

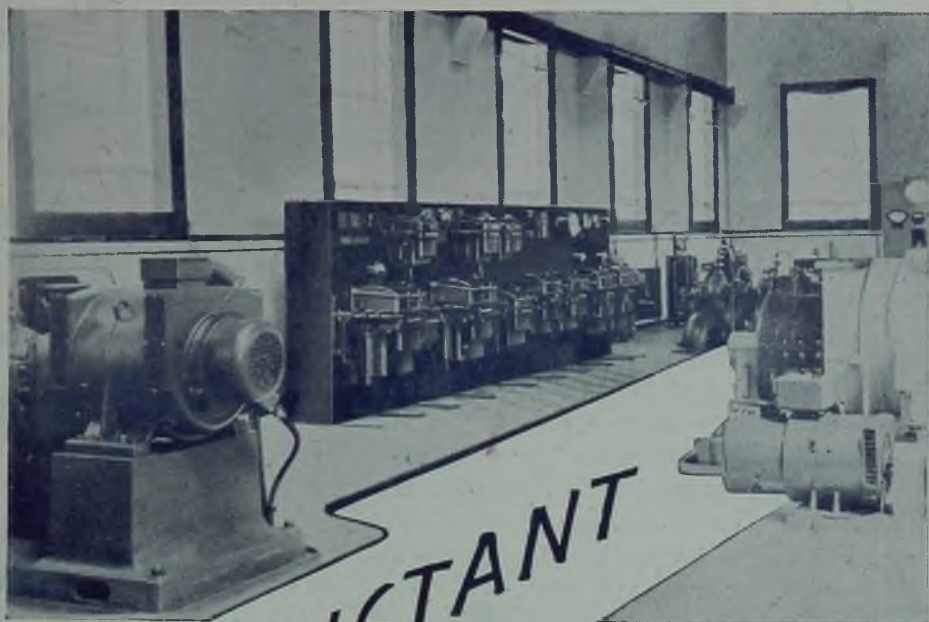
# ELECTRICAL REVIEW

FOUNDED  
1872

Vol. CXXXVII. No. 3542

OCTOBER 12, 1945

9d. WEEKLY



INSTANT

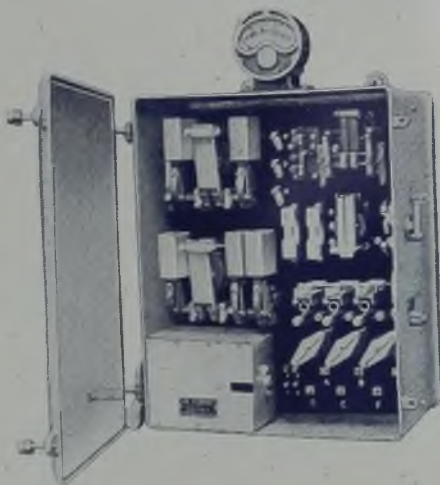
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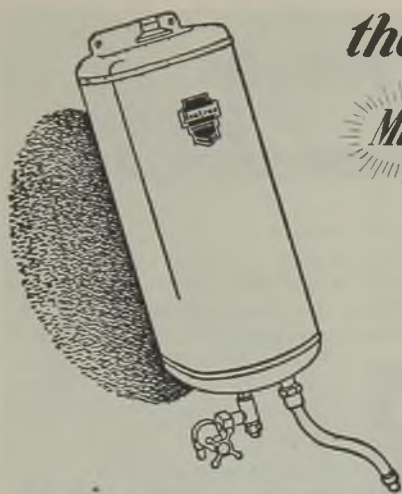
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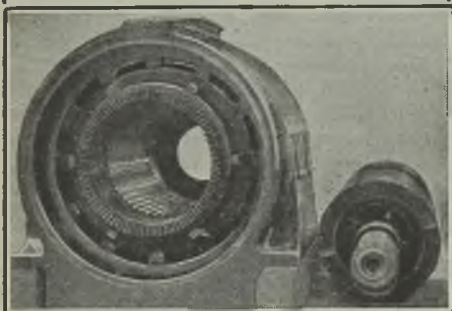
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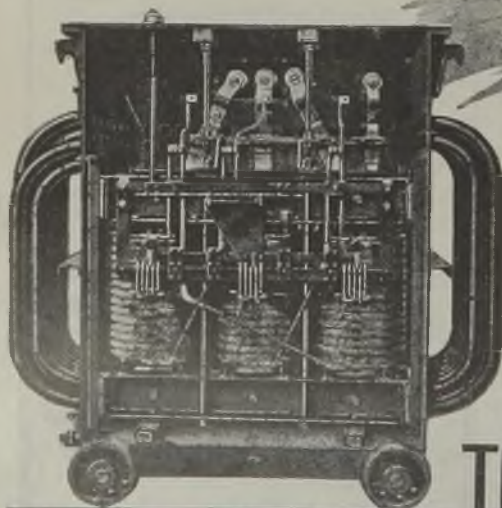
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## *Inside - Information*




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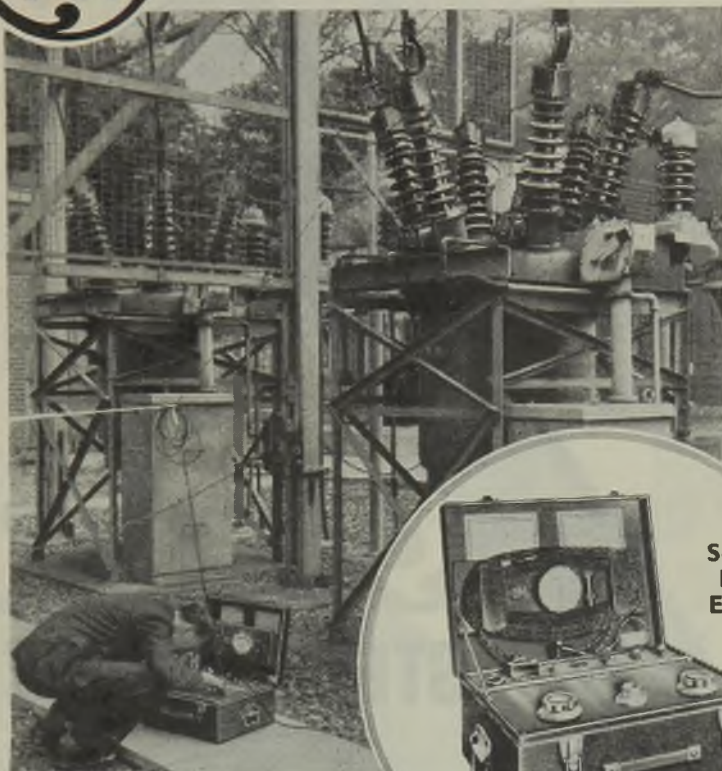
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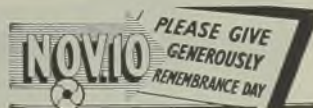
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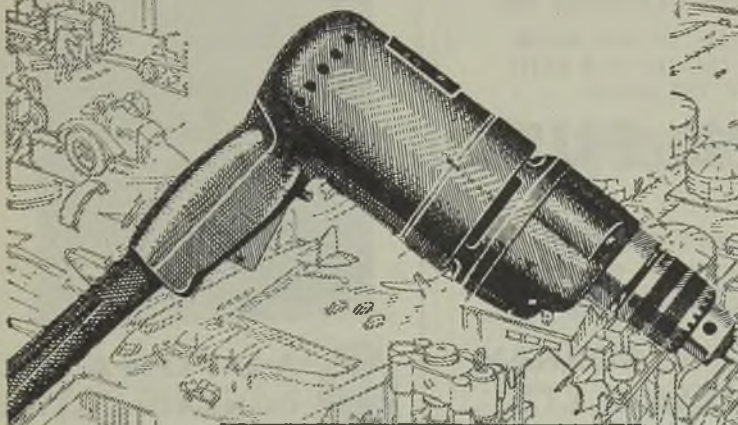


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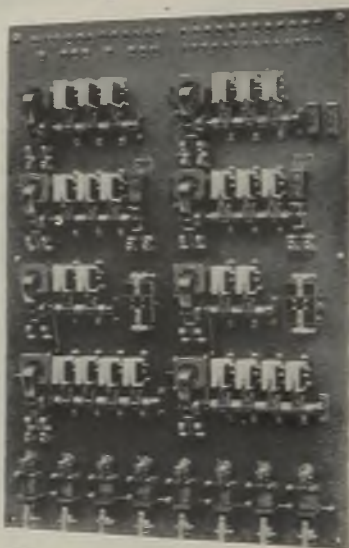
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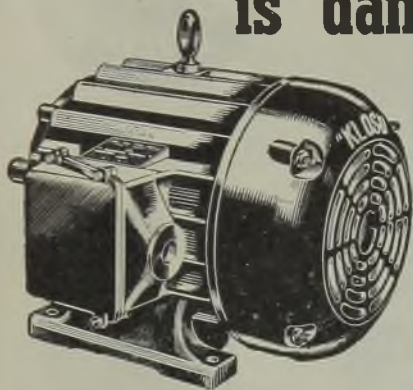
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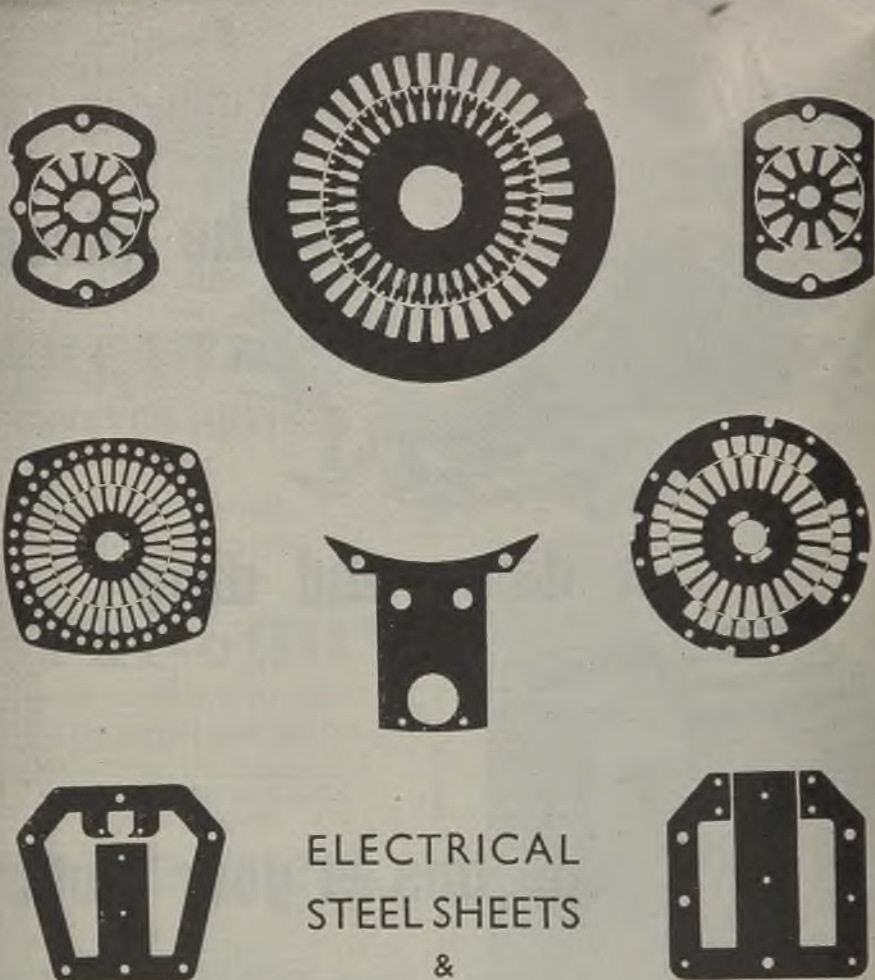
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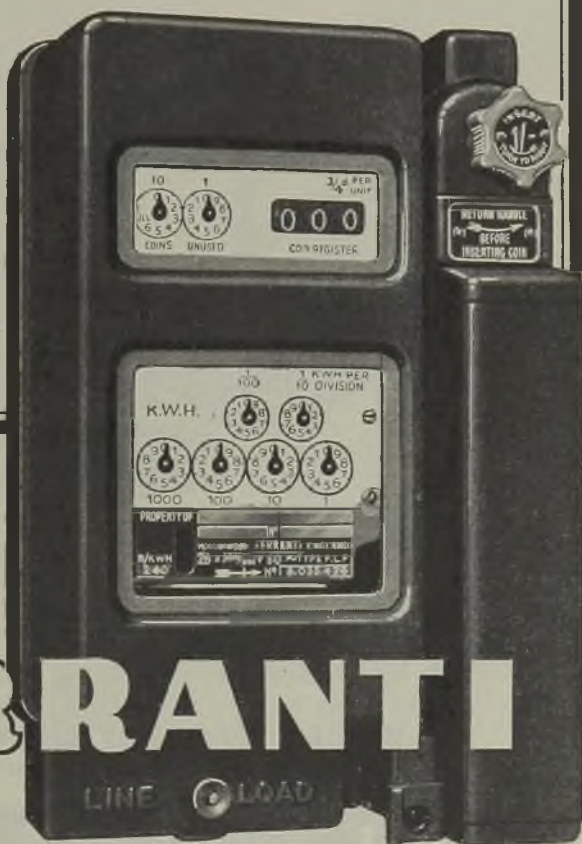
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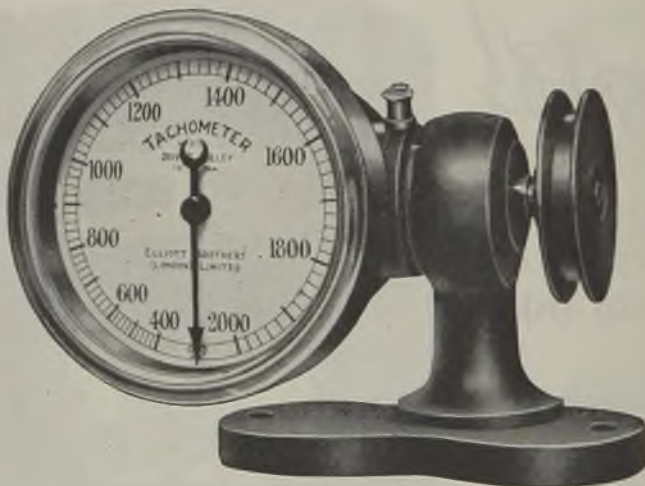
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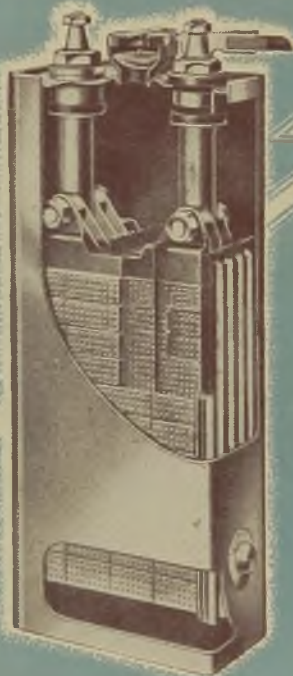
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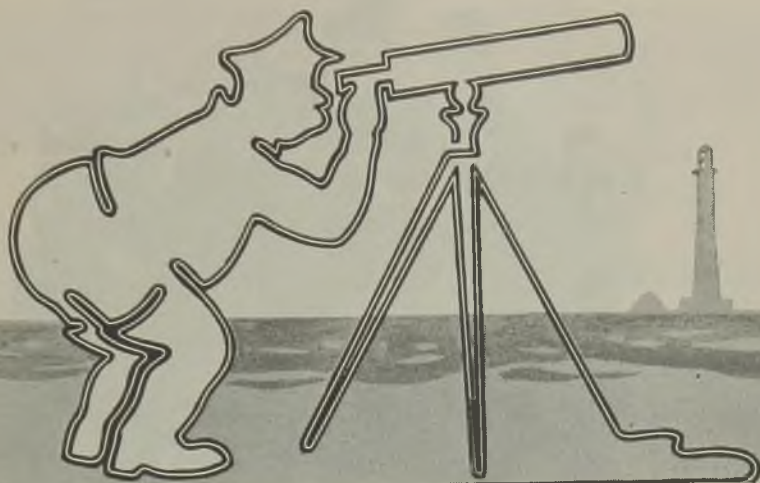
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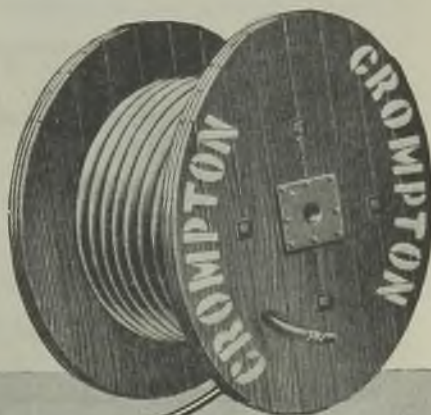
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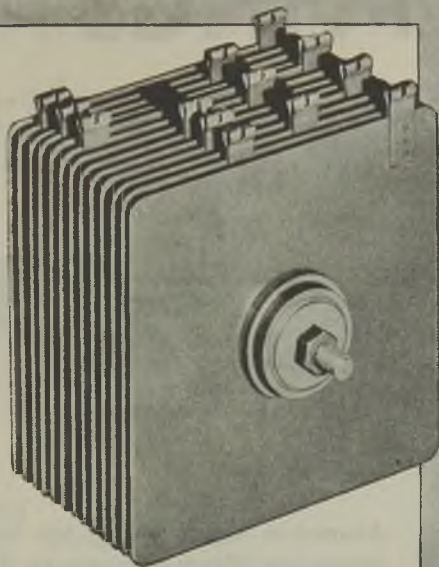
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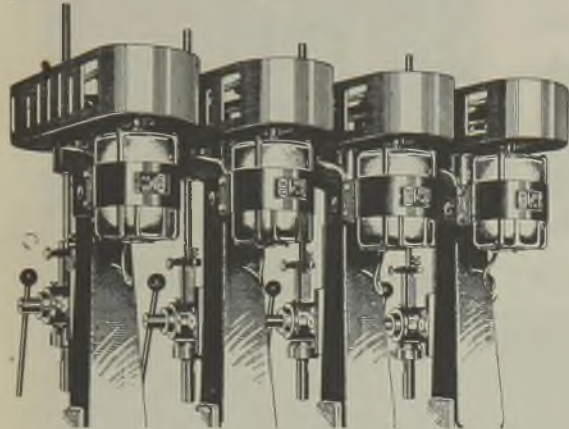
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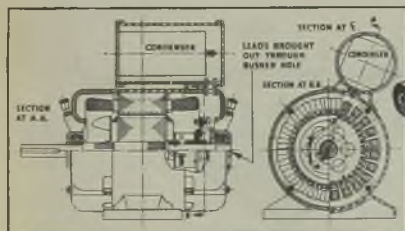
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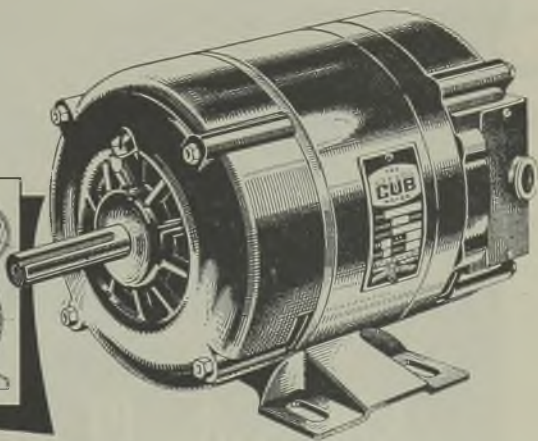
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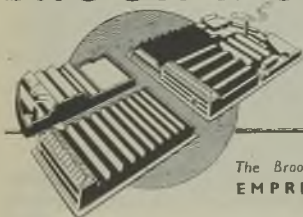
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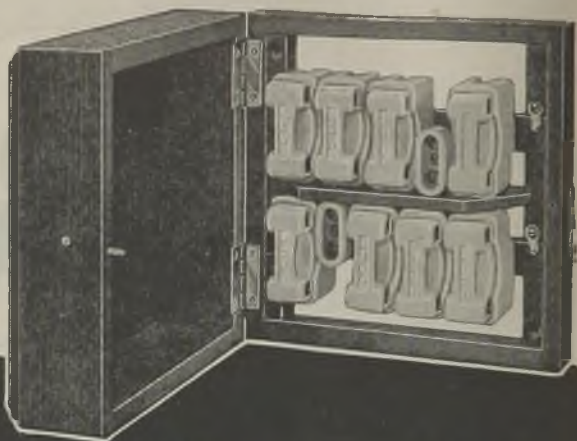
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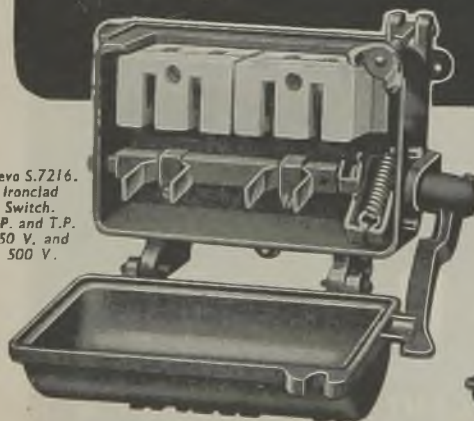
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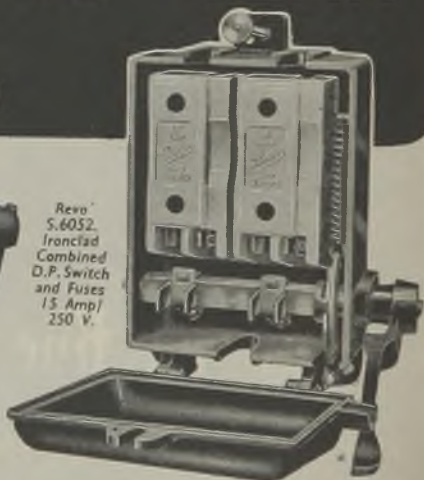


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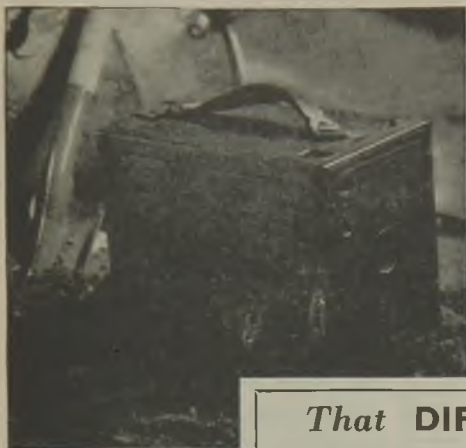


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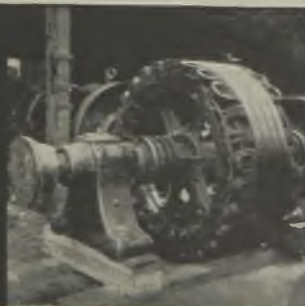
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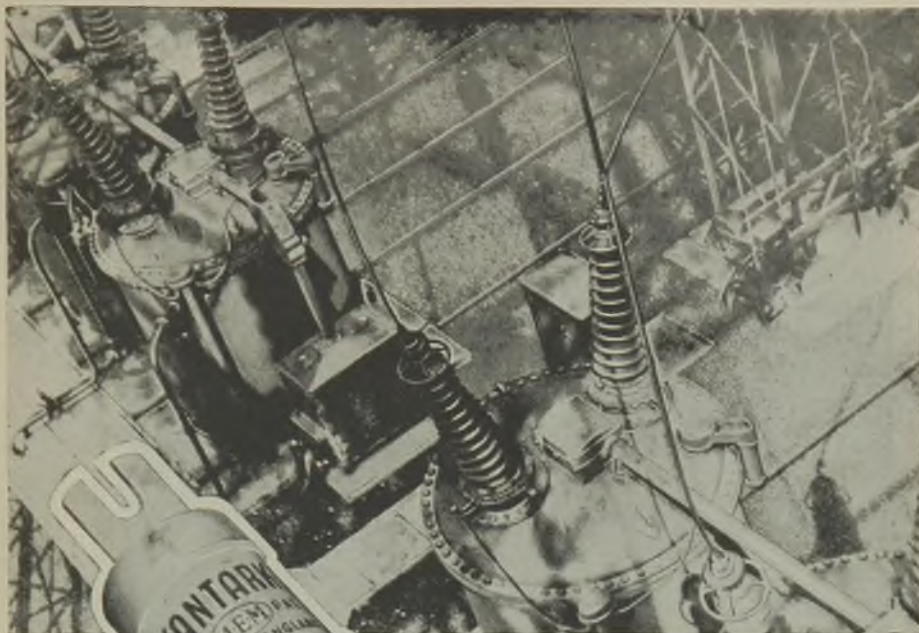
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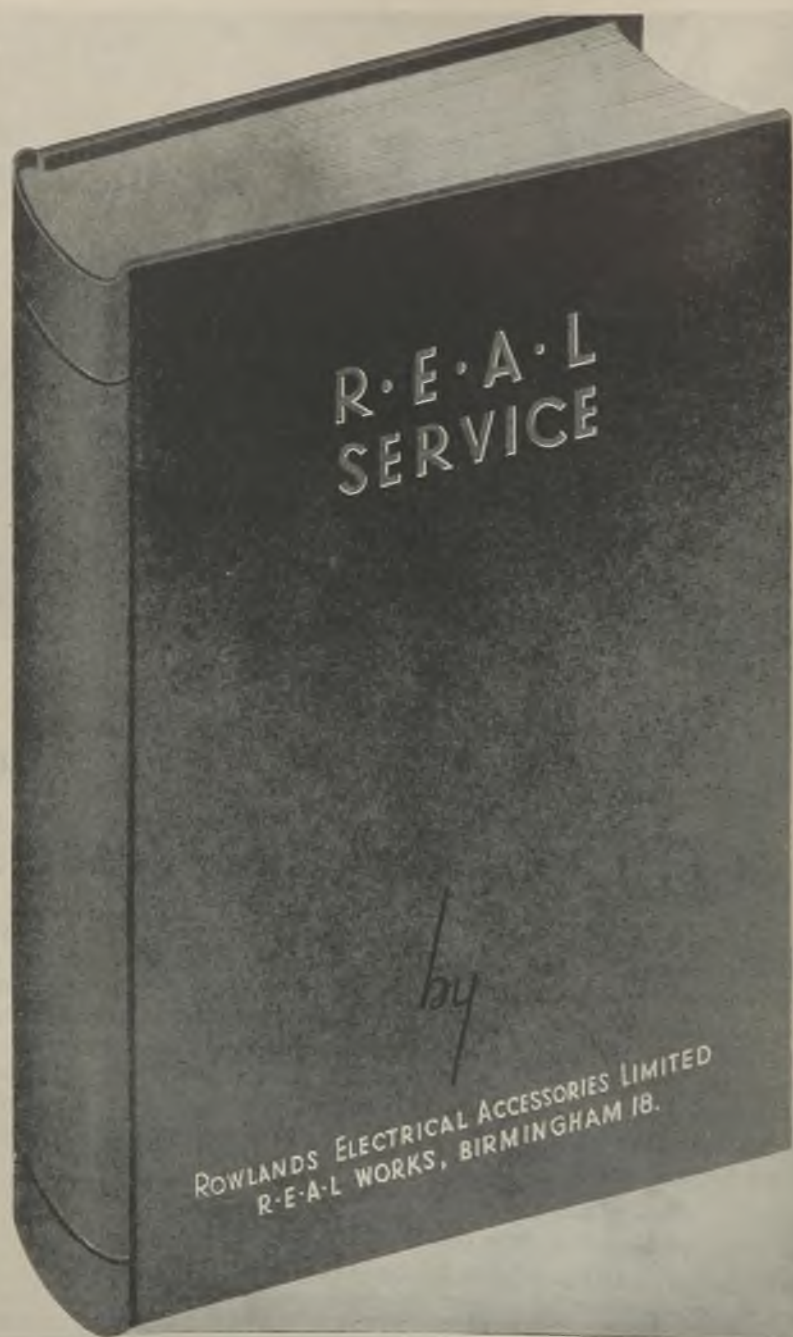
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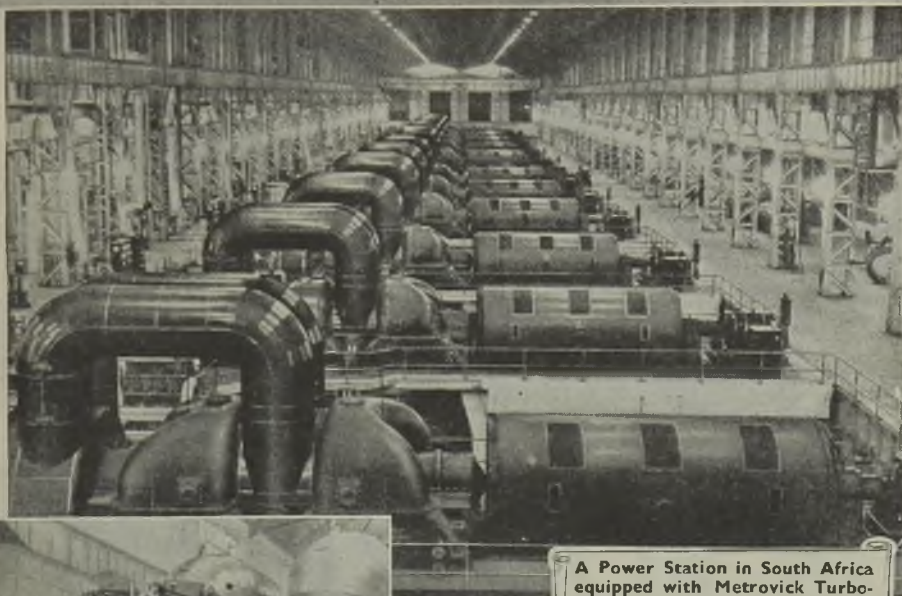


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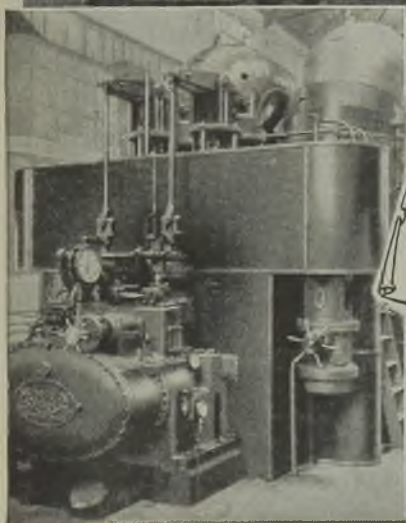
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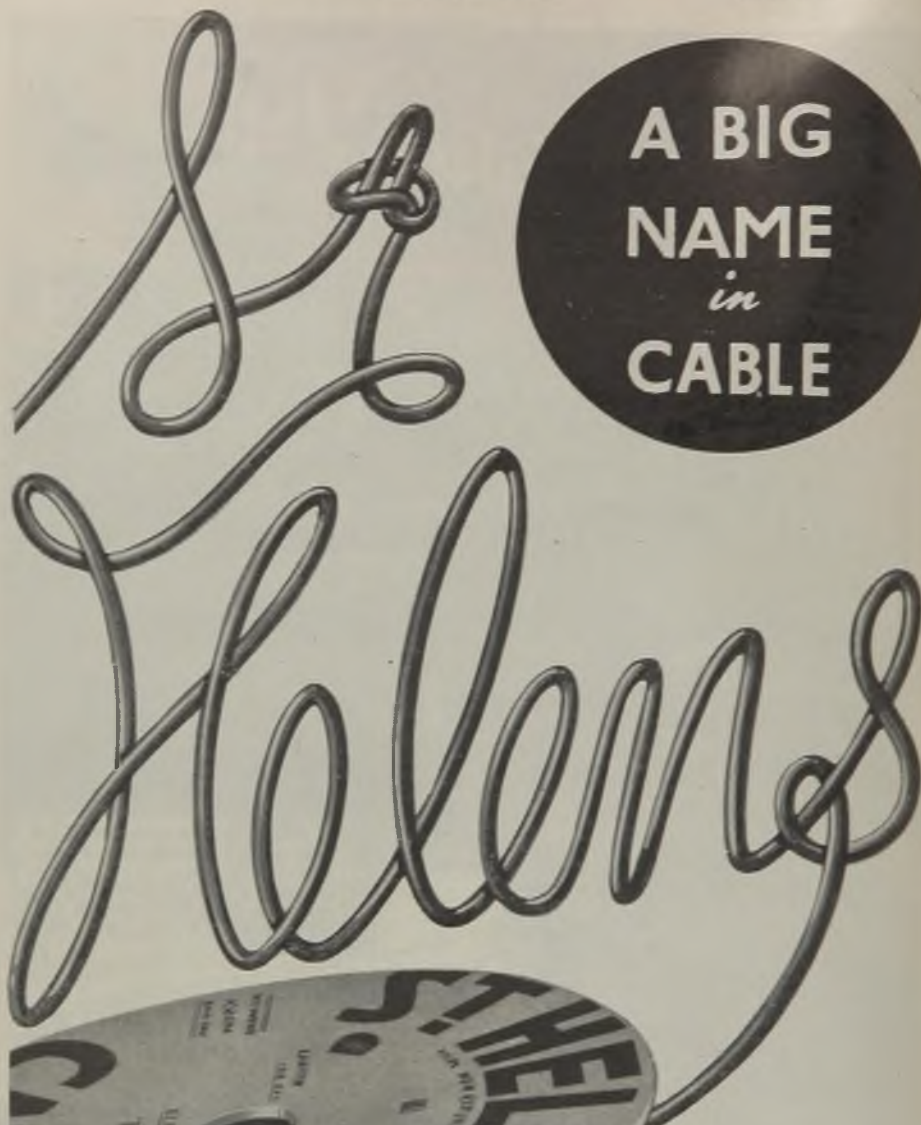
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# ELECTRICAL REVIEW

October 12, 1945

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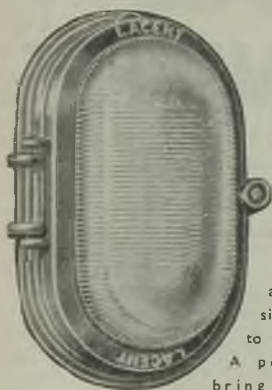
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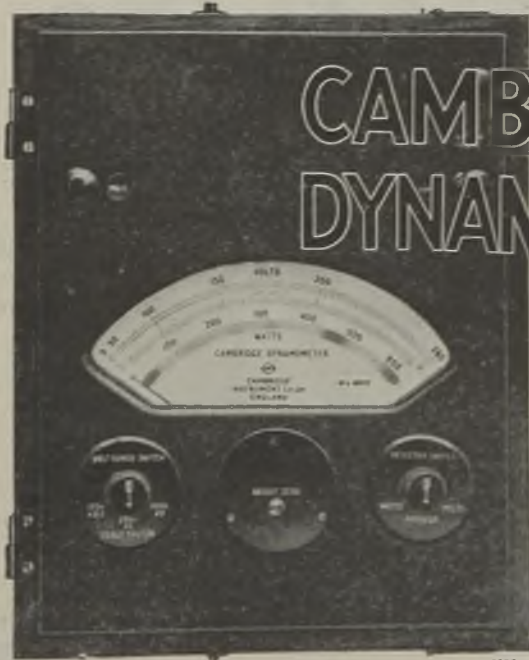
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# ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872



Vol. CXXXVII. No. 3542.

OCTOBER 12, 1945

9d. WEEKLY

## War Record and Afterwards

Dr. Dunsheath's I.E.E. Address

IT was fitting that the first presidential address to be delivered to the Institution of Electrical Engineers after the end of the war should have as its theme the magnificent contribution made by British electrical engineers to allied victory. Although Dr. Percy Dunsheath's survey of outstanding achievements covered little that would be unknown to those most closely concerned with any of the several individual aspects, it put these in their correct perspective in relation to one another and to the national effort—a perspective that the understandably piecemeal nature of official release of information had tended to obscure.

To have given so comprehensive an account of such varied activities in an address that took under an hour to deliver was in itself a remarkable feat of literary compression. The address placed the subject as a whole well within the grasp of the audience and, when published in full in the *I.E.E. Journal*, will present a definitive record that will no doubt be read by many more than the members of the largest professional engineering body in the world.

### No Respite

So far so very good. The President, however, left no doubt in the minds of members that the cessation of armed hostilities meant no letting up of their efforts and that from those who had already given much more would still be expected. Implicit in his description of what has been accomplished in the war was the need to adapt the results as far as

possible to normal constructive uses. Here a word of warning may be necessary. Many of these adaptations may be slow to mature in a useful form. Decades rather than months may be needed and the raising of unjustifiable hopes in the minds of members of the public is likely to do as great a disservice to progress as would over-caution in action.

### Expectations from Atomic Energy

There have been many examples recently of expectations of deriving from this or that discovery or project benefits of a different kind or degree from those scientifically or economically possible—at any rate immediately. The latest example is provided by the release of atomic energy, in which electrical engineers have had a large share. To them its supreme significance is that before existing sources of fuel come to an end, economically speaking, there is good reason to hope that atomic energy may have become convertible into controllable bulk heat. Methods of producing and distributing electrical energy in detail would therefore not differ much, so far as the public will be able to discern, from those at present in use.

As regards what is at present practicable, it is from a background of indispensable services rendered to their country in defeating an obvious and immediate menace that electrical engineers will draw encouragement to face the tasks now in front of them. These, Sir John Anderson said in paying tribute to the address, will demand display of the same qualities of

courage, resource and energy that have been prominent during the past six years in order that this country may maintain its rightful place in the future world. Dr. Dunsheath expressed the belief that with a continuance of a similar team spirit, electrical engineers will rise to the momentous occasion and be worthy of their destiny. He will not be alone in holding that this faith will be justified in works.

**THE** electricity supply industry, anxiously awaiting the Government's next move, will derive little satisfaction from a statement made last week by the Minister of Fuel and Power. Mr. Shinwell said that they looked forward to the nationalisation of the coal industry in a matter of a few months and continued: "We may require to go farther. I do not commit myself at this stage, or the Government, but we may have to consider other forms of fuel and power." In the meantime the E.T.U. has pledged wholehearted support for the Government in any steps it may take to bring the electricity supply industry under public ownership.

**INDUSTRIES** using process steam are in general of three kinds. First, the few in which the steam requirements greatly exceed those for power. The second group comprises those factories in which power and steam demands are continuously balanced. In the third group come all those industries in which the electrical needs are more than could be generated by back-pressure plant. An important aspect to consider when providing for years ahead is referred to in the new Fuel Efficiency Bulletin (No. 40) on combined power and heating issued by the Ministry of Fuel and Power. In this it is pointed out that industries in the first two groups constantly pass into the third, because most improvements in production methods reduce the steam required and raise electricity consumption.

**Man-Power Shortage** It was recently stated by the Electricity Commissioners that the electricity supply industry required 970 workers in various categories for the operation, maintenance and overhaul of generating plant. The statement on the release of men and women from the forces issued last week showed that

the programme for "Class B" releases includes 350 for the electricity supply industry. This figure is a good deal short of the immediate requirement but, of course, it will be supplemented to an unknown extent by men demobilised under "Class A." Releases under this arrangement are being speeded up and it is the hope of the Minister of Labour that this will largely meet the needs of civilian industries and services. The electricity supply industry's needs are widespread but the Minister has decided that so far as is possible "Class B" men will be placed in work near their homes.

**ELECTRIFICATION** has not been presented with **Shipyard Apprenticeship** its easiest task in marine work in view of the arduous conditions and special risks attached to any failure of mains or apparatus. This is implied in the need for specific I.E.E. Regulations for the purpose. A not unnatural conservatism tended to slow down electrical developments and at one time a shipyard did not offer the scope to electrical apprentices that was to be found elsewhere. In his chairman's address to the I.E.E. Scottish Centre, reported in this issue, Mr. R. I. Kinnear gives abundant evidence that this cautious attitude has changed as a result of experience of the ability of British electrical manufacturers to meet all needs. Increasing opportunities are therefore open to electrical apprentices where ships are equipped and maintained.

**OWING** to increasing demands for power in **Sea Return Conductor** central and south Sweden the 22-kV AC transmission system from the waterfalls in the north is likely to be inadequate and DC (for economy) an earth return is under consideration. In order to avoid interference with railway signalling and damage to buried cables, the feasibility of using the sea for the return circuit is being investigated. As a preliminary, current at 2,000 V was sent by a 350-mile overland line from Gullmar Fiord on the west coast to Grissleham, north of Stockholm, whence it travelled back 682 miles round the coast. Electro-magnetic mines and fish were unaffected. The biggest problem appears to us to be the conversion on a big scale from AC to DC and *vice versa* at the points of generation and distribution.





*Castle Carrock, a typical village supplied by the Carlisle undertaking; underground cables are used throughout*

## Serving Isolated Premises

Experiences of the Carlisle Electricity Undertaking

**S**UPPLYING electricity to widely scattered premises is a problem with which all electricity undertakings serving rural areas are confronted to a varying extent. Where the supply area includes a considerable urban area or where the rural area itself is semi-urban in character, an undertaking may be able to face the prospect of furnishing supplies to a comparatively small number of consumers, the revenue from whom may not suffice perhaps for years to bring in a return on the capital expenditure involved. Where the backing of a substantial urban load is absent and where even in the best parts of the area the premises are few and far between, the difficulties of

number of years, if they ever reach this point.

A typical example of this state of affairs is to be found at Carlisle. Here is an undertaking which, apart from the city, covers a 392-sq. mile rural area with a population of only 28,500 and only 8,500 premises, over 90 per cent. of them in two-thirds of the area. The city itself is of medium size (7.01 sq. miles), having a population of only 65,000 and 19,803 premises. Its 17,700 consumers



*Making sand and lime bricks at John Laing's Calsil Brickworks*

supplying the most isolated potential consumers appear almost insuperable without some external financial assistance. No matter how eager an undertaking is to make its services as widely available as possible, it obviously cannot commit itself to schemes of extension which may not be remunerative for a considerable

last year took 28.6 million kWh, of which 12.1 million kWh was for domestic purposes

and 6 million kWh for shops and commercial premises. An industrial consumption of 10.5 million kWh was absorbed mainly by the textile processing works of Ferguson Bros., Ltd., Carr & Co.'s biscuit factory, the

lime bricks at the rate of 26,600 a day, has 130 HP of motors installed. Making marl bricks, as well as processing limestone and as a side-line drying grass, the Kirkhouse Brick & Tile Co. has a useful consumption.



One of the coal drifts supplied by the Corporation

L.M.S. and L.N.E.R. Railways, Hudson Scott & Son's metal box works, R. R. Buck & Sons' shirt factory, Cowans, Sheldon & Co.'s crane works, and a number of other engineering establishments. Though satisfactory, inasmuch as they indicate a fairly high degree of utilisation of electricity throughout all classes of consumers, these figures reveal only a meagre foundation of urban load for the development of the extensive rural area.

In the rural area itself there are only two small towns, Longtown (2,000 inhabitants) and Brampton (2,250), but thanks largely to the availability of electricity a considerable number of industries have been established accounting for practically one-half of the total sales (6.9 million out of 15.4 million kWh). At present the total consumption

Another industry of especial importance at present, is drift coal winning, the Naworth Coal Co., taking a considerable amount of electrical energy for its various workings.

Of quite a different nature, Carrick's catering establishment, has at Low Row a bakery for making pies, cakes, etc. The electrical equipment there comprises electric ovens, water heaters, choppers, mincers, and an ingenious home-made pie tin cleaner and greaser incorporating electric iron elements for heating, fluorescent lighting, a new heating installation utilising Pyrotanax cable

Large electric bakers' oven in use at Carrick's bakery



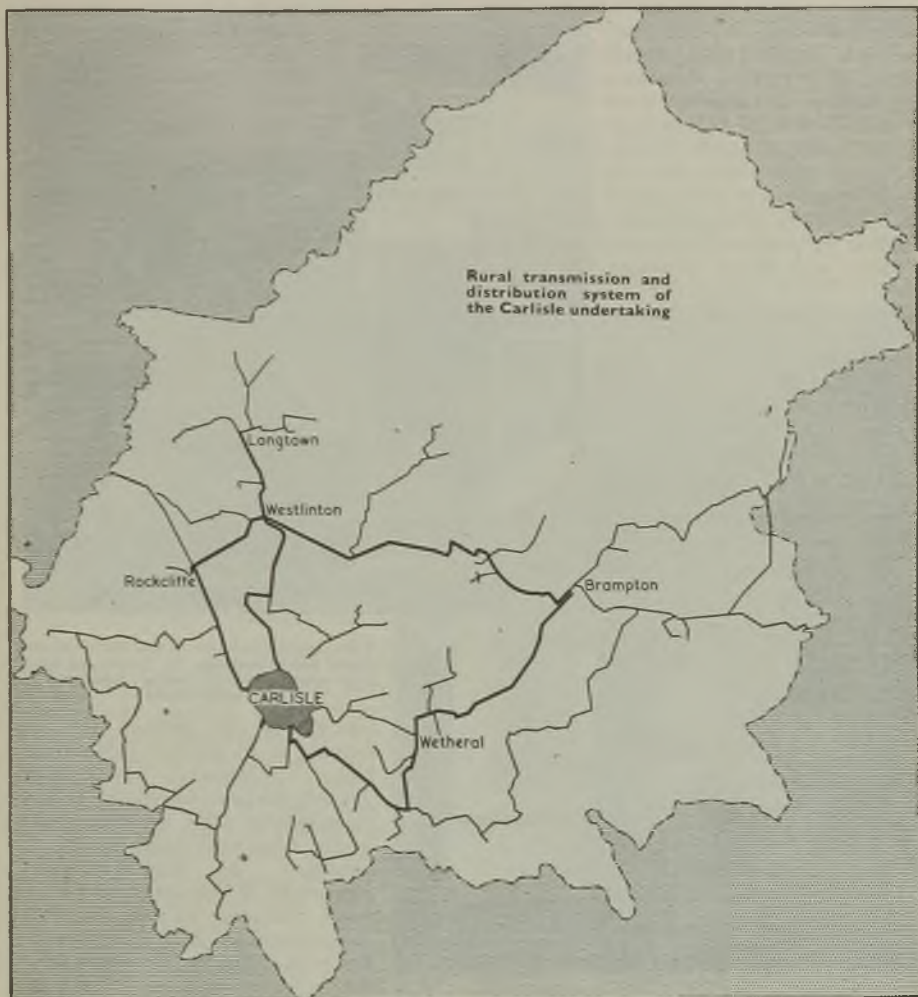
is swollen by the requirements of R.A.F. maintenance depots and army camps. Of the remainder the largest consumer is the Carlisle Plaster & Cement Co., at Cocklakes, where electricity is used for mining gypsum and manufacturing plaster boards required extensively for housing purposes. Also connected with the building industry are several brickworks. One of these, John Laing & Co.'s Calsil Brickworks, which produces sand and

throughout, and a complete laundry plant with washers, dryers, rotary irons, etc.

While the 3,684 domestic consumers in the rural area last year took 4.6 million kWh,

an average of 1,254 kWh, the 305 farms now connected used only 763,000 kWh, an average of 2,534 kWh. Furthermore only 157 of the farms used electricity for purposes other than domestic and these have an average consumption of 3,530 kWh, providing an

farms in the area are comparatively small (those over 120 acres are exceptional) and that about 100 small holdings run by the Land Settlement Association are included in the total. Tariffs are exceptionally low (the average price paid by the 157 farms referred



average yearly revenue of £18 12s. It is apparent, therefore, that however good the farming load may prove to be eventually, at the present stage it has not much to recommend it to the supplier, taking into consideration the fact that farms are generally off the normal route of the mains.

In considering these figures it should, however, be pointed out that most of the

to is 1·266d. per kWh) due largely to the low rateable value of the properties, the average being only £18 16s. This low rate in most cases more than counterbalances the 15 per cent. addition payable outside the city area. Not only will farmers benefit still further when a new all-in farm tariff is introduced soon, but the undertaking will be able to eliminate the wasteful and expensive necessity

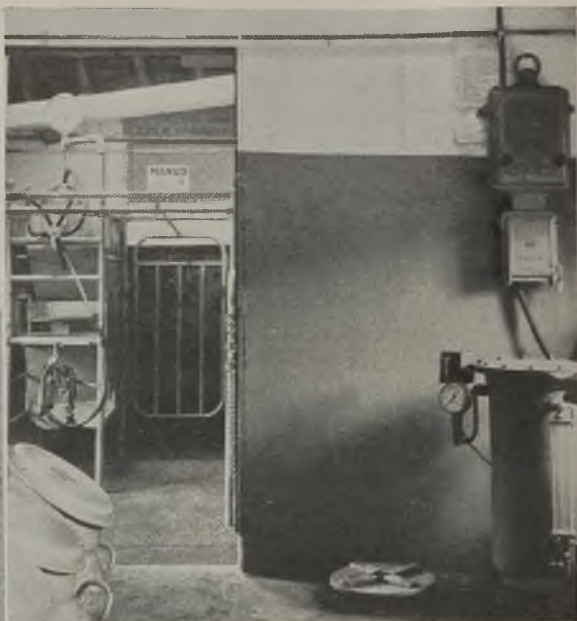


of having sometimes as many as five meters on a single farm.

One further point about farms. It must not be thought from the foregoing that there are no farmers who are taking full advantage of electrical facilities. Approximately one-third of the farms using electricity for other than domestic purposes are equipped with electric milking plant (but this requires only about 30 kWh a year per cow; a 12-cow herd is the average), while electric sterilising plant can now be found in about one farm out of six. There is a considerable number of electric incubators installed, and electric threshers,

steriliser, a 15-gallon water heater and fluorescent lighting.

However, whether farmers wish to use electricity extensively for their work or require it only for their wives' benefit in the



Electrical equipment in the Carleton Hill arm dairy includes a "milk parlour," Fild room, electrode boiler, steriliser and water heater

root and chaff cutters, pumps, etc., are in widespread use, but their consumption is small.

Carleton Hill Farm, one of the most extensively equipped farms we have visited in the area includes amongst its dairy equipment a Fulwood & Bland "milk parlour" in which the milk is automatically weighed and cooled, a J. & E. Hall coldroom, a 60-kW electrode boiler for steam raising, a G.E.C.

farmhouse, the demand for new supplies is at present exceptionally high. Substantial contributions towards the cost, amounting in some cases to over £200, have been made by the consumers where a long h.v. extension has been necessary; guarantees of consumption are not much favoured by the Electricity Department as they lead to waste. But even so this by no means solves the problem of supply extensions

generally in an area where "adjacent" consumers may be half a mile or more apart.

To give another picture of the difficult state of affairs in the area it may be mentioned that, although only rather more than half (about 4,550 out of 8,500) of the premises in the area are at present connected, every village and hamlet of twenty-five premises or more has a supply available. Moreover, as

we have already indicated, over 90 per cent. of the potential consumers in the rural area are in 257 of the undertaking's 392-sq. mile supply area, *i.e.*, there are only just over 30 premises per sq. mile. As there are only 4.4 premises per sq. mile in the remaining 135 sq. miles it is not to be wondered at that it has not yet been possible to devise a scheme to extend supplies to them.

As we reported last March, Mr. A. C. Thirtle, the city electrical engineer and manager, prepared a fairly comprehensive scheme which would have afforded supplies to a further 1,029 premises at a cost of £220,000. As the estimated gross revenue was only 3½ per cent. of the outlay and as 20 per cent. is the more or less generally accepted figure required to avoid a loss, application for financial assistance was made to the Electricity Commissioners. This being refused, the Corporation had no option but to abandon, for the time being at any rate, the comprehensive scheme and to concentrate on less ambitious plans with the object of supplying, piecemeal, groups of potential consumers. Several of these schemes are well in hand but will naturally cover only a very small proportion of the premises and will take very much longer.

### Lengthy Extensions

To furnish the supplies already available to the 4,500 rural consumers 175 miles of 11-kV mains and 113 miles of distributor cable have had to be provided, together with about 170 substations equipped with transformer plant totalling about 15,000 kVA. An extension of half a mile or more to supply single premises is not unusual.

The former chief engineer of the Carlisle undertaking, Mr. C. W. Salt, who retired just over a year ago, was a strong advocate of the underground system of distribution, as less liable to breakdowns and cheaper in the long run than overhead lines, though more expensive initially. As a result 143 miles of the total of 175 miles of 11-kV line and all the distributors are underground, and overhead lines and pole mounted transformers are something of a rarity.

Our map shows the general layout of the transmission and distribution system. Broadly it consists of a 0.1-sq. in. ring main system from the Corporation's Willow Holme generating station, passing through West Linton, Bampton and Wetheral, with a series of 0.075 or 0.0225 sq. in. spurs or subsidiary loops superimposed on it. The

h.v. underground transmission consists of paper-insulated lead-covered cable with two hessian tapes protected by tiles; the l.v. system consists of paper-insulated lead-covered and double-steel tape armoured cable. Frequently both high- and low-voltage cables are laid in the same trench.

\* If Mr. Thirtle's extension scheme for the northern area had been adopted another ring-main 26 miles in length would have been run from Carlisle *via* Longtown, Baileyhead and Bewcastle to Bampton, and it is to be expected that this will form an ultimate feature of the undertaking's system. On account of the question of initial cost, if for no other reasons, future extensions in the outer areas at any rate will almost certainly be overhead.

To reach the present stage of development the undertaking has had to spend on capital



Typical brick-built substation at Bampton, with one of the few sections of overhead lines

account close upon £3,000,000. The annual revenue for the last financial year was £249,030, there being a net surplus of £4,050. This is the first profit shown for four years and was made possible by a small increase in tariffs introduced in October, 1943, despite a further rise of 6s. 6½d. during the year in the average price of coal. The average price obtained per kWh sold was 1.35d.

The state of affairs which we have attempted to describe is by no means confined to Carlisle; there are several other undertakings which are facing the same difficulties.

We thank Mr. Thirtle and his staff for their help in preparing this article.

# Views on the News

## Reflections on Current Topics

**T**HE agitation in this country for the abolition or reduction of purchase tax on domestic electrical appliances has, I see, had a repercussion in Australia. The Electrical and Radio Development Association of New South Wales recently sent a telegram to the Acting Federal Prime Minister and Treasurer asking for an immediate review of the sales tax on radio and household appliances and the abolition of the tax on wiring accessories. The Association contended that such a move would assist in securing full employment and the ultimate revenue would more than offset any loss occasioned by sales tax reduction. As the *Electrical Review* reported last week, a beginning has already been made here (though not yet in connection with electrical appliances) which shows that our authorities appreciate the arguments in favour of a lessening or removal of the purchase tax.

\* \* \*

The results obtained by Motion Study demonstrated at the exhibition now being held by the Production Efficiency Board of the Ministry of Aircraft Production have to be seen to be believed. Increases in efficiency (due to changing from one method to another) of 200 or 300 per cent. are commonplace, of 600 per cent. not unusual and of 2,500 per cent. not unique. Even the apparently simplest operations offer scope for improvement. Picking up of, say, a screwdriver from the bench is much easier and saves quite a lot of energy if a small stand is employed. Incidentally I discovered that an empty hand can move twice as fast as one grasping something. Making both hands work simultaneously, rhythmically and symmetrically is a profitable subject for study, while the elimination of lifting even comparatively small objects does away with much fatigue. After all, raising a  $\frac{1}{2}$  lb. object 2,000 times is equivalent to moving nearly half a ton. Most of the expedients adopted are strikingly simple and the normal reaction is "Why weren't they done like that in the first place?"

\* \* \*

The dehydration of bath tubs at first glance appears a paradoxical subject for an article appearing in the American journal, *Electrical Contracting*. With the present fuel shortage in this country the problem is usually to get the water for the bath, or if we do really want to get rid of it there is always the plug. Closer investigation of the article reveals, however, that it is a new faster and cheaper process of manufacturing

bath tubs with the aid of infra-red rays that is being described. The tubs are cast in plaster of paris from a liquid ceramic material containing about 30 per cent. water, about 12 to 14 per cent. of the moisture going into the mould and permitting the casting to solidify and the mould to be removed. After an hour of infra-red curing, rough spots on the tub are smoothed, and the infra-red treatment resumed until less than 1 per cent. moisture remains after 16 hours. Former methods required 12-14 hours for curing, the removal of the fragile casting to the drying rooms (with considerable loss through breakages), and three weeks' drying.

\* \* \*

I cannot understand why indignation should be aroused by the dictum of certain London restaurants that clients who come to dinner must wear evening dress. The obvious course for those who disagree is to stay away from these establishments. But no such excuse is available to electrical men as regards the Victory Ball in aid of the Electrical Industries Benevolent Association. This event, as the *Electrical Review* has already announced, takes place at Grosvenor House, Park Lane, W.1, on November 9th and single tickets obtainable from the E.I.B.A., 32, Old Burlington Street, W.1, cost 25s. (including a buffet supper). The organisers plainly state that evening dress is optional, explaining that "this is a special dispensation for this year only in view of clothing coupon difficulties."

\* \* \*

Promptly upon the announcement of the removal of the building heating ban the temperature in London went up by an appreciable number of degrees, after a few days during which people in sedentary jobs acquired their first winter colds. When will the "authorities" realise that Nature has no regard for official directions and leave it to the public's common sense to decide whether heating is necessary or not?

\* \* \*

A commendable example of co-operation by technical institutions which has recently come to my notice is the publication of a joint syllabus of meetings by the Association of Secretaries of Technical Societies in Glasgow. Meetings in Edinburgh are also included, and members of the participating societies and institutions, divided into engineering and chemical groups, are invited to attend any except a few specially marked as private, and to participate in the discussions.—REFLECTOR.



# I.E.E. Presidential Address

## Dr. Dunsheath's Survey of Wartime Achievements

SOME of the contributions of British electrical engineers to the prosecution and successful outcome of the war were placed on record by Dr. P. DUNSHEATH (W. T. Henley's Telegraph Works Co., Ltd.) in his inaugural address in London on October 4th as president of the Institution of Electrical Engineers, now the largest engineering professional body in the world.

In his broad survey of the more outstanding wartime electrical achievements Dr. Dunsheath first drew attention to the way in which supplies of electric power had been maintained and augmented, particularly for the production of munitions and for new factories with individual loads up to 50,000 kW. The total loss of generating capacity due to enemy action in any single month never exceeded 266,000 kW, and much of it was out of commission for short periods only.

Overhead transmission lines suffered considerably by being fouled by the cables of drifting barrage balloons, resulting in short-circuits of exceptional magnitude but, as most of the circuit-breakers on the grid had recently been modernised, the faults were cleared successfully and rapidly. In only a few cases did displacement of transformer windings due to heavy stresses cause difficulties.

From the outbreak of war to the end of 1943 1,979 faults were attributable to war causes and more than two-thirds of them were cleared without interrupting supplies; 73 per cent. were caused by barrage balloons and 13 per cent. by low-flying aircraft, fragments of anti-aircraft shells and military exercises, while only 14 per cent. were directly caused by enemy action.

### Strengthening of the Grid

Strategic and other redistribution of load necessitated the reinforcement of the grid by 544 miles of 132-kV lines and 123 miles for lower voltages being erected up to the end of 1943. This involved 52 shipments from the United States between the end of 1940 and middle of 1941. Only two ships were sunk at sea, resulting in the loss of 346 tons of steel towers and 104 tons of cadmium-copper conductors; a further 30 tons of towers and 100 tons of conductors were destroyed during enemy air raids after they had been landed.

Changes in load distribution imposed an onerous task upon the grid control organisation. For instance the South-West England and South Wales area changed from an "export" of 7,000 kW to an "import" of 244,000 kW while South-East England changed from an import of 96,000 kW to an export of 292,000 kW. In the five years to 1944 new generating sets in individual sizes up to 60,000 kW in 73 different stations provided additional capacity of 3,896,000 kW, along with boilers for over 49 million lb. of steam per hour. A number of stations were constructed unusually rapidly, in 18 or 20 months, notwithstanding shortages of materials and labour. The successful operation of a system with an output of over 38,000 million kWh (in 1944) that increased by 12,000 million kWh (since 1939) was an outstanding performance; the 45 per cent. increase in output was achieved in spite of a reduction of 27 per cent. in the personnel employed.

### Extension of Communications

Dr. Dunsheath next turned to ways and means by which the Post Office maintained and extended systems of communication. Long-distance private telephone circuits used for war purposes reached a peak length in 1944, of 9,300 miles, or one-and-a-half times the size of the pre-war public trunk system, which was itself almost doubled; while the trunk telegraph system was increased four times. Progress made in equipment used for audio, carrier and coaxial systems involved considerable experimental and development work under difficult conditions and entailed complete revision of manufacturing processes.

The radio branch of the P.O. contributed in many ways to the prosecution of the war and the confusion of enemy services, in spite of disasters due to enemy action. New kinds of insulation had been used with advantage in submarine cables. In respect of communication cables for land use, very little development had taken place in the audio-frequency range, but there had been improvement in the design and manufacture of coaxial cables for high frequencies.

Overseas traffic *via* the Empire wireless and sea-cable system rose to three times its

pre-war volume. Although the whole of the photo-telegraph apparatus in London was destroyed by enemy action, 2,000 facsimiles were now being exchanged monthly over direct circuits between London and the principal cities of the world.

The role played by British broadcasting was probably still not realised. Licences had increased from just under nine to close on ten millions. This country possessed the world's largest long-wave broadcasting station, capable of delivering 800 kW to the aerials, as well as the world's largest short-wave broadcasting station with 12 transmitters, each capable of delivering 100 kW to directional beam aerials, of which there were 51. To improve home reception during the "blitz," and as an invasion precaution, the B.B.C. built and operated 64 small broadcasting stations: they ceased to function in July, 1945. At the beginning of 1945 the B.B.C. was operating transmitters with an aggregate aerial power in excess of 6,000 kW and 28,000 miles of P.O. telephone lines was used to interconnect studios and transmitters.

Reference was made to methods of detecting and destroying magnetic sea mines, while the remote power control of gun mountings on ships was briefly mentioned. For the latter purpose the metadyne system has been extensively employed. One of the many other important electrical developments connected with naval warfare was a system of producing DC that could be varied over a range of 800 V and yet remain stable at any value with an average error not exceeding 0.1 per cent.

#### Radar Developments

The increasing uses of radar and radio, some of which Dr. Dunsheath briefly outlined, rendered the suppression of radio interference caused by all varieties of electrical machinery on board ships a major problem and resulted in the use of many new devices. Much electrical equipment had to be re-designed and modified to withstand more severe shocks of explosions.

The war had witnessed phenomenal growth in the output and technique of the electronic valve, which had been the kernel of radar development, while many specialised problems had to be solved in the utilisation of cathode-ray tubes as radar indicators, not only for navigation but also for gun laying and control of searchlights.

Dr. Dunsheath mentioned in broad outline the work of some of the various committees

concerned with co-operation between the Services and the electrical industry. Normal production methods became too slow, so much thought had to be given to manufacturing layouts for, in some cases, six-fold expansion of output.

In his concluding remarks, dealing with atomic energy, the President said it was gratifying to know that during the last few months research programmes had been extended in three of the large electrical engineering laboratories in this country where problems were now being solved for the Government. It was not to be lightly anticipated that the successful release of atomic energy would at once open up a fresh practical source of power.

### The Opening Meeting

AT this opening meeting of the session of the Institution, the retiring President, Sir HARRY RAILING, was in the chair and presented the premiums and awards for the previous session.

After Dr. Dunsheath had delivered his address, Mr. P. V. HUNTER, proposed a vote of thanks saying that it was necessary that an attempt should be made to give a true picture of the achievement of electrical engineers in the war, after so many garbled and inaccurate accounts had appeared. The achievement as set out by Dr. Dunsheath had been a truly remarkable one and his address would be looked back on in the years to come as a landmark.

Having regard to the immense energy and fearlessness with which Dr. Dunsheath tackled the problems he had to deal with, he had no hesitation in saying that although the first year of peace would make much greater demands on the President than normal times, the new President would rise to the occasion and would give the Institution remarkable service during his year of office.

SIR JOHN ANDERSON said he had been fascinated by Dr. Dunsheath's account of the contribution made by the electrical industry of this country towards the prosecution and winning of the war. As a member of the Government for a year before the war and throughout the war with Germany, he had many opportunities of following the course of events and, indeed, he was primarily responsible, as Lord Privy Seal, for the preparatory work that was undertaken before the actual outbreak of war. Later on, as Lord President

of the Council, he had special responsibility for the supervision of the scientific effort of the nation so far as it concerned the responsibility of the Government, but despite the fact that he knew in some detail what was being done from time to time in the electrical field, he had no conception, until he listened to the address, of the magnitude and crucial importance of that contribution in winning the war. There was going to be just as great need in the years immediately ahead for the qualities of initiative, resource, courage and energy that were displayed during the war if we were to recover our position among the nations, having sacrificed almost everything for the purpose of winning the war.

Mr. T. G. N. HALDANE seconding the vote of thanks said that it was an address of outstanding merit and gave a very clear picture of the amazing progress and, above all, the amazing adaptability, of engineers during the past six years. All that came about under the stimulus of war and the question was what was the fundamental condition that made it possible. In his view, the fundamental condition was team work and team spirit directed towards a common goal and by a common purpose. How were we to find a common purpose and the team spirit which would enable us to convert our swords into ploughshares and reap the reward of six years engineering progress?

DR. DUNSHEATH then took the chair and expressed his appreciation of the vote of thanks, adding that he regarded it as a great privilege to be the first President to be able to

talk about these things with complete freedom, or almost complete freedom.

SIR STANLEY ANGWIN, proposing a vote of thanks to Sir Harry Railing for his services as President during the past year, assured Sir Harry that he had accomplished a great task. In addition to his experience and knowledge as an engineer and industrialist, Sir Harry had great humanitarian qualities and that personal touch which meant much in the relationship of engineering and matters in general.

MR. V. Z. DE FERRANTI, who seconded, after speaking of the regard he had had for Sir Harry Railing for many years said he naturally had a great sympathy with a brother industrialist, when he thought of the way in which an industrialist had to manage his diverse team. The Institution had been very fortunate in having been able to command the services of such a man, and in return he assured Sir Harry that he commanded the affection of all the members.

After the President had handed Sir Harry Railing the Past-President's certificate, Sir HARRY RAILING said that his task during the past year had been made easy by the unifying inspiration of the common struggle in which we had all been engaged and he only wished that the unity which had manifested itself in the Institution could now be shown among many classes and many nations. He expressed his indebtedness to the Past-President, the Vice-Presidents and members of Council during his term of office and specially thanked the Secretary and his staff for their valuable assistance.

## Education for Industry

### Minister Outlines Plans

**Q**UESTIONS relating to part-time education, works schools and county colleges were considered at a conference held by the British Association for Commercial and Industrial Education at the Institution of Electrical Engineers in London recently. Opening the conference, Miss Ellen Wilkinson, the Minister of Education, said that industry was realising increasingly the need for technical education, and this she was organising at three levels, the national, regional and local. She wanted to see more Regional Advisory Councils for Further Education, on which representatives of industry and commerce, local education authorities, universities and technical colleges would work together, and she also hoped that industry would make increasing use of the services of the highly qualified inspectors for technical education. Early in the New Year a training college for technical teachers would be set up by the Ministry at Bolton.

Miss Wilkinson added that educationists should learn more of the conditions in their local trades and industries and of the needs of young people working in them.

In view of the shortage of teachers and buildings, Sir Hugh Chance (Chance Bros.) wanted the county colleges to be established before the school leaving age was raised to sixteen and he hoped that the Ministry would impose pressure on education authorities to establish works schools in collaboration with industry.

Dr. W. P. Alexander (secretary of the Association of Education Committees) also emphasised the necessity for collaboration between education authorities and industry and declared that a boy entering a small firm not in a position to run its own works school should not suffer educational loss. The necessity for making works schools attractive was stressed by Mr. Parrish.



# PERSONAL and SOCIAL

## News of Men and Women of the Industry

**I**T is announced by the London Passenger Transport Board that **Mr. T. E. Thomas**, C.B.E., general manager to the Board since 1943, is retiring at his own request on October 20th. **Mr. J. H. Parker**, the chief electrical engineer, is also to retire, due to ill-health. **Mr. S. R. Geary**, O.B.E., operating manager (central buses) has been appointed general manager (road services) and **Mr. G. F. Sinclair**, C.B.E., chief engineer (trams and trolley-buses) is to be deputy general manager (road services). **Mr. A. A. M. Durrant**, C.B.E., chief engineer (buses and coaches) becomes chief mechanical engineer (road services) and **Mr. P. Croom-Johnson**, chief engineer (civil) is appointed chief engineer and will be responsible for both civil and electrical engineering departments.

**Mr. W. Arthur Jones**, general secretary of the Electrical Power Engineers' Association, is retiring on December 31st; he will carry with him the good wishes of many hundreds of power station men in this country and abroad.



Mr. W. Arthur Jones

Both they and the undertakings employing them have reason to be grateful for the great part **Mr. Jones** has played in building up and maintaining good relationships in the electricity supply industry. When he became foundation president of the Association of Electrical Station Engineers before the first World War the power station engineer's lot was not a happy one; he was overworked and underpaid. Then, and later as general secretary of the E.P.E.A., **Mr. Jones** strove hard to improve conditions and one of his Association's first moves was the presentation of a national claim which was adopted after successful arbitration proceedings; there followed in due course the creation of the National Joint Board of Employers and Members of Staff and its celebrated schedule. In all these activities **Mr. Jones** led his able associates and in this way was responsible for a great improvement in the power station engineer's status.

At its September meeting the National Executive Council of the E.P.E.A. made material recognition of his work and representatives of all areas have added their testimony of the universal regard felt for him. During his twenty-six years as general secretary **Mr. Jones** has steadily furthered the interests of his members with quiet tact and unfailing good temper. The esteem in which he is held by

the N.J.B. was expressed at a recent meeting by **Col. S. E. Monkhouse** and **Mr. A. H. Banks** on behalf of the employers' side.

**Mr. J. L. Johnson**, area manager for Electrical Commodities, Ltd., before the war and before that a representative for Nottingham Radio Supplies in the East Midlands, has now been released from the Forces and has joined **T. Beadle & Co., Ltd.**, as representative for Nottinghamshire, Derbyshire and Leicestershire.

**Mr. Kenneth R. Evans**, M.A., A.M.I. Mech.E., A.M.I.E.E., has been appointed manager of the Education Department of Metropolitan-Vickers Electrical Co., Ltd. Educated at Denstone College, Staffordshire, and Sidney Sussex College, Cambridge, **Mr. Evans** gained a second class honours Natural Science Tripos in 1920, having returned to Cambridge to complete degree studies after four and a half years' service with the Lancashire Fusiliers. He joined Metropolitan-Vickers in 1920, as an assistant to **Sir Arthur P. M. Fleming** in his work as director and manager of the Education Department, whom he now succeeds as manager.

**Wing Commander P. E. Gwyer**, O.B.E., has left the Ministry of Supply (R.A.F.) and resumed his duties as managing director of Metal Components, Ltd., after six years' service in the technical branch of the Royal Air Force.

**Mr. W. C. Huston**, manager of the B.T.H. Lighting Section since 1939, has been appointed a director of Harcourts, Ltd. Before joining the British Thomson-Houston Co., Ltd., in 1932, **Mr. Huston** received his early training and business experience in shipbuilding and general engineering.



Mr. W. C. Huston

**Mr. C. Rose** has been appointed representative in the London area for Veritys, Ltd. ("Maxlume" Department). He was formerly with Philips Lamps, Ltd. ("Philora" Department) which he joined on his discharge from the Forces after being injured in action on a London gun site in June, 1943.

A gathering of the staff and workpeople of **Bruce Peebles & Co., Ltd.**, met recently to pay tribute to **Mr. George Happer**, who has retired after 45 years' service with the company. **Mr. J. W. Rodger**, managing director, on behalf of the staff and workers presented **Mr. Happer** with a wallet of Treasury notes. As an inspector **Mr. Happer** actively participated in

the work connected with the generating plant for the Snowdon hydro-electric scheme, the first of any size in Great Britain, and equipments for many tramway systems. He eventually became chief inspector.

**Mr. H. F. J. Thompson, M.I.E.E.**, is retiring at the end of the year from the position of general manager and engineer of the Battersea Electricity Department, after over fifty years' service in the supply industry. Mr. Thompson was educated at the Central High School, Sheffield, and at Sheffield University. His first position was with the Sheffield Electric Light & Power Co. (1894-99) and he then spent a year or so with Moon, Loughlin & Co., Manchester. In 1900 he became mains superintendent to the South Metropolitan Electric Light & Power Co. He went to Battersea as chief assistant electrical engineer in 1906 and in 1935 succeeded the late Mr. F. A. Bond as chief of the undertaking.

From the date of Mr. Thompson's appointment up to 1939 the Department's sales rose by 67 per cent., but the war retarded progress; at the same time the average charge was reduced by 17 per cent. In this period there was a very substantial increase in domestic sales: there were increases of 50 per cent. in the number of rental wiring installations, 612 per cent. in the number of cookers, and 162 per cent. in other apparatus, although the number of consumers



Mr. H. F. J. Thompson



Mr. J. R. Jones

rose by only 34 per cent. Mr. Thompson has a number of useful inventions to his credit, including a closed-circuit air-cooling system for alternators and the Bowden-Thompson cable protection system.

At last week's meeting of the Battersea Borough Council **Mr. J. R. Jones, M.I.E.E.**, at present chief engineer and manager of the Hammersmith undertaking, was appointed to succeed Mr. Thompson, with whom he served as deputy before going to Hammersmith. Mr. Jones received his general education at the Higher Grade School, Colwyn Bay, and Monmouth Grammar School, and his technical education at Armstrong College, Newcastle-upon-Tyne, and the Technical College, Sunderland. His training was obtained with O'Brien & Co., Manchester, as a premium pupil of the borough electrical engineer of Monmouth, and

with the Newcastle Electric Supply Co. He remained on the staff of the Newcastle Co. for eighteen years after completing his training, the positions which he held including distribution engineer for five years over an area of approximately 100 sq. miles of the company's system, and senior charge engineer at Dunston power station for two years. In 1926 he joined the Newport (Mon.) Corporation as station superintendent and in 1930 became chief assistant engineer in the Watford Corporation Electricity Department. He was appointed deputy electrical engineer at Hammersmith in 1934 and two years later went to Battersea in a similar capacity, returning to Hammersmith in 1939 as chief electrical engineer. Mr. Jones is a member of the E.D.A. Council.

**Mr. Andrew J. Bowron, M.I.Mech.E.**, who has been superintendent of the Royal Ordnance Factory at Llanishen, Cardiff, since its inception early in 1940, was released at the end of September by the Ministry of Supply to take up the position of production manager at A. Reyrolle & Co.'s works at Hebburn.



Mr. A. J. Bowron

**Mr. P. T. Forth** has retired after 40 years with the North-Eastern Electric Supply Co., Ltd. For the past twenty-two years he has been in charge of the company's undertaking in the Crook area. He was formerly superintendent of the Priestman power station, Blaydon, and afterwards resident engineer of the Bankfoot and Bowden Close power stations, Crook.

**Mr. H. Horwood, A.M.I.E.E.**, who has been with the Ministry of Aircraft Production during the war, has resigned his position of assistant director, responsible for the standardisation of electrical equipment on aircraft, and has rejoined Measurement, Ltd., as technical sales engineer for "Actadis" ripple control installations and other forms of remote control, indication and telemetering systems.

**Mr. D. James**, who was until August last electrical engineer, Southern Area, King's Cross, L.N.E.R., and has since been engaged on special duties in the chief electrical engineer's headquarters office, has retired. Mr. James joined the former Great Eastern Railway in 1900 and the whole of his railway service has been with the electrical department.

On Saturday last the employees of the St. Helens Electricity Department presented **Mr. T. S. Parkinson**, deputy borough electrical engineer and manager, with an illuminated address and a cheque, as a token of esteem, on his leaving the Department to become borough electrical engineer of Leigh. Mr. P. Bregazzi,

engineer and manager, made the presentation; he was supported by Mr. Barker, mains superintendent and Mr. Gee of the Building Department.

Consequent on Mr. Parkinson's departure, the following promotions have been made at St. Helens:—Mr. J. Mills, A.M.I.E.E., technical assistant, to deputy engineer and manager; Mr. N. H. Barker, A.M.I.E.E., assistant mains engineer, to mains superintendent; and Mr. H. C. Barr, to assistant mains engineer.

Mr. E. L. Colston, joint managing director of Hoover, Ltd., has just completed twenty-five years' service with the company. At a dinner in honour of the occasion at Claridge's Hotel members of the organisation presented him with a 16-m.m. camera and projector. The presentation was made by Mr. C. B. Colston, chairman and joint managing director of the company.

Mr. Bentley Jones has joined E.K. Cole, Ltd., as assistant radio sales manager. Mr. Jones was for twelve years with the E.M.I. group and immediately before the war was sales manager of H.M.V. Household Appliances. Since 1939 he has been with the I.C.I.

Mr. J. Bloome, A.M.I.E.E., has left Johnson & Phillips, Ltd., after twenty years in their transformer and switchgear departments to become general manager to London Transformer Products, Ltd., Willesden. Mr. Bloome received his engineering training with Metropolitan-Vickers and at the Royal Technical College, Salford. He will be concerned with the design and production of transformers, rectifiers and associated equipment.

Mr. R. W. McOwen, A.M.I.E.E., technical assistant, Ilford Corporation, at present "on loan" to the Air Ministry, Directorate of Works, has been appointed assistant mains engineer at Stockton-on-Tees.

Mr. L. C. Rettig, late technical adviser in the West of England for Benjamin Electric, Ltd., has joined the staff of H. R. Cleave & Co., Bristol and Birmingham, as manager of their Illuminating Engineering Department.

We regret that in our issue of September 28th we stated that Sir Andrew Duncan was still a member of the Central Electricity Board. Actually he resigned from the Board when he joined the National Government.

## Obituary

**Mrs. J. Walsh.**—We regret to hear of the death of Mrs. Walsh, wife of Mr. John Walsh, chairman of the Blackburn branch of the Electrical Contractors' Association. Mrs. Walsh was founder and past president of the Blackburn branch of the Electrical Association for Women.

**Mr. H. L. Pirie.**—We regret to record the sudden death in Leeds on September 19th, of Mr. H. L. Pirie, M.C., M.I.Mech.E., chief engineer of the Coal Utilisation Joint Council.

## Flue-Gas Washing

**E**ARLIER this year the London County Council and the Battersea, Chelsea, Kensington and Westminster Councils made representations with regard to the reintroduction of flue-gas washing at Battersea power station, which had been discontinued during the war for security reasons. The Electricity Commissioners, having elicited further information from the London Power Co., Ltd., on the matter, have now replied to the questions raised by the local authorities.

They point out that the gas washing system at the station is the first of its kind to be installed in any country and has presented new problems, *inter alia*, in the design of large acid and erosion resisting structures, and while chemically the system has proved a complete success, much experience has been gained as a result of its operation in the behaviour of materials forming the internal structure. In 1938 designs for a new gas-washing plant were prepared in connection with the extension to the station; the improvements related chiefly to the detailed design of the internal structures, the main purpose being to insulate the steelwork of the main structure from acid liquor, and a modified form of gas scrubber was also included. Owing to the war the improvements were never put into operation.

The cessation of gas-washing necessitated serious internal alterations in the structures in order that the raw gases could be passed as directly as possible to the chimney stacks. The restoration of its original form is essential before gas washing can be reinstituted and very serious deterioration of the plant generally during the last four years of hot dry conditions has made a complete overhaul necessary for the safety of the main structure.

## Standard Screw Threads

**A**FTER a two-weeks session the Conference on the Unification of Engineering Standards was adjourned last Saturday. Delegates from the United Kingdom, Canada and the United States at Ottawa have drawn up a specification for a basis thread form that would provide a unified standard for all countries employing the inch system. Agreement has also been reached (subject to approval by national standard bodies) regarding acme and sub-acme threads and fine-motion screw threads for micrometers. Mutual understanding is reported on problems associated with watch and clock screws, microscope lenses, optical electrical and scientific instruments and various special thread forms. Diversity of practices, especially in regard to drawings, will entail much exploratory work before definite recommendations can be formulated in relation to high-duty studs in light alloys, which caused serious delays during the war. Discussions on pipe threads are to be continued at the Convention of the American Petroleum Institute in November.

Progress made in precision measurement and gauging methods encourages hope of ultimate co-ordination of practices. Further discussions are also to be held on limits and fits in engineering before the return of the fifteen British delegates towards the end of this month, after visits to industrial centres in Canada and the United States.



## CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication.  
Responsibility cannot be accepted for correspondents' opinions.

### Metering Inductive Loads

IN your issue of September 21st Mr. A. G. Beech discussed the behaviour of two single-phase meters inserted in a two-phase three-wire system, one of which rotated backward with a load having a power factor of less than 0.5 lag. To avoid any difference of opinion between the consumer and the supply undertaking regarding the meter registrations, a two-phase two-element meter is to be preferred to two single-phase meters.

If this is not available, a three-phase, three-element meter can be converted for the measurement of the consumption. Fig. 1 shows the connections of the meter; the "yellow" element is not in circuit. In addition to the welding equipment, ohmic and in-

ductive devices are connected between phase and neutral, showing the recording of the consumption to be correct for any load.

In the vector diagram in Fig. 2,  $I$  = line current;  $I_R, I_B$  = phase currents;  $V_{R-B}$  =

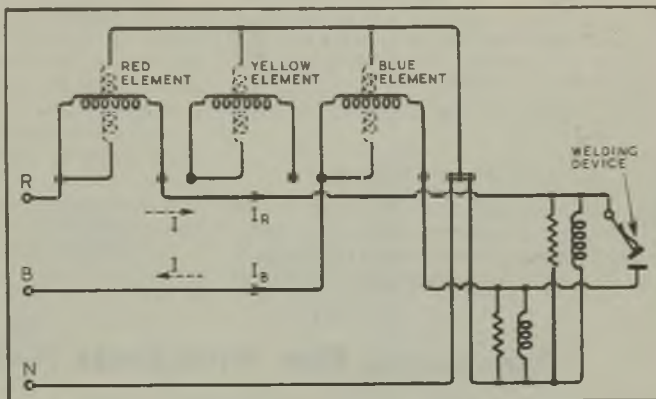


Fig. 1

line voltage;  $V_R$  and  $V_B$  = phase voltages;  $\cos \phi$  = power factor of welding loads, lagging, the phase angle being less than 60 deg.;  $\cos \phi_R, \cos \phi_B$  = power factor of ohmic and inductive loads, lagging.

The total power is given by  $P = I V_{R-B} \cos \phi + I_R V_R \cos \phi_R + I_B V_B \cos \phi_B$ . (1). The total registration of the meter,  $M = I V_R \cos (\phi + 30^\circ) + (-I) V_B \cos (\phi - 30^\circ) + I_R V_R \cos \phi_R + I_B V_B \cos \phi_B = I V_R [\frac{1}{2} \sqrt{3} \cos \phi - \frac{1}{2} \sin \phi] + I V_B [\frac{1}{2} \sqrt{3} \cos \phi + \frac{1}{2} \sin \phi] + I_R V_R \cos \phi_R + I_B V_B \cos \phi_B$  as  $V_R = V_B$  and  $V_{R-B} = \sqrt{3} V_R \therefore M = I V_{R-B} \cos \phi + I_R V_R \cos \phi_R + I_B V_B \cos \phi_B$  ... (2).

The meter rotates in a forward direction and the recording is correct.

London, N.1.

A. SALZMANN.

### Cut-Out Load Curves

MAY I put a date to the first use I met of 365 daily load charts cut out and stacked to form "hills and valleys" commented on by "Reflector" on p. 470 of your issue of October 5th?

In the exhibition connected with the 1926 World Power Conference in Switzerland I saw the late Sir John Snell contemplating such a stack of daily load charts of the entire

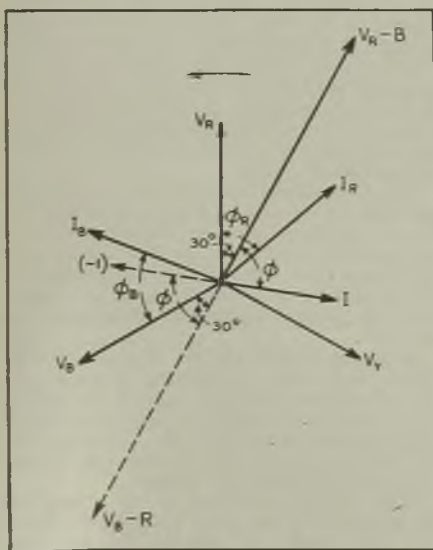


Fig. 2

output of all the generating plants in Switzerland, summed and plotted (by the technical students in Zurich Polytechnic) on transparent celluloid. I asked for Sir John's opinion of its practical value. He replied: "What is it?"

Even if the New York P. & L. Corporation has discovered a practical use for such a stack, it certainly cannot claim the stack as a novelty.

*Herne Bay.*

THEODORE STEVENS.

[The new E.R.A. report on "Load Representation," which was referred to in the *Electrical Review* of September 7th, illustrates a "hills and valleys" model used in Philadelphia in 1916 and refers to it as one of the earliest load cut-outs.—Editors, *Electrical Review*.]

### Installation Bonding

**W**HILE not presuming to judge in the particular case that Mr. G. G. Church raises, in view of our long experience of research and design against explosion hazards

we may explain the point put forward in his final paragraph.

When in suspension in air, many dusts are explosive, some highly so. Among the Class I risks listed by the late Dr. R. V. Wheeler, are flour, grain, oat dust, oat husk and similar dusts. It is probable that the installation inspector recognised a case for special care from his experience of situations where such care is desirable.

In coal mines the risk of explosion is not limited to methane (firedamp) alone, but extends to the coal dust, hence the statutory requirement that stone dust shall be mixed with the coal dust in roadways, etc., to render it incombustible.

Precautions aim at safeguarding against the worst possible conditions, the thousandth chance, hence they may appear unduly restrictive to those who meet explosion hazards on rare occasions only.

ERICSSON TELEPHONES, LTD.

*Beeston, Notts.* (Research Laboratory).

## Services for Scottish Schools

### Study Committee's Report

**P**OST-WAR BUILDING STUDIES No. 21 is a report by a committee appointed by the Scottish Secretary to consider the planning of schools and other educational buildings in Scotland. The chairman was Dr. J. Jardine, O.B.E., of the Scottish Education Department, and among those who submitted evidence were Mr. E. B. Doughty (Glasgow Electricity Department), Mr. M. W. Hime (district engineer, E.L.M.A., Glasgow) and Messrs. W. F. Mitchell and G. V. Downer (consulting electrical engineers).

The principal electrical interest lies in Appendix II dealing with heating and ventilation. The Committee, in the body of the report favours low-pressure hot-water for heating mainly, it is said, because this system is not subject to rapid variation, it does not unduly reduce the humidity of the air, there is little danger from hot surfaces or irritating dust, and expert control is not necessary if the system has been properly designed. It is stated that electrical means, employing thermal storage or electrode boilers, may be used. Nevertheless, the Committee says that opinions differ as to the economic value of thermal storage systems since with fluctuations in the weather more hot water than is required may be accumulated. Non-storage systems are cheaper to install but the cost of electricity "requires serious consideration."

Direct electrical methods are surveyed—tubular heating, convectors, panels, radiators

and hot-water or oil-filled radiators. Reference is made to the need for guarding apparatus within reach and to the cost of equipment. The Committee says, however, that all electrically-heated systems are specially suitable for temperature control. The economical running of the direct method of electric heating depends to a great extent upon the attendant's ability to estimate the time necessary for pre-heating in the early morning hours. Regulation of the early morning switching by means of time switches has been attempted, and further developments will doubtless produce a satisfactory type of fitting.

The Committee has arranged a long-term experiment with various forms of lighting in a modern classroom and says that from evidence it has heard fluorescent lighting has distinct advantages, inasmuch as it blends more naturally with daylight and may therefore help to supplement the natural lighting of classrooms on dull days.

Reference is made to the practice of some supply authorities of charging separately for lighting, heating and power and it is suggested that consideration should be given to a suitable and reasonable combined tariff. The desirability of providing ducts for heating and electric wiring during building is stressed.

Other points mentioned in the report are the possibility of the use of electric hand dryers and the wiring of schools for broadcast programmes.

# Ontario's Power System

## Rural Development Plans

**T**HE shutting down of war industries is not likely to have any serious effect on the operations of the Hydro-Electric Power Commission of Ontario. Reasons for this mentioned by Dr. T. H. Hogg, the chairman, in a preface to the Commission's annual report for the year ended October 31st, 1944, are the large, stable domestic load which has been developed, and the diversified character of industries. During the later war years the Commission was virtually operating without idle reserves of power.

The power demand for war production reached its peak in the spring of 1944, after which there was a gradual recession. Nevertheless, the total quantity of energy generated and purchased in 1944 was 2.2 per cent. greater than in the previous year—12,041 million against 11,780 million kWh—although output for primary purposes decreased slightly. The maximum aggregate peak load supplied by the Commission (April, 1944) was 2,445,291 HP.

The greatest progress was made in the rural electrical service. A total of 400 miles of primary line was constructed during the year and about 10,000 new consumers were connected. The capital cost of rural extensions approved in 1944 amounted to \$3,230,478, towards which a provincial grant-in-aid of \$1,612,471 is receivable. The whole service has been amalgamated into one rural power division with a uniform tariff structure. The Provincial Government guarantees the Commission against any loss due to the fixing of a maximum service charge, or its reduction or removal.

A preliminary estimate of the ultimate development of the rural service which can be foreseen at present, based on a minimum density of two farm contracts per mile of line, indicates that 35,080 miles of line will be required to serve 241,205 consumers (including 111,877 farms). So far 21,023 miles of line have been erected, serving 146,633 consumers (61,698 farms) and plans for the next five years provide for an additional 7,329 miles of line and the connection of 57,904 consumers (32,167 farms).

In March of this year the Commission bought the system of the Northern Ontario Power Co., Ltd., for \$12,500,000. The reduction of the cost of power to mines in the territory from \$36 per HP to the Commission's standard rate



The stringing of power conductors in the rough northern districts of Ontario is facilitated by caterpillar tractors

of \$27.50 will encourage hard-rock mining.

The total revenue of the Commission's Southern Ontario and Thunder Bay Systems and rural power districts during the year was \$51,257,245 (against \$49,517,905 in 1943), the balance after payment of all expenses being \$3,567,211 (\$1,208,686). Revenue from the Northern Ontario Properties was \$5,000,524 (\$4,834,378), with a surplus of \$230,715 (\$396,429).

Illustrating the sound financial position of the municipal utilities served by the Commission, the report states that out of 298 separate utilities 254 have liquid assets sufficient to discharge their total liabilities (171 have actually paid off their debt) while the remaining 44 are well on the way to becoming debt-free. To help small cost-contract utilities whose power costs were high the co-operating municipalities agreed to a levy of up to five cents per HP so as to reduce the price in these exceptional cases to \$39 per HP. The Commission was, however, able to do this with a levy of only two cents.

Researches carried out in the Commission's laboratories during the year included the electric smelting of Ontario ores, quick freezing of foods, and the development of an improved domestic water-heating unit.



# Aircraft Test Instruments

## Exhibition at Farnborough

**A**N exhibition of test instruments used in aircraft design, held at the Royal Aircraft Establishment, Farnborough, last week was organised jointly by the Establishment and the Ministry of Aircraft Production. The exhibits comprised instruments for both ground and flight testing of aircraft components before their final production. The type of equipment shown is used generally after the structures have been made to the design specification and are then subjected to various mechanical tests enabling their strain values, vibration periods, etc., to be measured. These instruments have been evolved to overcome such problems as the reduction of the weight of the aircraft to the minimum consistent with sufficient strength, and the elimination of excessive vibration.

Great advances in these instruments have been made during the war, and electronics now plays a very important part in this field. Modern aircraft development has resulted in investigations requiring instruments possessing high sensitivity, rapid response characteristics, providing for remote indication or recording, and simultaneous indication or recording of more than one quantity. These characteristics among others are possessed only by instruments employing the practically inertia-free electronic valve and cathode-ray tube.

### A Wide Range

The exhibition included accelerometers, air speed indicators, pressure gauges, air thermometers, movement indicators, various gyroscopic instruments, strain recorders, and torque and thrust meters. Gun characteristics are obtained by kinematic, strain and blast recorders. The general section embraced cameras, electrical pick-up units, clocks and time bases, various automatic observers and transmission systems for remote indication. Most of the exhibits were shown in operation.

It is impossible to deal in an exhibition of such a size with each individual exhibit, but the general principle of the various electronic recorders is of special interest. This type of instrument is designed to record small mechanical movements, such as pressure on a diaphragm, acceleration and vibration. The movement is transmitted mechanically, and converted to electrical energy which is fed to the instrument. The transmitter may take any one of four forms—variable resistance, capacitance, inductance or voltage. These small variations are then passed to a pre-amplifier or resistance or capacitance bridge, according to the system, and the resultant voltage is amplified electronically and fed to a cathode-ray tube from which readings may be obtained. Recordings may be made photographically or mechanically. A suitable time base is provided for the cathode-ray

tube; in some cases the moving film of the camera provides the time base for continuous recording. One exhibit showed a number of readings superimposed on a single tube with an interaction of only one per cent.

A complex arrangement of automatic switch-gear with timing relays and scanning switches linked to a board of a hundred potentiometers for balancing the transmitter bridge circuits feeds a DC amplifier to operate a recorder. This unit scans in succession a hundred circuits, the readings being recorded on a roll chart at the rate of from 60 to 80 per minute. For temperature recording thermo-couples are employed in various forms and photo-electric cells are used to record by camera the functioning of the flash equipment used in night photography, the cameras for which are electrically operated.

### Movement Recorders

For direct recording of movement sensitive Desynn transmitters and receivers may be used for distant recording of control position. These instruments are small and light, the transmitter consisting of two sliders connected to a DC supply and moving across a toroidally wound potentiometer from which three equally spaced tappings are taken to the three star-connected stator windings of the receiver. The transmitter arm feeds DC to opposite points of the potentiometer and energises the receiver stator which pulls its permanent magnet rotor into line with it. Thus movement of the transmitter arm (or aircraft control) is faithfully recorded by the receiver instrument. Variations in this standard arrangement for small measurements and to reduce the size for special applications are also available.

Also on show was the English Electric sparking plug tester described previously in these pages.

Most of this equipment is in production, and whilst it has been produced specially for the construction of military aircraft, it has many applications in all branches of engineering.

### The Durham Station

**T**HE Durham R.D.C. has petitioned the Ministers of Town and Country Planning, Health, and Fuel and Power, and the Electricity Commissioners, for approval of the application by the North-Eastern Electric Supply Co for permission to erect a power station at Kepier, near Durham. The Council points out that the need for electric power and a generating station in mid-Durham is generally admitted. It also submits that the objections to the proposals were without real foundation and were greatly outweighed by the advantages of ample power for the collieries in the area and the new industries it was hoped to attract.

# The Consumer's Needs

## Tariffs, Apparatus and Installations

**S**PEAKING as a consumer, both domestic and professional, in his inaugural address as chairman of the Installations Section of the Institution of Electrical Engineers in London, Mr. FORBES JACKSON (London County Council) suggested that the electrical industry tended to overlook the fact that it had a silent partner without whose support the industry could not exist. The industry failed to recognise the consumer as the source of its wellbeing. With one possible exception, none of the many trade associations made any pretence of consulting the consumer.

It was admittedly difficult to ascertain what the ordinary consumer thought. Mr. Forbes Jackson's own recent inquiries in various districts had revealed an amazing dumbness; pathetic content with things as they were, although they were vaguely felt to be silly. Except by direct request, suppliers showed no interest in, and never tendered advice to, consumers who treated diversity of systems and non-interchangeability of components with philosophical detachment. The reason was that the average family did not move about from place to place; when it had to, electrical difficulties were small compared with others.

### Scope for Better Utilisation

Thus, by and large, householders were not utilising electricity as it might be used and certainly not for saving labour. Even the vacuum cleaner had not been popularised by the electrical manufacturing industry. In any case should figures of increasing total output of electricity be accepted as evidence that, from the consumer's point of view, all was well? The industry had concentrated too exclusively on current-consuming appliances; there were other really laborious tasks of the home which only electricity could do, but appropriate appliances were not generally available.

Turning from domestic to professional aspects, Mr. Forbes Jackson explained that the local government authority he served dealt with about 5,000 premises in over 100 areas of supply, including 1,000 schools, 150 hospitals, offices, workshops, pumping and fire stations, kitchens preparing public and school meals, etc., having an annual

consumption of 40 million kWh. In addition it arranged for the supply of energy to, the provision of installations in and the general supervision of 100,000 small houses, which perhaps accounted for another 25 million kWh per year.

### Confusing Tariff Variations

The size of the supply undertaking had little to do with the service given to the consumer and, with a few exceptions, prices paid were not unreasonable. But the diversity of tariffs was annoying and confusing; there were so many apparent variations as to bring ridicule upon the industry. Prices could not be the same in rural as in urban areas, but there was no valid reason why in London for the same load there should be different forms of tariff and different prices in two adjacent municipal areas. Such differences tended to undermine national confidence in the direction of the industry and to obscure its otherwise great achievements. Their removal would do away with the major part of the external criticism of the industry and at the same time it might be possible to clear up the apparently meaningless variations in application forms; and also to standardise coal and maximum demand clauses.

Turning to the manufacturing aspect, he said there was insufficient demand to encourage the economic production of household labour-saving appliances and it did not seem to be anybody's business to instruct the consumer in that respect.

### Economical Wiring

Mr. Forbes Jackson feared that the more manufacturers combined the less incentive there would be for any one of them to produce something better or more novel than the others. More socket outlets were needed in small houses, but they would not be provided until some more economical method of wiring than the present system had been devised. His responsibility for planning, equipping and maintaining 100,000 small houses and flats had taught him that the installation of more than one size of socket in any one house was confusing and did not do anyone any good. He was convinced that the combination of fused-plug outlets

with a ring-main circuit provided a wiring system with such advantages over other systems that it could not be ignored.

Mr. Jackson would like to see the contractor advertising and selling the labour-saving appliances which everyone else seemed to have neglected. The consumer did not

believe that electricity could be made safe only by the compulsory registration of contractors. He would never accept the danger argument, his own experience being against it; but he might be made to realise that poor workmanship and cheap materials were expensive in the long run.

## Electricity in Ships

### Varied Applications Provide Good Training

**P**ROGRESS in the use of electricity in ships was reviewed by Mr. R. I. KINNEAR (John Brown & Co., Ltd.) in his inaugural address as chairman of the Scottish Centre of the Institution of Electrical Engineers, delivered at Glasgow and Edinburgh and to be repeated at Aberdeen.

The subject was chosen with the twofold object of indicating the extent and variety of applications and, more especially, to point out the suitability of shipyards to apprenticeship in electrical engineering because of the high standard of workmanship insisted upon and the diversity of experience obtainable. The chairman paid a very high tribute to designers and manufacturers of electrical equipment for the manner in which they had satisfied the onerous conditions specified, particularly during the war period. The progress achieved could not have been made without their collaboration and high sense of responsibility. Electricity had won its present position entirely upon its merits.

Progress was illustrated by tabulated particulars of three large passenger liners and comments on the installation of the *Queen Mary*, containing 578 motors of 17,818 HP, namely, 77 (4,640 HP) for engine room machinery, 37 (3,957 HP) for the boiler room, 19 (388 HP) for ventilating machinery spaces, 235 (1,119 HP) for ventilating passenger and crew accommodation, 28 (5,768 HP) for deck machinery, three (750 HP) for the steering gear, 32 (40 HP) for kitchen machinery, 78 (256 HP) various, 40 (268 HP) for lifts and hoists, five (150 HP) for refrigeration and 24 (480 HP) for boat hoists, the capacity of the generators and emergency sets being 9,250 kW.

Seven DC turbo-generators with integral condensers, each of 1,300 kW, were provided in two almost entirely separate power stations in different parts of the vessel. Energy was distributed from two main switchboards, respectively controlling auxiliary machinery and hotel services, to 32 auxiliary boards at

calculated load centres through semi-ring mains and circuit-splitting switches; there were 735 miles of cables in the ship.

There were 420 kW of heating radiators and 1,450 kW of cooking apparatus. Apart from adaptability and economy considerations, cleanliness and labour-saving alone justified the use of electricity for the catering services, particularly if the coal that would otherwise be needed was kept in mind.

There were about 29,000 lamps in the *Queen Mary*. One of the shipbuilder's many problems was the demand for increasing intensity of illumination, yet the mounting height of fittings in many positions could not exceed 7.5 ft. because of height restriction between decks. Cabins usually had anything from six to twelve lighting points, plus a number of special plug-outlets; two-, three- and even four-way switching was common practice. Thus much thought was required to arrange the several services to best advantage. The height limitation precluded the use of high-wattage lamps; tubular lighting had the disadvantage of fragility and, on that account, was expensive to maintain. Practice was therefore largely confined to the provision of numerous small points, consequently necessitating increased wiring and switching, which was neither economical nor wholly desirable.

Cables must have freedom to move, particularly at corners; but all precautions, against damage due to the continual movement of the ship's structure when at sea could not prevent faults. Their localisation was a problem of no small magnitude; one shipping company had arranged for sufficient current to be made to pass to earth on the opposite pole to that on which the fault occurred to cause the circuit fuse to melt. By that means the fire risk was immediately detected and, while the method was unorthodox, there was less danger in systematically blowing fuses than in allowing faults to develop.



# Choice of Appliances

## Suitable Design and Efficient Maintenance

**D**URING the war much attention was paid to the design of electrical appliances, both heavy duty and domestic. The benefits of such "electrical introspection" should soon emerge in the way of more efficiently designed appliances. In the meantime, however, production of immediate pre-war designs during the transitory period, should be a safeguard against too hasty development of appliances, which though original in some respects may leave much to be desired in the way of efficiency and reliability. Certainly, production of appliances of the utility wartime variety—often by manufacturers unknown in pre-war days—should be discontinued. Such appliances, by no means inexpensive, do not represent the best the industry can offer. More often than not their design has been determined by the exigencies of war, and if their manufacture is unduly prolonged, even during the heavy demand period, a poor impression of post-war electrical equipment may be given.

### Basis of Complaints

Generally, speaking, criticism has been focused on poor construction, lack of forethought in design and poor workmanship, especially as regards domestic equipment. Difficulties in the way of maintenance have also come under review and increased standardisation strongly urged. Many of such criticisms were applicable to pre-war appliances and no doubt manufacturers will not be unresponsive. On the other hand, no matter how well appliances are designed, unless they are employed for their intended purposes dissatisfaction, high maintenance costs and short life will inevitably result.

Experience has shown that there is a need for production of three classes of appliances for any particular requirement—heavy duty, light duty and domestic. If domestic appliances are employed for heavy duty work continuously, trouble and failure will occur. Conversely, to employ heavy duty equipment for light duty or domestic purposes involves needless expense. In pre-war days it was not uncommon to find domestic cookers, washers, wash boilers, vacuum cleaners, refrigerators, etc., employed in hotels, restaurants and commercial establishments;

**By Supply Engineer** upon occasion even domestic washing machines and wash boilers, etc., in communal laundries. This was because lowest cost often determined the selection and in some instances there were no alternatives. Appliances should be fitted to their work if confidence in the reliability of electrical equipment is to be stimulated.

Apart from initial design and correct selection for particular requirements, the question of maintenance is very important. Maintenance considerations were often completely neglected in pre-war days when initial design of many appliances was determined, causing much trouble in repair shops—many designs being more often cursed than blessed. As regards maintenance, there are generally two alternatives: to run appliances until failure occurs, which with the advent of all-electric houses and total reliance on electrical equipment is becoming less desirable; or to arrange for periodic inspection and maintenance of appliances without waiting for faults to occur. In the commercial sphere the failure of some appliances can lead to a substantial loss of business.

### Difficult Design

At first sight periodic maintenance without waiting for actual failure is the logical course, especially if coupled with a strong recommendation that where continuity in the use of appliances is of paramount importance sufficient duplicate apparatus should be available to enable maintenance to be carried out properly. Unfortunately the design of many pre-war appliances was such that routine dismantling and reassembly for maintenance purposes was impossible. Thus it was often more advisable to leave appliances in commission until definite failures occurred, especially as regards heating apparatus where disturbance of elements, etc., for inspection purposes often resulted in further damage.

The contribution of prompt, cheap and efficient maintenance of electrical appliances towards increased development cannot be too strongly emphasised. With coal ranges or fires there is little to go wrong and the same applies, to a lesser extent, to the appliances of electricity's more modern rival. With most types of electrical appliances, however, due to their inherent nature and

design, the position is vastly different and the average appliance demands a greater degree of respect as regards correct usage. Switches, flexibles, thermostats, elements, brushes, refractories, terminals, etc., are all common features of modern electrical equipment and if they are not correctly designed in the first place, and properly maintained, they are potential sources of breakdown. In immediate pre-war days there were signs that some of the more prominent designs of domestic appliances, especially cookers and water heaters, had secured the confidence of the general public

in the way of reliability. This was revealed by the tendency towards purchase as opposed to simple hire. By more careful design and efficient maintenance, it should not be difficult to extend this outlook to other fields.

At present all is not well in the production and availability of electrical equipment which will shortly be required for equipping both temporary and permanent houses. Unless production keeps pace with progress in other directions, many future householders may find that although their homes are equipped with cookers, water heaters, etc., no kettles, pans or irons are available.

## New Books

**Luminous Tube Lighting.** By Henry A. Miller, A.M.I.E.E. (Pp. 143; 78 figs.) George Newnes, Ltd., Tower House, Southampton Street, W.C.2. Price 12s. 6d.

The mere fact that events have made it temporarily impossible to make expansive use of the improved technique in some fields of lamp manufacture and lighting is no reason for ignoring the subject. Rather it should be an incentive to learn how to make the best use of what is available and to plan broadly for the future. Technical literature on luminous tubes is scanty but it is evident that they will be much used in coming years. "Luminous Tube Lighting" should be found useful by engineers, contractors and maintenance staff who rightly believe that they should have a working knowledge of the operation of the lighting tools they use, for it summarises the materials and equipment involved and describes each of the discharge tube light sources.

After an introductory chapter the theory of luminous discharges is dealt with, though the average reader may have some difficulty in understanding the atomic physics involved. This is probably the inevitable result of compression; a little more space might have been given to explanation of the various factors. The two following chapters giving details of the materials which go to make up a luminous tube and the methods of manufacture and assembly are of interest chiefly to specialised readers.

Then there are two chapters on various applications of neon tubes such as for sparking plug testers, stroboscopes, etc., leading to mention of sodium, mercury, ultra-violet and other low-pressure discharge lamps, the high-pressure mercury lamps, "black" lamps and the dual lamp. Data on the operation and characteristics of the mains voltage tubular fluorescent lamp refers to American types, and it is necessary to remember that although British and American brand names may be the same the actual lamps may differ in some respects.

Chapter 8, "Data and Tests," contains useful information for the lighting designer on the efficiency and depreciation of cold cathode fluorescent tubes, transformer voltages required and avoidance of radio interference. The approximate spacing required between continuous lines of tubes can be easily found from the tables provided, though the effects of room width and colour of decorations are not taken into account and must modify the result in some degree. The two final chapters on neon signs and miscellaneous use of luminous discharge tubes give details of transformer ratings, various circuit diagrams, methods of producing animation, etc., and installation data. Those who have been out of touch with this class of work for the last few years should find this section useful in enabling them to pick up the threads.—A.A.

**Palmer's Private Companies.** By J. Charlesworth, LL.D., Barrister-at-Law. (100 pp.), price 2s. 6d. **The Essential Work Order.** By H. Samuels, M.A. (38 pp.), price 2s. 6d. Stevens & Sons, Ltd., 119 & 120, Chancery Lane, London, W.C.2.

These two books are parts of the publishers' "This is the Law" series. The first was originally published nearly sixty years ago; this is the thirty-ninth edition. It explains the advantages of the private-company form of trading and gives details of the procedure which has to be followed in forming a private company. One-man companies and limited partnerships also receive attention.

It may seem a little late in the day to produce a guide to the Essential Work Order, but this form of control is likely to persist for some time yet and employers and employees released from the Forces, in particular, may find it useful. The Order referred to is the "General Provisions" Order (S.R. & O. 1942 No. 1594); there are, of course, other supplementary Orders relating to particular industries, e.g., electrical contracting, and these should be referred to for variations in the general arrangements affecting these industries.—J.H.C.

# Transportable Plant for Russia

## Particulars of Met-Vick 500-kW Set

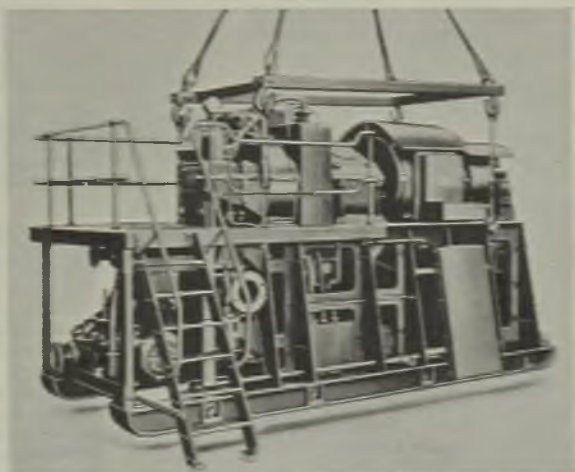
**M**OBILE power stations have already been supplied by the Metropolitan-Vickers Electrical Co., Ltd., for service in the U.S.S.R. Of a somewhat similar nature is the transportable turbo-generator set designed and manufactured by that company for the U.S.S.R. to the instructions of the Ministry of Supply. It is of 500 kW with condenser and auxiliaries in one assembly and, separately, a switch cubicle, with a case of loose items. The set weighs about 15½ tons; or when packed, including spares stowed in the case, about 19 tons. The fabricated foundation "cradle" of welded mild steel is free from resonant vibration. The base members are constructed as skids with lugs to enable the complete assembly to be hauled on rollers when desired. The condenser is integral with the exhaust casing. The single-cylinder, high pressure impulse turbine operates at 6,500 RPM with stop valve steam at 2¼ lb. sq. in. and 518 deg. F. There are six rotor wheels, of which the first is a velocity compounded stage and the other five single impulse type stages. The steam chest has two automatically operated governor valves controlled by an oil relay system for the admission of steam to two nozzle groups, one for loads up to 350 kW and the smaller for loads up to the maximum rating. On the steam chest a selective device is incorporated to enable efficient running to be obtained at partial loads, by permitting the smaller groups of nozzles to be first brought into use. An emergency device is provided for shutting down the plant in the event of excessive overspeed occurring.

The condenser is of the surface type, of 450 sq. ft. cooling surface and arranged axially beneath the turbine. Fabricated construction has been used for the condenser shell and the associated bottom half-casing of the low-pressure end of the turbine cylinder. The main circulating water pump is driven from the main turbine shaft and mounted on the same spindle as the condensate extraction pump. The two-stage, steam-operated air ejector is provided with inter- and after-coolers, through which the feed passes, and thus the latent heat of the ejector operating steam is conserved. To augment the discharge head of the circulating pump a horizontal booster pump is fitted into the cooling water discharge line from the

condenser and driven by a 24-HP squirrel cage motor.

The 1,000 RPM alternator is driven through double-helical single-reduction gears of 6.5 to 1 ratio. A flexible quill couples the turbine spindle and the gear pinion.

The alternator gives 625 kVA at 400 V, three-phase, 50 cycles. The exciter is controlled by a field rheostat and automatic voltage regulator.



Finished set being hoisted

The switchgear is contained in a sheet steel cubicle of four panels arranged for slinging from a crane and levering into position.

## Scottish Engineering Students

**T**HE objects of the Scottish Engineering Students' Association, which has been formed with headquarters at Glasgow, are to enable young men in all branches of engineering to meet on a social basis to read and discuss papers and to interchange views and ideas; and to provide activities for younger members of certain technical institutions and societies which may not themselves be in a position to organise individual student meetings. It is emphasised that the activities of the Association are not intended to interfere in any way with those of the individual institutions and to this end membership is strictly limited to members of recognised technical institutions and societies. Persons under the age of thirty are eligible. There is no subscription fee; funds are being provided by prominent Scottish engineers and shipbuilders who are interested in the work of the Association. The presidential address was to be given last night.



## Forthcoming Events

**Saturday, October 13th.—Manchester.**—At Geographical Society, 16, St. Mary's Parsonage, 2.30 p.m. Junior Institution of Engineers (N.W. Section). Annual general meeting and presidential address by L. H. A. Carr.

**Monday, October 15th.—London.**—Institution of Electrical Engineers, 7 p.m. London Students' Section. Chairman's address by H. Shorland, B.Sc. (Eng.) on "Tuning Forks."

**Birmingham.**—Grand Hotel, 6 p.m. Birmingham Electric Club. "Technical Education in the Present and Immediate Future," by C. F. Partridge, B.Sc., M.I.E.E.

**Liverpool.**—Royal Institution, 6 p.m. I.E.E. Mersey and North Wales Centre. "The Place of Radiant, Dielectric and Eddy-Current Heating in the Process Heating Field," by L. J. C. Connell, O. W. Humphreys and J. L. Rycroft.

**Tuesday, October 16th.—London.**—Lighting Service Bureau, Savoy Hill, 6.15 p.m. Association of Supervising Electrical Engineers. Presidential address by E. R. Wilkinson, M.I.E.E. preceded at 5.45 p.m. by two short films.

**London.**—At Institution of Electrical Engineers, 2.30 p.m. British Society for International Bibliography. Presidential address.

**Manchester.**—Engineers' Club, 6 p.m. I.E.E. North Western Centre Installations Group. "Modern Electric Lift Practice," by L. S. Atkinson.

**Stockport.**—Mersey Hotel, 7.30 p.m. Association of Supervising Electrical Engineers (Manchester Branch). "Electrical Installation," by R. H. L. Andrew.

**Cardiff.**—At South Wales Institute of Engineers, 6.30 p.m. I.E.E. Western Centre (jointly with Civil and Mechanical Engineers). Discussion of the Report on the Severn Barrage Scheme to be introduced by Sir William Halcrow and S. B. Donkin. Admission by ticket only.

**Wednesday, October 17th.—London.**—Institution of Electrical Engineers, 5.30 p.m. Transmission Section. Chairman's inaugural address by E. T. Norris.

**Barnsley.**—Queen's Hotel. Association of Mining Electrical and Mechanical Engineers (Yorkshire North-West and South Branches). Mr. Harvey's Report.

**Thursday, October 18th.—London.**—Institution of Electrical Engineers, 5.30 p.m. Discussion on "Weather and Electric Power Systems," to be opened by J. S. Forrest, M.A., B.Sc., H. W. Grimmit, A. J. Drummond and Wing Cmdr. R. M. Poulter, O.B.E. (Joint meeting with the Royal Meteorological Society.)

**Swansea.**—I.E.E. West Wales (Swansea) Sub-Centre. Inaugural address by G. D. Arden, chairman.

**Friday, October 19th.—London.**—Institution of Mechanical Engineers, 5.30 p.m. Presidential address by Prof. R. N. Arnold, D.Sc.

**London.**—39, Victoria Street, Westminster, 6.30 p.m. Junior Institution of Engineers. Film on "Boiler House Practice and Steam," to be introduced by E. C. Rogers.

**Sheffield.**—Metallurgical Club, West Street, 7.30 p.m. Junior Institution of Engineers (Sheffield Section). Annual general meeting and chairman's address on "Engineering

Aspects of Architecture—Some Electrical Notes Thereon," by T. F. Grocock.

**Newcastle-upon-Tyne.**—Neville Hall, Westgate Road, 6.30 p.m. I.E.E. North-Eastern Students' Section. Short informal talks by members on "My Occupation and Some Experiences."

**Newcastle-upon-Tyne.**—North-East Coast Institution of Engineers and Shipbuilders. Annual general meeting and presidential address by Sir Summers Hunter.

**Saturday, October 20th.—Leeds.**—Electricity Offices, Whitehall Road, 2.30 p.m. I.E.E. North Midland Students' Section. Lecture on "Colour" by Dr. Mole, J. A. Foot and K. A. Milligan.

**Bridgend.**—Mining and Technical Institute, 6 p.m. Association of Mining Electrical and Mechanical Engineers (South Wales and West Wales Branches). Visit of national president (Mr. A. Hepburn) and discussion on "Electrical and Mechanical Aspects of the Reid Report."

**Monday, October 22nd.—Birmingham.**—Grand Hotel (Grosvenor Room), 6 p.m. I.E.E. South Midland Centre. Chairman's address by F. J. Elliott, reunion and visit of the president, Dr. P. Dunsheath.

## Export Inquiries

**WE** have received the undermentioned inquiries from firms and individuals overseas who wish to secure agencies for British electrical equipment and appliances or to import them into their territories. We shall be glad to pass on to them replies received from readers which should be addressed to the Editors, quoting the number given in parentheses. We cannot vouch for the standing of inquirers and manufacturers replying to them will no doubt require the usual references:—

**Belgium.**—Monsieur Jean Vandenbempt, managing director of Appareillage Electro-technique, Brussels, is in London (c/o London Chamber of Commerce, 69, Cannon Street, E.C.4) until October 15th inquiring about possibilities of importing British electrical goods into Belgium. Readers may get into touch with him directly.

**India.**—Representation required for British makers of electrical accessories, wires and tools. (X.120).

## INFORMATION DEPARTMENT

**G**ENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

Makers of the "Yarworth" heating pad.

# COMMERCE and INDUSTRY

## Electricians' Wage Increase. E.C.A. and Wholesalers.

### I.E.E. Regulations

**T**HE Council of the Institution of Electrical Engineers has authorised the publication of a reprinted edition of the Institution's Regulations to be known as "Regulations for the Electrical Equipment of Buildings, Eleventh Edition (Revised December, 1943) (Reprinted with minor amendments, May, 1945)." Copies (1s. 3d. including postage) may be obtained from the Secretary or from E. & F. N. Spon, Ltd., 57, Haymarket, S.W.1.

### Wages in the Contracting Industry

An increase of  $\frac{1}{4}$ d. per hour is to be made in the wages of men over 18 years of age employed in the electrical contracting industry. The National Joint Industrial Council for the industry announces that as from the third pay-day in October up to the second pay-day in January next the cost-of-living (war) addition, including the extra 1d. awarded in September, 1944, will be as follows:—Labour over 21 years of age,  $6\frac{1}{4}$ d. per hour; labour between 18 and 21, 4 $\frac{1}{4}$ d.; labour under 18, 2d. (same).

The hourly rates of pay for adult journeymen electricians (including the war addition) are now as follows:—Grade A, 2s. 5 $\frac{1}{2}$ d.; Mersey District, 2s. 3 $\frac{1}{2}$ d.; Grade B, 2s. 2 $\frac{1}{2}$ d.; Grade C, 2s. 1 $\frac{1}{2}$ d.

### C. A. Parsons & Co.'s Prospects

Addressing about 3,000 employees at a works gathering, Sir Claude D. Gibb, chairman of C. A. Parsons & Co., Ltd., Heaton, Newcastle-on-Tyne, announced that the company intended to spend about £1,000,000 on developments within the next few years. Already purchases of new equipment costing £400,000 had been authorised and £250,000 worth had been delivered. The company had sufficient work work in hand to keep it going for the next four or five years, but it was looking ten or fifteen years ahead. Orders had had to be refused because they could not get them through the shops in time; some of these were for new power stations. The most modern methods and equipment were being introduced to enable them to compete in world markets.

### Occupational Training Schemes

The need for technically trained and highly skilled men to fill responsible positions was stressed by Mr. T. H. Windibank, M.I.E.E., works director at the Chelmsford factory of Crompton Parkinson, Ltd., when addressing students and visitors at the company's occupational training scheme prize-giving on September 25th. Mr. Windibank said that under the training scheme any boy with the necessary ability could rise to be works manager; in fact, his training would be directed to that end. He went on to give details of the boys who were being trained under the scheme. In all, there were 153 boys in eight classes and it was hoped that before long the scheme would be further developed.

Mr. B. Hallows Garside, A.M.I.E.E., general

manager of the Chelmsford works, presented certificates of training to students who had completed their period of tuition and pointed out that they had great value not only within the Crompton Parkinson organisation but generally.

### E.P.E.A. and Post-War Planning

At a recent meeting the National Executive Council of the Electrical Power Engineers' Association adopted Part 2, Section B of the report of the Post-War Planning Sub-Committee. This makes five recommendations: (1) That the National and District Joint Boards should not limit themselves to the negotiating of salaries and conditions, but should also function in respect of the wider issues affecting the electricity supply industry. (2) That either party to an Industrial Council should have the right in respect of any claim to call upon the other party for all relevant information in their possession or control, including inspection and production of documents. (3) That terms and conditions of employment agreed upon by National Industrial Councils or Boards should have the force of law, a National Arbitration Tribunal to decide in case of failure by a joint body to agree or in the event of a settlement being unduly delayed. (Pending legislation to this end the Conditions of Employment & National Arbitration Order, 1940, should remain in force.) 4. That a National Joint Council or Board should have an independent chairman appointed by the Minister of Labour. (5) That District Boards and Councils should expedite procedure and only refer national issues to the national bodies.

### Meter Engineers' Salaries

It will be recalled that in June last the National Joint Board of Employers and Members of Staff (Electricity Supply Industry) announced that it had agreed upon positions in the salaries schedule for certain grades of electricity undertakings' meter staffs. The new grades were given in the *Electrical Review* of June 29th (p. 941). The N.J.B. has now issued a new basic schedule including these new grades, as well as a revised current schedule. The salaries shown in the latter are the same as those reproduced in the *Electrical Review* of January 12th last.

### Women Electricians' Conference

The Women's Section of the Electrical Trades Union held its first annual conference at Filley, Yorks, last week; the Section now has about 8,000 members. The conference was addressed by the president of the Union (Mr. F. Foulkes) who said that during the war it had been proved that the contention that women had not the necessary craft qualifications for engineering and shipbuilding work was false. Male members of the Union would have to sink their old prejudices so far as the capabilities of women were concerned.

Miss Harrison (Tottenham) was unanimously



supported in her advocacy of the right of married women to stay in industry if they wished to do so. The conference urged the Union to appoint women national officials as a means of organising women electrical workers more efficiently.

Mr. W. C. Stevens, assistant general secretary, said that the executive committee of the E.T.U. hoped to secure a revision of the rules to enable women members to become branch chairmen or secretaries. He also said that the Union was endeavouring to obtain a clearly-defined agreement on grading with the employers.

### Atlas Lamp Publicity

An even bigger advertising campaign than before is being launched for "Atlas" lamps in which all the leading national, daily and Sunday newspapers will be used as well as the large circulation weeklies, the London evening newspapers and many leading Provincial papers and weekly newspapers. The chain of permanent road sites and bulletin boards throughout the country is being expanded. In addition Atlas advertising is appearing on many of the main-line railway stations and the London Underground system.

Although material is somewhat restricted, retailers still have the benefit of a window-dressing service designed to tie up with the Press and outdoor campaign. The campaign is a development of the theme of the "little man carrying the lamp," and a slogan "For Staying Power" is being adopted. The new Atlas poster is attractively designed in colour and in the Press the "staying power" theme is being put over by a series of semi-humorous drawings. Sales aids for retailers include a plastic counter model, cinema slides, window bills, price-lists, etc.



New "Atlas" poster

### Model Kitchen at Barking

Last week the Mayor of Barking, accompanied by the Mayoress, the Deputy-Mayor and the chairmen of the Electricity Committee and the Committee responsible for housing, opened a full-scale model kitchen of the type which it is hoped to incorporate in the houses on the new Barking estates. In this the cooker is a thermostatically-controlled horizontal model and the built-in refrigerator is of the standard type. The washing machine is essentially an electric wash-boiler equipped with a hand-operated suction type tumbler agitator and wringer. A dual-purpose water heater (15 gal.) provides large or small quantities of water as desired and on the ceiling is mounted a reflector type fire. Other equipment includes a thermostatically-controlled iron, a kettle and a clock.

The service unit is installed in a meter cupboard and the lighting of the kitchen is by a "warm-white" fluorescent lamp.

The kitchen was designed by the borough architect, Mr. C. C. Shaw, and equipped in conjunction with Mr. A. E. Marchant, the borough electrical engineer.

### Salford Contracts

It is announced that the order for the new boiler plant at the Agecroft station, Salford, has been given to International Combustion, Ltd.; it comprises four 315,000 lb. per hour boilers with coal-and ash-handling plant and dust precipitators and the value is £1,589,000. The Metropolitan-Vickers Electrical Co., Ltd., is to supply the two 50,000-kW m.c.r. turbo-alternators and ancillary plant at a cost of £562,000.

### Too Many Wholesalers?

At a recent meeting of the Southern Sectional Board of the Electrical Contractors' Association a resolution was put forward complaining of the "activities of sundry wholesalers and builders' merchants." The director of the Association (Mr. L. C. Penwill) is reported to have said that the Fair Trading Council was very active in this matter, but it was first incumbent upon the industry to ascertain the number of wholesalers required to handle efficiently the distribution of electrical products to the trade. If the number were found to be excessive consideration would have to be given to the withdrawal of wholesale terms to a certain number of wholesalers and the withdrawal would have to be on the basis of those not complying with the Fair Trading Policy and who did not serve the purpose of efficient distribution to the trade.

### Motion Study in Industry

To show the potentialities of Motion Study and its application to industry generally the Production Efficiency Board of the Ministry of Aircraft Production is now holding an exhibition and demonstration at the Carlton Hotel, Pall Mall, London. The exhibition was officially opened by Sir Stafford Cripps, President of the Board of Trade, on October 2nd. Motion study, which is the investigation of movements performed in doing work with a view to improving them, achieves its objects by securing the minimum of movement (by reducing or eliminating distance travelled, weight lifting and friction), simultaneous and symmetrical movements (by using both hands together), natural and rhythmic movements and by cultivating good movement habits. Among the several electrical firms co-operating in the demonstration to show old and new methods of undertaking particular processes are: Hoover, Ltd. (drilling and riveting a switch magnetic relay and assembly of accumulator cut-out); Ferranti, Ltd. (plug and control box assembly); Belling & Lee, Ltd. (plug and insulated terminal assembly); the General Electric Co., Ltd. (fan motor assembly); the Automatic Telephone & Electric Co., Ltd. (telephone switchboard key assembly); the Morgan Crucible Co., Ltd. (loading of carbon rings); S. Smith & Sons (England), Ltd. (instrument rotor drum assembly); the British N.S.F. Co., Ltd. (switch



assembly); Kolster-Brandes, Ltd. (automatic soldering of bobbins); the British Thomson-Houston Co., Ltd. (motor starting switch cover assembly, etc.); the British Thermostat Co., Ltd. (assembling and testing thermostat components); the Metropolitan-Vickers Electrical Co., Ltd. (assembling transformers with low meter gear trains, etc.); the Cosmos Mfg. Co., Ltd. (sub-assembly of double-pentode valve); and E. K. Cole, Ltd. (assembly of rotor and trimmer for radar equipment).

### Electrical Contractors' Enterprise

Lee, Beesley & Co., Ltd., electrical installation engineers, 6, Warwick Row, Coventry, have arranged for a lecture on "The Poetry of Light" to be given at the College Theatre, Coventry, on October 16th. The lecturer will be Mr. R. Gillespie Williams (W. J. Furse & Co., Ltd.) who is well known in the stage-lighting world. He will demonstrate stage-lighting methods to an audience consisting largely of members of local amateur dramatic societies reinforced by contingents from the Coventry Electric Club and the local branch of the Association of Supervising Electrical Engineers.

### Electrically Conductive Rubber

Rubber capable of conducting electricity is the subject of a paper prepared by MR. D. BULGIN for the London Section of the Institution of Rubber Industry.

The first part of the paper describes the preparation from rubber combined with carbon black of various forms as well as some of the factors, such as the processing method and vulcanisation, that affect the electrical resistance of the finished material. In the second half of the paper the author outlines the theory that conductivity is caused by free energy forces emanating from the included particles of carbon and that the degree of conductivity is modified by the viscosity of the rubber.

### Applications of "Perspex"

Some of the ways in which "Perspex" is already being converted to peacetime uses are demonstrated at an exhibition (October 9th to 13th) arranged by the Midland regional office of Imperial Chemical Industries, Ltd., in the Chamber of Commerce at Birmingham. This material is now being produced in a range of attractive translucent pastel shades as well as the original transparent form used in aircraft. As an alternative to glazing it transmits light of all wavelengths very well and is unimpaired by heat and long exposure to moisture and light.

The exhibits include concealed lighting (Harris & Sheldon, Ltd., Birmingham) through opal "Perspex"; also table lamps (Plastic Decorative Interiors, of Birmingham) and ornamental screens; applicators for medical examination (Vann Bros., London) demonstrating the "piping" of light through curved rods machined from block, which can be sterilised in boiling water; opal trough fittings (G.E.C. and Met-Vick) for fluorescent lamps; samples of decorative fittings ("Crystex," Birmingham) for filament lamps that display the effects of sand blasting and cellulose spraying on to clear "Perspex" sheet; table-lamp standards (W. J. Cox, London); wall light sconces and table-lamp

standards (Middlesex Metalcrafts) in coloured material; and table-lamp standards (Thermoplastics, Ltd.).

### Trade Publications

Crompton Parkinson, Ltd., Electra House, Victoria Embankment, London, W.C.2.—Illustrated brochure of 20 pages (F. 1081) entitled "Lighting for Cotton" dealing with the special requirements of the textile industry; it indicates why good lighting increases output, discusses different forms of lighting and offers advice about installations. Values of illumination on the working plane for specific processes are recommended. Typical textile lighting installations are illustrated.

British Industrial Plastics, Ltd., 1, Argyll Street, London, W.1.—An 8-page booklet written for plastic moulders outlining a year's experience of "radioelectric" preheating (high-frequency AC) of powders on a production scale. Practical information is given on electrode sizes, power output and heating capacity, temperature, first and running costs, and ascertained results with several different makes of plant.

Dorman & Smith, Ltd., Ordsal Works, Salford, Manchester, 5.—Booklet illustrating switchboards of many sizes and types individually designed for special requirements.

E.M.B. Co., Ltd., Moor Street, West Bromwich, Staffs.—Illustrated booklet on die-casting and injection moulding machines and different kinds of air presses.

Runbaken Products, 71, Oxford Road, Manchester, 1.—Illustrated leaflets describing vest-pocket "testoscopes," including a dual model for very low and medium voltages.

Applicants should write on their firms' business notepaper.

### Trade Announcements

Arthurs (Arthur Gray, Ltd.) are establishing showrooms on the first floor of their premises at Gray House, 150, Charing Cross Road, W.C.2, for the demonstration of radio, electrical and television goods.

The London office and stores of the Concordia Electric Wire & Cable Co., Ltd., have been transferred to 180, Gray's Inn Road, London, W.C.1.

The registered office of Vacuums, Ltd., has returned to Aldridge Road, Birmingham, 22b. The service department for the "Bustler" cleaner is at Tenby Street North, Birmingham, 1.

### Change of Name

Lawrence G. Western (Incubators), Ltd., has changed its name to Western Incubators, Ltd.; this is a change in title only.

### TRADE MARKS

THE following applications have been made for trade marks. Objections may be entered within a month from October 3rd:—

BRADSWITCH. No. 633,170, Class 9. Electric switches.—L. C. Bradley, L. J. Bradley, F. C. Bradley and N. E. Bradley, trading as L. C. Bradley, 20, Church Road, Perry Barr, Birmingham, 20.

BERRICON. No. 634,844, Class 9. Radio valve holders and electric switches.—Radio Instruments, Ltd., Purley Way, Croydon.

# ELECTRICITY SUPPLY

## Cheltenham Installations. Resumption of Hire-Purchase.

**Barrow-in-Furness.**—**LOANS.**—The Electricity Committee is seeking sanction to borrow £18,178 for the provision of a supply to various farms and estates, £5,000 for mains and services, and £5,000 for apparatus for hire.

**Birkenhead.**—**POWER STATION SITE.**—The Electricity Committee has obtained sanction to borrow £66,600 for the new power station site.

**MAINS EXTENSIONS.**—The Electricity Committee is to provide a supply to Pooles Dye Works, Oxtou (£2,696); to permanent housing estates (£41,716); and to temporary bungalows (£2,425).

**Burnley.**—**NEW FEEDER.**—The Corporation is to borrow £7,325 for the construction of a new e.h.v. feeder to Rosegrove substation.

**Cheltenham.**—**FREE APPLIANCE WIRING SCHEME.**—The Borough Council has approved a scheme for free wiring of five "additional" points in all new houses, whether built by the Corporation or by private enterprise. The scheme provides for wiring points to be installed by the Electricity Department for a cooker, a water heater, a wash-boiler or washing machine, a drying cupboard and a refrigerator. The remainder of the wiring installation is to continue to be the responsibility of the Housing Committee or the builder. In addition the Electricity Department will provide, free, an electric cooker and an immersion type water heater, together with suitable lagging for the tank where necessary. In such houses there will be no charge for the service cable, subject to the length being reasonable. The energy will be supplied under the two-part domestic tariff (through a two-part tariff prepayment meter if desired), the fixed charge being 2d. per week above the normal 15 per cent. per annum on the net rateable value, or other appropriate charges for flats in the borough, or houses in the rural area, with a minimum of one shilling per week. The running charge will be ½d. per kWh above the normal rate (½d. in the borough and ¾d. in the rural area).

In the case of the first 143 houses to be erected by the Corporation on the Lynworth estate, the scheme will be modified by omitting points for the drying cupboard and wash-boiler as the Housing Committee has already accepted an offer by the gas company.

In considering the scheme the Electricity Committee took the view that the wiring for the socket outlets for ordinary portable apparatus should be the responsibility of the Housing Committee or the builder, but it accepted responsibility for outlets for fixed apparatus not generally included in the wiring installation. The scheme, it was felt, would act as a great stimulus to electrical development in the area, and after a few years would be self-supporting.

**Fife.**—**CHARGE FOR CABLE.**—The Fife Electric Power Co., Dunfermline, in a letter to the County Council, propose to depart from the practice of supplying cable free of charge. For permanent housing schemes a capital charge of 8s. 6d. a yard for cable-laying in

private property is proposed. The County Council is taking the matter up with the Electricity Commissioners.

**Greenock.**—**ALLOCATION OF SURPLUS.**—The Electricity Department's accounts for 1944-45 showed a substantial balance; £22,000 has been paid out for capital expenditure and £10,000 transferred to the reserve fund.

**Ilford.**—**SUPPLY TO ESTATES.**—The Housing Committee has arranged for the Electricity Department to provide mains and services to temporary houses on the Forest Road estate at a cost of £5,986. The Electricity Committee is to erect three substations on housing estates at a cost of £11,046.

**Liverpool.**—**INSPECTION OF UNDERTAKING.**—Members of the Electric Power and Lighting Committee made a tour of the area of the electricity undertaking last week. At a luncheon in the Adelphi during the inspection, Alderman A. Critchley said Liverpool was showing what could be done by a progressive municipality to further the welfare of the surrounding boroughs and rural population. To-day, to some of these rural districts, the cost of electricity was only half what it was before Liverpool Corporation took them over notwithstanding the phenomenal increase in the price of coal.

Mr. J. Eccles, city electrical engineer, said the industry was going from strength to strength. All other forms of power had a limited sphere. It would be foolish to say that there was no possibility of using atomic energy for ordinary commercial purposes, but what we had to develop, as an alternative to coal, was the tidal energy round our shores.

**DISTRIBUTION EXTENSIONS.**—Consent has been received from the Electricity Commissioners to the borrowing of £350,000 in connection with extensions to the distribution system.

**Manchester.**—**STUART STREET STATION EXTENSIONS.**—Alterations in the original scheme for extensions at the Stuart Street generating station, and an increase in the cost of structural steelwork, have resulted in the estimate of £1,820,800 being insufficient. The Electricity Committee therefore proposes to apply for sanction to borrow an extra £120,000.

**DISTRIBUTION WORKS.**—To meet anticipated expenditure during the next twelve months mainly on the provision of supplies to new houses, and industrial developments, it is proposed to apply for sanction to borrow £20,000 for distribution station plant and £18,000 for feeder mains.

**Millom (Cumberland).**—**SUPPLY TO NEW HOUSES.**—The R.D.C. Electricity Committee has obtained sanction to borrow £1,092 for l.v. mains and services to fifty new houses at Haverigg, Millom.

**Portland.**—**RESUMPTION OF HIRE-PURCHASE.**—The question of recommencing the hire-purchase of apparatus was raised at a meeting of the Electricity Committee. The treasurer stated that the terms should provide for a deposit of approximately one quarter of the selling value,



the balance to be paid in equal quarterly instalments over a period of four years, together with interest at approximately 4 per cent. The Committee recommended that hire-purchase should be resumed on the terms suggested.

**Rawtenstall.**—**SERVICE CABLES.**—The Electricity Committee has agreed that in future the length of service cable laid free of charge shall be increased from 30 ft. to 60 ft. The minimum annual payment in cases where more than 60 ft. is laid is to be raised from 12½ to 15 per cent of the cost of providing the cable.

**LOAN.**—Sanction has been obtained to borrow £16,659 for improvements to the distribution system.

**Rotherham.**—**SUPPLY TO MEXBOROUGH.**—The Electricity Committee has arranged terms for the supply to Mexborough U.D.C. and reports that feeders and switchgear would be required from the Carlisle Street substation involving a cost of about £6,478.

**EXTENSIONS.**—The Committee is seeking sanction to borrow £22,650 for switchgear, cables and overhead lines for the supply to Newton Chambers & Co., Ltd., and proposes to utilise £3,500 surplus revenue for the provision of a supply to John Brown & Co., Ltd., at Aldwarke Colliery.

**Salford.**—**APPOINTMENT OF CONSULTANTS.**—The Light, Heat and Power Committee recommends the appointment of L. G. Mouchel & Partners, Ltd., as civil engineering consultants for extensions at the Agecroft power station at a fee of 6½ per cent. of the total cost.

**Wallasey.**—**HIRE-PURCHASE.**—The Electricity Committee has decided that the hire-purchase by consumers of any electrical apparatus shall be allowed for periods not exceeding six years. Application is to be made for sanction to borrow £10,000 for apparatus for hire purchase and £5,000 for mains and services in connection therewith.

**MAINS EXTENSION.**—The Electricity Committee is to provide a supply to the Mariners' Homes and to the Manor Road area at a cost of £16,190.

**Worcester.**—**PROPOSED REVISION OF CHARGES.**—Increases in charges which have been recommended by the Electricity (Tariffs) Sub-Committee must, it is stated, be regarded as an intermediate stage only since the new C.E.B. tariff which will be in operation from January 1st next may materially affect the purchase price of electricity. The proposed changes include an increase in the running charge of the domestic two-part tariff from ½d. to ¾d. and in the heating flat rate from 1d. to 1½d. per kWh. There are advances in various other tariffs, but in the case of bulk supply it is proposed to reduce the coal clause figure from 0.0012d. to 0.00105d. per kWh for each penny variation from the basic 12s. per ton.

## TRANSPORT

**London.**—**EXTENSION OF TIME.**—The Minister of War Transport has made the London Passenger Transport Board (Extension of Time) Order, 1945 (S.R. & O. 1945 No. 1150; Stationery Office, 1d.). This extends by three years the time within which a number of the Board's works are to be carried out. Included in the Order are a number of trolley-bus extensions mainly in the southern areas of London and in Essex.

## Sydney Extensions

### Progress at Pyrmont and Bunnerong

**T**HE annual report for 1944 of the general manager of the Sydney (N.S.W.) County Council, Mr. D. J. Nolan, summarises the progress made with the major extension schemes. At Bunnerong power station constructional changes required to overcome initial troubles with the steam generating plant for Nos. 8 and 9 sets were carried out by the contractors, Babcock & Wilcox, Ltd., as the plant was made available, it was nearing completion at the close of the year. Buildings for No. 10 turbo-alternator were in an advanced stage and manufacture of the set by C. A. Parsons & Co., Ltd., was completed but delivery had not been made at the end of the year (December 31st). The condensing and feed heating plant made in Australia by Thompsons Engineering & Pipe Co., Ltd., had also not been delivered, but the transformers supplied by A.S.E.A. Electric (Australia) Pty., Ltd., were in position.

For the Pyrmont station the Metropolitan-Vickers Electrical Co., Ltd., is manufacturing a 50,000-kW turbo-alternator, and condensing plant to its design is being made by Thompsons Engineering & Pipe Co. The principal part of the 430,000 lb. per hr. (m.c.r.) boiler, the contract for which was placed with International Combustion (A'sia) Pty., Ltd., is being made in England. The plant is scheduled for completion in 1947. Other equipment which was being manufactured in this country last year for the Pyrmont scheme included 33-kV switchgear (General Electric Co. Ltd.) and interconnector transformer (English Electric Co., Ltd.).

Generating data included in the report show that last year 1,043.9 million kWh was produced (mainly at Bunnerong) compared with 1,008.3 million kWh in 1943. At the "A" station 1.57 lb. of coal was consumed per kWh generated and at the "B" station 1.11 lb., the thermal efficiency on kWh sent out being respectively 18.46 and 25.48 per cent.

Electricity sales to the public increased by 1.13 per cent. to 867.1 million kWh, but there was a decrease in revenue from such sales due mainly to the primary charge under the residence rate being lowered from 5d. to 4½d. while the maximum average price per kWh was fixed at 3d. Gross income for the year advanced by £26,019 to £4,123,499 and expenditure by £186,531 to £4,073,115, there being a net surplus of £50,384 compared with £210,896 in 1943. The average cost per kWh sold was 1.094d. (1.088d.) and the average price—the lowest yet recorded—was 1.087d. (1.134d.).

### I.E.E. Benevolent Fund

As a result of the recent appeal by the Mersey and North Wales Centre of the Institution of Electrical Engineers, the sum of £150 has been collected and handed over to the Benevolent Fund of the Institution. The chairman and Committee of the Centre thank all the donors for their generous support.



# FINANCIAL SECTION

## Company News. Stock Exchange Activities.

### Reports and Dividends

**Aberdare Cables, Ltd.**—The accounts for the year ended October 31st, 1944, show a profit, including dividend from subsidiary and after providing for directors' fees, of £37,618, against £35,496 in the previous year. Taxation takes £27,973 (£21,500) and £1,160 (£7,000) is allocated to deferred repairs. A dividend of 6 per cent. is paid (the same as last year but on increased capital) and £9,814 (£9,789) is carried forward.

At the annual meeting last week the chairman (Sir George Usher) gave some figures to illustrate the extent of the company's war production; and said they were proud to think that this had been accomplished on the site of a derelict coal mine. They were now employing, in what was an entirely new industry in South Wales, as many people as formerly earned their livelihood there raising coal.

They had a well-filled order book and their cables were finding a ready sale in markets formerly the monopoly of the Cable Makers' Association. Their representatives in Africa, India and Australia reported considerable activity in those markets. Other important export business included contracts with the U.S.S.R., Turkey, Egypt, Portugal and France, to mention but a few of the countries with which they were in active daily negotiation. Their subsidiary, South Wales Switchgear, continued to make satisfactory progress and was now turning its attention from work for the Admiralty to the development and marketing of industrial and domestic equipment.

**East African Power & Lighting Co., Ltd.**—Reviewing the company's operations during the war, the chairman (Major H. F. Ward) stated at the annual meeting in Nairobi on September 28th that the maximum demand had risen from 8,360 to 15,317 kW with a sharply increasing load factor. Despite the fact that additional plant could only be procured from very restricted sources, they had been able to increase their installed plant capacity from 19,000 to 25,000 kW. In Uganda, they had hoped to replace thermal stations by a hydro-electric development on the River Nile and to interlink Kampala and Jinja and adjacent areas. On pre-war costs the scheme would have been an economic proposition, but it was now more difficult. The position was, however, still being investigated by Balfour, Beatty & Co., Ltd. Except for a surcharge of 5 per cent. in Mombasa for fifteen months to meet very heavy advances in the cost of coal they had not raised their tariffs; in the Nairobi area reductions had been made. As normality returned it was hoped that it would be possible to contemplate reductions in charges generally.

**Nigerian Electricity Supply Corporation, Ltd.**—The chairman (Major E. S. Marks) stated at the company's annual meeting in London that the revenue from power sales in the year ended February 28th last was the highest so far reached. Sales amounted to 62,821,110 kWh, an increase of 15 per cent. They could not look for an

equally satisfactory result in the current year owing to the unprecedented lack of rain in April and May when they lost practically a month's operation. Also, with the end of the war and the cancellation of the agreements between the Minister of Supply and the tin mining companies it was not yet clear what the demand for power would be.

**Philco Radio & Television Corporation of Great Britain, Ltd.**—Two years' accounts were issued this week. Those for the year ended March 31st, 1944, showed that the net trading profit was £108,862 (against £129,596 for 1942-43) and after meeting expenses, except N.D.C. and income tax, the net profit was £58,988 (£93,858). Against this is charged tax provision £17,074 and a debit balance of £15,543. An ordinary dividend of 25 per cent. is proposed (against nil) and £3,371 is carried forward. For the year 1944-45 the net trading profit was £115,701 and the net profit £59,887, against which taxation provision amounting to £31,741 is charged. An ordinary dividend of 10 per cent. is recommended on capital increased from 1,000,000 to 1,250,000 shares; £12,930 is carried forward. The directors refer to comments by the auditors upon the valuation of subsidiary companies shares and of stocks in hand and work in progress (mainly Government contracts, the majority of which have been cancelled). They say, however, that they are satisfied that in the aggregate the value of the assets is not less than the amounts shown in the balance sheet to be published shortly.

**The Ransome & Marles Bearing Co., Ltd.**, records a trading profit for the year to June 30th, after providing for taxation, of £184,143 (against £187,039) and a net profit of £123,227 (£123,134). Deductions include war damage, £2,210 (£8,714), contingencies £50,000 (£35,000) and directors' remuneration £3,000 (same), and after maintaining the dividend at 20 per cent. for the year £83,365 (£85,348) is carried forward.

**J. & F. Stone Lighting & Radio, Ltd.**, propose to pay a dividend of 15 per cent. for the year ended June 30th last, compared with 6 per cent. for the previous year. Net profits, subject to tax, amounted to £132,692, including £30,000 from a subsidiary company, against £68,693 (nil from subsidiary).

**Jerusalem Electric & Public Service Corporation, Ltd.**—To avoid the loss to holders of the 7 per cent. cumulative preference shares by the deduction of both Palestinian and British income tax, it has been decided that in respect of the current and future financial years the dividend will be paid at such a gross rate that the net amount will be equal to 7 per cent., less British tax only.

**Richard Johnson, Clapham & Morris, Ltd.**, announce a bonus of 5 per cent. in addition to a final dividend of 1½ per cent. on the ordinary shares. With the interim dividend the total distribution for the year is 20 per cent. (against 15 per cent.).

**The Watford Electric & Manufacturing Co., Ltd.**, is again paying an interim dividend of 5 per cent.

**Ericsson Telephones, Ltd.,** announce an interim dividend of 5 per cent., tax free, the same as last year.

**The Cables Investment Trust, Ltd.,** is paying a final dividend of 3 per cent. making 5 per cent. for the year ended June 30th last (same).

**Pinchin, Johnson & Co., Ltd.,** have declared an interim dividend of 2½ per cent. (same).

**The Rawlplug Co., Ltd.,** is again making an interim distribution of 10 per cent.

**G. D. Peters & Co., Ltd.,** announce an interim dividend of 7½ per cent. (same).

## New Companies

**Sutton Wholesale Electrical Co., Ltd.**—Private company. Registered September 27th. Capital, £1,000. Objects: To carry on the business of manufacturers of, and dealers in, electrical and other plant, radio goods, etc. Directors: C. H. Roberts, 37, Waterer Gardens, Burgh Heath, Surrey, and three others.

**Cross & McIlwham (Electrics), Ltd.**—Private company. Registered in Edinburgh September 29th. Capital, £5,000. Objects: To carry on the business of electricians, electrical engineers, contractors and dealers, radio engineers and dealers, etc. Directors: W. McIlwham, 28, Second Avenue, Glasgow, S.4, and three others. Registered office: 162, Ballater Street, Glasgow, C.5.

**Longford Electric Co., Ltd.**—Private company. Registered September 28th. Capital, £2,000. Objects: To carry on the business of wholesale and retail dealers in, and manufacturers of, electrical goods and radio fittings, etc. Directors: E. Bird, 72, King Street, Stretford, Lancs; and L. Norman, 6, North Western Street, Levenshulme, Manchester, 19. Registered office: 952, Chester Road, Stretford, Lancs.

**Middlesex Electrical Products (Hounslow), Ltd.**—Private company. Registered September 28th. Capital, £1,000. Objects: To carry on the business of manufacturers of, and dealers in, radio and television sets, and accessories, electric lamps, plant and fittings. Directors: J. Fabian, electrician, and Mrs. E. Fabian, 62, Bulstrode Avenue, Hounslow. Registered office: 11a, Lampton Road, Hounslow.

## Companies Struck Off Register

The names of the following companies have been struck off the Register and they are thereby dissolved:—**Dulci Electrical Co., Ltd.**; **Farr's Electric, Ltd.**; **Forest Battery Service, Ltd.**; and **General Inductance Co., Ltd.**

## Companies' Returns Statements of Capital

**Cambridge Electric Supply Co., Ltd.**—Capital, £600,000 in £1 shares. Return dated May 4th. 500,000 shares taken up. £500,000 paid. Mortgages and charges: £50,000.

**Peacehaven Electric Light & Power Co., Ltd.**—Capital, £20,000 in 962 preference shares of £1 each, 14,038 preference shares of 12s. each, 192,564 ordinary shares of 1s. each and 19,740 ordinary shares of 1s. each. Return dated May 2nd. 13,883 preference of 12s. and

160,27 ordinary shares taken up. £9,131 3s. paid being 12s. per share on preference and 1s. per share on ordinary. Mortgages and charges: £8,170.

**Keswick Electric Light Co., Ltd.**—Capital, £30,000 in £1 shares (5,000 preference and 25,000 ordinary). Return dated April 5th. 4,000 preference and 25,000 ordinary shares taken up. £23,000 paid. £6,000 considered as paid. Mortgages and charges: Nil.

## Increases of Capital

**Wardour Manufacturing Co., Ltd.**—The nominal capital has been increased by the addition of £9,000 in £1 ordinary shares of £1 each beyond the registered capital of £1,000. Simultaneously the 500 existing deferred shares were converted into ordinary.

**Marron Electrical Products, Ltd.**—The nominal capital has been increased by the addition of £6,000 in 6,000 shares of £1, beyond the registered capital of £4,000.

## Mortgages and Charges

**Provincial Electrics & Refrigerators, Ltd.**—Particulars filed of £10,000 debentures authorised September 18th, charged on the company's undertaking and property, present and future, including uncalled capital, ranking *pari passu* with £10,000 debentures issued to Midland Bank. The whole amount is now issued.

**India Rubber, Gutta Percha & Telegraph Works, Ltd.**—Satisfaction in full on September 18th, 1945, of mortgage debentures authorised January 28th and covered by trust deed dated March 29th, 1926, and registered April 8th, 1926, securing £400,000.

**London Commercial Electrical Stores, Ltd.**—Mortgage on 20/21/23, Cursitor Street, E.C.4, dated September 17th, to secure £15,000. Holders: Engravers Guild, Ltd., Windsor House, Cursitor Street, E.C.4.

**Electron (London), Ltd.**—Debenture dated September 6th, 1945, to secure £1,000, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: R. Slayton, 3, Goodwood Court, W.1.

## Winding-up Petition

**S. B. Smith & Co., Ltd.**—A petition for the winding-up of this company has been presented to the High Court by the Steel Nut & Joseph Hampton, Ltd., creditors, and will be heard at the Royal Courts of Justice, London, on October 15th. Notice of appearance at the hearing must be given to Stafford Clark & Co., solicitors, 3, Laurence Pountney Hill, Cannon Street, E.C.4, by October 13th.

## Liquidation

**Hants Electric Chassis, Ltd.**—Winding up voluntarily. Liquidator, Mr. H. P. Goodall, Electra House, Victoria Embankment, London.

## Bankruptcies

**H. C. Bridgman**, lately carrying on business at 7, Abbey Road, Westbury-on-Trym, Bristol, electrical engineer.—First and final dividend of 7½d. in the £ payable October 19th at the Official Receiver's Office, 26, Baldwin Street, Bristol, 1.

## STOCKS AND SHARES

TUESDAY EVENING.

**T**HE Chancellor of the Exchequer said at last week's banquet to City bankers and merchants at the Mansion House, that he would be introducing an interim Budget within a few weeks. Naturally he declined to give any advance news of the forthcoming proposals, and, accordingly, speculation has wide scope. Meanwhile, the Stock Exchange markets are developing into two distinct lines: one concerned purely with investment, the other, with an increasing volume of speculative investment—some people might call it gambling. The markets for front-rank industrial shares and preference issues pursue a somewhat humdrum course, active attention being diverted to other directions. Nationalisation continues to be a factor in restraint of enterprise, but investment insists upon employing money in stocks and shares rather than leaving it on deposit with the banks at a negligible rate of interest.

### Price Fluctuations

County of London Electrics at 40s., Edmundsons at 28s. and Yorkshire Electrics at 39s. 6d. have each gained 6d.: Metropolitan at 39s. are up 1s. Clyde Valley & Scottish Power are also better. The Overseas group for its main feature has a rise of 1s. 3d. to 96s. 3d. in Victoria Falls Power ordinary shares. Indian shares hold their previous prices. Calcutta Trams rose to £4, to react to 77s. 6d.

Shares in the equipment and manufacturing market are mostly better where changes have occurred. Automatic Telephones improved to 41s. 3d., Brush Electrical Engineering to 10s. 3d., Burco to 17s. 3d. Chloride Storage are lower at 4½. H.T.A., after being dull at 26s. 3d. on account of the dividend disappointment, recovered to 27s. 6d. Telegraph Constructions have advanced to the round £3. Other rises made Vactric 22s. 6d., Ward & Goldstone 31s. 6d. and Walsall Conduits 57s. Consolidated Signals at 6½ are 2s. 6d. better. Telephone Manufacturing and Telephone Rentals hardened to 12s. 6d., and 13s. 6d. respectively.

### Lancashire Electric

Prices of electricity supply preference shares show a disposition to ease off. The majority of them stand at fairly substantial premiums, as for example, Lancashire Electric 6 per cent. first preference, which are quoted at 36s. The dividends are free of income tax up to 6s. in the £, and the present distribution is equal to approximately 8½ per cent. gross. At 36s., the yield is a little under 4½ per cent. The company's earnings show ample margin for payment of the dividend.

### Preference Shares and Premiums

The Lancashire Electric 7 per cent. participating preference, have been receiving 7½ per cent. for the past twelve years. The shares rank

equally with the ordinary up to a further 3 per cent. after the latter have received 7 per cent. in any one year. At 32s., on a 7½ per cent. dividend basis, the return is £4 13s. 9d. per cent. British Power & Light sixes stand at 26s. at which the return comes to £4 12s. 3d. and Yorkshire Electric Power sixes at 29s. pay £4 2s. 9d. per cent. Midland Electric Corporation 7 per cent. preference at 31s. 6d. give £4 8s. 9d. per cent. Some investors have an objection to paying a high premium, and are content to accept a lower yield from well-secured shares standing nearer par. This is illustrated by Metropolitan Electric 4½ per cent. preference, which are quoted at 23s. 6d., giving a return at that price of a modest £3 16s. per cent. on the money.

### Radio Shares

Superior attractions in the mining markets have stolen the limelight from the radio group. A.C. Cossor shares fluctuated between 40s. and 45s., settling down to 44s., a fall of 1s. on the week. Philco are a better market, hardening to 15s. E.M.I. are also 6d. to the good at 33s. 6d. Pye eased off to 32s. 6d. J. & F. Stone Lighting & Radio announced a dividend of 15 per cent. on the ordinary shares, being a rise of no less than 9 per cent. as compared with each of the two previous years. The profit of £132,700 has practically doubled that of the previous year: it has the benefit of £30,000 profit made by a subsidiary company. The 5s. shares rose to 15s. on the declaration of the dividend.

### Miscellaneous Movements

Communication stocks show no striking changes. Cable & Wireless Preference is up ½ to 116. Anglo-American Telegraphs are rather better. Canadian Marconis lost 1s. of their recent sharp rise, reacting to 18s. 3d., and other dollar stocks have gone back, Brazilian Traction to 29½. International "Tel. & Tel." hold their rally to 33. Amongst the "peace" stocks, Great Northern Telegraphs keep steady at 36, and Tokyo Electrics at 56½. Anglo-Portuguese Telephones at 30s. and Cape Electric Trams at 28s., are amongst the shares to respond to investment demand. Ransome & Marles at 92s. 6d. have added ½ to their last week's rise of 6s. 3d. De la Rue at 11½ are 5s. up.

### Adelaide Electric

As reported in last week's *Electrical Review*, a Royal Commission has proposed a South Australian Electricity Trust which would acquire the Adelaide Electric Supply Co. Alternatively it is recommended that prices charged by the company shall be fixed by regulation. The scheme is opposed by the directors. The company's 6 per cent. preference stock is quoted in London at 97½, the 6½ per cent. "C" preference at 100 and the 4½ per cent. "G" consolidated debenture (English stock) at a little over par.



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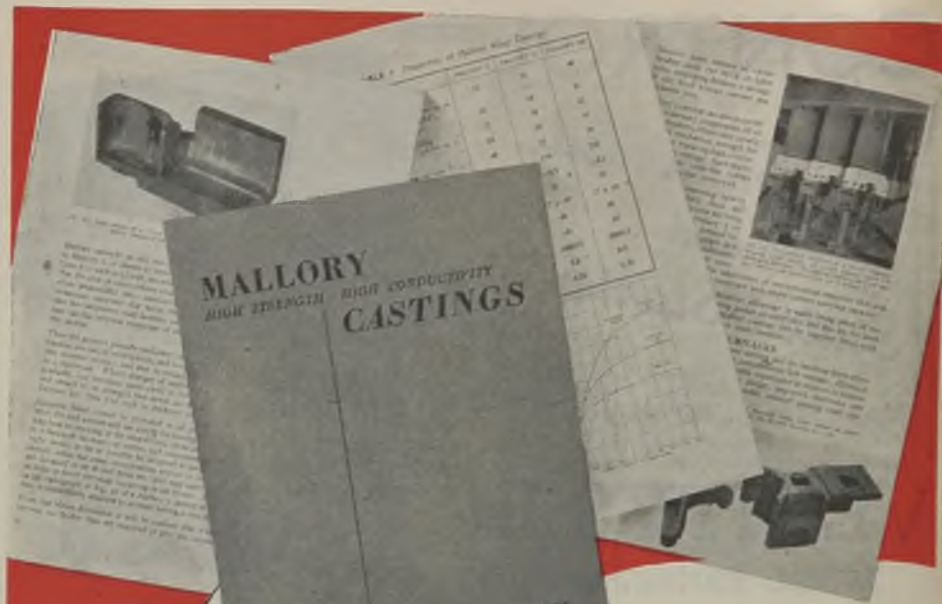
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# DC Motor Starters

## Notes on Calculating Resistance Values

By J. Cotterell, A.M.I.E.E.

**A**PPARATUS for starting DC motors without taking excessive current from the mains and without mechanical shock depends for its efficiency in the first instance upon the correct design of the resistances, having regard to the duties to be performed. The division of DC motors into shunt and series or compound, gives a natural division in view of the difference in their starting and running characteristics.

There are two methods of calculating the resistance sections of shunt-motor starters, namely, the mathematical and the graphical. In the former the assumptions are that the flux is constant, that the current will change between fixed limits, that the effect of inductance in causing the current changes to be non-linear can be ignored and that there is a constant resisting torque to the starting motion.

The constant resisting torque will require a constant current to overcome it, while for acceleration the current will have to be increased. Hence, the need for a variation of current between upper and lower limits.

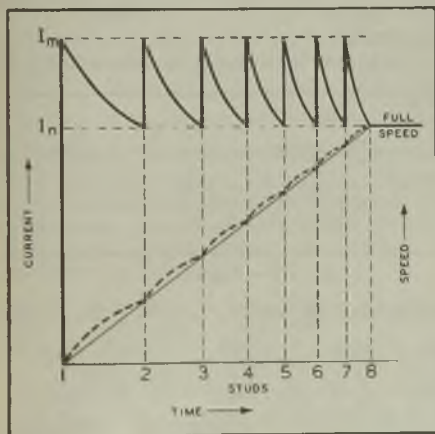


Fig. 1

Usually the choice of the latter is dominated by the supply authorities. The design depends upon the time allowable for full acceleration, e.g., rapid acceleration means a large difference between upper and lower

limits of current and hence a cheaper starter because of the fewer steps needed, although to allow for the larger currents a physically bigger resistance wire or strip will be required to dissipate the heat generated.

As a general rule a safe set of values for  $I_m$  (the maximum value of current) and  $I_n$  (the lower current limit) are: Infrequent use,  $I_m = 2$  to  $2.5 I_n$ ; frequent use,  $I_m = 1.3 I_n$ ; stock,  $I_m = 1.5 I_n$ .

As each step is cut out, the current rises momentarily to  $I_m$  and then falls to  $I_n$ . If

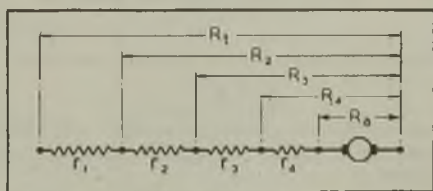


Fig. 2

$E$  = applied EMF,  $R_a$  = Resistance of armature and  $n$  = number of studs, on connection to stud No. 1 (Fig. 1) current rises to  $I_m$  and falls to  $I_n$  as the speed increases.  $I_n = \frac{E - kn_1}{R_t}$

where  $R_t$  is the total resistance of starter and armature and  $k$  = a constant depending upon design of motor.

Moving on to stud No. 2, current rises to  $I_m$  and speed momentarily remains at  $n_1$  RPM,  $\therefore I_m = \frac{E - kn_1}{R_2}$   $\therefore I_m R_2 = E - kn_1$  (2).

From equations (1) and (2) we get  $I_n R_t = I_m R_2$   $\therefore \frac{I_m}{I_n} = \frac{R_t}{R_2} = r$ . Similarly (see Fig. 2),

$\frac{R_1}{R_2} = \frac{R_2}{R_3} = \frac{R_3}{R_4} = r$  and so on, where  $R_t = R_2 r$ , but  $R_2 = R_3 r$ ,  $\therefore R_t = R_3 r^2$ , or for  $n$  studs  $R_t = R_n r^{n-1}$ ,  $\therefore r^{n-1} = \frac{R_t}{R_n}$ ,  $\therefore r = \sqrt[n-1]{\frac{R_t}{R_n}}$ .

Now  $R_t = \frac{E}{I_n}$ . Finally resistance between studs  $r_1 = R_t - R_2$ ,  $r_2 = R_2 - R_3$  and so on. (See Fig. 2.)

As an example of the application of the above formulæ, consider the following case.



A starter is required for a 500-V DC shunt motor. Armature resistance = 0.125 ohm; maximum allowable current = 100 A; normal

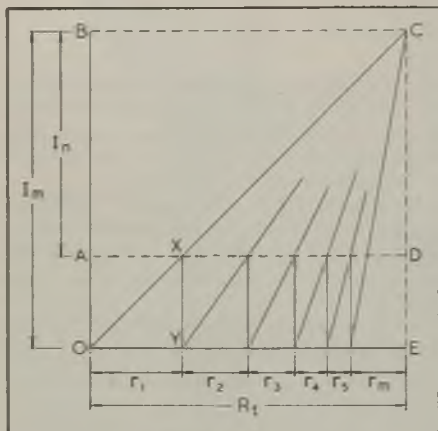


Fig. 3

current = 70 A. Find the number of studs and the resistance of each section of the starter.

$$R_t = \text{total resistance} = \frac{500}{100} = 5 \text{ ohms.}$$

$$\text{Ratio of } \frac{I_m}{I_n} = \frac{100}{70} = 1.429. \therefore n - 1 = \frac{\log 5 - \log 0.125}{\log 1.429}, \text{ whence } n - 1 = 10.28.$$

$\therefore$  number of studs = 11.

Calculating resistances we obtain  $R_2 = 3.5$  ohms.  $\therefore r_2 = R_t - R_2 = 5 - 3.5 = 1.5$  ohms.

Similarly,  $R_3 = 2.45$  ohms.  $\therefore r_2 = 1.05$  ohms. By the same process, the ohms in each case are as follows:  $r_3$  0.735;  $r_4$  0.515;  $r_5$  0.36;  $r_6$  0.252;  $r_7$  0.1764;  $r_8$  0.1235;  $r_9$  0.068;  $r_{10}$  0.061. This gives a total of 4.8409 ohms, instead of 5 ohms, which for all practical purposes is sufficiently accurate.

As an example of the graphical method of obtaining the resistance steps, consider the case shown graphically in Fig. 3, where

$R_t = \frac{E}{I_m}$  ohms.  $XD = AD \times \frac{I_n}{I_m}$  and therefore represents  $R_2$ . The construction is as follows: Given  $I_m$  and  $I_n$ , OE represents the total resistance  $R_t$ , and OB the maximum allowable current  $I_m$ . Complete the rectangle OBCE; BA represents the current  $I_n$ . Draw horizontal AD. Join O to C and at the point of intersection, X, drop the vertical XY, cutting OE at Y. Repeat this procedure until all the distance OE is used with the exception of distance  $r_m$ , which should be

the resistance of the armature. Then the resistances of the sections are marked out as  $r_1, r_2, r_3, r_4$ , etc. (The previous calculation can be checked by this graphical method.)

When grading the starting resistance for a series or for a compound motor, the mathematical method is as follows. As the current changes between the limits  $I_n$  and  $I_m$ , the flux changes between the limits  $\Phi_n$  and  $\Phi_m$ , since in a series motor the field flux is determined by the current in the motor which is the current in the armature. Let  $\frac{I_m}{I_n} = \lambda$

(the current increment) and  $\frac{\Phi_m}{\Phi_n} = \beta$  (the flux increment) and  $\frac{\beta}{\lambda} = \alpha$ .  $\therefore \alpha$  is clearly  $< 1$ .

Also in the circuit given in Fig. 4,  $r_1 = R_t - R_2$  or generally  $r_{n-1} = R_{n-1} - R_n$ .

Consider the instant when  $R_{n-1}$  is in circuit and current is  $I_n$ ,  $E_n$  = back EMF =  $V - I_n R_{n-1} = K N \Phi_n$ . The step is now cut out, giving  $R_n$  in circuit, current will rise to  $I_m$  and instantaneously speed will remain at N RPM.  $\therefore E_{n2} = V - I_m R_n = K N \Phi_m$ .

$$\therefore \frac{V - I_m R_n}{V - I_n R_{n-1}} = \frac{\Phi_m}{\Phi_n} = \beta. \therefore V - I_m R_n = \beta V - \beta I_n R_{n-1},$$

$$= -I_m R_n = \beta V - V - \beta I_n R_{n-1} = V(\beta - 1) - \beta I_n R_{n-1}, \text{ so that } R_n = \frac{V}{\beta I_m} R_{n-1} - \frac{V}{I_m}(\beta - 1) = \alpha R_{n-1} - \frac{V}{I_m}(\beta - 1) \quad (1),$$

where  $\frac{V}{I_m} = R_t$  = total resistance of motor and starter.

To prove that resistance steps form a

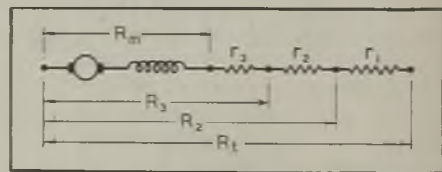


Fig. 4

geometric progression,  $r_n = R_n - R_{n+1}$ , but

$$R_n = \alpha R_{n-1} - \frac{V}{I_m}(\beta - 1) \text{ and } R_{n+1} = \alpha R_n - \frac{V}{I_m}(\beta - 1)$$

$$\therefore r_n = \alpha(R_{n-1} - R_n), \text{ i.e., } r_n = \alpha r_{n-1}, \text{ i.e., a geometrical progression.}$$

Therefore  $r_2 = \alpha r_1, r_3 = \alpha r_2, r_4 = \alpha r_3$  and so on.  $\therefore$  starter resistance total =  $\sum r_1 = r_1(1 - \alpha^n) = R_t - R_m$ .

To find  $r_1, r_1 = R_t - R_2$  and  $r_2 = R_2 - R_3$ , whence  $R_2 = \alpha R_t - \frac{V}{I_m}(\beta - 1), R_t = R$

$$r_1 = R_1 - R_2 - R_3 - \alpha R_4 = \frac{V}{i_m} (\beta - 1) - R_4 (1 - \alpha + \beta - 1), \text{ i.e., } r_1 = R_4 (\beta - \alpha), \dots (2).$$

Thence  $R_t - R_m = \left( \frac{1 - \alpha''}{1 - \alpha} \right) - R_t (\beta - \alpha)$ .

Equating to zero we get  $R_1(\beta - \alpha) \left( \frac{1 - x^n}{1 - \alpha} \right) -$

$$R_t + R_m = 0 \dots\dots\dots (f) \dots\dots\dots (3).$$

For example calculate the resistance steps for a 5-HP crane motor starter where applied voltage = 200, number of steps is 5, upper current

first (the Bragstad method) uses the speed-current characteristic (Fig. 5); the second uses the magnetisation characteristic. In Fig. 5 curve AB is a speed-current characteristic of a series motor with full voltage applied across it. It is required to construct a starter for a starting current varying between  $I_m$  and  $I_n$ . Then C and B corresponds to opposing torque at starting for currents  $I_n$  and  $I_m$ , and  $R_t = \frac{E}{I_n}$ .  $R \text{ starter} = R_t - R_m$ .

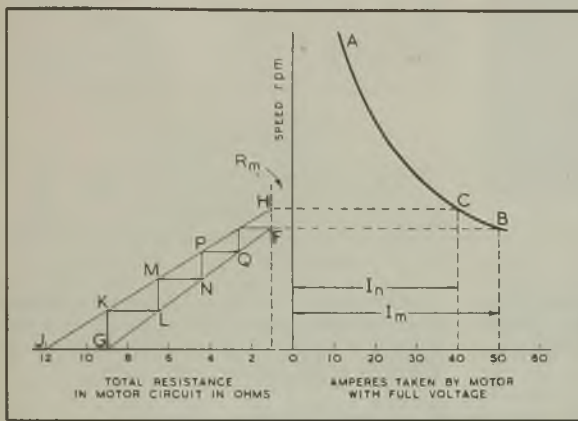


Fig. 5

limit 25 A, resistance of motor 1.36  $\Omega$ . Open-circuit characteristic is as follows, flux percentage corresponding to the current in each case: 4A, 31.5; 8A, 57.5; 12A, 73; 16A, 85; 20A, 94; 24A, 100; 28A, 106.

Dividing "f" by  $R_1$  we get  $(\beta - \alpha) \left( \frac{1 - x_0}{1 - \alpha} \right) - 0.85 = 0$ . Take  $I_n$  of such a value that  $I_m = I_n \cdot 1.3$ ,  $I_m = 25 \text{ A}$ ,  $\therefore I_n = 20 \text{ A}$ . Assume current values of  $I_n$  just above or below this value, e.g., 18, 20, 22 A. Find  $\beta$  from open-circuit characteristic and evaluate  $\alpha$  for these current ratios. Whence,

$I_m$	$I_n$	$\lambda = \frac{I_m}{I_n}$	$\Phi_m$ per cent.	$\Phi_n$ per cent.	$\beta = \frac{\Phi_m}{\Phi_n}$	$\alpha = \frac{\beta}{\lambda}$	(f) approx
25	18	1.39	101.1	90	1.232	0.888	+ .246
25	20	1.25	101.1	93.5	1.185	0.95	-.005
25	22	1.137	101.1	97	1.145	1.05	-.298

$\therefore$  Value of  $I_n$  to make (f) approx. = 0 is 20 A.  $\therefore r_1$ , i.e., the first step, =  $R_t(\beta - \alpha) = \frac{200}{25}(1.081 - 0.865) = 1.73 \therefore r_2 = r_1\alpha = 1.73 \times 0.865 = 1.5 \text{ ohms}$ ;  $r_3 = \alpha r_2 = 1.5 \times 0.865 = 1.3 \text{ ohms}$ ;  $r_4 = \alpha r_3 = 1.3 \times 0.865 = 1.12 \text{ ohms}$ ;  $r_5 = \alpha r_4 = 1.12 \times 0.865 = 0.97 \text{ ohm}$ .

There are two graphical methods. The

Point F is horizontally level with B and at a distance of  $R_m$  from the left of the vertical axis. Point G is at a distance of  $E_{I_m}$  ohm from O. The point J is at a distance of  $E_{I_n}$  ohms from O. F and G are joined and H and J also.

If the resistance of the starter is cut out continuously in proportion to the speed, then the speed will increase along the line GF. The speed would rise along JH if on the first contact if the resistance were  $\frac{E}{I_a}$  and the resistance were cut out proportionally to the speed. Along this line it

would take infinitely long to advance from J to A, as the opposing torque is equal to the driving torque and there would be no torque left over for acceleration.

If the starter be switched on at G, however, the current will fall and the speed increase along GK to K, when acceleration would cease and the motor would run at a constant speed.

The first step of the starter is now cut out, the speed rises and arrives at a constant speed at M. This procedure is carried out until full speed is obtained, the resistance steps being measured by the "treads" of the "stairs" marked on the graph.

In the second method (Fig. 6) plot open-circuit characteristic of volts against current ( $E$  being the applied EMF for machine) and along the base set off two values  $I_n$  and  $I_m$ . Erect perpendicular cutting open-circuit characteristic at A and B. Through points A and B draw a line until it cuts base produced at  $P^1$ . This point is called pole  $P^1$  and gives the ratio in slope form of the rise of flux from  $\Phi_n$  to  $\Phi_m$  as current changes from  $I_n$  to  $I_m$ . When the machine is

switched on the current rises to  $I_m$  and falls to  $I_n$  along the line  $I_mP$ , which is a part of the diagonal  $EI_m$ .

From  $P^1$  draw to  $P$  and extend until line  $AI_m$  is cut at  $Q$ . Join  $EQ$ . From  $P$  draw to  $R$  and extend to  $S$ . Join  $ES$ . Continue this construction until the whole length  $I_mA$  is used. Let the length  $AI_m = \frac{E}{I_m}$ . Calibrate  $AI_m$  in ohms. Then sections of the starter are  $I_mQ$ ,  $Q.S.$ ,  $S.U.$ ,  $U.W.$ , and  $W.A$  = resistance of the motor.

These distances are strictly voltage drops but, since  $E$  is constant, by devising a suitable scale, they will also represent ohms. If the whole distance  $AI_m$  is not taken up by this method  $I_n$  and  $I_m$  should be altered so that pole  $P^1$  is moved backward or forward to suit. The reactance of the series motor itself, under the changing starting current, will tend to limit the surge of current at starting.

This effect depends upon the size of the motor and the difference between  $I_n$  and  $I_m$ .

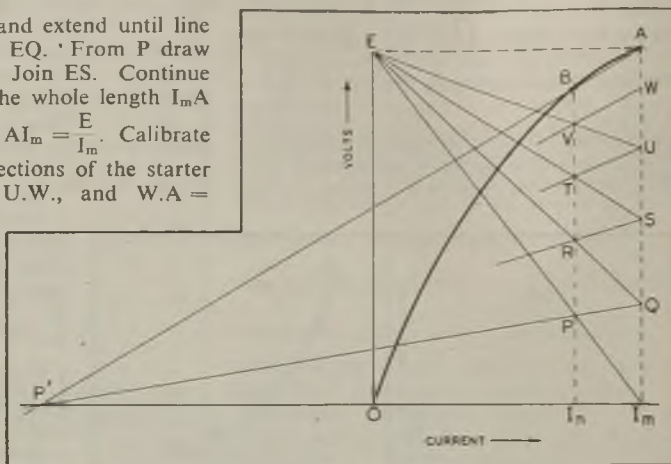


Fig. 6

All the above methods are approximations, since the equation to the open-circuit curve for every motor is not known; but for all practical purposes they will suffice.

## RECENT INTRODUCTIONS

### Notes on New Electrical and Allied Products

#### Mining Contactor Panel

A NEW kind of flameproof air-break contactor panel, the three-phase type "GA.8" room-switch, is announced by A. REYROLLE & Co., LTD., Hebburn-on-Tyne. It is strongly designed specially to serve as a light-weight control panel of low height for coal



Contactor room-switch for coal-face machines

Power Loading in Mines. The 50-cycle rating is 80 A at 650 V, but the contactor is capable of making and breaking six times its normal current rating. It is certified as flameproof (groups I and II gases) by the Ministry of Fuel and Power and complies with B.S. 229-775-787.

The welded steel enclosure is skid-mounted and forms two entirely separate flameproof compartments. In the upper are three 300-A air-insulated copper busbars, which terminate at each end of the panel in flameproof bushing-type terminals, and a triple-pole air-break reversing isolator capable of breaking full-load current in an emergency. The isolator is fully interlocked so that it must be in the "off" position before the lower compartment becomes accessible. All the connections between the two compartments are taken through flameproof bushing-type terminals, which are specially placed near the front of the panel to allow easy access.

The lower compartment contains a triple-pole air-break contactor with fixed and moving contacts, blow-out coils, arc-shields, an operating coil (which also has an under-voltage release), an operating and control relay assembly with change-over links for local or remote control, an over-current assembly with multi-

cutters, conveyors, loaders and similar machines, complying generally with the draft report of an official Sub-Committee on Switchgear for



range trip coils usually for between 15 and 60 A and double-acting oil-filled dashpots, and a voltage transformer with a tapped primary for the intrinsically safe control circuits.

The main cable to and from the busbars can be accommodated in a standard detachable cable box or flit-plug box, and the outgoing cable to the controlled machine can be coupled by means of a 100-A or a 30-A restrained or bolted plug and socket. Consequently all the cables may be jointed and compounded, if required, away from the switchgear.

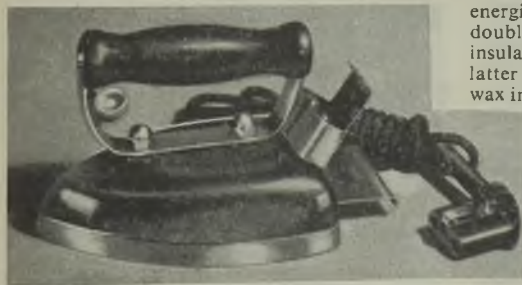
Units can be used singly or built up into switchboards; they can be added to or removed from each other very quickly, since it is only necessary to insert a terminal chamber between the busbar-chamber ends and couple the skids, or to remove the inter-coupling parts, as the case may be.

### Electric Hoist

At a recent local engineering exhibition C. E. REED & Co., LTD., Cart Lane, Bristol, 1, displayed an electric goods hoist which is provided with guides to ensure that the rope will wind itself evenly on the barrel, even if the lift be taken sideways. The barrel is flat, without rope grooves machined in it. Both hoisting and lowering limit switches are fitted and can be adjusted for any height. The driving motor is totally enclosed and rated for 30-minute operation, while an electro-magnetic brake acts upon the rotor shaft. The hoist is actuated through reversing contactors mounted on the side and controlled by a pendant push-button switch. These hoists can be made in 5, 10, 20, 30 cwt. as well as 2, 3 and 5 ton sizes.

### A Domestic Iron

The "Londalex" electric iron produced by LONSDALE & CO. (ELECTRIC), LTD., Elco Works, Cromwell Grove, Levenshulme, Manchester, 19,



The "Londalex" iron

weighs 4½ lb. and is loaded at 450 W. Of pleasing and practical design, it has a plated base and a black wooden handle with a white plastic thumb rest. The connector is of the side-entry type.

### A Modern Kettle

The first of a range of domestic appliances to be introduced by the TETRA ENGINEERING CO., LTD., 1, Redhill Street, London, N.W.1, is a household kettle which is constructed either of



The "Tetra" kettle

chromium plated copper or dye-anodised aluminium.

It is of three pints capacity with a loading of 1,450 W and the immersion element is protected by a simple cut-out which is designed to be easily re-set by the user. The spout is said to be specially shaped to permit speedy pouring without dripping.

### Electric Fencing

An electric fencing outfit for the purpose of enclosing animals on farms, which has been improved somewhat in detail, is now offered by the HARVEST SAVER & IMPLEMENT CO., LTD., 65, South Molton Street, London, W.1.

A single wire is supported on post insulators, which are available in various shapes, and is energised by a 6-V accumulator through a double-wound transformer with a moulded insulating barrier between its windings. The latter are vacuum impregnated and coated with wax in order to minimise the ingress of moisture.

This "Warden" outfit is of the inductive discharge type, a controller being provided for slightly varying the rate of impulsing, which is normally intended to be 60 per minute. The timing device, which may perform more than 31 million oscillations per annum in continuous service, has self-lubricating bearings. The duration of contact per impulse is about 100 milliseconds.

A "soil condition compensator" with "wet" and "dry" terminals has been incorporated and a spare fuse is provided as well as an exterior locking device for the weather-proof case.

# NEW PATENTS

## Electrical Specifications Recently Published

*The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.*

**A**UTOMATIC Telephone & Electric Co., Ltd., C. Gillings and C. E. Beale.—“Telephone or like signalling systems.” 3338. February 23rd, 1944. (572002.)

Automatic Telephone & Electric Co., Ltd., I. W. McClew and O. A. Pearce.—“Telephone or like systems.” 1250. January 22nd, 1944. (572022.)

C. J. Beaver, E. L. Davey and W. T. Glover & Co., Ltd.—“Jointing of conductors of electric cables.” 888. January 17th, 1944. (572022.)

N. M. Best.—“Electric circuit-breakers provided with overhead release devices.” 1378. January 25th, 1944. (571997.)

British Solenoids, Ltd., S. J. Tyrrell and A. C. Young.—“Thermionic valve holders.” 16438. October 7th, 1943. (572018.)

British Thomson-Houston Co., Ltd.—“Control systems for the disposal of dust or the like.” 11870/43. July 21st, 1942. (572009.) “Bladed bodies.” 2462/44. February 13th, 1943. (572058.) “Blades for compressors and like machines.” 2464/44. February 18th, 1943. (572059.) “Liquid seals for shafts.” 3972/44. March 8th, 1943. (572076.) “Withdrawable electric switchgear.” 3973/44. March 9th, 1943. (572077.) “Snap action devices particularly applicable to electric switches.” 4404/44. March 12th, 1943. (572084.) “Concentric transmission lines.” 4406/44. March 16th, 1943. (572085.) “Methods of drying extruded tubing.” 6190/44. April 6th, 1943. (572099.)

British Thomson-Houston Co., Ltd., and W. J. Scott.—“Glazed windows for observation and other purposes.” 17066. October 18th, 1943. (572020.)

Cantie Switches, Ltd., and B. Heller.—“Electrical switchgear and protective devices.” 1269. January 24th, 1944. (571995.)

C.A.V., Ltd., W. A. Bevis and A. V. Waters.—“Dynamo regulators.” 1132. January 20th, 1944. (571991.)

Cooke & Ferguson, Ltd., and R. Drucker.—“Electric tumbler switches.” 1303. January 24th, 1944. (571996.)

Crompton Parkinson, Ltd., and H. Astbury.—“Electric circuit interrupting apparatus furnished with arc extinguishing arrangements.” 1197. January 21st, 1944. (571993.)

N. R. Davis and Sun-Vic Controls, Ltd.—“Electrical systems for controlling the operation of apparatus and magnitudes of variable quantities.” 16332. October 5th, 1943. (571983.)

Dorman & Smith, Ltd., T. Atherton and J. Lund.—“Sockets for electric plugs.” 511. January 11th, 1944. (572021.)

W. T. Evans.—“Device to prevent single-phasing of polyphase motors.” 1949. February 2nd, 1944. (572027.)

General Electric Co., Ltd., H. G. Jenkins and

S. H. Noble.—“Thermal glow switches.” 7967. June 10th, 1942. (572005.)

Hoover, Ltd.—“Suction cleaners.” Cognate applications 3509/44 and 3510/44. April 26th, 1943. (572065.) “Suction cleaners.” 3512/44. April 26th, 1943. (572066.)

Landis & Gyr, Soc. Anon.—“Clockwork movement with motor winding gear.” 4377/44. May 17th, 1943. (572083.)

Patelhold Patentverwertungs & Elektro Holding Akt. Ges.—“Apparatus for producing a control voltage for the tuning of radio transmitting and receiving apparatus.” 7503/43. May 19th, 1942. (572006.)

G. R. Shepherd (Westinghouse Electric International Co.).—“Electrical measuring devices.” 4004. March 3rd, 1944. (572078.)

V. A. Sheridan.—“Electrical measuring instruments.” 1172. January 21st, 1944. (571992.)

F. L. Simmons.—“Permanent magnet chuck or work holder.” 8137. May 21st, 1943. (572007.)

Standard Telephones & Cables, Ltd., and R. N. Hall.—“Gas-tight articulated joints for the envelopes of electron discharge devices.” 1680. January 28th, 1944. (57200.)

A. V. Summers.—“Electrically heated clothing, flying equipment and the like.” 20946. December 14th, 1943. (571985.)

Svenska Turbinfabriks Aktiebolaget Ljungstrom.—“Turbine rotors.” 4742/44. February 24th, 1943. (572090.)

N. Tansey.—“Electric time switch devices.” 3831. March 1st, 1944. (572074.)

E. Wilcox and E. Wilcox & Co., Ltd.—“Electric contacts or terminals.” 2649. February 12th, 1944. (572118.)

A. L. Williams.—“Shade securing rings for use with electric lampholders.” 5148. March 20th, 1944. (572094.)

## American Copper Position

**E**STIMATES of the quantity of copper that American industry will consume after its reconversion and when it has settled down to a regular output, average about 2,250,000,000 lb. a year. Expanded demand compared with the pre-war rate is expected from all branches of industry and some authorities believe it will take ten years to meet the needs of many copper users. Peak consumption by industry in the United States before the war was in 1940, when it was about 2,140,000,000 lb. Against this demand, American mines are expected to be able to produce only about 1,444,000,000 lb. of copper annually, or about 800,000 lb. short of industry's needs. Such an output rate would, however, be nearly 250,000,000 lb. less than the output in 1940. The electrical industries are expected to start using the metal at an annual rate of from 900,000,000 to 1,000,000,000 lb. when regular peacetime production is again under way. This would be some 25 to 30 per cent. more than these industries consumed in 1940.—*Reuter's Trade Service.*

# CONTRACT INFORMATION

## Accepted Tenders and Prospective Electrical Work

### Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

**Australia.**—Victorian State Electricity Commission. October 24th. 66-kV and 22-kV outdoor switchgear and accessories (Spec. 45-46/13).

Rockhampton City Council. October 20th. One 5,000-kW turbo-alternator.

Melbourne and Metropolitan Tramways Board. November 5th. Pumpless rectifier equipment. Tender 1351, Controller of Stores.

**QUEENSLAND.**—December 10th. State Electricity Commission. Boilers, main sets and house sets. (See this issue.)

**Burnley.**—October 31st. Education Committee. Equipment for Burnley Technical College. (See this issue.)

**Eire.**—January 28th. Electricity Supply Board. Hydro-electric generating plant at Cathleen's Fall and Cliff stations on the River Erne. (September 28th).

**Gainsborough.**—October 29th. Electricity Department. One 500-kVA, 3-phase static transformer. (See this issue.)

**Hackney.**—October 26th. Electricity Department. Six 500-kVA transformers. October 5th.

**Manchester.**—October 26th. Electricity Committee. Ventilating plant for No. 2 boiler house, etc., Stuart Street generating station. (October 5th.)

**Scotland.**—November 6th. North of Scotland Hydro-Electric Board. 11-kV distribution lines, Morar area, Inverness-shire. (October 5th.)

**Sheffield.**—November 5th. Electricity Committee. 20-MVA, 33/11-kV transformer. (October 5th.)

### Orders Placed

**Barrow-in-Furness.**—Electricity Committee. Accepted. 11,000-V switch (£345).—Ferguson Pailin. E.h.v. jointing work: straight-through joints (£6 15s. each), 10-core pilot cable joints (£3 3s. 6d. each), end dividing boxes (£4 0s. 6d. each); compound 3½d. per lb. and semi-fluid joint box compound at 9s. 6d. per gallon.—British Insulated Callender's Cables.

**Battersea.**—Electricity Committee. Accepted. Electric pump (£604).—James Beresford & Son.

**Birkenhead.**—Electricity Committee. Accepted. One 300-kVA and two 500-kVA transformers.—Bryce Electric Construction Co.

**Coventry.**—City Council. Accepted. 33-kV switchgear for supply to Courtaulds' new works (£24,194).—General Electric Co.

**Lowestoft.**—Electricity Committee. Accepted. Cables: l.v. (£9,010); h.v. (£726).—Callender's.

**Manchester.**—Generation Sub-Committee. Accepted. Condensing water valves (Stuart Street).—J. Blakeborough. High-pressure pipe-work (Stuart Street).—Babcock & Wilcox. 33-kV cable.—Standard Telephones & Cables.

Distribution Sub-Committee. Accepted. Battery and charging equipment (Whalley Range).—Britannia Batteries. (Sub-contractors for automatic charging equipment.—Standard Telephones & Cables). 33-kV feeder cable.—British Insulated Callender's Cables.

**Rotherham.**—Electricity Committee. Accepted. Switchgear for Swinton substation (£1,070).—Whipp & Bourne. Single-circuit overhead lines (£1,404).—Henley's.

**Wallasey.**—Electricity Committee. Accepted. L.v. cable for three years.—Britannic Cable & Construction Co.

### Contracts in Prospect

*Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.*

**Aberdeen.**—Houses (50), with electrical work; County Architect's Office, 22, Union Terrace, Aberdeen.

**Aberfeldy (Perthshire).**—Houses (18); town clerk.

**Aireborough.**—Houses (50), Springfield Farm site, Rawdon, for U.D.C.; F. Tunnell, surveyor, Micklefield House, Rawdon, near Leeds.

**Battersea.**—Factory extension, Etruria Street, for Projectile & Eng. Co., Ltd.; Walter Bridges & Co.

Buildings, Hester Road, for Phillips Mills, Ltd.; J. L. Simpson, Unilever House, Blackfriars.

Houses and flats, Sheepcote estate; borough engineer.

**Bedlington.**—Houses (44); U.D.C. surveyor.

**Birkenhead.**—Rebuilding 13 houses, Council estates (£10,000); Lloyds & Cross, Ltd.

Flats, Mount Grove (£2,157); W. S. Brocklebank, Ltd.

Houses (54), Bedford Avenue estate; borough engineer.

**Brighouse.**—Workshop, Bradford Road; J. Jagger & Sons, Ltd.; builders, Bailiffe Bridge.

**Bromsgrove.**—Factory, Stoke Wharf; Chance Bros. & Co., Ltd., glass manufacturers, Smethwick, Birmingham.

**Chipping Norton.**—Houses (38), for R.D.C.; T. Rayson, architect, 35, Beaumont Street, Oxford.

**Coleford (Gloucestershire).**—Factory (£40,000); F. W. Carter & Co., Ltd., Bristol.

**Croydon.**—Factory, Waddon Marsh Way; Macdonald (Shopfitters), Ltd.

**Essex.**—Extensions. South East Essex Technical College (£6,000), canteen and youth centre, Great Barfield (£3,850), youth centre, Runwell (£1,600), laboratory, Hornchurch High School, Cedar Avenue (£1,400) and convalescent home, Clacton (£16,000); county architect, Chelmsford.



**Finchley.**—Pathological laboratory at Memorial Hospital; F. Madgett, chairman of Memorial Hospital Committee.

**Gateshead.**—Factory for the Safety Glass Co., Ltd., Team Valley Estate; J. H. Nattar, 36, Eldon Square, Newcastle-on-Tyne.

**Haltwhistle.**—Factory for Kilfrost, Ltd., paint manufacturers; Cackett, Burns Dick & McKellar, Ellison Place, Newcastle-on-Tyne.

**Hartlepool.**—Factory for Matador Paper Supplies, Ltd.

**Hayes.**—Houses (60), Park Farm estate, for U.D.C.; Camp & Jones, building contractors, 116, Church Road, Hayes.

**Hellesdon (Norfolk).**—Building trades training centre; Ministry of Works.

**Hendon.**—Houses (47); A. O. Knight-borough engineer, Town Hall, Hendon, N.W.4.

**Langley Moor.**—Factory for Woodhouse & Smith, hosiery manufacturers; F. Hedley, architect, Neville's Cross, Durham.

**Hereford.**—Houses (50), Hunderton estate; Hereford Federated Builders.

**Leeds.**—Houses (2,000) for the City Council; N. B. Bell & Co., Ltd., builders.

**Llantrisant and Llantwit Fardre.**—Houses (40) for R.D.C.; T. J. Hopkins, surveyor, Pontyclun, Glamorganshire.

**Middlesbrough.**—Cinema, Acklam Road South, for Thompson's Enterprises, Ltd.; Kitching & Co., architects, 40 Albert Road.

**Newmarket.**—Houses (42) for R.D.C.; architect, Council Offices, Park Lane.

**Northampton.**—Factory and houses (32), Flore; Erinex, Ltd.

**Northants.**—Conversion of P.A. Institution, Peterborough, into county hospital; county architect, County Offices, Guildhall Street, Northampton.

**Paisley.**—Factory at Renfrew Road for Crittall Manufacturing Co., Braintree, Essex; manager.

**Plymouth.**—Houses (500), Efford site No. 3; city architect, Compton Park House, Tavistock Road.

**Rawtenstall.**—Houses (98), Hall Carr estate; borough engineer.

**Stockton-on-Tees.**—Factory, Bowesfield Lane, for Tarslag, Ltd.

**Stoke-on-Trent.**—Reconstruction of Church Schools (£50,000); Archdeacon the Venerable Percy Hartill, The Rectory.

**Sunderland.**—Factory for A. Whyman; W. B. Edwards, Eldon Place, Newcastle-on-Tyne.

**Sutton-in-Ashfield.**—Houses (76), Hardwick Lane estate, for U.D.C.; Warner & Dean, architects, Mansfield Road.

**Trafford Park.**—Works extensions, Mellors Road; Trussed Concrete Steel Co., Ltd., 6/7, Collingham Gardens, Earl's Court, S.W.5.

**Wallasey.**—School, Rakc Lane; R.C. trustees.

**Wallsend.**—New offices for Parsons Marine Steam Turbine Co., Ltd.; R. T. James & Partners, Grosvenor Street, Lower Place, London S.W.1

Furniture factory, Tyne Plywood Works, for the Great Universal Stores, Ltd.

**York.**—Houses (100), Council estates; York Building Trades Employers' Association.

## Municipal Reports

### Hackney

**T**HE Hackney Electricity Department (engineer, Mr. E. A. Mills) reports a net surplus of £30,549 for the year ended March 31st last as compared with £3,089 for 1943-44. In the latter year, however, the earlier reading of consumers' m.d. meters resulted in an understatement of revenue by about £10,000.

The borough suffered considerably from air attacks during the war and there were last year some 9,000 fewer consumers than in 1938-39, yet, in spite of this, supplies to private consumers (*i.e.*, excluding public lighting and bulk supply) are 1½ million kWh greater. Last year's total sales in the distribution area amounted to 74 million kWh and the revenue, excluding bulk supplies, was £462,530, working expenses being £336,393. Charges have been raised on two occasions since 1938-39. The overall increase in the average selling price has been 20 per cent. (from 1.257d. to 1.512d.), but the purchase cost of electricity has advanced by 56 per cent. (from 0.499d. to 0.777d.). During the four years to March, 1943, trading losses were incurred aggregating £116,768, of which £68,000 had to be met from reserve. In the past three years benefit has been derived from reduced loan charges.

### Willesden

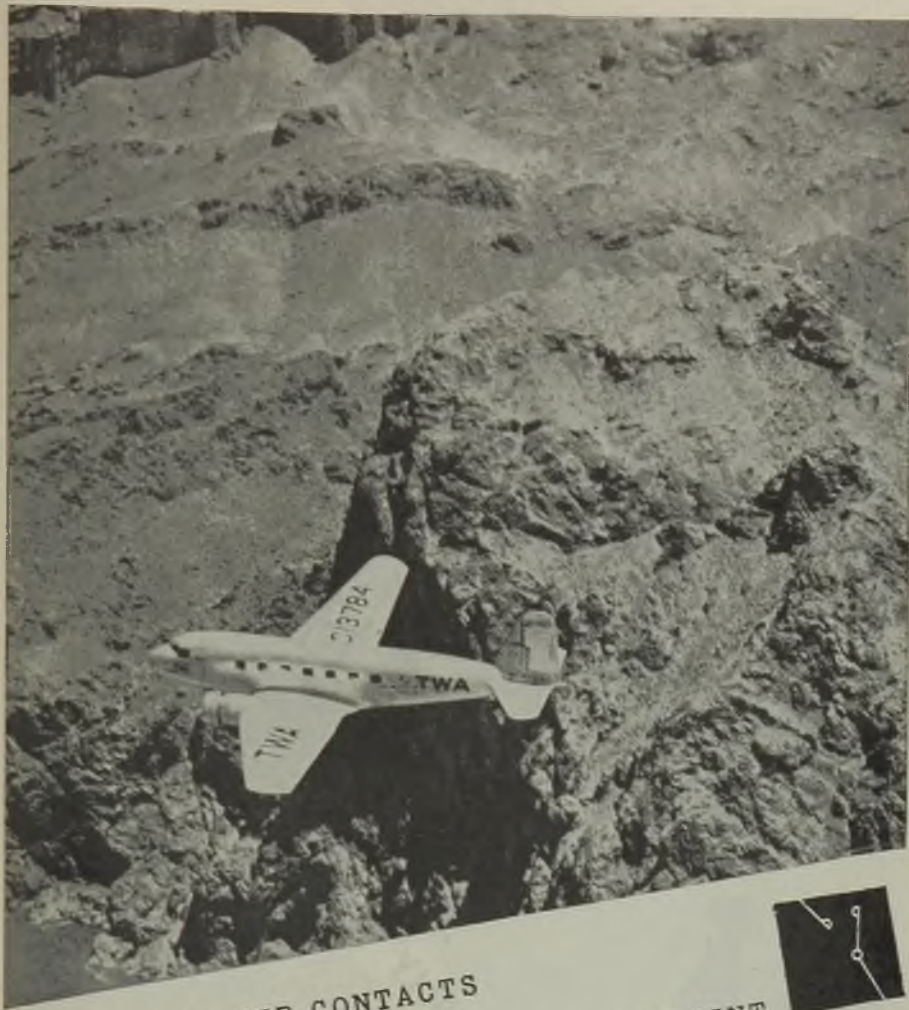
The 1944-45 accounts of the Willesden Electricity Department (engineer and manager, Mr. A. B. Catling) show a decrease in revenue from the sale of electricity (£473,751 compared with £482,242 in 1943-44). Total income on revenue account was £494,051 (£499,239) and working expenses amounted to £442,534 (£408,234), leaving a gross surplus of £51,517 (£91,005). After payment of loan charges, etc., there was a deficit of £12,502 compared with a surplus of £27,101 in the previous year.

Due to a reduction in power supplies from 55.0 million to 47.2 million kWh (partly compensated by an increase in other sales, particularly under the domestic all-in rate), the total quantity of electricity sold decreased from 97.9 million to 94.8 million kWh.

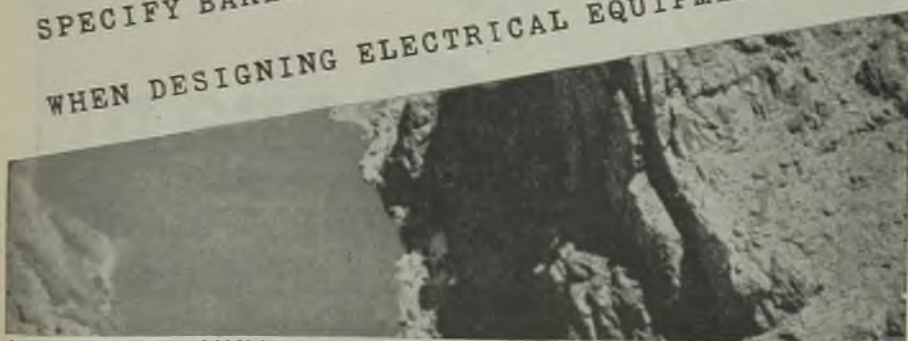
The average price received per kWh sold was 1.1996d. (against 1.1820d.) and including other income the average worked out at 1.2510d. (1.2236d.), with working costs at 1.1205d. (1.0006d.) and total costs 1.2768d. (1.1634d.).

### King's Lynn

Last year there was a surplus of £12,925 (against £6,806) on the operation of the King's Lynn undertaking (chief engineer, Mr. C. W. Jackson). Revenue from the sale of electricity, excluding bulk supplies, was £66,671 (£63,965). Domestic consumption was higher but power supplies decreased and the total quantity sold was practically unchanged at 10.7 million kWh. In addition there were bulk supplies of 42.9 million kWh (29.8 million).



**SPECIFY BAKER CONTACTS  
WHEN DESIGNING ELECTRICAL EQUIPMENT**



**BAKER PLATINUM LTD., 52 HIGH HOLBORN, LONDON, W.C.1**



A black and white advertisement for Osram lamps. The background features several Osram lamps of different shapes and sizes, including a standard incandescent bulb and several tubular fluorescent-style lamps. A diagonal banner across the center reads "GOOD LIGHTING IS A TONIC" and "ESPECIALLY WITH OSRAM". In the bottom left, a rooster and a small chick are shown; the rooster is looking up at the banner, and the chick is looking up at the rooster. The Osram logo is prominently displayed in the bottom right, with the tagline "THE WONDERFUL LAMP" and "A S.G.C. PRODUCT" below it.

A new era of brightness in the home, office and factory! Brightness, cheerfulness, cleanliness, fresh air, good health and good lighting are the order of the day. Good lighting is a tonic—especially with Osram!

**GOOD LIGHTING IS A TONIC**  
**ESPECIALLY WITH OSRAM**

**Osram**  
**THE WONDERFUL LAMP**  
A S.G.C. PRODUCT

Advertisement of The General Electric Company Limited.



# CLASSIFIED ADVERTISEMENTS

**ADVERTISEMENTS** for insertion in the following Friday's issue are accepted up to **First Post on Monday**, at Dorset House, Stamford Street, London, S.E.1.

**THE CHARGE** for advertisements in this section is 2/- per line (approx. 7 words) per insertion, minimum 2 lines 4/-, or for display advertisements 30/- per inch, with a minimum of one inch. Where the advertisement includes a Box Number there is an additional charge of 6d. for postage of replies.

**SITUATIONS WANTED.**—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

Original testimonials should not be sent with applications for employment.

**REPLIES** to advertisements published under a Box Number if not to be delivered to any particular firm or individual should be accompanied by instructions to this effect, addressed to the Manager of the **ELECTRICAL REVIEW**. Letters of applicants in such cases cannot be returned to them. The name of an advertiser using a Box Number will not be disclosed. All replies to Box Numbers should be addressed to the Box Number in the advertisement, c/o **ELECTRICAL REVIEW**, Dorset House, Stamford Street, London, S.E.1. Cheques and Postal Orders should be made payable to **ELECTRICAL REVIEW LTD.** and crossed.

## OFFICIAL NOTICES, TENDERS, ETC.

### BURNLEY EDUCATION COMMITTEE

Municipal College—Engineering Department  
Establishment of New Electrical Engineering Laboratory

**TENDERS** are invited for the following items:—

1. Construction of 9 concrete machine plinths finished in red brick, together with the carrying out of structural alterations to existing classroom.
2. Provision of necessary material for, and wiring up of, 9 machine sets to control panels and test benches.
3. Supply of the following test benches: Seven 5 ft. long; one 10 ft. long; one 8 ft. long. All 2 ft. 6 ins. wide and 3 ft. high. Each bench to have 1½" teak, stained sycamore or other hard wood top, and suitable reinforced legs.
4. Supply of 30 terminal boards, each 25" × 6" × ½", to be made of high grade black insulation board, drilled and engraved, together with 450 chromium plated ½" Whitworth brass terminals, complete with washers and locknuts.
5. Supply and installation of "Warm White" fluorescent Lighting, with vitreous enamelled reflectors.

Further details of all or any of the above items may be had on application to the Director of Education, Education Offices, Burnley.

Detailed tenders in sealed envelopes, specially marked "Tender for Electrical Laboratory Equipment" in the top left-hand corner, must be delivered to the Acting Town Clerk, Town Hall, Burnley, on or before 31st October, 1945. J. C. NELSON, Acting Town Clerk.

3034

### STATE ELECTRICITY COMMISSION OF QUEENSLAND

(1) Tenders are invited for the supply, delivery, erection and setting to work of 50,000 lb. per hour Steam Boilers and Accessories at the undermentioned centres in Queensland, Australia:—

Wide Bay Regional Electricity Board, Maryborough: 4 boilers.  
Capricornia Regional Electricity Board, Rockhampton: 6 boilers.  
Townsville Regional Electricity Board, Townsville: 6 boilers.

(2) Tenders are invited for the supply, delivery, erection and setting to work of 7,500-kW and 750-kW Steam Turbo-Alternators, Accessories and Evaporating Plant at the undermentioned centres:—

Wide Bay: 2 main sets, 2 house sets.  
Capricornia: 3 main sets, 2 house sets.  
Townsville: 3 main sets, 2 house sets.  
Three evaporating sets are required; one for each power station.

Tender forms, general conditions and specifications may be obtained from and inspected at the office of the Agent-General for Queensland, Queensland Government Offices, 409-410, Strand, London, W.C.2. Tenders close at the office of the State Electricity Commission of Queensland, Parbury House, Eagle Street, Brisbane, Queensland, Australia, at noon on 10th December, 1945.

3035

### SHEFFIELD CORPORATION

Electricity Department

Contract No. 706—Transformer

**T**HE Electricity Committee are prepared to receive tenders for the supply and delivery of the under-mentioned Transformer:—

One 20-MVA, 33/11-kV, 3-phase, Double Wound, Self Cooled.

Contractors desiring to submit tenders may obtain specification and form of tender at this office on making a deposit of £2 2s., which sum will be refunded on receipt of a bona fide tender. To meet the convenience of contractors, two copies of the specification will be furnished; additional copies may be purchased at a cost of £1 1s. per copy.

Any person or firm sending in a tender will be required to comply with the Standing Orders of the Council relating to the "Prevention of Corruption" and to the standard rates of wages and proper hours and conditions of labour. A print of the Standing Orders may be obtained from the Department.

The tender and accompanying documents, filled up as directed, must be enclosed in the official envelope supplied with the specification, which shall not bear any name or mark indicating the sender, to be delivered to the Town Clerk, Town Hall, Sheffield, 1, not later than the first post on Monday, 5th November, 1945. Tenders received after the time stipulated herein will not be considered.

The Committee do not bind themselves to accept the lowest or any tender.

JOHN R. STRUTHERS,

Commercial Street, General Manager and Engineer.

Sheffield, 1.

September, 1945.

2975

### GAINSBOROUGH URBAN DISTRICT COUNCIL

Electricity Department

**TENDERS** are invited for the supply and delivery of

One 500-kVA, Three-phase Static Transformer. Copies of the specification may be obtained on application to the Electrical Engineer and Manager, 6, Lord Street, Gainsborough, Lincolnshire.

Tenders in plain sealed envelopes, endorsed "Transformer," should be delivered to the undersigned not later than first post on Monday, 29th October, 1945.

REG. C. HAMMERSLEY, Esq., A.M.I.E.E.,  
Engineer and Manager. 3011

## SITUATIONS VACANT

None of the vacancies for women advertised in these columns relates to a woman between 18 and 40 unless such woman (a) has living with her a child of hers under the age of 14, or (b) is registered under the Blind Persons Acts, or (c) has a Ministry of Labour permit to allow her to obtain employment by individual effort.

**A**PPPLICATIONS invited from men becoming available for civilian work on Class A demobilisation, for positions as experienced practical Model makers, in the Instrument Department of a large electrical manufacturer in the Midlands. Only men with previous experience in this class of work need apply. Applicants should state age and previous employer, with details of work in each case, to—Box 2980, c/o The Electrical Review.

**METROPOLITAN BOROUGH OF HACKNEY****Electricity Department****Appointment of Senior Demonstrator and Demonstrators**

**A**PPPLICATIONS are invited for the appointments on the permanent establishment of a Senior Demonstrator in Grade A(1) of the Council's scale of salaries, i.e. £255 x £15 to a maximum of £300 per annum, and two Demonstrators in Grade A(2), i.e. £180 x £15 to a maximum of £255 per annum. At the present time a cost of living bonus at the rate of 18s. 6d. per week is payable on these salaries for persons over the age of 21.

**SENIOR DEMONSTRATOR, Grade A(1).** Applicants shall have had a good education and hold a recognised diploma approved by the Ministry of Education in Domestic Science and Electrical Housecraft and possess a thorough knowledge of the use of electrical domestic appliances.

Applicants shall also have had experience in a senior position with an electricity supply undertaking; in the supervision of a staff of demonstrators; the preparation of demonstration schemes, including the supervision of industrial canteens. The age of the person for this appointment should be approximately 30 to 35 years.

**TWO DEMONSTRATORS, Grade A(2).** Applicants for these appointments shall have similar qualifications to the Senior Demonstrator, but it is not necessary that they have held a senior position.

The appointments will be subject to one month's notice on either side and to the provisions of the Council's Superannuation Acts. The selected candidates will be required to pass a medical examination.

Conditions of appointment, together with forms of application, can be obtained from the undersigned upon receipt of a stamped addressed foolscap envelope.

Applications endorsed "Demonstrators (Electricity Department)" shall reach the undersigned not later than first post 10th November, 1945.

This advertisement in respect of the Grade A(2) Demonstrators is published by permission of the Ministry of Labour and National Service under the Control of Engagement Order, 1945.

**DUDLEY SORRELL,**Town Hall, Hackney, E.8.  
21st September, 1945.Town Clerk.  
3019**CITY OF LEICESTER EDUCATION COMMITTEE****Leicester College of Technology and Commerce**

(Principal: L. W. Kershaw, O.B.E., B.Sc.,

A.M.Inst.C.E., F.G.S.)

**A**PPPLICATIONS are invited for the posts of Full-time Lecturers in the School of Engineering for Mechanical Engineering (ability to teach Structural Design to the standard of B.Sc. Engineering will be an advantage) and Electrical Engineering.

Applicants should be University Graduates or hold an equivalent qualification and have had good industrial experience.

Salary will be in accordance with the Burnham Scale.

Applications, accompanied by copies of two recent testimonials and giving the names of two referees, should be addressed to the Principal of the School as soon as possible.

**H. S. MAGNAY,**

Education Department,

Newarke Street, Leicester.

2nd October, 1945.

Director of Education.

3018

**ROYAL TECHNICAL COLLEGE, SALFORD**

(Principal: J. E. RICHARDSON, Ph.D., B.Eng.,

M.I.E.E., A.M.I.Mech.E.)

**A**PPPLICATIONS are invited for the post of full-time Lecturer in Electrical Engineering, to commence duties on 1st December, 1945.

Applicants must have had industrial experience and be capable of teaching Design of Electrical Machinery up to the Higher National and London University Final B.Sc. degree standard, together with at least one other advanced electrical subject. Salary in accordance with the new Burnham Technical Scale.

Application forms and further particulars may be obtained from the Principal, Royal Technical College, Salford, 5, to whom applications should be returned not later than 15th October, 1945.

**H. H. TOMSON,**

Clerk to the Governors.

2862

**CENTRAL SUSSEX ELECTRICITY LIMITED AND ASSOCIATED COMPANIES****Appointment of Chief Assistant Engineer**

**A**PPPLICATIONS are invited for the above position at a salary of £800 per annum, inclusive of war allowance.

Candidates, having high technical ability and wide experience in electricity supply must be competent to prepare and carry out schemes for 33-kV, 11-kV and L.T. underground and overhead extensions, and assume general responsibility for the efficient operation and maintenance of a network having 600 miles of mains and 400 sub-stations and all the necessary switchgear supplying approximately 20,000 consumers. Administrative experience and a sound knowledge of correspondence and office routine on the engineering side of an Electricity Supply Undertaking is essential.

The Ministry of Labour and National Service (Technical and Scientific Register) have given permission under the Control of Engagement Order, 1945, for the advertisement of this vacancy.

Applications, endorsed "Chief Assistant Engineer" and giving details of qualifications and experience, together with copies of testimonials or references, should reach the undersigned not later than Saturday, 27th October, 1945.

**H. DIXON,**

Engineer and Manager.

Electra House,

Haywards Heath, Sussex.

2968

**COUNTY BOROUGH OF GREAT YARMOUTH****Electricity Department****Appointment of Charge Engineers and Junior Charge Engineer**

**A**PPPLICATIONS are invited for the following positions at the South Denes Power Station.

**TWO SHIFT CHARGE ENGINEERS.** Applicants must have had a sound technical and practical experience in mechanical and electrical engineering. Salary and conditions of service will be in accordance with the N.J.B. Agreement, Class F, Grade 8 (present salary £397).

**SHIFT JUNIOR CHARGE ENGINEER.** Applicants should hold the Higher National Certificate, or its equivalent, in electrical or mechanical engineering, and possess a knowledge of power station control rooms and generating plant. Class F, Grade 9 (present salary £320).

The appointments are subject to the provisions of the Local Government Superannuation Act, 1937.

Forms of application may be obtained from the undersigned and should be returned not later than 29th October, 1945.

The Ministry of Labour and National Service, A.9.D. have given permission under the Control of Engagement Order, 1945, for the advertisement of these vacancies.

**FARRA CONWAY, Esq.,**

Town Hall,

Great Yarmouth.

Town Clerk.

3014

**STALYBRIDGE, HYDE, MOSSLEY & DUKINFIELD TRANSPORT & ELECTRICITY BOARD****Electricity Department****Appointment of Installation Inspector**

**A**PPPLICATIONS are invited for the position of Installation Inspector with the above Undertaking from persons excepted from the provisions of the Control of Engagement Order, 1945.

Candidates should have served an apprenticeship with an electrical contractor, and subsequently worked as a journeyman on the wiring of domestic premises, small workshops and factories and large industrial concerns. They should be acquainted with the "Regulations for the Electrical Equipment of Buildings" and be in a position to inspect work carried out for compliance with such Regulations.

Wages in accordance with District Council No. 3, at present 26.11d. per hour.

Applications, giving full details of training and experience, should be addressed to the undersigned to reach him not later than Saturday, October 27th.

**J. HARWOOD LUMSDEN, M.I.Mech.E.,**

Park Road,

Stalybridge, Cheshire.

October 2nd, 1945.

A.M.I.E.E., Chief Engineer.

3010

## COUNTY BOROUGH OF BOLTON

## Education Committee

## Training College for Technical Teachers

**A**PPPLICATIONS are invited from suitably qualified men and women for the following permanent appointments to the staff of the new Training College for Technical Teachers which will open in Bolton in January, 1946.

## (a) SENIOR LECTURERS.

Salary Scales: Men, £600 × £20 to £750 p.a.  
Women, £500 × £20 to £650 ..

## (b) LECTURERS.

Salary Scales: Men, £400 × £20 to £650 p.a.  
Women, £350 × £20 to £550 ..

Applicants should have qualifications and teaching experience in Technical Subjects (engineering, building, commerce or science); or experience in the training of teachers, or both.

To a large extent the staff will be engaged on pioneer work, and originality, initiative and a disposition for investigation and research are desirable.

Application forms and further particulars may be obtained from the undersigned, to whom completed applications should be submitted not later than 23rd October, 1945, endorsed "Training College."

W. H. HAYWARD,

Education Officer, Chief Education Officer.  
Nelson Square, Bolton. 3024

## URBAN DISTRICT COUNCIL OF ATHERTON

## Appointment of Electrical Engineer and Manager

**A**PPPLICATIONS are invited for the above appointment from persons experienced in the management and administration of an Electricity Undertaking.

The commencing salary will be £525 per annum, plus war bonus (at present £59 16s.), and will be subject to the provisions of the Local Government Superannuation Act, 1937.

The appointment will be determinable by three months' notice on either side, and the successful candidate will be required to live within the Urban District.

Applications, stating age, qualifications and experience, accompanied by copies of three recent testimonials, and endorsed "Electrical Engineer," must reach the undersigned by the 22nd October, 1945.

Canvassing, directly or indirectly, will be a disqualification, and candidates must disclose whether they are related to any member or senior officer of the Council.

W. BALSON,

Town Hall, Atherton, Clerk of the Council.  
Manchester.  
1st October, 1945. 3052

## COUNTY BOROUGH OF BLACKPOOL

## Electricity Department

## Appointment of Deputy Borough Electrical Engineer

**A**PPPLICATIONS are invited for the position of Deputy Borough Electrical Engineer at a salary in accordance with Class C, Grade 1, of the National Joint Board Schedule, at present £774 rising to £806 per annum. The appointment will be subject to the provisions of the Local Government and Other Officers' Superannuation Act, 1937, and the successful applicant will be required to pass a medical examination.

Applicants must have held a position of superior responsibility in an Electricity Supply Undertaking and be experienced in Generation and Distribution and capable of assisting in the administration of the undertaking.

Applications, which should be made on a form to be obtained from the Borough Electrical Engineer, Shannon Street, Blackpool, must reach the undersigned not later than 5th November, 1945, and be endorsed "Deputy Borough Electrical Engineer."

TREVOR T. JONES, Town Clerk.

Town Hall, Blackpool. 3050

**A**RMATURE Winders, experienced all classes A.C. and D.C. jobs. Class A ex-Servicemen or otherwise exempt M.O.I. control. Permanencies for suitable men. Service Electric Co. Ltd., Abbey Mfg. Estate, Alporton, Telephone, Wembley 0194. 49

## THE SALCOMBE GAS &amp; ELECTRICITY CO. LTD.

## Appointment of Assistant Distribution Engineer

**A**PPPLICATIONS are invited for the above position from qualified electrical engineers who must have experience in the laying, jointing, testing and maintenance of 3-phase High Tension and Low Tension Cables, maintenance and operation of static substations (indoor and outdoor types), erection and maintenance of E.H.T. and L.T. overhead lines and keeping the necessary records in connection with the above. Single man preferred. Salary £312 per annum.

Applications MUST be accompanied by an intimation of release by the present employer in case of success.

Applications, giving full details of age, training and experience, and endorsed "Assistant Distribution Engineer," should be forwarded not later than October 19th to The Salcombe Gas & Electricity Company Limited, 37, Alexandra Road, Epsom.

The Ministry of Labour and National Service have given permission under the Control of Engagements Order, 1945, for the advertisement of this vacancy. 2923

## MID-LINCOLNSHIRE ELECTRIC SUPPLY CO. LTD.

## Meter Repairer

**A**PPPLICATIONS are invited for the appointment of a Meter Repairer at the rate of 2s. 2½d. per hour for a 47-hour week. Applicants must have had experience in repairing all types of quarterly and prepayment meters, time switches, maximum demand attachments, etc.

The successful candidate will be required to participate in the Company's Superannuation Scheme.

Applications in writing, giving details of training and experience, accompanied by copies of recent testimonials, endorsed "Meter Repairer," should be addressed to the undersigned not later than the 26th October, 1945.

The Ministry of Labour and National Service have given permission under the Control of Engagements Order, 1945, for the advertisement of this vacancy.

N. F. MARSH, M.A., M.I.E.E.,

Mid-Lincolnshire Electric Engineer and Manager.  
Supply Co. Ltd.,  
North House, Grantham, Lincs. 3006

## CHELTENHAM ELECTRICITY UNDERTAKING

## Mains Foreman

**A**PPPLICATIONS are invited for the position of Mains Foreman in the Cheltenham Electricity Department from those with experience in the laying of cables and the supervision of joiners. Must be good disciplinarian. Rate of pay at present £5 5s. 9d. for 47-hour week.

Applications should include age, particulars of training and experience, together with testimonials or references, and should be sent to the undersigned not later than Monday, October 29th.

The successful applicant will be required to pass a medical examination and contribute to the Council's Superannuation Scheme.

This advertisement appears by permission of the Ministry of Labour and National Service.

R. W. STEEL, A.M.I.E.E.,

Borough Electrical Engineer.  
2nd October, 1945. 3012

ASSOCIATED MUNICIPAL ELECTRICAL ENGINEERS  
(Great Britain and Ireland) and the  
ELECTRICAL POWER ENGINEERS' ASSOCIATION

## NOTICE

## Atherton U.D.C.—Appointment of Electrical Engineer

**T**HE Standing Joint Committee of the above Associations desire to point out that the above advertised post is not in accordance with Clause 10 of the Agreement made by the National Joint Committee of Local Authorities and Chief Electrical Engineers (Electricity Supply Industry), under which clause the latest available data of output indicates a commencing salary of £622 per annum, rising to £732 per annum.

ALL ENGINEERS, WHETHER ENGAGED IN THE ELECTRICITY SUPPLY INDUSTRY OR NOT, ARE URGENTLY REQUESTED NOT TO APPLY FOR THE POST NOW BEING ADVERTISED, AND IF AN APPLICATION HAS ALREADY BEEN MADE IT SHOULD BE WITHDRAWN.

W. ARTHUR JONES, A.M.I.E.E., Secretary.

Standing Joint Committee.

A.M.E.E.—E.P.E.A. 3053



**A**RMATURE Winders required, experienced in A.C. and D.C. work. Class A release or over 51.—The Midland Electric Installation Co. Ltd., Cyprus Works, Upper Villiers Street, Wolverhampton. 2897

**A**SSISTANT-cum-Traveller required. To assist small firm rapidly expanding. Electrical Accessories. Good prospects to reliable man. Able to drive car. East London. Class A ex-Serviceman, or otherwise free. Apply in first instance to—Box 3047, c/o The Electrical Review.

**A**SSISTANT, male (Class A ex-Serviceman or over 51) or female for retail electrical shop in London, must be willing and reliable, state experience and wages expected. Reply—Box 73, c/o The Electrical Review.

**C**HARGEHAND Maintenance Electrician for industrial work, A.C. and D.C. experience required. Class A release or over 51.—Midland Electric Installation Co. Ltd., Upper Villiers Street, Wolverhampton. 2871

**C**LERICAL Assistant, Class A ex-Serviceman, for Stores Office. Must have thorough knowledge of all electrical material. Apply—London Electrical Company, 92, Blackfriars Road, S.E.1. 24

**C**ONTRACT Engineer to handle orders for motors, generators and allied equipment. Manchester district. Applications from those over 51 or Class A ex-Servicemen only. State experience, age and salary.—Box 2977, c/o The Electrical Review.

**D**OMESTIC electrical appliances. North London manufacturers require Manager capable of control. Must have first-class technical and practical knowledge from design to production. Good opening for fully experienced man. Write fullest particulars in confidence.—Box 2943, c/o The Electrical Review.

**D**RAUGHTSMAN used to automatic control gear, over 51 or Class A ex-Serviceman. Please state age, full previous experience and salary required. Near London.—Box 2911, c/o The Electrical Review.

**E**LECTRICIAN Apparatus Draughtsman, also Jig and Tool Draughtsman, over 51. Good working conditions, Surrey area. Canteen, etc. Apply—Box 2992, c/o The Electrical Review.

**E**LECTRICIAN Designer for small rotating and static electrical machines and apparatus, motors, generators, alternators, etc., A.C. and D.C. mainly of a special nature. Over 51 or Class A ex-Serviceman. Salary about £600, according to qualifications. London area.—Box 3003, c/o The Electrical Review.

**E**LECTRICIAN Engineer re-opening former electrical contracting business, requires Electricians at once, Leicestershire market town. Applications invited from men over 51 or Class A ex-Servicemen only.—Box 2991, c/o The Electrical Review.

**E**LECTRICIAN Engineer required for large industrial concern in London. Applicants, who should be between 35 and 40 years of age and of good personality, should be fully qualified and preferably corporate members of the Institution of Electrical Engineers. Applicants should have had first-class practical experience in the operation and maintenance of A.C. and D.C. generating plants, factory distribution systems, motors and automatic control gear, lifts, etc., and would be required to manage a staff of electricians. Duties would also include the preparation of specifications, the ordering of equipment and material, and its installation in a large factory plant. Salary £600-£800, depending upon qualifications. Applications should give full particulars of education, technical training, experience and positions held. Write—Box 3033, c/o The Electrical Review.

**E**LECTRICIAN required immediately by Electrical Contractors, London, permanency to suitable man. Class "A" ex-Serviceman or man over 51. Apply, giving full particulars, to—Box 2945, c/o The Electrical Review.

**E**LECTRICIAN-Wiremen for installation and maintenance work. Class A ex-Servicemen or otherwise exempt from Ministry of Labour control.—C. F. Parkinson, Electrical Contractor, 114, West St., Boston, Lines. 7763

**E**LECTRICIANS and Assistants for work in London and Provinces. Class "A" ex-Servicemen, or otherwise exempt from Ministry control. Write, or apply, to—F. H. Wheeler & Co. Ltd., 39 Victoria street, S.W.1. 2934

**E**LECTRICIANS wanted immediately. A priority work. Class A ex-Servicemen or men otherwise free. Applications from demobilised pre-war employees especially appreciated. Apply—Holiday Hall & Stinson Limited, 36, Victoria Street, Westminster, S.W.1. 7732

**E**NGINEERS and Draughtsmen, becoming available for civil employment, under Class A demobilisation, are invited to apply for positions in the Switchgear Department of a large electrical engineering manufacturer in the Midlands. Applications stating age, appropriate technical qualifications and industrial experience, and salary required, to—Box 69, c/o The Electrical Review.

**E**LECTRICIANS accustomed to industrial installations, screwed conduit work, etc., also Electricians for plant maintenance. Class A ex-Servicemen or otherwise exempt M.O.L. control. Permanencies for suitable men.—Service Electric Co. Ltd., Abbey Mig. Estate, Alperton. Telephone Wembley 0194. 48

**E**LECTRICIANS and Assistants required for London housing programme. Best conditions, permanency for right men. Class "A" ex-Servicemen, or otherwise free.—Box 44, c/o The Electrical Review.

**E**LECTRICIANS required (London area), Class A ex-Servicemen only or over 51. Apply in writing, giving full details of experience, to—Box 2863, c/o The Electrical Review.

**E**XPERIENCED Estimator required for industrial installation work in the Midlands, Class A release or over 51.—The Midland Electric Installation Co. Ltd., Cyprus Works, Upper Villiers Street, Wolverhampton. 3005

**E**XPERIENCED Traveller to represent a wholesale electrical co. in the London area. Write giving details of experience, age and salary required.—Box 2996, c/o The Electrical Review.

**E**XPORT Sales Engineers required in switchgear department London manufacturers with commercial experience able handle overseas enquiries and orders. Pensionable post. Age, experience, when free, salary required. Applications from those over 51 or Class A ex-Servicemen only.—Box 7786, c/o The Electrical Review.

**F**IRM of electrical engineers and contractors shortly opening business in the South Scottish area invite applications from Electricians and Wire-men experienced in the highest grade domestic and industrial installations. Permanent positions with good prospects and conditions are offered to suitable applicants over 51 years of age or Class A ex-Servicemen. Men expecting release from the Services in the near future are particularly invited to apply. All applications will be considered and acknowledged. Reply giving full particulars of age, training and experience, and when disengaged, to—Box 144, Phillips Advertising Ltd., 15, Wilton Road, London, S.W.1. 2986

**F**OREMAN-Electroplater, to take charge of small plant working chiefly nickel, with barrelling, rumbling and polishing, in Felixstowe. Applicants must have sound knowledge and experience of the trade, and a good opportunity is provided. State age, experience and rate expected. Applicants must be free from restrictions of the Control of Engagement Order.—Box 3021, c/o The Electrical Review.

**I**NSTRUMENT Makers, 20 Instrument Makers required urgently for the Telecommunications Research Establishment, Malvern; must be 21 and over. Skilled on non-ferrous metals. Brazing and soldering. Able do machining; milling. Pref. able read Micro. and Vernier. Rates of pay 99/- p.w. and O.T., average earnings £6 p.w. Day shift. Free fares for interview and to start work. Hostel accommodation. Application should be made in writing to the Exchange Manager, Ministry of Labour and National Service, Malvern. 305

**L**ADY required to take charge of Electrical Contractors' Showroom (London). Apply, giving full particulars, to—Box 2946, c/o The Electrical Review.

**M**ANAGER for electrical department of an established business. Must have good credentials and experience, be able to estimate, take complete control and obtain the business. Good opening for progressive man. Write, stating age, experience and salary required, to—Box 3775, Frost-Smith Adv., 64, Finsbury Pavement, E.C.2. 2998

**M**ANAGER required for Winding Dept. of electrical engineering co. in East London. Applicants must be good organisers with thorough practical winding experience of all sizes A.C. and D.C. motors, and be used to controlling and training mixed labour. Applicants should state concise particulars of training and subsequent experience, age, and salary required.—Box 2965, c/o The Electrical Review.

**M**ANAGER required to take charge of technical development in the design and production of small electric motors. Please send full details of experience and salary required.—Box 2929, c/o The Electrical Review.

**M**EDIUM size firm specialising in variety of special small electric motors require Production Engineer, over 51 or Class A ex-Serviceman, for batching up work and issuing shop orders and general progress planning. Full particulars of age, qualifications and experience to—Box 3002, c/o The Electrical Review.

**M**OTOR REPAIRER and Tester (Mechanician) required by Thornton-Cleveleys U.D.C. Electricity Department (Lancashire), E.S.I. Scale, Zone B, 47-hour week, 96s. 6d. Apply direct, giving full particulars of experience, etc. The Ministry of Labour and National Service have given permission under the Control of Engagement Order, 1945, for the advertisement of this vacancy.—Box 3041, c/o The Electrical Review.

**OVERSEAS Employment.** City of Salisbury, Southern Rhodesia: City Electrical Engineer. Applications for the above position are invited. Salary £1,250 to £1,600 per annum. Applicants should be Corporate Members of the Institution of Electrical Engineers and should have had a sound training in mechanical and electrical engineering. Experienced in the construction, operation and control of a large electricity supply undertaking and sound technical knowledge of both modern steam practice and the latest developments of electrical practice. Copies of not more than three testimonials are required and applicants should, if possible, state the earliest possible date on which duties can be commenced. The successful candidate will be bound by the Council's service and leave regulations and will be required to furnish a satisfactory medical certificate. Write, quoting D.1445XA, to Ministry of Labour and National Service, Appointments Department, Technical and Scientific Register, Room 670, York House, Kingsway, London, W.C.2, for application form, which must be returned completed by 6th November, 1945. 3043

**OVERSEAS Employment.** The Calcutta Electric Supply Corporation Limited: Station Charge Engineers. Applications are invited for appointment as Charge Engineers for Generating Stations. Candidates must have had a thorough practical and technical training in electrical and mechanical engineering, together with recent operating experience of all plant in a modern generating station. Corporate membership of one of the Sector Institutions an advantage. Agreements in the first instance for five years at a salary starting at Rs.600 a month, with overseas allowance of Rs.150 a month for Europeans, and rising by annual increments of Rs.35 (Rupee equals approx. 1s. 6d.). Free quarters, medical attendance and passages out and back. Liberal leave rules and Provident Fund. Age between 25 and 35. Write, quoting D.1490XA, to Ministry of Labour and National Service, Appointments Department (Technical and Scientific Register), Room 670, York House, Kingsway, London, W.C.2, for application form, which must be returned completed by 22nd October, 1945. 3014

**PLANNING Engineer,** to take charge of planning department and fig and tool drawing office. Must be first-class fig and tool designer having good all-round experience with mass production particularly on small mechanisms utilising press work, auto parts and ball-mouldings. Class A ex-Servicemen accepted until present restrictions removed. Good salary offered for right man. Write giving age, salary expected, experience, etc. to—Box 2878, c/o The Electrical Review.

**PRODUCTION Manager** required by small but progressive transformer factory, London area. Sound young mechanical engineer capable of organising production and controlling labour and experienced in modern methods will find permanent post. State age, positions held and salary required.—Box 3030, c/o The Electrical Review.

**PROGRESS Clerk** required in purchasing dept., with knowledge electrical/radio terms. Class A ex-Serviceman. Good prospects permanency. Write, stating age, experience, salary desired.—RCA Photophone Ltd., Belgrave House, Belgrave Street, King's Cross, W.C.1. 3032

**REQUIRED for Far East Engineer** for electrical contracting department, including estimating, sales and supervision of installation and maintenance contracts. Must have had contracting experience. Write, stating age, training and experience, to—"O. H." c/o Streets, 116, Old Broad Street, E.C.2. 3025

**SMALL factory** still on war production proposes to turn over to manufacture of fractional H.P. motors. Experienced Engineer is required to take sole charge, design, development and production. Good salary and excellent prospects for the right man who will have free hand and every assistance from sole proprietor. Write in first place to—Box 3054, c/o The Electrical Review, giving experience and other relevant particulars.

**STOREKEEPER** required by firm of electrical contractors. Experience preferred but not essential. Class A ex-Servicemen only or over 51. Apply in writing, giving full details of experience and salary required, to—Box 2804, c/o The Electrical Review.

**STOREKEEPER** required, with thorough knowledge of accessories and general supplies. Good opening for suitable applicant. Applications only from Class A ex-Servicemen or those over 51.—National Electrical Supplies Co. Ltd., 13, Chillon St., Baker St., W.1. 3058

**SUPERVISING Engineer** required by large firm of electrical contractors to take charge of branch office in South Wales. Practical knowledge of all types of first class electric power and lighting installations essential. Apply by letter, giving age, training, experience and remuneration required, to—Box 2028, c/o The Electrical Review. Immediately the present employment restrictions are removed, applications will be considered.

**SWITCHGEAR Sales Representative** required for South Wales and West of England. Sound electrical engineering technical training necessary. Apply, stating full details of experience and salary required, to—Box 2964, c/o The Electrical Review.

**TECHNICAL Translator** into English from Swedish required by first-class electrical engineering company in Sweden, primarily for the English edition of their technical house journal. Permanent position with salary according to qualifications, approximately £400-£500 per annum and superannuation. 15.8c. degree in electrical engineering preferable. Write quoting D.1488XA, to—Ministry of Labour and National Service, Appointments Department, Technical and Scientific Register, Room 670, York House, Kingsway, London, W.C.2, for application form which must be returned completed by 12th November, 1945. 3046

**TELEVISION and Radio Development Engineers** and Draughtsmen required for progressive growing firm, with good prospects. Applicants should be exempt from the provisions of the Control of Engagement Order, 1945, or Class "A" ex-Servicemen with similar experience. Our own employees have been notified. Write fully, in confidence, giving age and salary required, to—Personnel Officer, R.F. Equipment Ltd., Amersham, Bucks. 2921

**TEST Room Assistants (Male),** age over 51 or Class A ex-Servicemen, with experience on moving coil instruments, preferably Pyrometers, London district. State age, experience and rate required. Replies to—Box 3032, c/o The Electrical Review.

**WANTED** an experienced Toolmaker-Designer for Bakelite Moulds. Applications from those over 51 or Class A ex-Servicemen only. Write in first instance to—Box 3057, c/o The Electrical Review.

**WORKMAN** for general factory work. Only those who have knowledge of A.C. and D.C. motors and wiring need apply. Permanent and progressive job to good reliable man. Applications from Class A ex-Servicemen or those over 51.—Cox & Danks Ltd., Plant & Machinery Dept., Fagus Road, Feltham, Mdx. 3059

**WORKS Manager** for small electrical components factory. State experience and salary required; also copies of recent testimonials.—Box 3055, c/o The Electrical Review.

**WORKS Manager.** Small factory (50), rapidly growing, producing domestic electric equipment, fires, irons, kettles, water heaters, etc., requires Works Manager with practical experience of machine shop, press shop, tool room and spinning shop processes. Will act as own buyer initially and operate a costing system. Works are being extended, and must be qualified to put down plant for producing electric kettle bodies in aluminium and copper. Must be a friendly but strict disciplinarian. Works situated in East Coast seaside town. A generous salary and prospects offered to assist and work directly under managing director. State in time order past experience, present occupation, salary expected and age.—Box 2993, c/o The Electrical Review.

**YOUTH** with some knowledge of electrical goods required as Warehouse Assistant, good prospects. Apply—Mr. Fisher, Farmer, Stedull & Co., 145, St. John Street, Clerkenwell, E.C.1. 3038

## APPOINTMENTS FILLED

Disatisfaction having been so often expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

**CITY of Oxford Electricity Dept.**—Mains Engineer; Preston County Borough—Electrical Maintenance Engineer; West Hampshire Electricity Co. Ltd.—Storekeeper.

## SITUATIONS WANTED

**ACCOUNTANT, A.S.A.A., A.C.I.S.** (first place) (38), special knowledge of costing and machine accounting, desires appointment as company secretary.—Box 7771, c/o The Electrical Review.

**M.I.E.E., Int.A.M.I.P.E.** (30) desires position as assistant works manager in progressive electrical company. Design, D.O., estimating, workshop and executive experience. Remuneration £600 p.a.—Box 7749, c/o The Electrical Review.

**ARMY officer,** release 21, seeks position with well-established firm, 10 yrs.' experience wholesale and retail, domestic appliances and installations. Capable of designing electric appliances.—Box 7692, c/o The Electrical Review.



**B**UYER and Stores Supervisor seeks position with concern manufacturing Engineering and Electrical equipment. Fully experienced in buying, modern stock control methods, and stores routine, etc.—Box 7702 c/o The Electrical Review.

**C**HARGEHAND Electrical, 38, seeks opportunity to manage electrical business, wide experience. Wife could assist. Ex. refs.—Box 7703, c/o The Electrical Review.

**C**HIEF Buyer, 19 years' experience manufacturing electrical, mechanical and radio engineering, age 37, excellent contacts all markets, thorough knowledge stores and stock control, also costing, free to accept responsible position. Willing to consider directorship progressive company.—Box 7765, c/o The Electrical Review.

**C**HIEF Electrical Engineer, age 33, presently responsible for layout, installation, maintenance of E.H.T., H.T. and L.T. distributions, works capacity 4,600 kVA, experienced costing, estimating; desires position home or abroad.—Box 7707, c/o The Electrical Review.

**C**ONTRACTING Manager, 20 years' experience, age 40, excellent testimonials, free one month.—Box 7759, c/o The Electrical Review.

**D**RAUGHTSMAN, with 10 years' experience in design and production of domestic and industrial cooking and heating equipment, seeks position with firm interested in the development of above apparatus.—Box 7792, c/o The Electrical Review.

**E**LECTRICAL and Mechanical Engineer, M.A.S.E.E. Age 34, 17 years' experience. At present Station Engineer, Air Ministry. Desires to settle in any one location seeks position with Works, Corporation or Supply Co. Mains or Assistant Engineer; similar, Manager of Works.—Box 7750, c/o The Electrical Review.

**E**LECTRICAL Development Engineer, Grad.I.E.E., age 28, experienced automatic control gear, fract. h.p. machines, fire control gear, seeks position, London area.—Box 7770, c/o The Electrical Review.

**E**LECTRICAL Engineer (26), fully qualified, wide experience, at present responsible for electrical side of large concern, is interested in suitable position with reputable firm.—Box 7760, c/o The Electrical Review.

**E**LECTRICAL Engineer (30) desires change, preference London area. First-class contracting experience, now holding executive position with large contractor in the North covering layouts, estimating, maintenance and supervision of labour.—Box 7762, c/o The Electrical Review.

**E**LECTRICAL Engineer (33), with National Certificate and a wide experience in maintenance and installation work, seeks a position of responsibility.—Box 7725, c/o The Electrical Review.

**E**LECTRICAL Engineer (35), B.Sc. (Hon.), A.M.I.E.E., release October, desires permanent progressive post with consultants or contractors dealing with power installations and electrical equipment buildings. Wide practical and commercial experience.—Box 7788, c/o The Electrical Review.

**E**LECTRICIAN, Maintenance, Installations. Handy Fitter, drive car, 47, seeks permanent position—A. 7, St. Luke's Avenue, Clapham, S.W.4 7698

**E**NGINEER, A.M.I.E.E., skilled in installation and maintenance transmitting receiving gear, good general knowledge office routine, desires change.—Box 7780, c/o The Electrical Review.

**E**NGINEER (31) seeks progressive position. Ordinary and Higher National Certificates (Elec. Eng.). Free to take up immediate employment. Six years with well-known firm of industrial instrument manufacturers. Would consider sales or laboratory work, London area only.—Pitt-Bayly, 59a, Oxford Gardens, W.10. 7691

**E**NGINEER (Mechanical), age 37, seeks post in South. 18 years' experience on design-development of electro-mechanical apparatus, including television and radio equipment. Present salary £500.—Box 7745, c/o The Electrical Review.

**E**XPERIENCED Electrical Engineer, released Sgt. R. Signals, requires progressive situation, administrative or practical, sound knowledge of all installations, prepared to continue studies. London, Bournemouth or Southampton.—Box 69, Smiths, Square, Bournemouth. 3020

**F**ULLY Qualified Electrical Maintenance Engineer requires position of trust, preferably Midlands or South-West.—Box 7773, c/o The Electrical Review.

**H**IGHLY-trained Secretary seeks permanent post-war position. Experienced minuting of meetings, Trade Association work, full statistical knowledge and general confidential secretarial work.—Box 7794, c/o The Electrical Review.

**L**IGHTING Fittings, Domestic Appliances and Radio. Advertiser, 15 years' experience, London showrooms, ex-officer, just released, seeks appointment London area as Showroom Manager, Buyer, Sales.—Box 7687, c/o The Electrical Review.

**M**.Sc. Honours degree electrical engineering, 16 years' experience, generators, motors, electrical instruments and electronics, own patents, wants to change position.—Box 7791, c/o The Electrical Review.

**M**ANAGER, methods and design, A.M.I.P.E., age 36, wide experience high grade electro-mechanical apparatus, telephone, radar, etc., tactful administrator and disciplinarian, good organiser, proven production engineer, mass production, tools, presswork, etc., seeks progressive senior post. Available November.—Box 7761, c/o The Electrical Review.

**P**OST-war. Advertiser desires change, wishes represent manufacturers producing good class Electrical Water Heating Apparatus, etc. All-round knowledge technical and commercial, extensive connection, guarantee business, Midlands preferred.—Box 7730, c/o The Electrical Review.

**P**ROGRESSIVE young man with 14 years' experience in the vacuum industry requires position as Manager or Assistant Manager in large neon sign company on salary, plus 1,000-ft. run bonus, basis. Expert knowledge of glass working, pumping and neon installations. Able to install and equip complete neon sign factory and control all processes to make neon tubes. Alternatively would consider working partnership with small electrical concern, very limited capital.—Box 7768, c/o The Electrical Review.

**R**ESPONSIBLE executive position required, offering attractive prospects. Present Sales Manager (30), with good connections and wide experience of sales, production, staff control and administration. Midland area preferred. Please indicate salary and position in full.—Box 7723, c/o The Electrical Review.

**S**TAFF Foreman and Supervisor (43), able to control labour and execute large contracts, drawings, wages, etc., desires change. At present and for number of years staff foreman for well-known electrical contractors. Would consider practical assistant to consultant.—Box 7753, c/o The Electrical Review.

**S**UPERVISOR (38), requires settled post, anywhere, experienced, O/H lines, U/G, and installations.—Box 7701, c/o The Electrical Review.

**T**ECHNICAL Sales Engineer (40), A.I.E.E., and Central Register, desires appointment with manufacturer. Over 15 years' experience L.T. power distribution equipment, industrial lighting and heating schemes. Established connection wide area Midlands public utility undertakings and important industrial concerns. Own car and telephone.—Box 7744, c/o The Electrical Review.

**W**ILLING to travel. Particularly interested in South America. Electrical Maintenance and Installation Engineer, age 27, secondary education, London apprenticeship. 11 years' experience Diesel alternators, distribution, etc. Due for A release, February, 1946.—Box 7789, c/o The Electrical Review.

**W**ORKS Superintendent desires change, 20 years' experience, radio and light mechanical production, knowledge of time study, etc. Go anywhere.—Box 7693, c/o The Electrical Review.

**Y**OUNG Electrical Engineer (24), student apprenticeship, 7 years' experience installations and switchgear manufacture, Matriculation, Ordinary and Higher National Certs., desires interesting post, London area.—Box 7787, c/o The Electrical Review.

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**A** number of portable Alternating Lighting Sets, fully guaranteed, for quick delivery. 14-3 kVA, 230/1/50. The Electroplant Co., Wembley, Middlesex. 3029

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**A** C. and D.C. House Service Motors, all sizes, quarterly and prepayment, reconditioned, guaranteed one year. Repairs and recalibrations.—The Victoria Electrical Co., 47, Battersea High Street, S.W.11. Tel. Battersea 0780. 19

**A** C. and D.C. Motors, all sizes, large stocks, fully guaranteed.—Milo Engineering Works, Milo Road, East Dulwich, S.E.22 (Forest Hill 4422). 7528

**A** C. Motors, 1/50th h.p. to 10 h.p., from stock. Also D.C.—The Johnson Engineering Co., 86, Great Portland Street, London, W.1. Tel.: Museum 6373. 57

**A** ERLAT Cables, all sizes quoted for, good deliveries.—Edwards Bros., 20, Blackfriars Road, London, S.E.1. 7777

**A** LMOST new Dynamo, 2,150/3,000 amps., 50/70 volts, 350 r.p.m., self-excited, from stock.—Electroplant Co., Wembley. 3030

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**C**ARBONS, large stocks assorted sizes, solid and cored.—Edwards Bros., 20, Blackfriars Road, London, S.E.1. 7779

**D**IESEL-driven Alternating Set. Generator by Comp-ton Parkinson. 14 kVA, 240 volts, single-phase, enclosed screen-protected, ball bearings, 1,000 r.p.m., with exciter: coupled to a 3-cylinder enclosed upright Diesel Engine by Ruston & Hornsby. The whole built on cast-iron base, complete with daily fuel tank and silencer and expansion chamber, starting handle with switchboard. In new condition.—Thos. W. Ward Ltd., Brettenham House, Lancaster Place, London, W.C.2. Telephone No. Temple Bar 9631. 3060

**D**YNAMO, 110 volts, 10 kilowatts, as new.—Moody, Railway Street, Braintree, Essex. 3026

**C**ONTACTOR for sale; 200 amp., double pole, 480 v., D.C., with 240 v. operating coil by Allen West.—Ferguson Edwards & Co. (London) Ltd., Hoxton Square, N.1. 2927

**E**LECTRIC Lighting Plant. Complete Electric Light Plant suitable for large country house lighting and other services, 14-h.p. Belliss & Morcom Paraffin Engine. 53 large Accumulators, all complete and in good running order. Capable of operating 100-110 volts, £150. Owner going on main supply in six weeks' time.—T. Macpherson, Fairstead, Great Warley, Brentwood, Essex. Telephone, Brentwood 1308. 3036

**F**OR sale, Working Drawings, Winding Details, Patterns, etc., for a range of small A.C. electric motors. Offers wanted.—Box 7752, c/o The Electrical Review.

**G**ENERATING Sets for sale, 18 kVA, 400/3/50, petrol: 2½ kW, 220-v. D.C. Crude Oil Set.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 3045

**I**E.E. Journal, 1930-1940, vols. 68 to 87, new condition, offers.—Box 7758, c/o The Electrical Review.

**I**NSU-Glass covered Plain or Enamelled Instrument Wires, No. 18 s.w.g., No. 40 s.w.g., stock deliveries.—Saxonia, Roan Works, Greenwich, S.E.10. 28

**K**RUPP Horizontal (cable covering) Press (2 cylinders opposed), water rams 19.5" diameter, lead rams 6" diameter, 18" stroke (working), working pressure (hydraulic) 2½ tons sq. in., lead container capacity 420 lbs. Press with hydraulic pump in working condition complete with oil-heated melting pot, etc. Can be inspected at works of—Southern United Telephone Cables Ltd., Dagenham Dock, Essex. 2944

**L**EAD-covered and Armoured Cables, P.I. and V.I.R., various special lines at low prices.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 7780

**L**ESLIE Dixon & Co. for Dynamos, Motors, Switchgear, Chargers and Telephones.—214, Queenstown Road, Battersea, S.W.8. Telephone, MACaulay 2159. Nearest Rly. Sta.: Queen's Road, Battersea (S.R.). 18

**M**AY we send our Engineers' Stethoscope on approval (without obligation)? Particulars on request.—Capac Ltd., 2, Ullswater Road, London, S.W.13. 78

**M**G. Set, 200/1/50 p., 40 volts, 200 amp. sec., starter and regulator, ex. cond.—Box 2853, c/o The Electrical Review.

**M**ONOMARK. Permanent London address. Letters re-directed. 5s. p.a. Write—BM/MONOS5, W.C.1. 68

**M**OTOR Generator Set by Metro-Vick. on cast-iron baseplate. Input 31 h.p., 230 volts D.C., 1,100 r.p.m. Output 180 amps., 240/110 volts shunt D.C., 1,100 r.p.m. With control panel and regulator.—Newman Industries Limited, Yate, Bristol. 2904

**M**OTOR Generator Sets and Convertors, all sizes and voltages from ½ kW up to 500 kW in stock.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, City Road, London, N.1. Telephone, Clerkenwell 5512, 5513 & 5514. 28

**N**AMEPLATES, Engraving, Diesinking, Stencils, Steel Punches.—Stillwell & Sons Ltd., 152, Far Gosford Street, Coventry. 14

**O**NE modern Ward Leonard Set by Metro-Vick. consisting of 60-h.p., 400-volts, 3-phase, 50-cycles squirrel cage motor direct coupled to 2 ½ kW, 220-volt comp. inter dynamos and exciter, ball-bearing set with switchgear.—Box 3048, c/o The Electrical Review.

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**P**ORCELAIN Cleats, 2 and 3 groove, various sizes ex stock, price list.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 7781

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**R**OTARY Converters in stock, all sizes; enquiries invited.—Universal Electrical, 221, City Road, London, E.C.1. 16

**S**EVERAL Telescopic Tower Ladders ready for essential work. Extensions, Trestles and Steps to order.—Shaftesbury Ladders Ltd., 453, Katherine Road, E.7, Grangewood 3363. 15

**S**INGLE-phase Transformer, 230-v. input, 400-v. output, 5 kVA, reconditioned.—The Central Tool & Equipment Co. Ltd., Church Terrace, Richmond, Surrey. Phone, Richmond 1163/4. 3008

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**S**TAFF Time Checking and Job Costing Time Recorders (all makes) for quick cash sale. Exceptional condition. Write—Box 528, Smiths, 100, Fleet Street, London, E.C.4. 31

**S**TREET Lighting. Steel Lamp Columns, 9 to 14 feet out of ground. Large quantity available.—Box 2874, c/o The Electrical Review.

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**S**WITCHBOARDS suitable for dynamos and alternators, all sizes from 100 amp. up to 1,500 amp.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 25

**T**RANSFORMER Lead-in Wire, 7/38 and 14/38 s.w.g., Insu-Glass finished, various colours, stock.—Saxonia, Greenwich, S.E.10. 34

**T**R.S. Cables and Flexibles, Welding Cables supplied.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 7785

**T**WO A.C. motor-driven Plating Plants by Laurence Scott, 485 r.p.m., each comprising 6 1/2-volt, 640-amp. Generator, 7 1/2-volt, 80-amp. Generator, 220-volt D.C. Exciter. All direct coupled to 16½-h.p. Squirrel Cage Motor by Laurence Scott, wound for 415 volts, 3-phase, 50 cycles; complete with Brookhirst Auto-Transformer Starter. Each generator complete with switchboard and shunt field regulators.—George Cohen, Sons & Co. Ltd., Wood Lane, London, W.12. Telephone, Shepherds Bush 2070. 3037

**20**-kW Motor Alternator Set, input 220 volts D.C., output 400 volts, 4-wire, 3-phase, 50 cycles, 1,500 r.p.m., with starter and regulator; 25-kW Motor Generator Set, input 400 volt, 3-phase, 50 cycles, output 250 volts, 100 amps., 950 r.p.m., ball-bearing set with Ellison starter and D.C. switchboard.—Newman Industries Limited, Yate, Bristol. 3049

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**100**-h.p. "Laurence Scott" Slipring Motor, 400/3/50, screen protected, ball bearing, 930 r.p.m. Complete with "Allen West" oil immersed Starter. Date 1941.—Stewart Thomson & Sons, Fort Road, Seaford, Liverpool, 21. 55

**140**-kVA Belliss/Crompton Alternator, 400/3/50, 4-wire. Seen running.—Stewart Thomson & Sons, Fort Road, Seaford, Liverpool, 21. 47

**250**-kVA Alternator, 400 volts, 3-phase, 50 cycles, 750 revs., with direct-coupled exciter; also two 250-kW Rotary Converters, with transformers and switchgear, input 6,600 volts, 3-phase, 50 cycles, output 420/210 volts D.C.—Midland Counties Electrical Engineering Co. Ltd., Grice Street, Spon Lane, West Bromwich. 36

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**ACCUMULATOR** Plates (old) and lead Peroxide: as actual smelters we pay top price. Also old storage batteries, transformers and whole installations purchased.—Elton, Levy & Co. Ltd., 18, St. Thomas Street, S.E.1. Hop 2825-6.

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**FOR** many years we have specialised in the purchase of surplus electrical equipment of every description. We are interested in A.C. and D.C. Motors for re-use, Transformers, Storage Batteries, and Cable for scrap, etc. Please send your enquiries to—S. Cohen & Sons, Britannia Wharf, Copenhagen Place, E.14, and to Dynasnap Works, London Road, Barking. Established 1870. Telephones, East 3844 (3 lines) and East 3360. 3007

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**WANTED.** Rotary Converters, any size.—Universal, 221, City Road, London, E.C.1. 22

**WANTED.** 50,000 Tubular and other Electric Fire Bars. Wholesalers may receive electric fire supplies in return.—Globelectric Batteries Ltd., 90, Victoria Street, S.W.1. Victoria 9550. 2940

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**CLOCKWORK** Controllers for Public Lighting, Clocks, Control and Time Switches, Electric Clocks and all types of instruments and appliances operated by clockwork repaired and overhauled. Inquiries welcomed.—J. W. & R. E. Hughes (Clockwork Engineers), 58, Victoria Street, London, S.W.1. Phone, Victoria 0134. 35

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**MACHINING** Work, for Centre Lathes up to 6½ in. centres and medium-sized milling (good grade work preferred).—The London Electric Firm, Croydon. Up-lands 4871. 56

**SMALL** Armatures, etc., winding or rewinding, in quantity. High-class work, prompt delivery.—Max Electric Co. Ltd. (formerly Southern Ignition Co. Ltd.), 190, Thornton Road, Croydon. 59

**TECHNICAL** Translation work undertaken by experts.—Techniglot, 261, Eversholt Street, Mornington Crescent, N.W.1. 7733

## AGENCIES

**AGENCIES** required, South of England, including the London area: (a) Cables; (b) Small Switchgear; (c) Transformers; or any lines suitable for distribution for wholesalers' business.—Box 40, c/o The Electrical Review.

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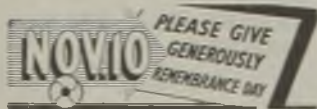
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## COMPANY MEETINGS

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**T**HE Ninth Ordinary General Meeting of the above company was held on October 4th in London, Sir George Usher (chairman of the company) presiding.

The Chairman said: I am happy to place before you the accounts for the year ended 31st October, 1944, and to report continued good progress in the current year. Our organisation has been actively employed during the war years in coping with the heavy demands for war material. Your company has delivered nearly one and a half million 25-pounder shells, nearly 400,000 6-pounder shells, approximately 15,000 mines and smoke bombs, and over 100,000 miles of copper wire for the purposes of telephonic and telegraphic communication. We are proud to think this has been accomplished on the site of a derelict coal mine. In other words, your company is a living example of a new industry arising from the ashes of an old one, and we are gratified to think that on this site we are now employing, in what was an entirely new industry in South Wales, as many people as formerly earned their livelihood in raising coal there.

#### "Q. P. I."

We have a well filled order book and excellent prospects. Our export business is developing on sound and satisfactory lines. Our Q.P.I. Cables are finding a ready sale in markets formerly the monopoly of the Cable Makers' Association. I might explain that "Q.P.I." means—Quality, Price, Independence.

It has been our pleasure during recent months to welcome home our representatives in Africa, India and Australia, who report considerable activity in those markets.

Other important export business includes contracts with the U.S.S.R., Turkey, Egypt, Portugal and France, to mention but a few of the countries with which we are in active daily negotiation. Our munition contracts are now completed, so that we can turn our full activity towards our peace-time products.

Our subsidiary, South Wales Switchgear Ltd., continues to make satisfactory progress. It has done valuable work for the Admiralty throughout the war period and is now turning its attention to the development and marketing of industrial and domestic equipment.

In conclusion, I should like to express my thanks to the managing director, Mr. F. G. Penny, to Mr. Wignall and Mr. Nicholas, to Mr. Giffiver, our efficient secretary, and to the workpeople and staff who have so loyally supported us throughout the difficult days of war.

We send our cordial greetings to all employees working in H.M. Forces and hope they will soon be with us again.

The report and accounts were unanimously adopted and the proposed dividend of 6% was approved.

3025

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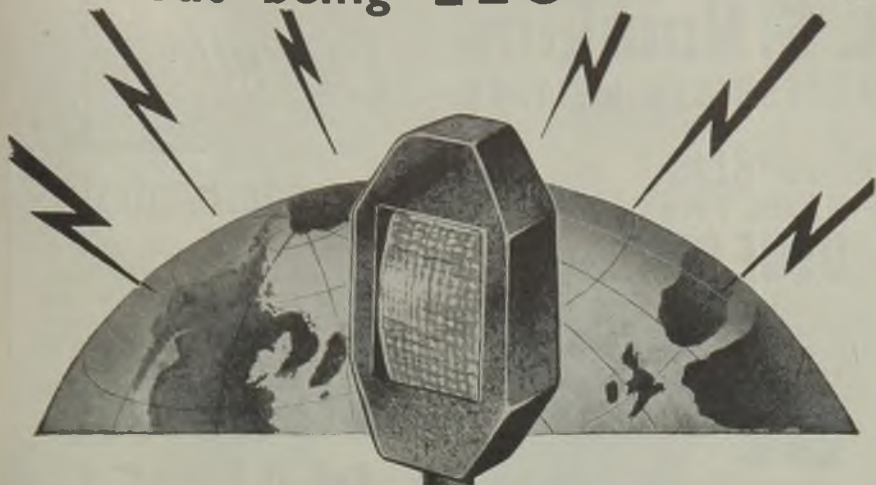
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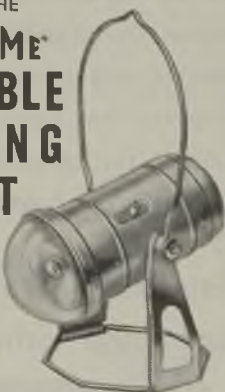
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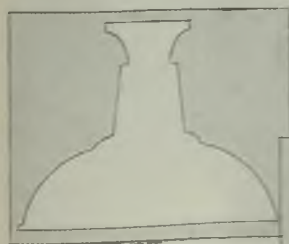
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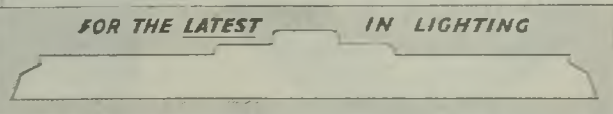
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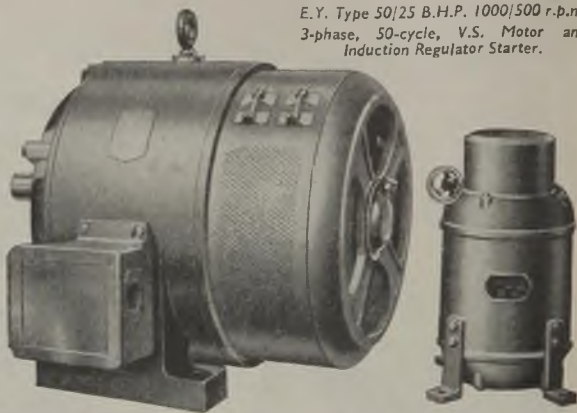
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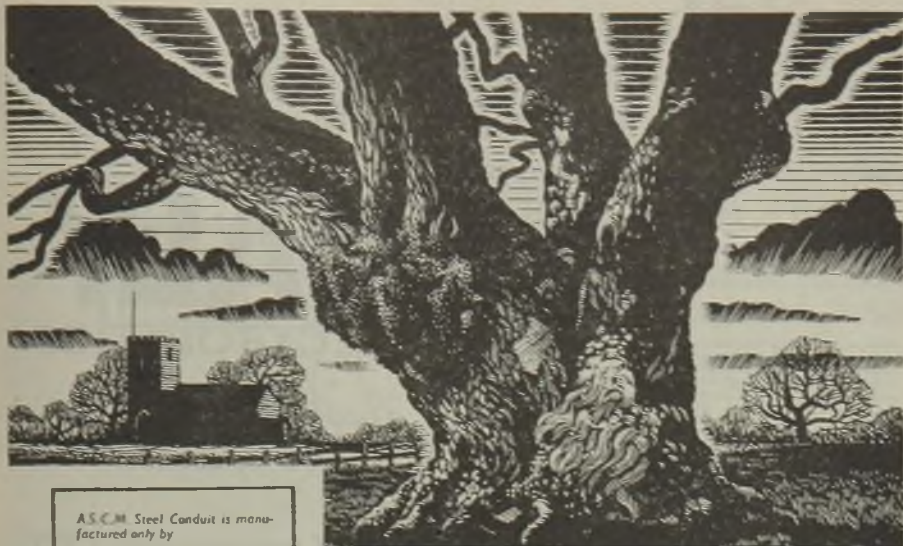
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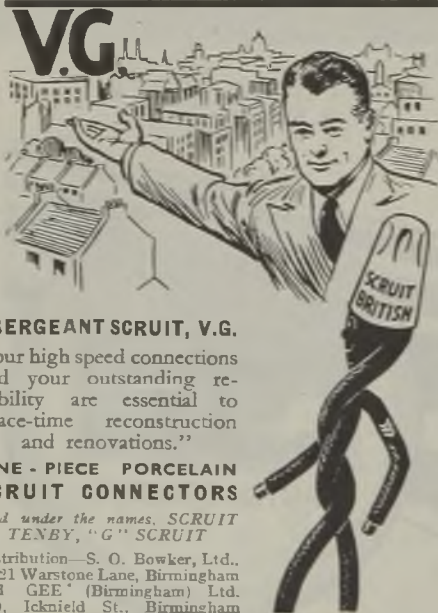
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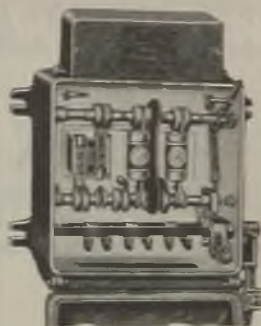


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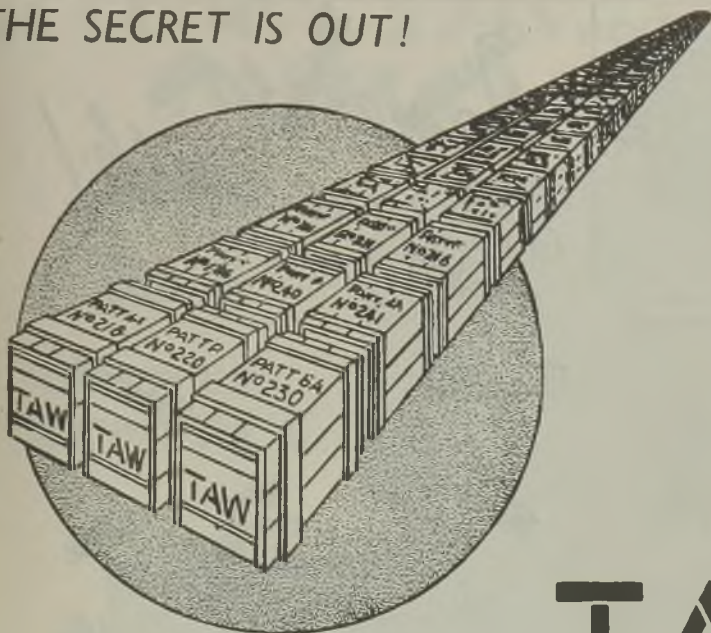
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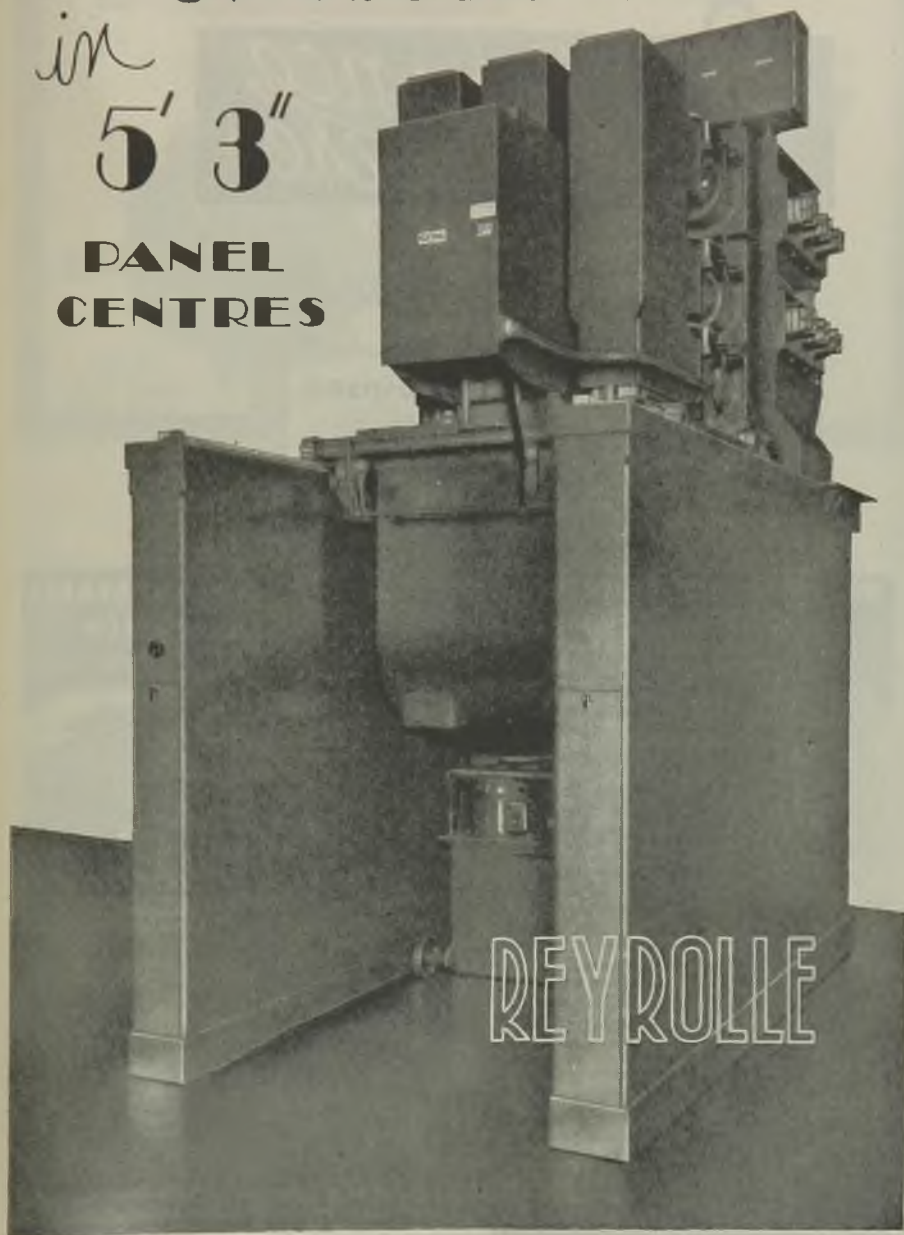


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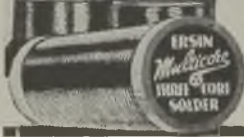
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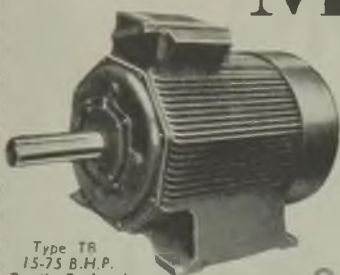
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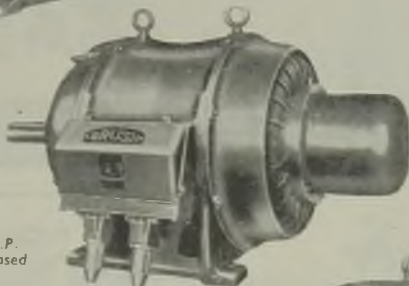
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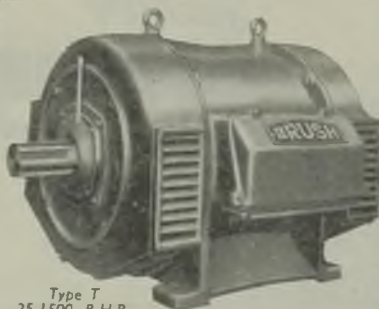
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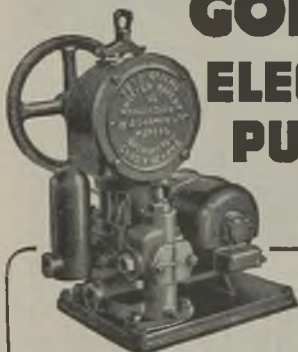
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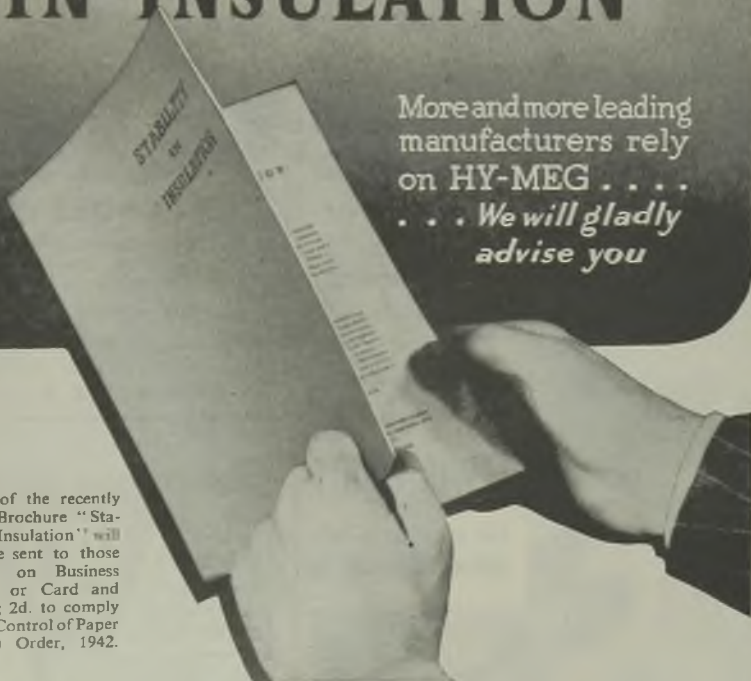
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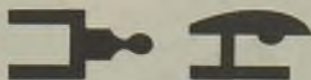
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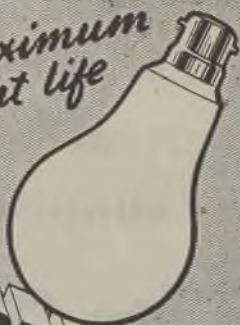
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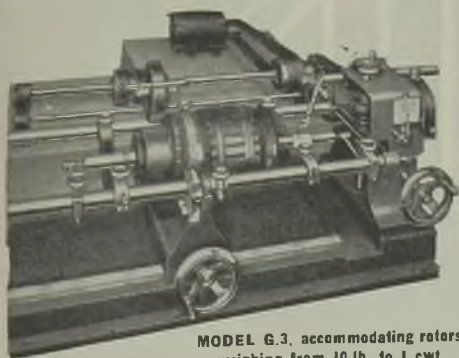
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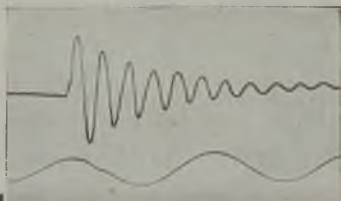
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