighting were staged, including lamps of the fluorescent type. Elsewhere in this issue brief descriptions of the installations are given and from these it will be appreciated how thoroughly the manufacturers entered into the spirit of the conference, in spite of the difficulties which had to be surmounted with respect to materials. Apart from their value in this country as a means of lighting our streets, it was made clear at a meeting of the Electric Light Fittings Export Group last week that street lighting fittings, among others, can, and are, making a substantial contribution to our export trade. On this point it should not be overlooked that one of the ways of promoting the overseas market in street lighting equipment would be to light all our own streets in such a way that our potential customers abroad might be invited to see in operation what is being offered them. If all our own public lighting authorities saw wisdom in good street lighting, then any sales resistance put up by our overseas friends would be less difficult to overcome.

## Portrait—Mr. F. J. Elliott

*One of the many electrical engineering interests enjoyed by Mr. Elliott is that concerned with rural electrification, for under his guidance some 90 per cent. of the farms in a 95-acre rural area without the Wolverhampton boundaries, have been connected since 1930. He is, too, a member of the E.D.A. Rural Electrification Advisory Committee.*

\* \* \*

*Before going to Wolverhampton seventeen years ago, Mr. Elliott was at Bristol where, among other responsibilities undertaken, he changed over a 93-cycle single-phase supply system to the standard three-phase at a cost of £1 000 000. It took five years to complete and involved the laying of 105 miles of h.t. cable and the commissioning of no fewer than 175 sub-stations.*



**A**S Chief Engineer and Manager of the Wolverhampton undertaking, Mr. F. J. Elliott can truthfully claim to have not only helped to build the supply industry from small beginnings, but to possess a practical knowledge of the industry broader in its outlook than many others have had opportunity to acquire.

Mr. Elliott, in his career, has been associated with two particularly interesting undertakings, namely, Bristol and Wolverhampton. He joined the former in 1910 after completing his education at University College, Bristol. His progressively responsible positions there included engineer-in-charge of rotary sub-stations, and later in charge of the main generating station, assistant consumers' connection engineer and assistant mains engineer. The highlight of this period, which ended in 1930, was his work on the £1 000 000 change-over scheme from a 93 cycles single-phase supply to a standard three-phase system. This took five years, during which 105 miles of h.t. cable were laid and 175 sub-stations placed in commission. During the change-over, 45 sub-stations were raised from 6 kV to 11 kV working; Mr. Elliott also helped to reframe the existing system of consumers' and mains' records.

In 1930, he joined the Wolverhampton electricity department as chief engineering assistant, and was soon working on a wholesale reconstruction of the 6 kV system. The link-up between the local undertaking and the grid had doubled the

maximum possible short-circuit kVA, and it was found necessary to replace or modify more than 300 switches in some 150 sub-stations, and instal new gear at the generating station with a rupturing capacity of half a million kVA.

Mr. Elliott made a survey of the Wolverhampton d.c. system, planning a change-over scheme in 1933, and in 1937, supervised a change from a two-phase non-standard supply in the residential areas. By 1933, l.t. mains had been laid in every Wolverhampton street.

One of Mr. Elliott's lasting interests is an ambitious rural electrification scheme, under which some 90 per cent. of the farms in a 95 acre rural area without the borough boundaries have been connected up since 1930. The linking-up of the remainder is already worked out in detail and now awaits materials and labour. It is interesting to note that the tariff rate offered to these rural consumers is similar to that in force in the town area.

Mr. Elliott's rural electrification work, however, goes beyond this, and he sits on the E.D.A. Rural Electrification Advisory Committee, as well as on two other committees of the association. He is, also, a member of the C.E.B. Consultative Technical Committee, Central England District, and a past-Chairman of the South Midland Centre of the I.E.E.

# A.P.L.E. Conference

## Street Lighting Problems Discussed at Southport

THE annual conference of the Association of Public Lighting Engineers opened at Southport on Monday and the proceedings throughout the week more nearly resembled the character of pre-war gatherings than any held since the end of hostilities.

### INDUCTION OF PRESIDENT

The annual meeting of the association in the Cambridge Hall, on Monday afternoon, was followed by the official opening of the conference by the Mayor of Southport, Counc. James Peet, J.P., and the induction of the president, Mr. Thomas Wilkie, public lighting engineer of Leicester, one of the original members of the association. It is his second term of office, he having been elected president in 1930. In the evening, a reception was given to the delegates in the Floral Hall by the Mayor, Aldermen and Councillors of Southport.

Other social functions during the week included a reception for the ladies at the electricity department's showrooms in Lord Street, on Tuesday afternoon; a luncheon in the Floral Hall on Wednesday; and a reception by the President and Mrs. Wilkie in the Floral Hall on Thursday evening. To-day there is a tour by motor coach to Chester, via Mersey Tunnel, Hoylake and West Kirby.

On Wednesday evening there was an official inspection of the outdoor demonstrations of street lighting comprising a variety of installations for Classes "A" and "B" roads, and also a display of lamp columns for main road and side road lighting, in the Princess Gardens.

The morning session on Tuesday opened with the Address by the newly-elected President, who said that three points he had made in his Presidential Address seventeen years ago, might usefully be made again. Firstly, he suggested the need for legislation which would lay upon local authorities the definite responsibility for providing efficient street lighting, instead of continuing it as a permissive service. Too often the installation of lighting, or otherwise, and more so the standard thereof, was decided on purely financial grounds.

Secondly, it was desirable that street lighting should be the concern of a qualified official, especially in the larger administration areas. It should be divorced completely from either gas or electricity undertakings. The proposed nationalisation of those industries might

make divorcement inevitable and, indeed, several local authorities were considering the position that street lighting would occupy after the vesting date. Authorities whose administrative layout did not permit of a separate organisation, should at least authorise one official to specialise in street lighting and should ensure that, if at all possible, he should be under the direct control of a committee or sub-committee, which would deal solely with lighting.

Mr. Wilkie's third point was the failure, so far, to deal effectively with the problem of road safety. He suggested that the appropriate Ministry should name in every local authority, a committee or official, in whom would be vested full authority and complete dictatorial powers to deal with all matters of road safety. No public service, he added, was more concerned with road safety than lighting, and the Minister would receive from lighting officials their whole-hearted co-operation.

### RESTRICTIONS NOT JUSTIFIED

The President expressed his personal view that the recent and existing restrictions in street lighting were not justified by known facts and that they should be withdrawn immediately. Local authorities should be encouraged to raise existing lighting standards, and this was more than justified by the relatively small amount of coal involved even in full pre-war lighting.

Mr. A. E. Marchant (Barking) and Mr. Robert Bell (Erith) contributed a paper on "Street Lighting in Relation to Road Safety, Traffic Problems and Crime Prevention." With the great and growing density of traffic on the roads, stated the authors, there was increasing responsibility for ensuring its passage with the least danger to itself and others. Increased visibility during the hours of darkness would assist materially in the problem of reducing road accidents and casualties arising from them. Given plenty of light in our streets, the forces of law and order would have a reasonable chance of dealing with crime; without it their task was made much more difficult. Good street lighting increased the effective strength of a police force, since it not only enabled any policeman to watch a considerable area and to observe from a distance, but it tended to discourage malefactors owing to the increased risk of detection.

It was submitted that merely to have effective lighting for the roadway was not sufficient; footpaths, too, should be well

lighted. A reasonably even level of visibility was essential. At all costs, patchy lighting, which was a fruitful cause of accidents, must be avoided. Unless and until one common standard of street lighting was generally adopted, difficulties would continue to be encountered. It would be useful as an expedient if it were possible to devise some form of graduation of light from one system to another which was contiguous to it. The lighting of isolated areas should be avoided wherever possible. From the safety point of view, the colour of the light must also receive consideration.

Mr. J. Woodhouse (Sheffield lighting department), in a paper on "Maintenance of Public Street Lighting," read at the afternoon session, said there was great need of the application of the opinion of the Ministry of Transport's Departmental Committee on Street Lighting that satisfactory maintenance was of no less importance than correct design. The question of maintenance should be considered in relation to the design of an installation in the first instance. In Sheffield they considered that an installation was "new" for only two weeks; after that it must be watched and cared for as any other installation in the city, remembering that it would have to stand for many years and that its efficiency must never fall below a certain level. After describing the practice adopted by his department, Mr. Woodhouse said illumination measurements provided at the most only a check on maintenance; they did not tell what was the cause of the fall in illumination. Causes of deterioration were sufficient to require planned attention.

Dr. S. English (technical director, Holoplane, Ltd.), in a paper on "Street Lighting Photometry," read at the morning session on Wednesday, said now that the preparation of a revised standard specification for street lighting had been temporarily abandoned by the B.S.I. Committee, who had decided to concentrate on the production of a code of practice based on the recommendations of the Ministry of Transport Report of 1937, the street lighting engineer might well wonder what measurements he should take to serve as a check on the satisfactoriness or otherwise of his installation and also as a check on the maintenance of the installation to a certain degree of its original performance. There they came up against a problem, the solution of which was a long way off, and the best methods of approaching that solution were very much matters of personal opinion. If they kept in mind that the ultimate aim was the production of good

general visibility, then it was obvious that three major factors must be considered, namely: (1) the brightness of the road surface and backgrounds; (2) the brightness of typical objects or obstructions on the roadway; and (3) glare. After discussing those essential factors in turn, Dr.

English spoke on the consideration of portable photometers. There were now available, he said, the visual comparison type and the photo-electric type. The visual comparison type, though regarded by some as outmoded, was, as a matter of fact, the more useful instrument, since it could be used as a foot-candle meter, or as a direct reading brightness measuring instrument with the greatest of ease, and in the hands of an experienced operator surprisingly accurate readings could be obtained. He

described a new lumeter, and said street lighting engineers would find that instrument an improvement on, and a worthy successor to, the instrument they knew so well before the war.

Mr. R. W. Steel (Cheltenham borough electrical engineer), whose paper on "Side Street Lighting" was read at the Thursday morning session, drew attention to many of the problems confronting the illuminating engineer in designing street lighting for what are known as side streets, and gave examples showing how the problems were not fully recognised in the past, and how modern practice followed the principles underlying the recommendations of the Departmental Committee on Street Lighting as laid down in their final report published in 1937. He suggested that there should be more than two groups of roads for street lighting purposes to permit greater mounting height and higher values of illumination in some roads now falling within Group B. Attention was drawn to the problem of light obscuration by trees and a proposal made that the matter should be considered by the bodies concerned at national level. The paper also attempted to show the probable trend of side street lighting in the future.

\* \* \*

The discussion on the papers read at the conference will be given in abstract in the next issue, as owing to unavoidable pressure upon our pages this week it is beyond practical politics to do more than give a precis of each paper.

The proceedings at the annual meeting of the association on Monday, together with the result of the election of officers, are, however, given on p. 838.



MR. T. WILKIE



# Street Lighting

## Simplicity and Efficiency Keynote of Design

THE ten demonstration installations of electric street lighting in connection with the conference of the Association of Public Lighting Engineers at Southport this week are held to be typical of the trend which will be followed in the next year or so. Brief details are as below.

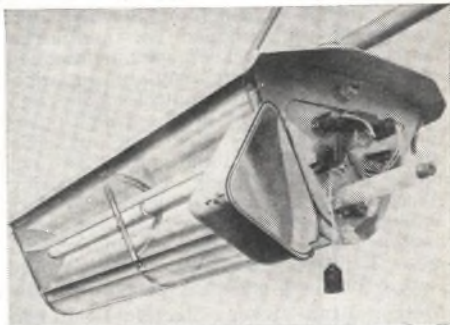
### Brighton Lighting and Electrical Engineering Co., Ltd.

Installed in Scarisbrick New Road are eight Bleeco "W" lanterns of the totally enclosed reflector type, using Philora 140 W sodium lamps burning horizontally. Light distribution is of the axial asymmetric type with greatest intensities in the region between  $70^\circ$  and  $80^\circ$  from the vertical. Additional diffusion and spread are achieved by the use of vertically fluted glass side panels through which direct light from the lamps and reflected light from top reflectors in the hood is passed. The bottom glazing is in the form of two panels so inclined that part of the incident light is deflected by surface reflection to fortify the main axial distribution. Sufficient light is nevertheless transmitted to provide adequate illumination below the lantern.

### British Thomson-Houston Co., Ltd.

Eight Mazdalux lanterns, each containing three 80 W "warm-white" fluorescent tubular lamps, are erected in Nevill Street. In the comparatively narrow part of the road four lanterns are sited at single, staggered 120 ft. spacing, and in the wider

Concrete Utilities, Ltd. This combination of spacing and mounting height gives 5 000



A Mazdalux lantern containing three 80 W warm-white fluorescent tubes

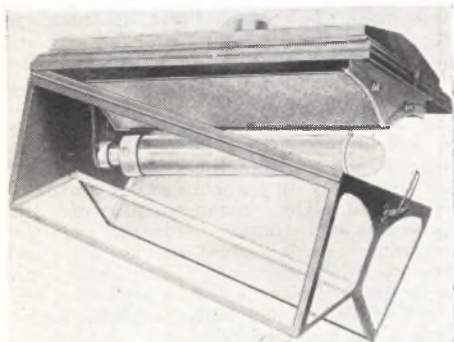
lumens per 100 ft. of road in the narrow part, and 10 000 lumens per 100 ft. in the wider stretch.

### Engineering and Lighting Equipment Co., Ltd.

Eight Golden Ray fittings are displayed in East Bank Street, accommodating 140-W Philora sodium lamps burning horizontally. Non-axial symmetric distribution is employed, the main lobes being separated by  $160^\circ$  on the street side, and inclined at an average of  $73^\circ$  from the vertical with peak candle power at  $78^\circ$ , thus giving very full cover at the most useful angles. The light distribution is achieved by refractor plates, exclusive to this lantern, incorporating both horizontal and vertical prisms, which, being on opposite faces of the plates, do not intersect. If required, lanterns can be supplied with two-piece refractor plates with smooth surfaces on each exposed face. The lantern top and its ends are of cast iron or cast aluminium, while the bottom channel supports for the reflectors are of heavy gauge copper. The underside of the lantern is open.

### Falk, Stadelmann and Co., Ltd.

Installed in Hoghton Street are eight Hilux lanterns made to take 250 W mercury discharge lamps as an alternative to 400 W lamps. Focusing is pre-set according to which lamp is to be employed. Light distribution is controlled by a Holograph single-piece bowl refractor surrounding the vertically-burning lamp. An internal reflector is also incorporated. Two types of asymmetric refractor, giving axial ( $180^\circ$ ) or non axial ( $160^\circ$ ) distribution, are



A Bleeco "W" lantern using a Philora 140 W sodium lamp

section four lanterns, at the same spacing, are in pairs opposite each other. The lanterns are mounted, at a height of 25 ft., on specially-designed columns made by

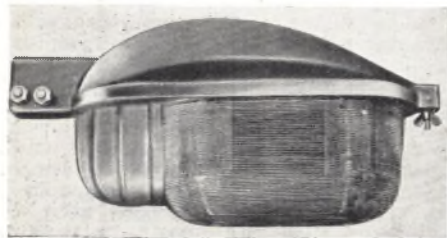
available. The maximum candle power of each lobe occurs at 75° from the vertical. The main body of the lantern is of heavy gauge copper sheet surmounted by a cast iron crown piece for fixing and cable connection.

#### General Electric Co., Ltd.

Four Osram tubular fluorescent lamps are fitted to each of seven Four Forty lanterns erected in Hoghton Street. The lantern bodies are made of non-ferrous materials, and sheet Perspex is used for glazing. Distribution may be described as axial asymmetric, control of the light flux being effected by anodised high purity aluminium reflectors. All the auxiliaries are accommodated in the body of the lantern, thus simplifying column wiring. Access for relamping is gained by the Perspex glazed doors, of which there is one each side. Concrete columns by Concrete Utilities, Ltd., were specially designed for these essentially large lanterns.

#### Metropolitan-Vickers Electrical Co., Ltd.

The Trafford lantern, demonstrated by eight units employing 400-W horizontally-burning mercury discharge lamps with magnetic arc deflectors, is installed in Scarisbrick New Road. Non-axial asymmetric light distribution is obtained from a single-piece prismatic refractor bowl designed to utilise the fullest possible amount of direct light from the lamp. An anodised aluminium reflector under the canopy deflects the remaining upward lighting flux on to the refractor prisms. The canopy



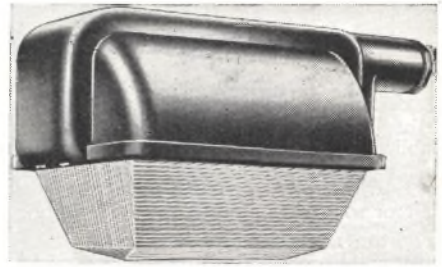
*The Metrovick Trafford lantern employing a 400 W mercury discharge lamp*

is of cast aluminium alloy, to which is hinged an easily removable retaining ring for the single piece refractor bowl; either 400 W or 250 W lamps may be used.

#### Revo Electric Co., Ltd.

This company has installed seven Sol Etern lanterns in Kingsway and Coronation Walk, each incorporating two 80 W fluorescent tubular lamps. Light distribution is effected by reflectors and is asymmetric. The reflectors are of highly specular finish and the lantern construction is mainly of aluminium, specially treated to resist corrosion. Control gear is housed

within the lantern, and outer-hinged dust proof covers, Perspex glazed, provide easy



*The Siemens' Sieray-Euston lantern accommodating a 250 W mercury discharge lamp*

access to the patented sliding lampholders which facilitate relamping.

#### Siemens Electric Lamps & Supplies, Ltd.

Euston-Sieray lanterns accommodating 250-W Sieray mercury discharge lamps burning horizontally, in East Bank Street, are designed for both 250 W and 400 W lamps. The arc is controlled by a magnetic deflector above. The optical system consists of a pair of internal specular reflectors operating in conjunction with a prismatic disc refractor. Non-axial asymmetric distribution is provided, the refractor providing the whole of the non-axiality as well as general control. The top canopy of the lantern is of cast aluminium. This is fitted with a hinged ring to carry the prismatic glassware.

#### Holophane, Ltd.

This company is responsible for an installation in London Road, for which are used Dilux lanterns. Each of the eight erected is fitted with a 400 W magnetically controlled horizontally-burning mercury discharge lamp, giving, at the recommended mounting height of 25 ft., with 120 ft., between standards, a light output of 7 350 lumens to 100 ft., linear of road. By suitable design of refractor and reflector, approximately 90 per cent. of the light is directed into the lower hemisphere so that stray upper emission is virtually eliminated. The arrangement of the prisms is such that the emission near the horizontal is emphasised to give adequate surface brightness along the roadway, but by careful choice of beam angle and the provision of a controlled cut off, dazzle and glare are avoided.

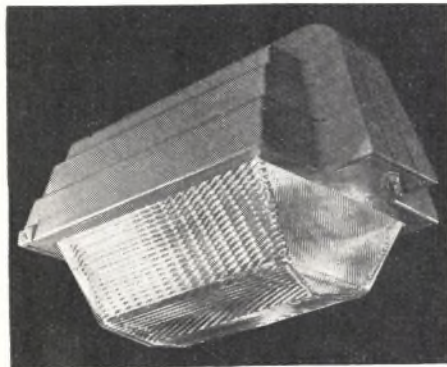
#### Wardle Engineering Co., Ltd.

This firm has installed eight Solar lanterns fitted with horizontal-burning 140-W sodium lamps in Scarisbrick New Road. Cut-off type axial asymmetric distribution of the light is effected by mirror reflectors; those

at the top are held in correct position by spring-loaded clips, and those beneath by two die-cast clips fixed to rods supported by the end castings; the lower mirrors serve also to cut off the direct light from the lamp. Upper cut-off is effected by sharp control of light reflected from the top mirrors, thus dispensing with the deep skirt usually associated with lanterns of this class. The main body of the lantern is a cast iron top with cast iron lampholder and brass end plates. Brass carrying clips support the lamp and vacuum glass.

#### **Stewarts and Lloyds, Ltd.**

Twelve tubular steel poles have been erected and for the purpose of comparison, some are of the plain circular form and others are fluted. For Group "A" roads there are eight poles of two types—bracket-arm and shepherd's crook. Four of the poles are shown with pendant lanterns and four with side-entry lanterns. For Group "B" roads there are four poles, two being of the swan-neck and two



*The Holophane Dilux lantern fitted with a 400 W mercury discharge lamp*

of the pillar type. The poles have no added ornamentation.

#### **Simplex Electric Co., Ltd.**

Although unable to participate in the outside demonstrations, this company has for many years specialised in the manufacture of street lighting equipment. Among lanterns in production is the Refrax, claimed to be one of the most highly developed dust-proof lanterns, at present available, for main road lighting.

#### **Measurements, Ltd.**

This company illustrates in the conference programme the Actadis equipment installed at the power station of Worcester Corporation for the purpose of street lighting control. The system is

also suitable for the remote control of water heaters and any special circuits.

#### **Philips Electrical, Ltd.**

Supplied discharge lamps and apparatus for demonstrations arranged by the Brighton Lighting and Electrical Engineering Co., Ltd.; the Electric Street Lighting Apparatus Co.; the Engineering and Lighting Equipment Co., Ltd.; the Revo Electric Co., Ltd., and the Wardle Engineering Co., Ltd.

#### **Gomshall, Ltd.**

The display here is restricted to illuminated guard-posts designed in accordance with the recommendations contained in the Report of the Departmental Committee on Traffic Signs, 1944, and subsequent Ministry of Transport specifications. Correct placing of the light sources achieves evenly lighted panels.

#### **Spun Concrete, Ltd.**

Examples are shown of hollow spun reinforced concrete lighting columns and standards, which are characterised by simplicity of design and avoidance of superfluous embellishments.

#### **Automatic Light Controlling Co., Ltd.**

This exhibit is of "Gunfire" time switches for street lighting control.

#### **Venner Time Switches, Ltd.**

Here are featured exhibits of time switches of the hand-wound, electrically-wound and synchronous motor-driven types. Attention is drawn to the pilot wire relay system for centralised public lighting control, and also to the Cyclo-hour meter for determining the number of hours a lighting system has been in operation.

#### **Poles, Ltd.**

This firm supplied seven different types of Adastral galvanised sectional steel lighting columns used in the demonstrations. They are: An hexagonal column with double bracket arms, a hexagonal column with single bracket arm and a circular column with a single bracket arm, all of 25 ft. mounting height; a hexagonal column fitted with a swan-neck bracket and having an expanded base incorporating an inspection door, and a circular column with a swan-neck and expanded base, both at 15 ft. mounting height; a hexagonal column adapted for fitting a lantern vertically at the top, and a circular column also suited for a vertical lantern at 13 ft. mounting height.

#### **Electric Street Lighting Apparatus Co.**

While unable to take part in the outdoor demonstrations of equipment, this

company is producing all types of Bi-Multi Reflector system of street lighting and improving the delivery of units for tungsten sodium and mercury light sources.

#### **Broad and Co., Ltd.**

Attention is called to the Broaderete lighting columns, in either of two finishes, namely: fine grey fluted, or smooth ground semi-polished finish, in which the natural colour of the Mountsorrel granite aggregate is exposed. The base chamber has a solid concrete door matching the column in line, material and finish.

#### **Sangamo Weston, Ltd.**

Time switches of the synchronous motor-driven type designed for a wide range of automatic time control applications on a.c. circuits, including street lighting; a range of house service meters, and several new types of instruments recently developed, for measuring the voltage, current and power in lighting circuits are exhibited.

#### **Stanton Ironworks, Ltd.**

Four types of Stanton spun concrete lighting columns, are to be seen in Princes Park. One of them, the 6B, can be supplied with an 8-ft. bracket arm, and where double bracket arms are fitted for centre lighting, the column gives a span of 15 ft. over the centre section of the roadway, enabling staggered lighting to be carried out. Stanton columns are now supplied with concrete doors, giving access to spacious accommodation for lighting control gear and winches where necessary.

#### **Concrete Utilities, Ltd.**

Also in Princes Park is a full range of reinforced concrete lighting columns in various finishes, the standard being rubbed cement. Special units developed in conjunction with William Sugg, Ltd., including a bracket on Avenue 2D column, enclosing a box which houses the control equipment, are also shown. In addition, some of the latest fluorescent lantern types are to be seen among the columns.

## A.P.L.E. Annual Meeting

**T**HE retiring president, Mr. W. N. C. Clinch, occupied the chair at the annual meeting of the Association of Public Lighting Engineers, which preceded the opening of the conference in the Cambridge Hall, Southport, on Monday afternoon.

Loyal greetings were sent to the King, and another message was sent to the National Technical Conference of America, now meeting in New Orleans.

Mr. H. C. Brown (hon. treasurer) presented the statement of accounts for the year, showing a balance in hand of £1 329.

The elections of Mr. Thomas Wilkie (Leicester) as president, and Mr. N. Boydell (Eastbourne) as vice-president were unanimous. As the result of a ballot, Messrs. L. A. Doxey (Leeds), J. H. Morrison (Bolton), and P. Richbell (Croydon) were elected to fill vacancies on the Council. Mr. P. Crawford Sugg and Mr. E. Stroud were re-elected as associates' representatives.

The Mayor of Southport officially opened the conference, which was attended by about 800 members and delegates, extending a cordial welcome to the association.

The President, thanking the Mayor for his welcome, said it was difficult in present circumstances to do all that was desired in public lighting, but every effort should be made to pave the way for the future.

Inducting the new president, Mr. Clinch said that during the last year the Council had made every effort to ensure that the association was not in cold storage. There

had been a deputation to the Ministry of Transport and a report had been published in the association's journal. Moreover, the officers of the Ministry of Transport consulted the Council on matters relating to street lighting and thus obtained a true representation of the views, experience and technical knowledge of the members of the association. The members, as a team, must apply their minds to making the streets not only safe, but also gay and attractive.

On the motion of the newly-elected President, a cordial vote of thanks was accorded Mr. Clinch and Mr. Wilkie presented to him the past-President's badge and certificate.

The President mentioned that he had received a message from Mr. Langlands, the first President of the association, who was unable to attend the conference.

Mr. Wilkie then expressed thanks to Mr. W. T. Gann and Mr. H. J. Risby, Southport borough electrical and gas engineers, respectively, for the assistance they had rendered in connection with the arrangements for the conference, and particularly in regard to the demonstration street lighting installations that had been staged for the meeting.

Mr. N. Boydell, then expressed appreciation of the honour extended by his election to vice-presidency.

Coun. Marshall, of Eastbourne, extended a cordial invitation to the association to hold its next conference in his town.

# Light Fittings as Exports

## Discussion on Shortages and Tariff Difficulties

**F**OLLOWING an informal luncheon of the Executive Committee of the Electric Light Fittings Export Group, in London on September 10, a full meeting of the Group was held for the purpose of discussing problems associated with exports and how such trade might be developed. Both the luncheon and the meeting were attended by officials of the Board of Trade, the Ministry being represented by Mr. R. B. Tippetts, assistant secretary, Mr. M. Kielbig, and Mr. D. H. Lyal, Export Promotion Department. Others present included Mr. J. D. Howie, Ministry of Supply, Col. S. C. Halse, chairman, Lampshades and Standards Manufacturers' Association, Mr. R. D. Best, chairman, National Brassfoundry Association, and Mr. H. Wigston, Electric Discharge Lamp Auxiliaries Council.

### SHIPMENTS IN 1946

Mr. A. E. Iliffe, who presided at both the luncheon and the meeting, explained that the exports of lighting fittings in 1946 were valued at £1 006 500 and it was the desire of all concerned to improve upon that figure. Reviewing the industry in its three main descriptions, viz., decorative and commercial lighting, street lighting and industrial lighting—fittings for the first had, he said, a different asset value from the export point of view than, say, the industrial group. There had always been competition in the manufacture and export of the decorative type of fitting, raised mainly by the cheaper Continental forms of lighting. There were, however, many countries prepared to pay for the right article, made to the right design by the right craftsman, and in this field there was little to fear, provided the necessary encouragement was forthcoming.

With regard to the export of the other groups of fittings, manufacturers of these and of glass, needed every encouragement to meet local competition. Commercial fittings generally incorporated metalware; in many instances the metalware for the ornamented type of fitting did not lend itself to local production, and was imported. In some countries glass was made locally, but in others it was imported. It had been the custom for many years for metal workers to also supply the glass, and any encouragement along these lines would mean the importation for re-exportation of certain foreign-made glass.

Mr. Iliffe then emphasised that the control of importation of components for the

light fittings industry should be in hands experienced in the manufacture and exportation of such fittings, as otherwise there would be a leakage to fields less promising of building up the fittings export business.

Turning to street lighting, there was again some competition in local manufacture, but the standard of glass manufactured in this country had not been challenged. There was, therefore, an export field for electric street lighting fittings of the highest quality.

The industrial fittings group also had export possibilities. While local manufacture had to be reckoned with, the quality and design of British-made fittings were from an examination of samples, infinitely superior.

Referring to the countries to which we hoped to export, Mr. Iliffe pointed out that though the Government continually thought of dollar purchases from this country, America had never been a large purchaser of electric light fittings; there was now, however, an indication of some acceptance of our ornamental period fittings, even by the United States. There were also export possibilities to South America for street and train lighting fittings, though some loss must be experienced by the restriction on imports, and by the passing of the South American railways from British control.

### POTENTIAL MARKETS

The greatest opportunities for export were in the sterling area, and amongst those countries which had sterling balances. Dealing with other countries, there were those which pre-war did not usually purchase from this country and there was a healthy export business to the Colonies and Dominions. During the war years, however, owing to the impossibility to export, the latter had encouraged local manufacture, even at uneconomic rates.

The position to-day was, nevertheless, that manufacturers generally in this country had order books in volume quite apart from value, representing perhaps twice their 1939 export figure.

Mr. Lyal pointed out that though there no longer existed the Export Council which brought the Group into being, it was hoped that every industry would form some representative body which had the promotion of export trade as its objective. Attention was drawn to the world-wide

network of trade commissioners which had been built up by the Government and to the fact that the importance of overseas trade to this country was fully appreciated. By failing to use the services of this network, industry would be needlessly handicapping itself.

Several members of the Group drew attention in subsequent discussion to the fact that before a successful export business could be built up, there must be a healthy home market. So far as lighting fittings were concerned it was necessary, too, that our factories were sufficiently well lighted for the export goods to be made. In the manufacture of fluorescent lighting fittings, electrical steel was necessary and the materials position in this connection should be reviewed.

One speaker, who had visited both the U.S.A. and Canada, suggested that since those countries took views with respect to design different from our own, non-competing firms should get together in building up a co-operative effort to ascertain designs most likely to be successful.

Another speaker who had visited the U.S.A. in an attempt to promote export business, found it difficult to meet the 45-60 per cent. duty imposed. With such conditions prevailing export business was, in his view, impossible.

Attention was drawn to the fact that the regulations relative to flameproof fittings in this country were not applicable abroad and the cost involved in those circumstances was sometimes hard to justify. Another speaker pointed out that though the Government had directed an export publicity campaign for all and everybody in this country, he had yet to hear of any similar campaign being directed against our potential customers. Another problem raised was conduit for exported decorative fittings.

Replies were made on behalf of the Board of Trade, but in view of the then anticipated statement by Sir Stafford Cripps, little of constructive value was advanced. It was, however, explained that a sub-committee was now in operation with a view to dealing with steel for fluorescent lighting components.

## High Power Switchgear Testing

IN planning the development of high power switchgear it is essential to forecast as far ahead as possible future demands of supply systems, both in this country and abroad. While many detail requirements are still obscure, it is clear that transmission voltages are likely to increase considerably in the near future, at least 264 kV being required for this country, and probably 330 or 400 kV for overseas schemes. Such schemes will undoubtedly use a.c., until high voltage d.c. transmission emerges from its experimental stages. With the increasing voltage arises the demand for higher breaking capacities, and the only sure way of proving the performance of a circuit-breaker is to make breaking capacity tests up to its full rating. When the General Electric Co., Ltd., in 1930 planned the Witton high power testing laboratory, the requirements for this country could be met with a station capable of testing circuit-breakers rated at breaking capacities up to 1 500 MVA, at voltages up to 132 kV. To achieve such an output most economically a single 3 000 r.p.m. special low reactance alternator, provided with super-excitation, and a bank of three single-phase high voltage transformers were installed. These have been in constant use since 1934. In order that the output of the station may be adequate to provide the data necessary for the design of the larger circuit breakers which it is anticipated will be required in the

near future, it has been decided to increase the available output considerably, particularly at the higher voltages. To effect this a second alternator of a design similar to that of the existing machine is being installed in a second generator room alongside the existing one. This machine will have its own super-exciter and will run in parallel with the existing alternator. The full short-circuit output from the two machines will be 4 000 MVA at voltages up to 22 kV. Additional banks of reactors are being installed for regulating the short-circuit currents obtainable.

For the high voltage test, six additional transformers are being installed. At the higher voltages, this arrangement will provide more than twice the output obtainable at present. The available voltage will also be increased, and will be suitable for testing 264 kV circuit-breakers rated up to 3 500 MVA. As multi-break designs will be used at voltages exceeding 264 kV the plant will be adequate for testing, since such circuit-breakers can be tested in sections or in units, and short circuits equivalent to over 5 000 MVA will be obtainable at the highest voltages.

The Birmingham branch of the Society of Inventors is arranging to hold an exhibition of inventions in the late autumn. Intending exhibitors are requested to write to Mr. B. Thornton Clark, 244, Stoney Lane, Yardley, Birmingham, 25.

# I.E.E. TRANSMISSION SECTION

## SUCCESSFUL WEEK-END VISIT TO THE YORKSHIRE AREA

THE I.E.E. Transmission Section was able this year to resume its series of summer visits, and at the joint invitation of the Central Board and the Yorkshire E.P. Co., Ltd., visited Yorkshire on September 13-14.

The meeting centred on the Granby Hotel, Harrogate, and the function was attended by no fewer than 122; many others who had wanted to participate had, unfortunately, to be refused on account of accommodation. Although the meeting was held under the chairmanship of Mr. J. Andrew Lee, the itinerary was based upon that originally planned by Mr. S. R. Siviour during his 1939 year of office, when the war prevented that summer meeting from being held. Many leading members of the Institution were present, including Mr. J. Hacking, the newly appointed vice-chairman of the B.E.A.

The two days' tour was in the northern part of the Y.E.P. area of supply, and the first stop was at Messrs. B. S. & W. Whiteley's Pool Paper Mills. There members saw "Elephantide" pressboard and paper being made and noted the extensive use of electric power necessitating an 800 kVA sub-station. It was a shock to many to realise that this material, noted for its insulating properties, starts as 99.5 per cent. water, and it was heartening to see that in such a highly mechanised mill, there is still a place for the craftsman who makes the angle end-rings for transformer coils.

### CHEVIN SUB-STATION

The next stop was at the Chevin sub-station of the Y.E.P. Co. This is outdoor gear and is noteworthy for its clean layout. It is attended and the control room contains the 11 kV, 100 MVA switchgear, and the instrument panels and protective relays for the 33 kVA, 500 MVA and 66 kV, 750 MVA equipment. Grass lawns instead of large pebble-filled areas are a distinctive feature. Connection of the transmission lines to the switchgear and transformers is through surge diverters, but no recording apparatus has been provided yet to measure the frequency of operation.

The Y.E.P. Co. have developed an economical 66 kV line consisting of H-section steel, made up from a central plate with two bulb edged plates welded to the edges of the first plate. The poles occupy only a small ground area, are almost completely fabricated in the workshop, are

easy to transport and assemble on site and are low in maintenance cost. Their capital cost is about 30 per cent. cheaper than a comparable steel lattice tower and their only disadvantage is a slight weakness of strength in the direction of the line. In-line stays at 4 per pole in each direction have been fitted at suitable locations to overcome this difficulty. A start has now been made, however, with wooden poles, with unearthed steelwork, for 66 kV operation.

From this sub-station on the journey to Bramhope, an 11 kV, three-phase, light line to B.S. 1320 was noted, before stopping at the company's head office canteen for lunch. This was followed by two short speeches, one of welcome by Mr. W. R. T. Skinner, of the Y.E.P. Co., and the other of thanks by the Section chairman, Mr. Lee.

### 66 KV LINES COMPARED

Between Bramhope and Otley, the members noted an interesting comparison between a C.E.B. and a Y.E.P. line, each of 66 kV, running side by side. The coaches then made a long run, in beautiful weather, up lovely Wharfedale to Gargrave, passing through Ilkley and Skipton. To preserve amenities the main 11 kV supply in the valley is by underground cable, which must have greatly increased distribution costs. An ingenious arrangement was found at Gargrave, where a 33 kV line from Silsden via Skipton is joined by one from Silsden via Barnoldswick and by another going to Cracoe. The three lines join at a tee-pole, but on the last single pole of each line, overhead sectionalising isolators are mounted. Each of these poles and the tee-off pole are wood, and can be easily and cheaply removed when a 66 kV sub-station is built on the site. The two former lines are already on steel poles for this higher pressure, and full insulation at all section and terminal poles on their route means that the change-over will be simple. The line to Cracoe will remain at 33 kV operation, and is built largely to B.S. 1320. Wood poles, 32 ft. by 11½ in. are used with a single steel cross-arm mounted above the top of the poles. The symmetrical arrangement of conductors thereby attained, the glass insulators and the even spans of 360 ft. make a very unobtrusive construction.

A stop was made at Cracoe sub-station where transformation from 33/11 kV takes place. The layout is again spacious and

tidy, and must be easy for operation and maintenance. Tea was provided by the C.E.B. and the company at the Fell Hotel, Burnhall, and then an hour was spent at Bolton Abbey. The final run back to Harrogate over Blubberhouses Moor was a pleasant relief in a strenuous day from 9 a.m. to 7 p.m.

The second day, like the first, started promptly at 9 a.m., and on the first stage a standard Y.E.P., 11 kV, three-phase overhead line on wood poles, with their "tipped triangle" cross-arms was noted before arriving at Osbaldwick.

At York the ladies left their menfolk for the only time during the meeting and were conducted on a tour organised by Mr. W. A. Crocker, the city electrical engineer. At the C.E.B. sub-station the main interest was the 132 kV gas-pressure cable, which, laid in 1945 in an experimental length round an adjacent field with both terminations in the sub-station, was described in *THE ELECTRICIAN* of October 20, 1944 and May 18, 1945.

Lunch at the Royal Station Hotel, as guests of the company and the Board was followed by a short welcoming speech by Mr. Lapper of the C.E.B., and a reply on behalf of the members by Mr. Norris, a past chairman of the section. An hour's run brought the party to Ferrybridge power station, where a diversion was made from the official route. Many members decided to tour the station itself rather than confine their attention to the special features of the switching stations. The C.E.B. showed the 66 kV gas-pressure cable between the Y.E.P. and their own sub-stations, laid in 1940, which is similar to that at York. The company's cables are also of the gas-pressure type, but instead of relying upon compression of an inner lead sheath, are single-sheathed with gas impregnation of the paper insulation at 200 lb./sq. in. In testing the cables, the Y.E.P. used a "Faraday Cage" similar to the 132 kV cage used more recently at Birmingham, and referred to in *THE ELECTRICIAN* of September 5 last.

#### LINES AT ABERFORD

The return journey to Harrogate was made the occasion for inspecting various types of overhead lines. At Aberford there is 20-year old l.v. distribution on wood poles with steel cross-arms and G.P.O. type insulators. The 100 kVA kiosk at Greystones Park is typical of many, being made from pre-cast concrete slabs with a slab roof, steel doors in self-contained frames, all built on a concrete raft. The roof is finally asphalted and construction only takes a few days. Near to Bramham Cross Roads there is an 11 kV, three-phase 0.05 sq. in. H.D.C. overhead line on concrete poles, and just

before Wetherby there is an unusual double circuit 11 kV line on steel masts. This has a single steel cross-arm on the top of the mast, with two-phase conductors of each circuit mounted on pin insulators on each side of the centre. The third phase wire is suspended underneath the cross-arm centrally between the upper phases, thus forming an inverted triangle of conductors on each side of the mast.

By 4.15 p.m. the members were all back at Harrogate and gradual dispersal took place. Comment must be made upon the splendid timing of the visits, the wide range of equipment and types of lines displayed, the lovely country traversed and the efficient organisation. The only casualty was a bleeding nose sustained by one of the members, but how it occurred only participants will know.

### New Rye House Station

SOME civil engineering work has been started on the 90 acres site of the new Rye House power station of the Northriaer Power Co., at Hoddesdon, Herts.

The initial section of the station will comprise two turbo-alternator sets each with a maximum continuous rating of 32 MW, two 350 000 lbs. per hr. boilers, the necessary buildings and civil engineering works and one cooling tower having a capacity of 1 900 000 gals. of water per hour. The steam conditions at the turbine stop valves will be 600 lbs. per sq. in. and 850° F.

Contracts placed to date include:

Sinking test bore-holes ... ..	L. King, Nazeing, Essex.
Formation of embankment for railway sidings ... ..	Inns and Co., Ltd., London.
Supplying and laying tracks, points and crossings for railway sidings ... ..	Thos. Summerson and Sons, Ltd., Darlington.
Connections from main line to railway sidings and signalling ... ..	L.N.E. Railway Co.
Foundations ... and buildings ... ..	Walter Lawrence and Son, Ltd., London.
Turbo-alternator sets, including condensers and auxiliaries ... ..	Richardson Westgarth and Co., Ltd., Hartlepool.
Boilers and ancillary plant ... ..	Babcock and Wilcox, Ltd., London.

The site of the station is bounded on or towards the North-West by the L.N.E.R. main line to Cambridge, on or towards the East by the River Lea Navigation and on or towards the South-West partly by the Essex Road. It is adjacent to the proposed North Orbital Road.

The embankment for the railway sidings has already been formed, for which purpose some 100 000 tons of material were excavated from a ballast pit on the site.



# Estimating Three-Phase Power Factor

By G. W. Stubbings, B.Sc., A.M.I.E.E.

WHEN a steady load taken from a three-phase supply with balanced voltages is measured with one wattmeter, if the load is balanced; or with two wattmeters with an unbalanced load, the kVAR in the load, and, hence the power factor can be estimated by altering the connections of the instruments so that the voltages applied to them are retarded in phase by  $120^\circ$ . The total power  $P$  in watts, given by the single wattmeter for balanced loads, or by the algebraic sum of the readings of the two instruments used for an unbalanced load, is equal to  $M \cos \phi$  where  $M$  stands for the total equivalent voltamperes and  $\cos \phi$  for the power factor. When the voltage or voltages used for the test are retarded in phase by  $120^\circ$  the reading or algebraic sum of the readings  $Q$ , will correspond to the quantity  $M \cos (\phi$

turning it through one third of a revolution. The correctness of the direction of this turning can be checked by the circumstance that with lagging power factors a lagging phase shift of the voltages will always cause the red or lagging phase wattmeter to give

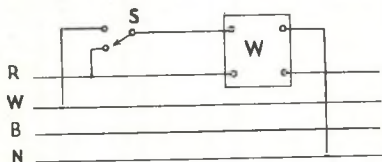


Fig. 1

$-120^\circ)$ . If the ratio  $Q/P$  is put equal to  $n$ , so that  $Q = nP$ , then

$$nP = M \cos (\phi - 120^\circ) = -\frac{1}{2} M \cos \phi + \frac{\sqrt{3}}{2} M \sin \phi$$

$$M \sin \phi$$

and

$$2nP = -P + \sqrt{3} M \sin \phi$$

whence, dividing by  $P = M \cos \phi$

$$\tan \phi = \frac{2n + 1}{\sqrt{3}}$$

and, from this, we obtain by the standard trigonometrical formula

$$\cos \phi = \frac{\sqrt{3}}{2} \times \frac{1}{\sqrt{(n^2 + n + 1)}}$$

Fig. 1 shows how, by the use of a double-throw switch  $S$ , the requisite phase shift of the voltage applied to a single wattmeter for balanced loads can be made. When two instruments are used for an unbalanced load, the method shown in Fig. 2 is convenient. Here connection of the wattmeter voltage circuits is made to the supply mains by means of a three-pin plug and socket. To obtain the required  $120^\circ$  phase shift of the testing voltages, a cyclic change is made of the connections of the instruments to the supply mains by removing the plug and

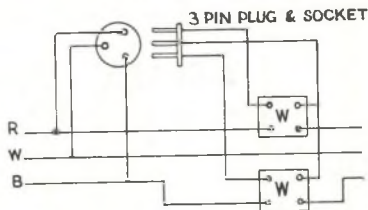


Fig. 2

the greater (algebraic) reading. The plug and socket should be marked to indicate the normal engagement for power measurement.

A graph connecting power factor values with the ratio  $n$  is more convenient to use than by direct calculation by means of the formula. A few points on the graph can be determined by inspection. When  $n = -\frac{1}{2}$   $\tan \phi = 0$  and the power factor  $P.F.$  is unity; when  $n = 0$   $P.F. = \frac{\sqrt{3}}{2}$  and when  $n = 1$   $P.F. = \frac{1}{2}$ . Other points on the graph can be located without calculation

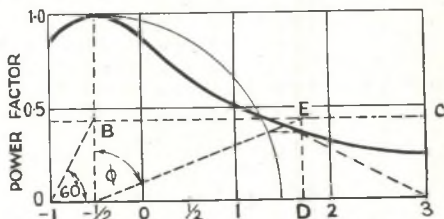


Fig. 3

by the geometrical construction shown in Fig. 3, in which the power factor scale is double the scale for  $n$ . From the point of the horizontal axis corresponding to  $n = -1$  a  $60^\circ$  line is drawn to cut the ordinate for  $n = -\frac{1}{2}$  at the point  $B$ , so that the length of  $AB$  on the  $n$  scale is  $\frac{\sqrt{3}}{2}$ .

The line  $BC$  is drawn parallel to the horizontal axis. With centre  $A$  and radius equal to unity of the  $P.F.$  scale a segment

of the circle is drawn. To locate the point on the graph for any value of  $n$  determined by a point such as  $D$ , the point  $A$  is joined to the intersection of  $E$  of the ordinate of  $D$  and the line  $BC$ . The intersection of this line with the circle is projected horizontally to the ordinate  $DE$  and this projection is the required point on the graph. This can readily be seen to be true, for as  $AB = \frac{\sqrt{3}}{2}$  and  $AD = n + \frac{1}{2} \tan BAE = \frac{2n+1}{\sqrt{3}}$ ,

so that the angle  $BAE = \varphi$ , and the ordinate at  $D$  to the graph is equal to  $\cos \varphi$  on the P.F. scale. The slope of the graph for

$n = 1$  is readily found to be  $\frac{1}{2}$ , so that the line joining the point on the graph for  $n = 1$  to the point on the horizontal axis for  $n = 3$  is the tangent. At the point corresponding to  $n = 0$  the slope is  $\frac{\sqrt{3}}{2}$  so that

here the tangent is parallel to a line joining the point  $B$  to a point on the horizontal axis corresponding to  $n = \frac{1}{2}$ . Lastly, the graph is evidently symmetrical with respect to the ordinate for  $n = -\frac{1}{2}$ . The accurate drawing of the graph is greatly facilitated by locating the two tangents at the points for  $n = 0$  and  $n = 1$ .

## British Electricity Authority

Statement by Lord Citrine, following Inaugural Meeting

**T**HE newly constituted British Electricity Authority held its inaugural meeting on September 11, and below is abstracted a statement by Lord Citrine, chairman of the Authority.

It would be premature for the Authority to make any immediate statement of its general plans and policy, but it will be appreciated that, while the shortage of generating plant exists, restrictions are inevitable. The abnormal position created by the war and the resulting economic difficulties mean that this shortage cannot be overtaken for several years to come.

The Authority has a great task before it. Its concern will be to ensure that the generating, transmitting and distribution of electricity shall be efficient throughout all its phases. There is also a heavy task of co-ordination of the numerous undertakings to be carried through and this will necessarily take time. The Authority must plan carefully and thoroughly for the future; but at the same time it must make immediate arrangements to ensure that, so far as existing conditions permit, the needs of the nation will continue to be met when the day comes for the vesting of all these electricity undertakings in the Central Authority or the Area Boards.

The purpose of the statement is to make it clear that the Authority will be specially concerned to maintain effective management during the transfer. It will also endeavour to secure that the employees will not be exposed to breaks in employment or a worsening of the conditions under which they will work, when the undertakings pass over to public ownership.

There will be no abrupt break with the past. Changes, consequent upon reorganisation of the industry, are bound to come; but insofar as these changes adversely

affect contracts of service, the individuals concerned will be covered by the reasonable operation of the safeguards provided in the Electricity Act of 1947. The Minister has promised that full consultation will take place with the trade unions before the Regulations provided for in the Act are actually made. Meanwhile, the new Authority looks confidently to all employed in the industry to arrange that the change-over takes place with smoothness and efficiency.

The future prosperity of the nation depends very largely on an efficient electricity supply industry. It has been built up by the efforts of that great band of efficient and devoted workers of all grades, to whose work everyone would wish to pay tribute. With their assured goodwill and co-operation, the impending reorganisation of the industry should help to promote national prosperity and to raise the standard of living.

### *Illumination Design*

**T**HE 49th illumination design course, arranged by the E.L.M.A., Lighting Service Bureau, will take place at 2, Savoy Hill, Strand, London, from September 30 to October 3, and will be followed by a three-day continuation course commencing on October 28. A refresher course for the electrical industry consisting of three sessions of two lectures each, will be held at the Engineers' Club, Albert Square, Manchester, on October 7, 14, and 21, commencing at 4 p.m. A refresher course will also be held at the Corporation electricity department, 31, Kingsway, Stoke-on-Trent, on consecutive Monday evenings, beginning at 7 p.m.

# • 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. I. V. ROBINSON, secretary to the heavy plant sections of the B.E.A.M.A.,



MR. I. V. ROBINSON

has been nominated president-elect of the Whitworth Society and will take office in 1948. Mr. Robinson obtained a Whitworth Exhibition in 1900, followed by a scholarship in 1902. He also gained a National Scholarship at the Royal College of Science, South Kensington. While with Richardsons, Westgarth and Co., Mr. Robinson represented that company

at all B.E.A.M.A. meetings for a few years and he joined the staff of the association in 1919 to supervise the heavy plant interests. As the B.E.A.M.A. representative, he has attended many conferences of the International Electrotechnical Commission, and of the World Power Conference, and he was chairman of the technical sessions at the meetings of the International Steam Tables Conference held in London (1929), Berlin (1930) and New York (1934). In 1933 and 1934 Mr. Robinson visited Australia on behalf of the B.E.A.M.A. to put before the Australian Tariff Board the arguments of the British electrical industry for the reduction of Australian import duties. Since then he has represented the B.E.A.M.A. on the British Council of the Australian Association of British Manufacturers.

MR. ALLAN H. WRIGHT has been appointed manager of the South Burnett Electricity Board, Kingaroy, Queensland. He was formerly electrical engineer to the municipality of Quirindi, New South Wales.

MR. J. M. C. SCOTT, a former member of the staff at R.R.D.E., Malvern, and now at the atomic energy establishment at Harwell, Didcot, has been awarded the Medal of Freedom, with bronze palm, by the United States Government, for research work connected with radar and carried out in Malvern during the war years.

MR. THOMAS WILKIE, public lighting engineer at Leicester, has been elected president of the Association of Public

Lighting Engineers for the second time. He is the sole survivor still in local government service of the 10 people who met in Bingley Hall, Birmingham, in October, 1923, and decided to form the association. His first term of office as president was in 1930, when he succeeded Mr. S. B. Langlands, then city lighting engineer for the city of Glasgow, under whom he received his training.

MR. F. OVERSTALL, who for the last two and a half years has been deputy electrical engineer with the Peterborough electricity undertaking, has been appointed engineer and manager of the electricity department at Burton-on-Trent and expects to take up his new duties on December 1. He was deputy electrical engineer and manager at Paisley, before going to Peterborough and has also held appointments at Birmingham, Birkenhead and Aylesbury.

MR. EDWARD C. SMITH, head of the Civil Mechanical and Electrical Engineering Department of the Wigan Mining College, has been recommended for appointment as principal of Burnley Technical College in succession to Dr. J. Graymore, now appointed to Plymouth Technical College. Mr. Smith, who has been at Wigan four years, was educated at the Brighton, Hove and Sussex Grammar School, Brighton Technical College, and London University where he took his B.Sc. (with first-class honours) and his Ph.D. (engineering) degrees. He served an apprenticeship with the English Electric Co., Ltd.

## Obituary

MR. STANLEY YATES, chief clerk of the Bury electricity department for many years, on September 10, aged 50 years.

MR. HENRY SAVAGE, formerly works manager, W. T. Henley's Telegraph Works Co., Ltd., on September 7. He joined Henley's North Woolwich works in June, 1890, as a junior test-room assistant. In 1919 he became joint works manager at those works with the late Robert James Hatton, and a year later, when Mr. Hatton retired from the managership, he was appointed works manager. Mr. Savage retired on June 30, 1930. During his retirement he became actively interested in the Royal Empire Society. He had also been a member of the Folkestone Town Council.

# Testing Dynamic Balance

## War-time Process for Checking Rapidly Rotating Bodies

OF the many developments of new equipment and processes made in the research establishments of the Ministry of Supply, not all are considered of sufficient importance to justify being made the subject of patent applications. Many, however, may be of interest to engineers in industry, and the Ministry has therefore requested, in order that the information should be freely available for industrial use, that space should be given in this journal from time to time for brief accounts of those developments likely to be of value to our readers.

The first of these abstracts, which describes a method for checking the dynamic balance of rapidly rotating bodies, evolved during the war by Messrs. Sykes and Robins (Royal Aircraft Establishment, Farnborough) for testing the rotors of gyroscopes incorporated in predictor gunights, appears below. The principles employed should be readily adaptable to the testing of rapidly rotating parts of other equipment.

The apparatus built up for testing of the mirror-bearing rotors of predictor gunights is illustrated in Fig. 1. When in position in the apparatus, the circular mirror G is mounted for rotation about the rotor axis A, and a lens  $L_1$ , is provided to receive light rays from a filament F and focus them on to a portion of the mirror near its edge. After reflection from the mirror, the rays pass through a lens  $L_2$ , which forms an image of the filament at a pin-hole P. Rays from the pin-hole are reflected, in turn, by a mirror  $M_1$ , the central portion of the mirror G and a mirror  $M_2$ , a lens  $L_3$  being provided to produce an image of the pin-hole on a screen S.

Movement of the mirror out of its normal plane arising from dynamic unbalance of the gyroscope rotor results in the image on the screen S tracing an approximately circular path, the diameter of which gives a measure of the amplitude of the oscillation due to unbalance.

In order to indicate the phase of oscillation, a small black arc is painted at the edge of the mirror G: this has the effect of interrupting, once per revolution of the mirror G, the path of light from the filament F to the pin-hole P. As a result of this interruption, a small gap is caused in the trace on the screen S, the position of the gap giving an indication of the

angular relation of the phase of oscillation to the datum represented by the black area at the edge of the mirror.

The sensitivity of the arrangement is clearly a simple function of the length of

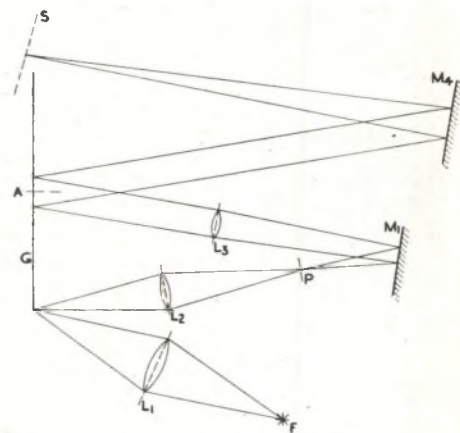


Fig. 1

the optical arm from oscillating mirror to screen and the definition of the image on the screen. No difficulty has been found in balancing down to one minute total amplitude of mirror oscillation.

In applying the method to the testing of rotating bodies which do not normally bear mirrors (such as parts of electric motors, separating machines, etc.) rays from a light source may be focussed upon a suitable bright portion of the rotating body and a small non-rotating mirror may be temporarily attached to the frame of the apparatus, or any part of it which is subject to oscillation as a result of unbalance of the rotating body, to receive rays from the lens  $L_3$  or its equivalent; occultation of the trace being achieved by the provision of a small non-reflecting area at a datum point on the bright portion of the rotating body.

A weekly intelligence bulletin, entitled "Industrial Design Abstracts," which is being offered to a limited number of subscribers at a cost of £3 3s. per annum, including postage, is being published by the Council of Industrial Design on Thursdays. It will contain abstracts of articles covering the whole field of industrial design and related matters.

# Fuel Economy Conference

## Power Networks for China—District Heating

**L**AST week we gave abstracts from a number of papers of electrical interest read at the Fuel Economy Conference of the World Power Conference at The Hague, and below are given points from further papers.

M. M. BOCHKOLTZ (Belgium) outlined the advantages of all kinds, and especially the economy of fuel, that resulted from the organisation of the production of electricity by a network of interconnected power stations, run as a single enterprise, such as had been set up in Belgium. The interconnected network, comprising mainly h.t. lines and stations of 150 000 and 70 000 V, was, he said, being reinforced to such an extent that the organisation of production might be carried through without any hitch, when the main power stations in the country would be re-equipped by means of units of 50 000 kW. Belgium was operating the exchange of electric energy with the neighbouring countries on a limited scale, in the expectation that an appropriate technique might soon increase those operations.

M. R. DUGAS (France) gave a comparison, based on statistics, of the practical results obtained by the French railways from the point of view of draw-bar yield steam traction (coal heating and heating with oil fuel), electric traction and Diesel traction, and then discussed how the following would be classified from the point of view of organic yield in the near future, high pressure steam locomotive, diesel locomotive, electric locomotive, gas turbine, generator with free pistons. The paper emphasised the advantages of electric traction even on an exclusively thermal basis, and of Diesel traction. It showed that the use of oil fuel for steam locomotives gives only a limited advantage, and, finally, that the gas turbine, without being able to show the same results as the Diesel engine, will perhaps succeed in competing with it from an economic point of view, since the fuel is cheaper and is less expensive to store.

MESSRS. C. H. CHEN and Y. S. SUN (China) contributed an interesting paper on "The Electrical Power Industry in China: Past, Present and Future." They showed that in 1936 the generating capacity of electric utilities in China was 631 000 kW. Over 90 per cent. of the capacity was concentrated along the coast. When war broke out the whole piece of Eastern China fell into Japanese hands, and very little power capacity was left

in free China. At the end of 1944, a total capacity of 32 000 kW of industrial power plants was installed in Free China. Not all of the 32 000 kW was brought in from occupied territories, but more than two-thirds of it came within that category. In China proper, the aggregate installed capacity is about the same as eight years ago. Due to war destruction and aerial bombing and also due to damage through long periods of mal-operation and poor maintenance, the total available capacity was only about one-half of the previous figure.

The Japanese developed considerably the power industry in Taiwan and Manchuria during their stay in these areas. The situation in Manchuria would be very promising, if this plant had not been dismantled and removed by the Soviet Army. The Communist Army subsequently did a lot of destruction. At present, only 414 000 kW has been actually taken over by the National Government and only 245 000 kW is actually in running condition. As all the existing power plants are in very poor condition with power shortage prevailing everywhere in the country, it is reasonable to seek relief from this situation immediately by whatever means are available. The next stage of the task is to tackle the electricity supply problem on a broad national basis. Electric power networks are to be constructed. Twelve networks are tentatively planned for primary development. This programme calls for an addition of over 1 100 000 kW within five years.

Mr. L. S. WILCOXSON (U.S.A.) described the principles and development of the cyclone burner. The plentiful supplies of poorer grades of coal which predominated in the world, he said, should be considered as the primary source of fuel, particularly for power purposes, for the foreseeable future. The cyclone burner had been developed to use such coals containing high percentages of low-fusion temperature ash not only efficiently, but effectively. In it, molten coal ash was a means to assist in the combustion of coal in crushed form. A high percentage of the ash was removed continuously from the burner through a secondary furnace, and the resulting flue gases were relatively free from fly ash compared with other methods of combustion. An existing unit was described, and the author said that there were now on order two horizontal cyclone burner units, each with four cyclone burners to generate

750 000 lbs. of steam per hour at 1 325 lbs. per sq. in. and 935°F.

Mr. ROYCE L. BEERS (U.S.A.), speaking of spreader stokers in the United States, said installations had been made for boilers up to 250 000 lbs. per hr., and still larger units were contemplated. The spreader type would operate satisfactorily with a wider ranger of coal than could be used with underfeed, forced draught, cham and travelling grate types, and their response to changes in load was rapid, the flexibility being comparable to that obtained with oil. Efficiencies compared with the best results obtained with other types of equipment on high grade fuel, and were often better with low grade fuel. In addition, the power requirements and maintenance needs of spreader stokers were low.

MESSRS. W. F. DAVIDSON and M. J. STEINBERG (U.S.A.) delivered a paper on "Combined Steam and Electric Supply in New York," dealing with a district heating project commenced in 1934 at two coal-fired generating stations. "Topping" turbine-generators had been selected to replace and supplement low-pressure sets, the factors leading to this choice including the fuel and capacity savings made possible by the availability of exhaust steam for supply to the district heating system. With the modernisation only partly completed, it had been possible, in 1946, to supply from turbine exhausts 37 per cent of the total district steam requirements with large fuel savings, and savings in boiler capacity of approximately 4 per cent. It was estimated that when the modernisation programme had been completed, about 1950, 80 per cent. of all steam could be supplied essentially from turbine exhausts with additional fuel savings.

MESSRS. A. K. BAK and N. CHR. GEERTSEN (Denmark) said the first large district heating scheme to be installed in Denmark was in Copenhagen in 1925. Eleven cities and towns now had district heating, and in some cases combined power and heat generation was employed. Recent investigations had shown that the substitution of a large number of small power stations by centralised generating plants situated in large towns would effect an annual saving of coal of at least 265 000 tons, and by establishing combined power and heat generation in four towns with populations ranging from 43 000 to 107 000, a further 110 000 tons might be saved. A large power-heat scheme had been planned for Copenhagen, involving the erection of a new plant and the rebuilding of an existing station for power-heat generation. When all areas in Copen-

hagen suitable for district heating had been covered to the extent of 60 per cent. of the total maximum requirements, a total of 400 million kWh per annum might be generated on back-pressure operation with a resulting saving in fuel imports of about 160 000 tons annually. Hot water distribution with an outgoing water temperature of 158°-239° F. was preferred for house heating purposes, and steam distribution was used where a higher temperature was necessary. High pressure hot water with temperatures of 266°-356° F. did not seem to give any advantages compared with the two other systems.

M. ALF O. HALS (Norway) said that the development of space heating by electricity in Norway, originating from the desire to replace imported fuel by water power, had led to an improvement in housing conditions. Panel and tubular heaters were most commonly used at present. Experience with dwellings had shown that about 3 kWh was needed to replace one kg. of coke in the boilers of a hot water heating plant. In buildings occupied for only part of the day, the energy consumption could be substantially reduced by automatic operation. Surplus power was used to a considerable extent for space heating by means of various types of apparatus, especially electrode boilers with fuel-fired boilers as a supplement. When energy was used in this manner, approximately 5 kWh was needed to replace 1 kg. of coal or coke.

IR. M. C. HOENKAMP (Netherlands), in a paper on district heating, said the consideration of such schemes in the Netherlands had become urgent because large parts of several towns had been destroyed. In the reconstruction of Rotterdam, schemes had been studied to supply heat solely from the Schiehaven power station, which would save considerable quantities of fuel at a cost of large capital investment, or the establishment of ten small boiler-houses in the areas of heat demand, which would be cheaper but would save less fuel. It had been finally decided to combine these methods, and the Schiehaven station would supply the base heat load, with boiler stations supplying peak heat demands. The price per thermal unit would be lower for the scheme adopted than for either of the other methods. A description of the project was given.

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Further technical reports from Germany, now available at the sales offices of the Stationery Office, include the following: F.I.A.T. 800, Nickel Cadmium Storage Batteries in Germany (1s.); F.I.A.T. 1027, The Krawinkel Image-Storing Cathode-Ray Tube (4s.).

# Lamp Sales Publicity

## Display Pieces and Literature for Coming Season

**A** WELL-ILLUSTRATED, forty-page Mazda lamp catalogue already distributed, the first to be published by the British Thomson-Houston Co., Ltd., since 1939, lists all the lamps on the company's present manufacturing programme. Other publications include a leaflet, (L.813), listing Mazda lamps for domestic lighting purposes and an attractive illustrated price list of car bulbs (L. 814). In an effective cut-out display piece for shop window or counter, the past, present and future of lighting are symbolised by pictorial representations of a candle, a Mazda pearl lamp, and 80 W and 40 W fluorescent lamps on backgrounds of brown, blue and yellow. A red base bears the trade name and silhouettes of home and factory. It is 28 in. long and 19 in. high. A folder, in course of preparation, gives details of the new Mazda internally silvered infrared lamp and illustrates some of the ovens in which it can be incorporated. In addition to booklets and leaflets dealing with fluorescent lighting of streets and lighting requirements of schools, an informative bulletin, "Circuits for Discharge Lamps," is available, and another surveying the problems of mines lighting and describing the developments made by the company, is being prepared. A booklet entitled "Industrial Efficiency Through Good

increased production. The need for good lighting in schools and offices and the fuel economies that can be effected by the right kind of street lighting will be indicated.

The wide range of Ekco lamp sales aids has been extended by the introduction this autumn of new cut-outs, posters and window streamers. Though some of this material is still in the printers' hands, Ekco-Ensign representatives can arrange for stockists to receive an adequate and varied range immediately, including a large window centre piece, and smaller cut-outs. Amongst the new items are a bright and attractive double-crown poster featuring a child's head, a novelty cut-out for either hanging or standing, showing a hand holding a lamp, a counter or window cut-out with stand-up lamp and lettering, and a window streamer of strong design. So far as Ensign lamps are concerned, many of the sales aids produced earlier this year have proved so popular that it has been decided to maintain them in the 1947/48 range. New items have, however, been added. These include a crown poster with a lively nautical theme and a bold streamer (40 in long) for use as a pelmet or window bill, featuring the slogan "Ensign Lamps—the reliable lamps for brighter homes." The company are reintroducing their Ekco and Ensign lamp window dressing service this season, and interested dealers are asked to discuss the scheme with their representatives.



*Ekco-Ensign novelty cut-out*



*B.T.H. cut-out display piece representing the past, present and future of lighting*

Lighting" will be issued shortly. Arrangements are being made for stands, displaying Mazda lamps and Mazdalux lighting equipment, to be taken in the principal exhibitions during 1948. Advertisements in newspapers and magazines will remind the public of the quality and dependability of Mazda lamps. Advertisements in trade journals will emphasise the importance of correct lighting as an aid to

The recently-formed firm of Ekco-Ensign Electric, Ltd., approaches its first lighting season with an impressive backing of display material.

Containing descriptive matter and illustrations relating to more than 2 000 electrical and electronic patents, the "Electronic Engineering Patent Index," has just been published by the Electronics Research Publishing Co., New York.

# Industrial Information

## Railway Lamps Contract

A contract for the supply of "Cosmos" and "Metrovick" electric lamps for a period of twelve months ending August 31, 1948, has been placed with the Metropolitan-Vickers Electrical Co., Ltd., London, by the Great Western Railway Co.

## New Range of Oil Engines

The board of Lagonda, Ltd., have reached an agreement to sell their Staines factory, including machinery, etc., to a group headed by Mr. Alan P. Good, who will use the premises primarily for the manufacture of a new range of oil engines. Other products will be made.

## Craftsman's Certificate

Following widespread adoption of the model indenture prepared by the Education and Apprenticeship Committee of the Gauge and Tool Makers' Association, the Council has decided to award, under certain conditions, a special certificate to craftsmen in the precision gauge and tool industry. Applications for the award will be considered from toolmakers who:

- Have served a bona fide apprenticeship with a member of the association, and
- Have passed the final examination of the City and Guilds of London Institute machinists', turners' and fitters' course.

## Booking Hall Illumination

Reproduced on this page is a photograph showing the decorative fluorescent lamp



*Fluorescent lighting in the booking hall of American Overseas Airlines, Regent Street, London*

fittings, designed by George Forrest and Son, Ltd., 30-38, Osborne Road, Acton,

W.3, in the booking hall of the American Overseas Airlines, 180, Regent Street, London. The electrical contractors were Thompson Ritchie and Co., Ltd., 39, Victoria Street, London, S.W.1.

## Works Tableau

A works tableau designed by the publicity department of E. K. Cole, Ltd., in



*Ekco works tableau at Southend's Hospital Carnival*

which 50 members of the company's social and sports club appeared, was awarded first prize at Southend's Hospital Carnival on September 6. The display illustrated the firm's organisation and recreational side of the firm's organisation, light-hearted groups representing "Holiday with Pay," "Canteen," "Pensions Scheme," "First Aid," and the many activities of the sports club from drama to angling. Mr. Clark Ramsay, the company's Press relations officer, handed the prize cheque back for the Hospital Fund.

## Scottish Office of D.S.I.R.

The Department of Scientific and Industrial Research has opened a Scottish office at 18, Melville Street, Edinburgh. Dr. H. Buckley will be in charge.

## Institute of Marine Engineers

The next examinations for admission to the Institute of Marine Engineers will be held as follows:—Students (common preliminary examination), April 6 to 9 and October 5 to 8, 1948; graduates (section A of Associate Membership Examination), May 24, 26 and 28, 1948; associate members, May 24 to 31. Syllabuses of these examinations, copies of previous papers, and particulars of exempting qualifications, will be supplied on applica-



tion to the Secretary, at 85, Minories, London, E.C.3. An examination for the award of a Lloyd's Register scholarship in marine engineering, value £157 a year for three years, tenable at a British University, will be held on May 24 to 28, 1948.

### Stores Lighting

On this page is illustrated a recent installation of Philips 80 W "daylight" fluorescent lamps designed by the lighting engineers of Philips Electrical Ltd., Century House, Shaftesbury Avenue, London, W.C.2. Linealux fittings (type 657) were used and illumination of 15 lumens per sq. ft. was provided. The installation was carried out by Pinching and Walton, Ltd., Cannon Street, London, E.C.1.

### E.C.A. Section Conference

More than 100 delegates attended the annual conference of the North West Counties section of the Electrical Contractors' Association at the electricity showrooms, Southport, on September 11. Ald. W. H. Bellis, chairman of the Southport Electricity Committee, who welcomed the delegates, mentioned the high standard of workmanship set by the association.

### Lamp Sales Conference

Following the annual two days' sales conference, held at the London offices, Southern England sales representatives of Thorn Electrical Industries, Ltd., were entertained at dinner on Friday night by Mr. Jules Thorn (chairman and managing

director). After a short speech of welcome to the guests by Mr. A. S. Shier (sales director), the toast of the company

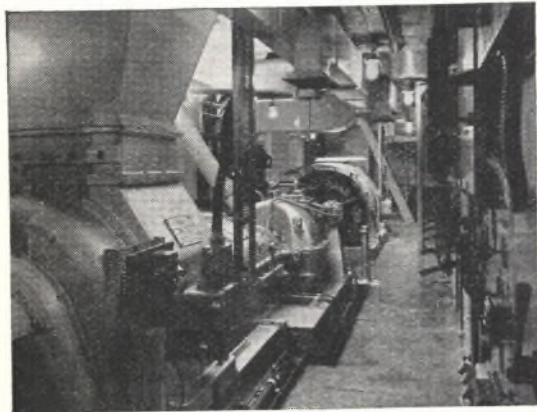


*Basement of an Islington store lit by Philips fluorescent lamps*

and Mr. Thorn was proposed by Mr. G. T. Webster who said that the chairman's energy and personality were an inspiration to all. Mr. Thorn said he had enjoyed the conference, and he believed that he had, in the sales staff, "a good bunch of fellows." Mr. G. A. Shea then proposed "The Sales Director." The toast to "The Northern Branch" was submitted by Mr. S. T. Holmes (publicity manager) and acknowledged by Mr. E. T. Hunt (assistant sales manager, Northern branch). A similar sales conference for Northern sales representatives is being held at the recently-opened Manchester premises of Thorn Electrical Industries this week.

### Giant Floating Dock

Appointed by the Admiralty as the "main machinery contractors" for the big floating dock, 855 ft. long, 172 ft. in the beam, and 72 ft. high, which was erected in Bombay and towed to the Mediterranean last April, the General Electric Co., Ltd., was responsible for the whole of the mechanical and electrical equipment as well as the 40 miles of electric cable which were used. All the heavy electrical plant and switchgear were made at the company's engineering works at Witton, Birmingham. The turbines, with their auxiliary plant, were built at the G.E.C.'s works at Erith, Kent, and the electric cable at the Pirelli-General cable works. The dock carries three 1 000 kW turbo-alternators, two 600 kW



*Part of the electrical plant of the Admiralty floating dock, showing, in the foreground, one of the 1 000 kW turbo-alternators with a 600 kW motor-generator in the background*

motor-generators, 250 kW of Diesel-driven d.c. generators. There are four oil-fired boilers, each with a capacity of 20 000 lbs. of steam per hour. Nearly one hundred motors are used in the ventilation system alone. The pumping plant includes seven vertical spindle pumps, capable of pumping 30 000 tons of water per hour. Other pumps provide fire, washdown and drainage services. Two evaporating plants can produce 100 tons of distilled water a day. The whole of the machinery, switchgear, boilers, engines and all other plant is housed inside the upper portions of the side-walls of the dock which is thus independent of any shore connections. It is, in fact, equipped, to supply electric power, fresh water, lighting and all engineering services to the "ship in dock." The telephone system, in addition to providing intercommunication between all sections of the dock and its plant, also furnishes a full service between the dock, the "ship in dock" and the shore.

### **B.E.T.R.O.'s American Service**

Less than a fortnight after the announcement in the United States Press that the Washington office of the British Export Trade Research Organisation will help American importers find British sources for the goods they want, nearly 100 important trade inquiries have been received at B.E.T.R.O.'s London office and forwarded to the members most likely to be interested. The new drive has been welcomed in both official and commercial circles. The "Wall Street Journal" has featured this free service which B.E.T.R.O. is now offering American buyers, and Time Incorporated, in co-operation with B.E.T.R.O., has launched a nation-wide survey of the British goods American importers require most. Already 200 British manufacturers have submitted their American export problems, and on September 15, Time Incorporated, through "The Merchandising Group," which has representatives in 55 cities and towns across the United States, started to find out the answers.

### **Photographic Exhibition**

The first part of the 92nd annual exhibition of the Royal Photographic Society of Great Britain was opened on Friday last at 16, Prince's Gate, London, and will close on October 5. There are on view 188 pictorial prints remarkable for their artistic merit and high photographic standard, as well as a choice selection of colour work and most interesting displays of pictorial lantern slides and transparencies and stereoscopic prints and transparencies, including some delightful nature studies. The second part of the exhibition, comprising scientific, nature,

record and technical subjects, will open on Saturday, October 11, and conclude on November 1. Amateur and miscellaneous films are being shown publicly in the lecture theatre at the Science Museum, Exhibition Road, South Kensington, on Tuesday next, September 23, at 7 p.m., and on the following Tuesday, at the same place, scientific, technical, documentary and other films will be screened. These include "Transmission of Electricity," by the Merton Park Educational Film Unit.

### **Health Minister Thanks E.D.A.**

Mr. Aneurin Bevan, Minister of Health, has sent a letter to Lord Brabazon, president of the British Electrical Development Association, thanking the association for their co-operation in making the recent Hospital Domestic Aids Exhibition so successful. At the request of the Ministry of Health, the E.D.A. organised the exhibition, which took place at the Tea Centre, London, in July, and Mr. Bevan said all concerned had done a most excellent job. He was certain that the exhibition had given valuable guidance to representatives of hospital authorities, on the way in which mechanical devices could be brought in to assist in hospital domestic work.

### **"Orders Out of Chaos"**

As a result of unlimited ordering of material on the part of the electrical wholesale trade, the Midland Electric Manufacturing Co., Ltd., have prepared a scheme which they call "Orders Out of Chaos." The scheme is explained in an attractive little booklet, wherein, after pointing out that few wholesalers, unless they are operating on a national basis, are in a position to obtain a true-over-all picture of the demand for any manufacturer's products, proceeds to make clear the effect of controls upon those materials which go to make the company's products and how orders accumulate in consequence. The scheme in brief, will allow a sharing out of the company's production and will operate in the following way: The industry will be supplied with up-to-date catalogues incorporating the company's latest post-war patterns of switchgear, and new lists 284 and 285 become operative on October 1. The prices in these lists are subject to trade terms and current preferential terms. By consolidating prices in these catalogues the industry will be relieved of invoice calculations arising from surcharges which have operated since 1939. The company propose cancelling all unexecuted orders for standard material outstanding on September 30, with a view to wiping out the arrears position which has developed since the end of the war, and which the company can see no reasonable prospect of clearing under

existing conditions. It is proposed to allocate a fair share of the company's production to all customers based on past business, with a view to relating the value of orders accepted to a figure approximating more closely the value of production. Special allocation envelopes for each month of the year have been prepared and the company suggest that if the queue mentality can be removed on a national scale in regard to supplies, the buyers' market will be restored sooner than appears possible at present, and lead to the elimination of many business worries which have been so apparent in recent years.

### "Country Comes to Town"

At the "Country Comes to Town" Exhibition, held under the auspices of the N.F.U., in Stanley Park, Blackpool, recently, the electrical exhibit, housed in a marquee 100 ft. by 40 ft., was arranged jointly by the Blackpool, Preston and Lytham St. Annes electricity undertakings, and the E.D.A.'s North-West Area Committee. The Preston undertaking was mainly responsible for the agricultural section, where a wide range of electrical equipment for use on the farm was shown. The Blackpool undertaking had recently instituted a scheme for the hire of commercial cooking equipment and the opportunity was taken to show a comprehensive range of this and of food preparation machinery. A selection of domestic apparatus was provided by the Lytham St. Annes undertaking. Electricity was prominent in the many demonstrations on the showground, and one item of special interest was the breaking of a world baking record, a finished loaf being produced 40 minutes and five seconds after the wheat had been cut. It was baked in an electric bread oven used for demonstration purposes. The previous record, held by Italy, was 2½ hours.

### The Strowger Journal

The subjects of five articles contained in the May issue of the Strowger Journal are automatic telephony, supervisory remote control, street traffic signals, voltage stabilisation and cold cathode tubes. In the July number a new three-channel carrier telephone system is described, and two other articles, dealing, respectively, with time metering and V.F. signalling and dialling equipment for both operators and subscribers, foreshadow possible developments in the operating field.

### A.S.E.E. Branch Merit Competition

The Examining Board of the A.S.E.E. has awarded the West London branch the silver cup for the best all-round record for 1946/47. South-East London came second, Birmingham third and Liverpool fourth. The cup will be presented to the winners by the president, Mr. H. Nimmo, at the association's opening meeting at the E.L.M.A. Bureau, on October 14.

### I.E.E. Meetings

We have received from the Institution of Electrical Engineers details of the arrangements for the first half of the 1947/48 session, reference to which will be made under the heading of "Coming



Marquee housing the electrical display at the "Country Comes to Town" Exhibition at Blackpool

Events" each week. The opening meeting of the session will be held in the institution lecture theatre on October 9, when Mr. P. Good will deliver his presidential address. The certificates for premiums awarded for session 1946/47 will be presented at this meeting.

### Trade Publications Received

A leaflet from Barries Electrical Agencies, Ltd., King Street, Brighton, describing the Barlecta adhesive thread as a binding and insulating medium.

An illustrated booklet, issued by Evershed and Vignoles, Ltd., Acton Lane Works, Chiswick, London, W.4, describing in detail recording instruments made by the company for a variety of purposes.

Two illustrated booklets, issued by C. A. Parsons and Co., Ltd., Heaton Works, Newcastle-upon-Tyne, giving details of surface condensing plant and glass reflectors, respectively, manufactured by the company.

# 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:—

**Newark-on-Trent**, September 19.—Supply and delivery of: (a) p.i. cable; (b) two 300 kVA distribution transformers. Specification from Borough Electrical Engineer, Municipal Buildings, Balderton-gate, Newark.

**Middlesbrough**, September 19.—Supply and delivery, over two years, of: (a) 250 kVA, three-phase, 11 kV, indoor transformer; (b) 500 kVA, three-phase, 11 kV, indoor transformer; (c) oil and compound-filled, metal-clad circuit-breaker and oil-break isolators, suitable for use on 11 kV system; (d) sub-station type distribution feeder panels. Specifications from Borough Electrical Engineer, Corporation Electricity Works, Snowdon Road, Middlesbrough.

**Huddersfield**, September 20.—Tenders invited for purchase of following plant: One three-phase 6.6 kV bank of three 1500 A, single-phase indoor type air-insulated concrete pattern reactors (reactive shop F.L. 5 per cent.), complete with expanded metal screens on three sides, and sheet steel roof. Plant may be examined at St. Andrew's Road power station by appointment. Tenders to Borough Electrical Engineer and Manager, Market Street, Huddersfield.

**Bury**, September 22.—Installation of fluorescent and filament lighting equipment in library; equipment provided by Corporation. Applications to inspect building, to the Librarian, Public Library, Silver Street, Bury, Lancs.

**Manchester**, September 22.—Supply and delivery, during 12 months ending October 31, 1948, of accessories for use with domestic appliances. Specifications from Chief Engineer and Manager, Electricity Department, Town Hall, Manchester, 2.

**Southport**, September 27.—Supply and delivery of oil-cooled static transformers. Specification from Borough Electrical Engineer, 188, Lord Street, Southport.

**Weymouth and Melcombe Regis**, September 27.—Supply and delivery of transformers. Specification from Borough Electrical Engineer and Manager, Electric House, Westham Road, Weymouth.

**Winchester**, September 27.—Supply and installation of a complete central heating system for west wing of the Guildhall, the

existing coke-fired boiler to be replaced by either electric, oil or coke-fired boiler, and new piping and radiators to be installed. Specifications from the City Engineer, Guildhall, Winchester; deposit, £2 2s.

**Silsden**, September 30.—Supply, delivery and erection of 25 cwt. electric lift at gas works. Specification from Gas Engineer and Manager, Gas Works, Silsden.

**Edinburgh**, September 30.—Supply of p.i. cables for 12 months commencing January 1, 1948. Specifications from the Engineer's Office, Dewar Place, Edinburgh.

**Portsmouth**, September 30.—Supply, delivery and erection of:—(a) one (alternatively two) 15 MVA, 33/11 kV, type O.N. transformer; (b) four 5 MVA, 33/11 kV, type O.N. transformers; (c) one earthing transformer; (d) seven liquid type neutral earthing resistors. Specifications from Engineer and Manager, 111, High Street, Portsmouth.

**Bristol**, September 30.—Installation of self-starting synchronous electric clock control (approx. 11 000) for street lighting. Particulars from City Engineer, 7, College Fields, Bristol, 8.

**Plympton St. Mary**, October 6.—Works as follow: (a) supply, delivery, laying and jointing of .15 sq. in., 33 kV and .30 sq. in., 6.6 kV underground cables, with pilots and telephone cables; (b) supply, delivery and erection of: 1.—one 18 panel, 6.6 kV, 250 MVA switchboard, consisting of two 800 A and fifteen 400 A units and a bus section switch; 2.—one eight panel, 6.6 kV, 250 MVA switchboard, consisting of one 800 A and six 400 A units and a bus section switch; 3.—one 11 panel, 6.6 kV, 250 MVA switchboard, consisting of two 800 A and eight 400 A units and a bus section switch; (all switchgear to be of the compound-filled type); (c) supply and delivery to site of three 33/6.6 kV, three-phase, 7 500 kVA transformers, type O.N. Specifications from Clerk to the Council, Council Offices, Plympton, S. Devon.

**Poplar**, October 9.—Supply and delivery of nine 500 kVA transformers, 6 000/415 V. Specification from Borough Electrical Engineer and General Manager, 208-212, East India Dock Road, Poplar, E.14.

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

# Electricity Supply

**Rochdale.**—On trading during the year ended March 31, last, the electricity undertaking made a net loss of £2 923, as compared with a net loss of £13 874 in the previous year.

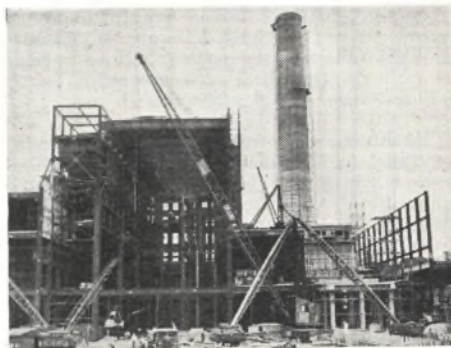
**Dunston.**—Work has been started on the erection of a testing laboratory at Dunston-on-Tyne power station for the North-Eastern Electric Supply Co., Ltd. The foundations are at present being prepared.

**Reading.**—The Electricity Committee reports a net profit of £12 713 on the undertaking for year ended March 31, compared with a loss of £18 000 in 1945-46. A profit is anticipated in the current year, and in a joint statement, the Manager and the Borough Treasurer have urged some allowance to consumers, even if only of a temporary nature. The Committee decided that there should be a 5 per cent. rebate on the amount of bills for the two winter quarters of 1947-48, the amount involved being estimated at £12 000. The abolition of meter rents was also agreed. At the Council meeting, when the proposals were adopted, it was stated that £10 500 of last year's profit was from a rebate on coal costs for the previous twelve months.

**Bradford.**—During the financial year ended March 31, 1947, the undertaking (Mr. T. H. Carr) made a net profit of £47 475, compared with £40 387 in the previous year and a loss of £8 731 in the year 1945-46. The income was £1 318 762 (£1 158 047) and expenditure £1 111 262 (£938 543), giving a gross profit for the year of £207 500 (£219 504). Net revenue charges were £160 025 (£179 117). On the capital account, the net debt stood at £2 632 741. A transfer of £42 794 (£36 706) was made to the reserve account. With 80 705 consumers at the end of the year, an increase of 3 000, a total of 254 495 186 (213 587 487) units was sold, bringing in an average price per unit sold of 1.244d. and giving a net profit per unit of .045d., compared with .046d. in the previous year. The cost of energy purchased from the C.E.B. was £762 677. The income realised from sale of energy to the Central Board was £749 324.

**Portsmouth.**—A balance on net revenue account of £5 802, compared with a deficit on the previous year's working of £9 244, is shown in the annual accounts of the city undertaking for the year ended March 31, 1947. A gross balance of

£130 972 compares with £103 726 in 1946. In his report, the Engineer and Manager (Mr. R. H. Coates) states that in Decem-



*A recent photograph of the new station being built by the Kingston-on-Thames Borough Council below Kingston bridge. The first stage of the station will comprise two 30 MW sets with three 260 000 lbs. per hour boilers. In the second stage, two further sets and three more boilers will be added*

ber a large bulk supply which the undertaking had given to Chichester was transferred to the grid. Consequently, the growth in total sales for the year was only 4.9 per cent. If Chichester were excluded from this reckoning, however, the growth in remaining supplies was 11 per cent. During January, the report adds, the maximum output from the station rose to 93 070 kW, although the installed capacity is only 90 000 kW. A total of 274 494 000 units were generated during the year and 15 583 000 units were used on works. Purchases from the C.E.B. totalled 249 752 800 units and total units sold were 222 481 562.

**Generation of Electricity.**—The official returns rendered to the Electricity Commissioners show that 2 767 million units were generated by authorised undertakers in Great Britain during the month of August, 1947, as compared with the revised figure of 2 847 million units in the corresponding month of 1946, representing a decrease of 80 million units, or 2.8 per cent. During the past eight months of 1947 (i.e., up to the end of August) the total number of units generated by authorised undertakers was 27 289 million units, as compared with the revised figure of 26 093 million for the corresponding period of 1946, an increase of 1 196 million units, or 4.6 per cent. The total number

of units sent out from the generating stations of authorised undertakers during August, 1947 (i.e., units generated, less units consumed in the stations by auxiliary plant and for lighting, etc.), was 2 603 million units, as compared with the revised figure of 2 680 million units in the corresponding month of 1946, a decrease of 77 million units, or 2.9 per cent. During the past eight months of 1947 (i.e., up to the end of August) the total number of units sent out was 25 743 million, as compared with the revised figure of 24 604 million units for the corresponding period of 1946, representing an increase of 1 139 million units, or 4.6 per cent.

**Hackney.**—The result of the year's working, as shown in the accounts for the year ended March 31, 1947, was a net surplus of £41 033, compared with £15 281 in the previous year. This surplus, added to a balance brought forward of £38 189, gives a total of £79 222 available for appropriation, of which £40 000 has been transferred to reserve fund and £14 447 appropriated for relief of rates. The

gross revenue from sales in the Hackney supply area amounted to £613 704, compared with £531 659, an increase of 15.5 per cent. The Borough Electrical Engineer (Mr. E. A. Mills) reports that the number of units sold increased from 83 825 463 to 100 330 900, an increase of 19.7 per cent., while gross revenue received per unit was 1.47d., a rise of .05d. on the previous year. Works costs per unit generated were .5920d., compared with .5735d., and the average selling price, less discount, was 1.418d. per unit, compared with 1.470d. in 1945-46, and 1.307d. in 1939-40. During the year, units generated totalled 224 683 500 (168 683 300) and units sent out totalled 212 763 220 (159 157 277), of which 95 873 520 units (62 339 477) were exported to the C.E.B. and the Stoke Newington Borough Council. The number of consumers, at 51 527, was the highest figure yet reached in the undertaking and the maximum demand, similarly, at 44 900 kW, compared with the previous highest figure of 38 100 kW in 1945-46. The undertaking load factor was 36.35 per cent.

## Generating Plant Extensions

The Electricity Commissioners have now approved of the C.E.B. making arrangements with authorised undertakers concerned in respect of a substantial portion of the 1951 and 1952 programmes. Below is given a list of generating plant and boilers for which arrangements have been made since January 1, 1947.

AREA	STATION	OWNERS	DETAILS OF EXTENSIONS	
			Gen. plant (kW)	Boilers (lb./hr.)
Scotland ...	Portobello ...	Edinburgh Corp. ...	1 × 60 000	1 × 540 000
N.W. England and N. Wales	Warrington ...	Warrington Corp. ...	1 × 20 000	1 × 200 000
	Carrington ...	Manchester Corp. ...	1 × 60 000	1 × 360 000
	Westwood ...	Wigan Corp. ...	1 × 30 000	1 × 300 000
	Bolton ...	Bolton Corp. ...	1 × 30 000	2 × 180 000
	Whitebirk ...	Blackburn Corp. ...	1 × 1 250*	—
	Chadderton ...	Oldham Corp. ...	1 × 40 000	3 × 150 000
	Clarence Dock ...	Liverpool Corp. ...	1 × 60 000	2 × 360 000
			1 × 50 000	2 × 350 000
Mid-E. England			1 × 1 500*	—
	Sculcoates ...	Kingston-upon-Hull Corp. ...	1 × 30 000	2 × 190 000
	Skelton Grange ...	Leeds Corp. ...	1 × 60 000	1 × 550 000
	Keadby† ...	C.E.B. ...	3 × 60 000	3 × 550 000
	Lincoln ...	Lincoln Corp. ...	2 × 20 000	4 × 120 000
	Thornhill ...	Yorkshire E.P. Co. ...	1 × 45 000	4 × 180 000
Central England	Hardingstone ...	Northampton E.L.P. Co. ...	1 × 30 000	2 × 190 000
	Stourport ...	Shrops., Worcs. and Staffs. E.P. Co. ...	1 × 60 000	1 × 525 000
	Staythorpe ...	Derby and Notts. E.P. Co. ...	1 × 60 000	3 × 240 000
	Walsall ...	West Midlands J.E.A. ...	2 × 30 000	3 × 150 000
	Meaford ...	N.W. Midlands J.E.A. ...	2 × 60 000	4 × 360 000
S.E. and E. England	Fulham ...	Fulham B.C. ...	1 × 60 000	—
	Littlebrook ...	Kent E.P. Co. ...	2 × 60 000	4 × 360 000
	Rye House ...	Northmet Power Co. ...	2 × 30 000	2 × 330 000
			2 × 2 000*	—
	Hackney ...	Hackney B.C. ...	2 × 30 000	4 × 190 000
Battersea ...	Battersea B.C. ...	1 × 30 000	2 × 190 000	
Bankside‡	City of London E.L. Co. ...	2 × 60 000	4 × 360 000	
S.W. England and S. Wales	Plymouth ...	Plymouth Corp. ...	1 × 30 000	—
			1 × 1 250	—
	Portsmouth ...	Portsmouth Corp. ...	1 × 30 000	2 × 190 000
	Poole ...	Bournemouth and Poole E.S. Co. ...	1 × 50 000	2 × 300 000
	Usk Mouth†	Newport Corp. ...	6 × 60 000	12 × 360 000
Carmarthen Bay...	Llanely and Dist. E.S. Co. ...	2 × 60 000	4 × 360 000	

\* Auxiliary sets; † new stations; ‡ cancelling a previous direction for 2 × 50 000 kW sets and 4 × 300 000 lb./hr. boilers.

# Company News

WALSALL CONDUITS, LTD.—Int. div. of 20%, less tax (same), on ord. for year to Aug. 29, 1947. Payable Oct. 1, 1947.

COUNTY OF LONDON ELECTRIC SUPPLY CO., LTD.—Int. div. of 3% actual, less tax (same), on ord. for year to Dec. 31, 1947. Payable Sept. 29, 1947.

BOURNEMOUTH AND POOLE ELECTRICITY SUPPLY CO., LTD.—Int. div. of 5% actual, less tax (same), on ord. for year to Dec. 31, 1947. Payable Sept. 29, 1947.

SOUTH LONDON ELECTRIC SUPPLY CORP., LTD.—Int. div. of 3% actual, less tax (same), on ord. for year to Dec. 31, 1947. Payable Oct. 15, 1947.

ASSOCIATED ELECTRICAL INDUSTRIES, LTD.—An interim dividend of 5%, less tax, will be paid on the ordinary stock on account of the year 1947 to stockholders registered on the books of the company on September 22, 1947.

DUBILIER CONDENSER CO. (1925) LTD.—Net prft. to Mar. 31, subject to final audit, £22 578 (£29 822), after provdg. for inc. tax £15 000 (£21 000). Ord. div. 20% (same); fwd. £32 687 (£24 076).

GREAT NORTHERN TELEGRAPH CO.'S HOLDING CO., LTD.—Rept. for yr. ended June 30 shows div. on shs. of Gt. Northern Telegraph Co. £75 000 (£90 000), plus int. £2 249 (£1 024), less workg. expd. £155 (same, bank comm. £220 (£64), dirs.' fees £207 (£194), taxes £22 200 (£28 560), div. 13% (15%), fwd. £125 (£48).

EAST AFRICAN POWER AND LIGHTING CO., LTD.—Income 1946 £233 026 (£210 845). After exes., deprecn., loose assets and stores, etc., net rev. before tax £195 738 (£184 663). To taxn. £5 559 (£14 410), deprecn. acct. £42 928 (£48 574), gen. res. £15 000 (same), devpt. res. £25 000 (nil), prelim. devpt. exes. written off £6 980 (nil). Pref. div. £21 000 gross (same), fin. ord. div. 4%, mkg. 7% (same), fwd. £69 072 (£67 734). Consd. rev. acct. shows total income £290 416 (£279 177) and net rev. £237 940 (£236 016) and consd. blice. sheet curr. assets £796 715 (£900 710) and curr. liab. £202 824 (£186 276).

W. G. ALLEN AND SONS (TIPTON), LTD.—Presiding at the annual meeting, Mr. Albert Weddell (joint managing director) said the company had the biggest order book which they had ever had in peacetime. This could be increased considerably, however, if additional labour and materials could be easily obtained. Unfortunately, they were short of men, both skilled and unskilled, and it was very difficult to obtain additional workpeople. They were doing the utmost they could, but it seemed like scraping the bottom of the

barrel of manpower. It was obvious, Mr. Weddell commented, that in a business such as theirs shorter working hours and a shorter working week in the engineering trade must result in a smaller output from a given number of men.

STRAND ELECTRIC HOLDINGS, LTD.—Strand Electric Holdings Co., is to pay on Oct. 20, a div. of 17½%, less tax, against 12½% (including 2½% bonus) for each of the past three years. To facilitate preparation of consolidated accounts, the holdings' accounts for the last financial period have been made up to April 30, 1947, instead of July 11, 1947, and in future the financial year of the holdings company will be the same as that of the operating company (Strand Electric and Engineering Co.)—namely: May 1 to April 30. Although the holdings accounts cover less than ten months the operating company's (from which the holdings company derives the whole of its revenue) covers a full year's trading. Net profit of the operating company, after charging E.P.T. and profits tax, but not income-tax, for the year to April 30, 1947, amounts to £31 575, which compares with £19 983. Transfer to reserve is £7 000—£4 000 from profits and £3 000 from tax surplus. Gross dividend for the holdings company is £22 245, which compares with £16 569. The holdings company's carry-forward is raised from £3 549 to £4 428.

FISHER AND LUDLOW, LTD.—Reviewing the activities of the company at the recent annual meeting, Maj. E. Beddington Behrens (chairman) said he was pleased to report great progress in the manufacture of the Bendix home laundry, the only completely automatic washing machine being produced in this country. It was being marketed at home and abroad by Bendix Home Appliances, Ltd., in which company they had a substantial holding. They were hoping to overcome certain shortages in supply so as to accelerate production to meet the enormous demand for this labour saving product. One interesting feature of this machine was its introduction in the form of factory launderettes as an additional welfare factor to increase production. About 78 per cent. of the washing was at present done in the home. If the woman worker were able to have her washing done at the factory for a nominal sum, she would not only be relieved of an arduous household drudgery but factory absenteeism, due to the wash-day would be greatly reduced.

# Commercial Information

## Adjudications

KEENE, Henry John, trading as Bush Tool and Supply, 38, Fairlawn Avenue, Chiswick, W.4, London, carrying on business at 33, Park Road, North Acton, W.3, electrical manufacturer. Court: Brentford. Date of Order: Aug. 26, 1947. Date of Filing Petition: Aug. 14, 1947.

HARVEY, Ernest, residing at 211, Balsall Heath Road, Birmingham, Warwick, and formerly carrying on business as an electrical contractor, at 211, Balsall Heath Road, Birmingham, and 104, Darlston Road, Kings Hill, Wednesbury, Stafford, under the name or style of "Harvey Radio," and also carrying on business in partnership with another as electrical contractors, at 159, Bristol Street, Birmingham, under the name or style of "Raydex Electrical Service Co." Court: Birmingham. Date of Order: Aug. 29, 1947. Date of Filing Petition: July 11, 1947.

MARROW, Egbert, residing at 131, King Street, Knutsford, and carrying on business at 123, King Street, Knutsford, Chester, under the style of "Marrows Radio Service," electrical and radio engineer. Court: Manchester. Date of Order: Aug. 28, 1947. Date of Filing Petition: Aug. 28, 1947.

## First Meeting

BRADLEY, John Fox, 39, Mackenzie Road, Holloway, London. Electrical engineer. Court: High Court of Justice. Date of First Meeting: Sept. 17, 1947, 11 a.m. at the Bankruptcy Buildings, Carey Street, London, W.C.2. Date of Public Examination: Nov. 6, 1947, 11 a.m., at the Bankruptcy Buildings, Carey Street, London, W.C.2.

## 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.

ROBINSON, S. R. (male), 6, Margrett Road, St. Pauls, Cheltenham, electrician. £49 15s. 3d. June 24.

COPE, R. L. (firm), 112, London Road, Broadway, Dunton Green, electric dealers. £15 7s. June 17.

MODERN LIGHTING CO. (firm), 21, Victory Avenue, Chase Terrace, electrical sundriesmen. £25 19s. 6d. June 12.

## Coming Events

### Saturday, September 20

I.E.E., N. MIDLAND STUDENTS' SECTION.—Leeds. At the Electricity Department Offices, Whitehall Road. Chairman's address, "The Electrical Layout and Equipment of Colliery Surface Plant," by H. Moorhouse. 2.30 p.m.

I.E.E., S. MIDLANDS STUDENTS' SECTION.—Ramble from Hampton-in-Arden to Chadwick End. 9.30 a.m.

### Monday, September 22

I.E.E., S. MIDLAND CENTRE, RADIO GROUP.—Birmingham. Chairman's address by E. May. 7 p.m.

E.L.M.A. LIGHTING SERVICE BUREAU.—Birmingham. At the Electricity Showrooms, Paradise Street. Illumination Design Course. 9.15 a.m.

### Wednesday, September 24

BRITISH ELECTRICAL DEVELOPMENT ASSOCIATION, MID-EAST ENGLAND AREA.—Scarborough. At the Public Library, Vernon Road. Commencement of Autumn Two-Day Conference. Programme includes "Fluorescent Lighting Practice," by W. J. Jones. 2.30 p.m.

### Thursday, September 25

BRITISH ELECTRICAL DEVELOPMENT ASSOCIATION, MID-EAST ENGLAND AREA.—Scarborough. At the Public Library, Vernon Road. Conclusion of Autumn Conference. Proceedings include "Space Heating by Electricity—Economics and Policy," by G. F. Moore. 10.30 a.m.; "Full Farm Electrification," by C. A. Cameron Brown. 2.30 p.m.

### Friday, September 26

ILLUMINATING ENGINEERING SOCIETY, BIRMINGHAM CENTRE.—Rugby. Special Meeting.

## Metal Prices

	Monday	September 15		
	Price	Inc.	Dec.	
<b>Copper—</b>				
Best Selected ... ..	per ton	£130 10 0	—	—
Electro Wire bars ... ..	"	£132 0 0	—	—
H.C. Wires, basis ... ..	"	£149 10 0	—	—
Sheet ... ..	"	£173 10 0	—	—
<b>Bronze Electrical quality</b>				
<b>1% Tin—</b>				
Wire (Telephone) basis	per ton	£172 5 0	—	—
<b>Brass (80/40)—</b>				
Rod basis ... ..	per lb.	1s. 1½d.	—	—
Wire ... ..	"	1s. 6½d.	¾d	—
<b>Iron and Steel—</b>				
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	—	—
<b>Lead Pig—</b>				
English ... ..	"	£91 10 0	—	—
Foreign or Colonial ... ..	"	£90 0 0	—	—
<b>Tin—</b>				
Ingot (minimum of 99.9% purity) ... ..	"	£442 10 0	—	—
Wire, basis ... ..	per lb.	5s. 6¾d.	—	—
Aluminium Ingots ... ..	per ton	£80 0 0	—	—
Spelter ... ..	"	£70 0 0	—	—
Mercury (spot) ... ..	per bott.	£16 0 0	—	—
<i>(ex. warehouse)</i>				

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



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For Gas Tubes - Sizes :  $\frac{1}{2}$ ",  $\frac{3}{4}$ "

For Lead Pipes - Size : 15/16"

Details of 'Metway' full range of Earth Clips is given in LIST No. : OE. 31/E.

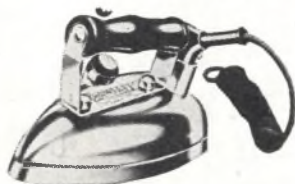
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### ELECTRICAL APPLIANCES

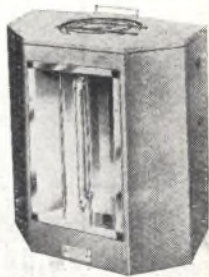
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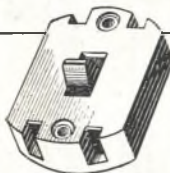
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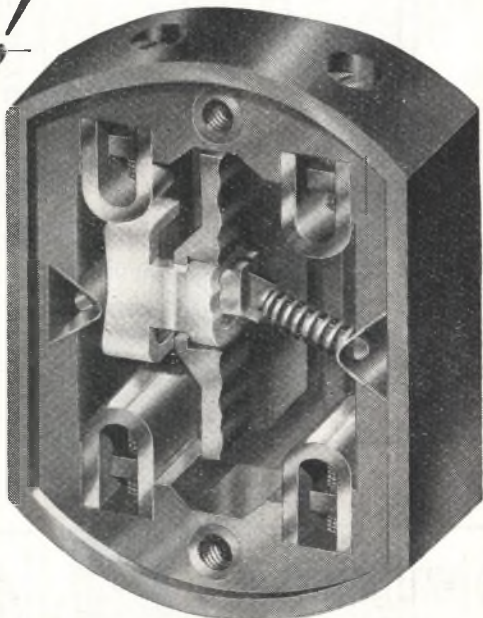
# NOW-A SWITCH WITH ALL THE FEATURES YOU HAVE SOUGHT!



The above shows the basic Hi-Craft switch body which is incorporated with Surface and Flush switch and switched socket covers.

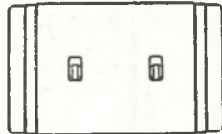
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- No exposed metal parts.
- External wiring applied direct to contact surfaces.

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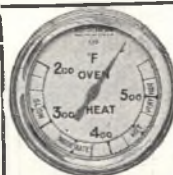
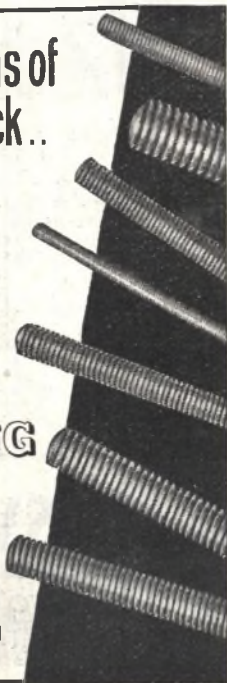
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Illustration above in section clearly shows the wide margin of safety inherent in the 'NETTLE' design. Below are illustrated models from the range.

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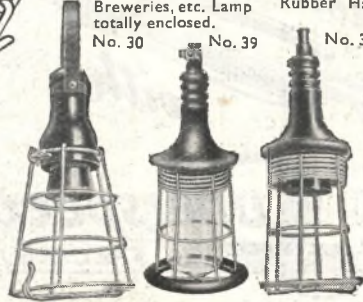
No. 39. Watertight. Suitable for use in Breweries, etc. Lamp totally enclosed.

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No. 31. Reflector Type.

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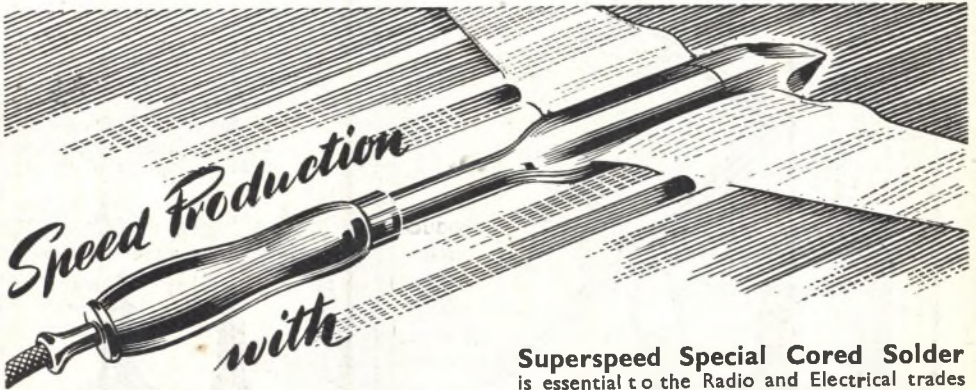
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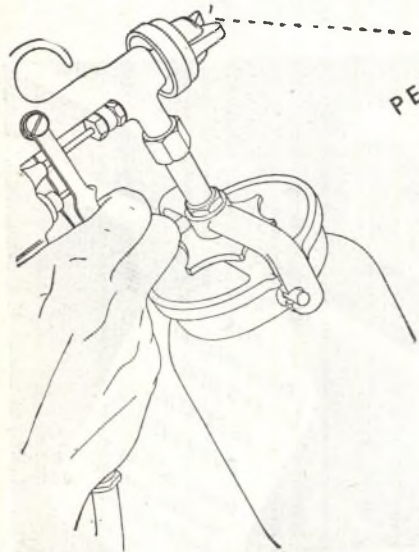
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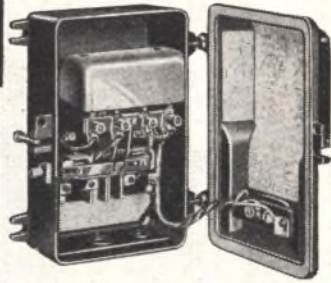
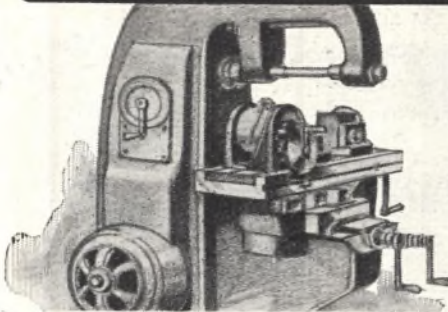
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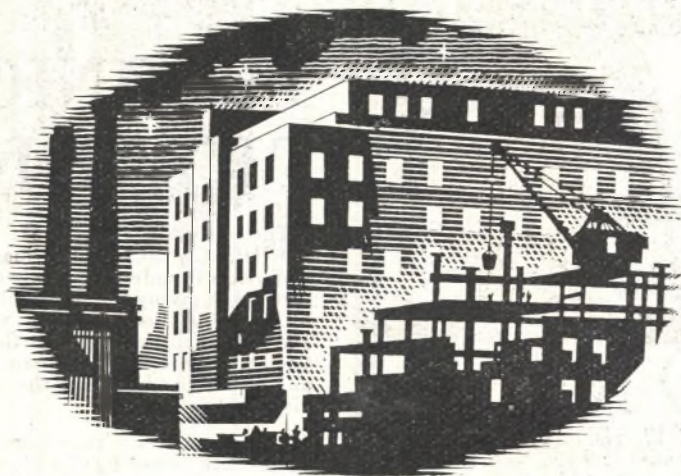
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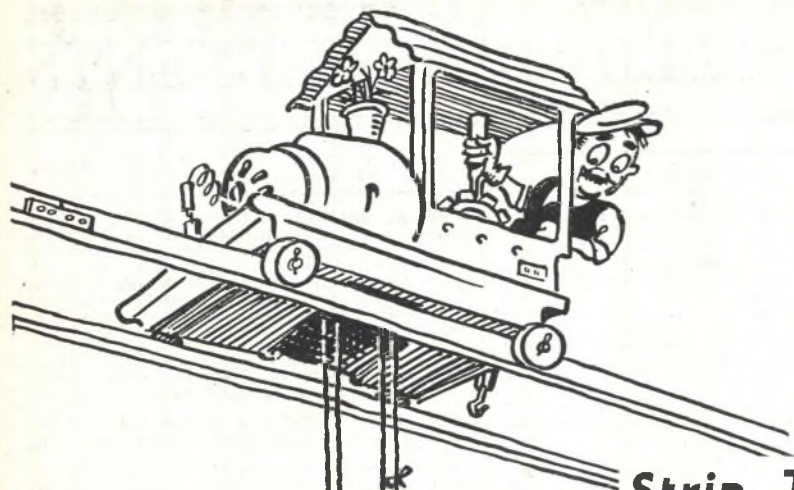
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## TENDERS

### 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 Saturday, October 4th, 1947.

Town Hall,  
ACCRINGTON,  
September 9th, 1947.

P. D. WADSWORTH,  
Town Clerk.

(164)

## SITUATIONS VACANT

### CITY OF MANCHESTER ELECTRICITY DEPARTMENT.

APPLICATIONS are invited for the position of Resident Engineer at Barton Power Station, at a salary in accordance with Class K, Grade 3, of the N.J.B. Schedule (£839 per annum, rising by two biennial increments to £877 per annum), together with the free tenancy of a house situated near the Power Station (equivalent to £50 per annum for superannuation purposes).

Candidates must have had a good engineering training followed by experience in the operation and maintenance of plant in large selected stations. They should possess administrative ability and be Corporate Members of either the Institution of Electrical Engineers and/or the Institution of Mechanical Engineers.

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

Application (on a form to be obtained from Mr. R. A. S. Thwaites, Chief Engineer and Manager) should be endorsed "Resident Engineer," and addressed to the Chairman of the Electricity Committee, Town Hall, Manchester, 2, and be received not later than 10 a.m. on Monday, October 6th, 1947.

Canvassing, directly or indirectly, will disqualify.  
PHILIP B. DINGLE,  
Town Clerk.  
Town Hall,  
MANCHESTER,  
September, 1947.

(166)

### IMPERIAL CHEMICAL INDUSTRIES LTD. WILTON WORKS.

Advertisement—Ref. No. ICI/X/32.

**CONSTRUCTION MANAGER.** IMPERIAL CHEMICAL INDUSTRIES LTD., WILTON WORKS, invite applications for the senior appointment of CONSTRUCTION MANAGER. The successful candidate will be directly responsible to the Chief Engineer for construction of a new chemical works, involving the setting up of a complete organisation, and the execution of the civil, mechanical and electrical work by Contractors and direct labour. He must be fully conversant with modern methods of construction, and control of large numbers of men. Considerable experience in this or similar types of construction work is essential.

The successful candidate will be appointed to the established staff. Applications, giving full details, should be submitted to the Personnel Manager, I.C.I. Wilton Works, P.O. Box 54, Middlesbrough, quoting advertisement reference No. ICI/X/32. (165)

## SITUATIONS VACANT

**IMPERIAL CHEMICAL INDUSTRIES LTD., WILTON WORKS** require **DRAUGHTSMEN** to assist with the design and detailing of a large new works. Successful candidates will be appointed to the established staff. Preference will be given to applicants who hold the Higher National Certificate or higher qualification and have the appropriate experience, as follows:

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**ARCHITECTURAL:** Design of offices, laboratories, houses, welfare and general industrial buildings.

**CIVIL:** Design of roads, railways, drains and water services.

**STRUCTURAL:** Design of buildings and structures, and design and detailing of reinforced concrete work for industrial buildings.

**MECHANICAL:** Design of pipework for steam, gas and water, compressed air stations, lay-out of chemical plant, etc.

**POWER STATION:** Design and lay-out of modern h.p. boiler plant and power plant.

**ELECTRICAL:** Lay-out of plant electrical installations, including motors, starters, distribution boards, cables and lighting, and necessary calculations.

**INSTRUMENT:** Lay-out of mechanical and electrical instrument installations for chemical plant. Preference for men experienced in modern automatic control instruments for temperature pressure and flow.

Applications, giving full details, should be submitted to the Personnel Manager, Imperial Chemical Industries, Ltd., Wilton Works, P.O. Box 54, Middlesbrough, Yorks., quoting advertisement reference ICI/X/29. (130)

### METROPOLITAN BOROUGH OF ISLINGTON.

#### Electricity Department.

#### APPOINTMENT OF TECHNICAL ASSISTANT.

APPLICATIONS are invited from Corporate Members of the Institution of Electrical Engineers for the above permanent appointment at a salary in accordance with Class G, Grade 5, of the National Joint Board Schedule, at present £601 13s., rising to £634 4s. per annum, and having a good experience of the following:—

- The operation and maintenance of a large transmission system not less than 33 kV and preferably underground.
- The carrying out of short circuit calculations on an extensive scale.
- The preparation of estimates, specifications and technical reports.

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

Application forms for the above position may be obtained from the Engineer and General Manager, Electricity Department, 341-3, Holloway Road, London, N.7, and should be completed and returned to him endorsed "Technical Assistant," not later than noon on October 8th, 1947.

H. DIXON CLARK,  
Acting Town Clerk.  
Town Hall,  
Upper Street,  
LONDON, N.1. (174)

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

## SITUATIONS VACANT

**DRAUGHTSMAN** wanted for West London area, with experience of electricity meters and/or instrument work. Write stating age and experience.—Box L.G.O., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4. (148)

**ELECTRICAL Wholesalers** require competent Representative with car to cover London and part of Home Counties. Must have good connections and references. Excellent commission basis only.—Apply: Box L.G.C., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4. (113)

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**A NUMBER** of New Switchboards from surplus disposed at low prices: 25 for 110 v. D.C. 5/20 amps., complete; 25 for use with alternators up to 5 kW, 230/300 v., 1-ph., 50 cycles, with automatic voltage regulators. All panels complete with costly apparatus.—Full details from: The Electroplant Co., Wembley, Middlesex. (120)

**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. (150)

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**ALTERNATORS**, all sizes from 2-120 kVA, for quick delivery.—Apply to: The Electroplant Company, Wembley, Middlesex. (119)

**AVAILABLE** 1½ million (1,500,000) yards Electric Cable Twin Flat 3/029 250volts. T.B. & C. Brand new. Low price quantities. Also 8 million yards Covering, 400 types and sizes.—Box 5001, Magna, 82-94, Seymour Place, London, W.1. (169)

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

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**ELECTRIC MOTORS**, limited quantity Crompton Parkinson ¼ to 4 h.p. 220/230 v. D.C., with Starters, Flameproof Switches and Thermostats. In lots or separately.—Box L.G.U., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4. (180)

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

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**LARGE variety Single, Two and Three-core P.V.C. Wire** and Cable; also P.V.C. Slewing, at bargain prices. All sizes stocked.—**R. Lowther**, 8, Paton Street, Manchester, 1. (145)

**MERCURY Switches**, all types. For details apply manufacturers, Quicksilver Tube Mfg. Co., The Grays, High Street, Harlington, Middlesex. (60)

**METRO-VICK Mains Transformers**, new and unused, ex-Ministry of Supply, 4 kVA, oil-filled, input 230 v., 50 cycles, output 18 000 v. packed in manufacturer's crate, £15 carr. fwd.; 3½ kVA, oil-filled, input 230 v., 50 cycles, output 21 000 v., £15 carr. fwd. Substantial discounts can be given for quantity orders.—Wireless Instruments (Leeds) Ltd., 54-56, The Headrow, Leeds, 1. Tel. 22262. (66)

**MODERN Low Temperature Oven** by Birlec Ltd., thermostatically controlled and complete with all equipment. Internal size of oven 4 ft. 9 in. by 3 ft. by 3 ft. Type No. 1617, 24 kW, 400 v., 35 amps., 3-phase, 50 cycles. Temperature range 400° C. Condition as new. Inspection.—Commercial Structures Limited, Staffa Works, Staffa Road, E.10. (123)

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**ROD FIRE ELEMENTS** and ceramic rods from 750 w. to 1 000 w., 110 v. to 250 v., 9 in. to 12 in., constant supplies. Good delivery, suitable for export. Clip in and screw in types. Best quality guaranteed, keenest prices. Manufacturers and wholesale trade only. Rods made to requirements. Cheapest and best on the market. Samples by request.—Sole Agent: Richard Voss, 6, Merton Way, Hillingdon, Middlesex. (59)

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

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SWITCHPLUGS, 15 amp., 3-pin. We are now accepting orders for delivery December-January. Price on application. All other types of accessories held in stock. Write for our 1948 price list.—L. Benn & Co., Ltd., 81, City Road, London, E.C.1. (178)

TIME SHEETS. Our stock-printed Time Sheets are remarkably cheap compared with specially printed ones. On decent quality, 3 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. (16)

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

15 × 3 SWITCHPLUGS. All sizes Switchplugs, Sockets, Plugtops, Multiplugs, Switches, Lampholders, Button-holder, Junction Boxes, Ceiling Roses, Adaptors, Connectors, Elements, etc. Immediate delivery.—Douglas Turner Ltd., 13a, Edge Street, London, W.8. (157)

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19 SEPTEMBER 1947

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## PATENTS

THE Proprietors of British Patents Nos. 562713 for "IMPROVEMENT IN AND RELATING TO MOUNTING MEANS AND GEARING MECHANISM FOR MAGNETO-ELECTRIC MACHINES," 562951 for "IMPROVEMENT IN AND RELATING TO MAGNETO-ELECTRIC MACHINES," and 562952 for "IMPROVEMENT IN AND RELATING TO MAGNETO-ELECTRIC MACHINES AND METHOD OF MAKING THE SAME," desire to enter into negotiations with a Firm or Firms for the sale of the patents, or for the grant of licences thereunder.—Further particulars may be obtained from: **MARKS & CLERK, 57 and 58, Lincoln's Inn Fields, London, W.C.2.** (175)

THE Proprietors of British Patent No. 538147 for "IMPROVEMENTS IN AND RELATING TO WOUND CONDENSERS AND CONDENSER TYPE INSULATORS," desire to enter into negotiations with a Firm or Firms for the sale of the patent, or for the grant of licences thereunder.—Further particulars may be obtained from: **MARKS & CLERK, 57 & 58, Lincoln's Inn Fields, London, W.C.2.** (167)

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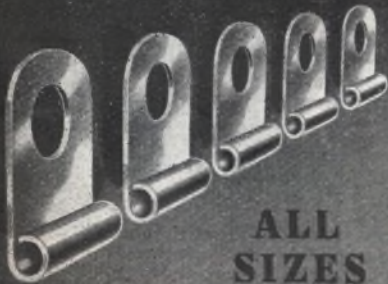
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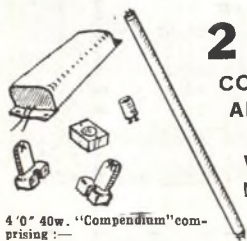
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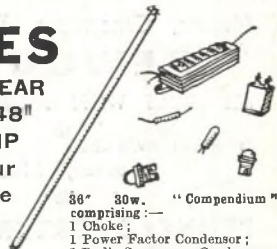
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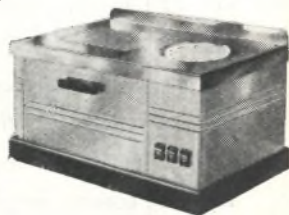
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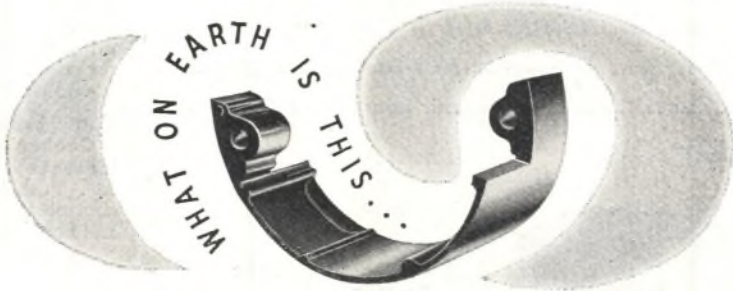
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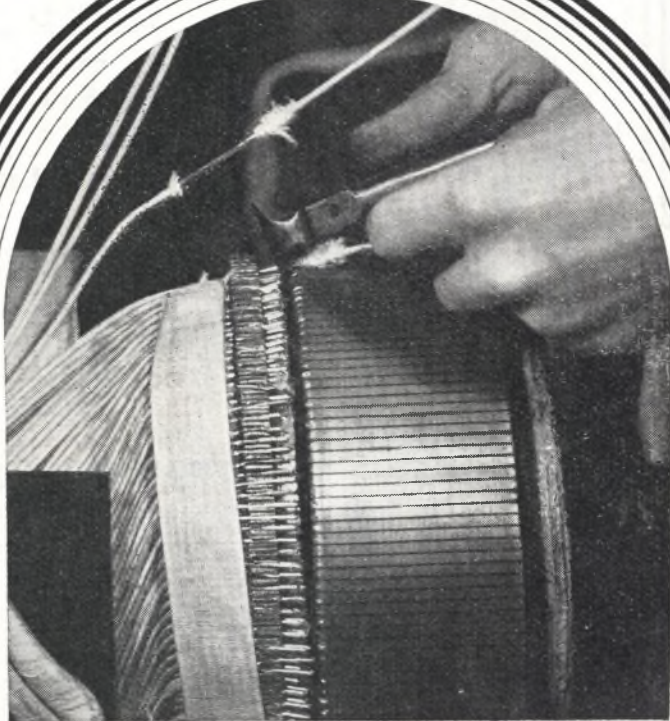
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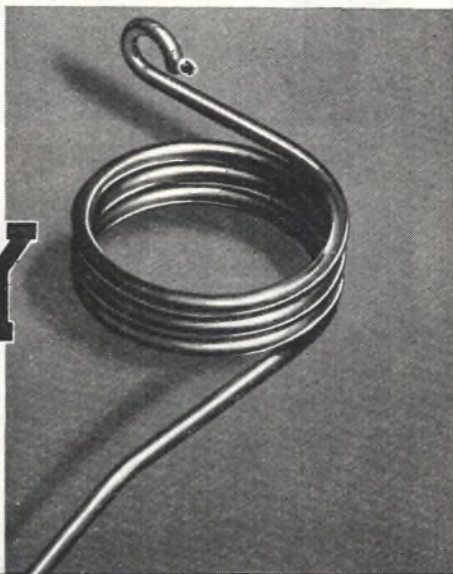
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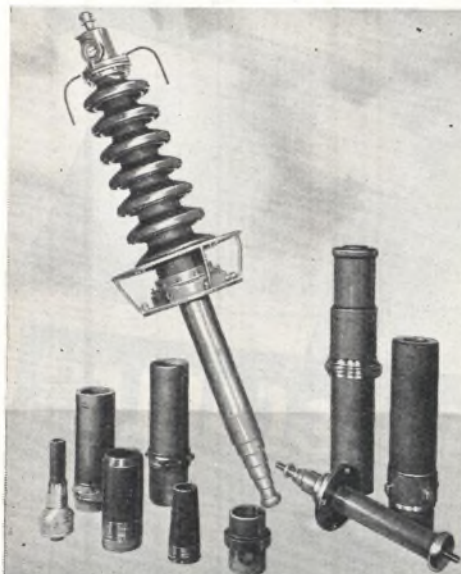
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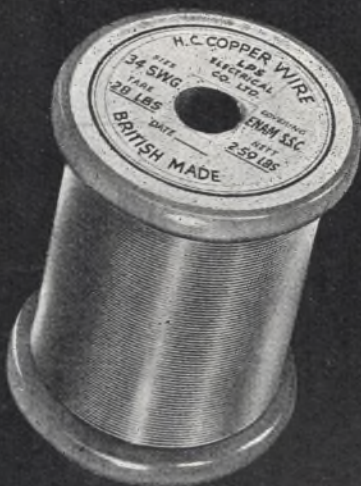
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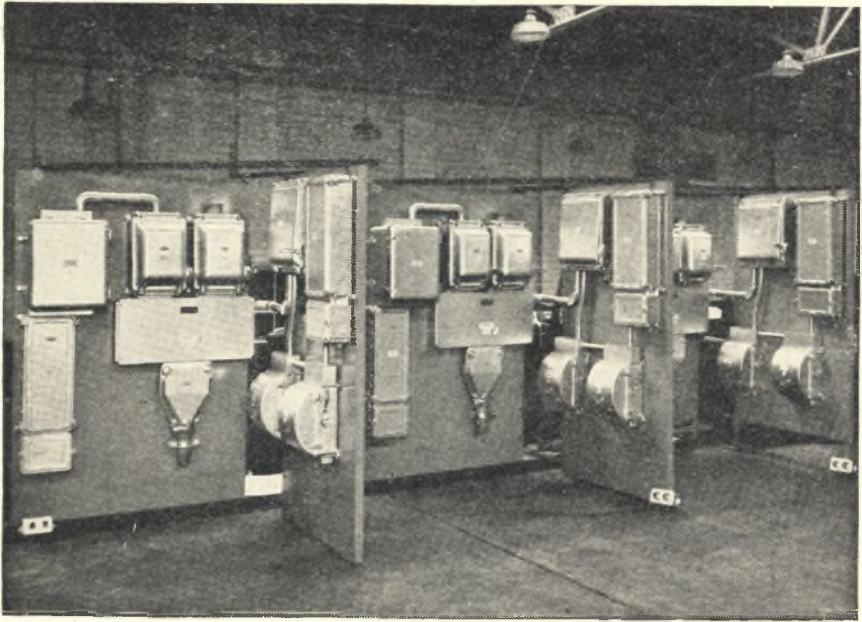
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