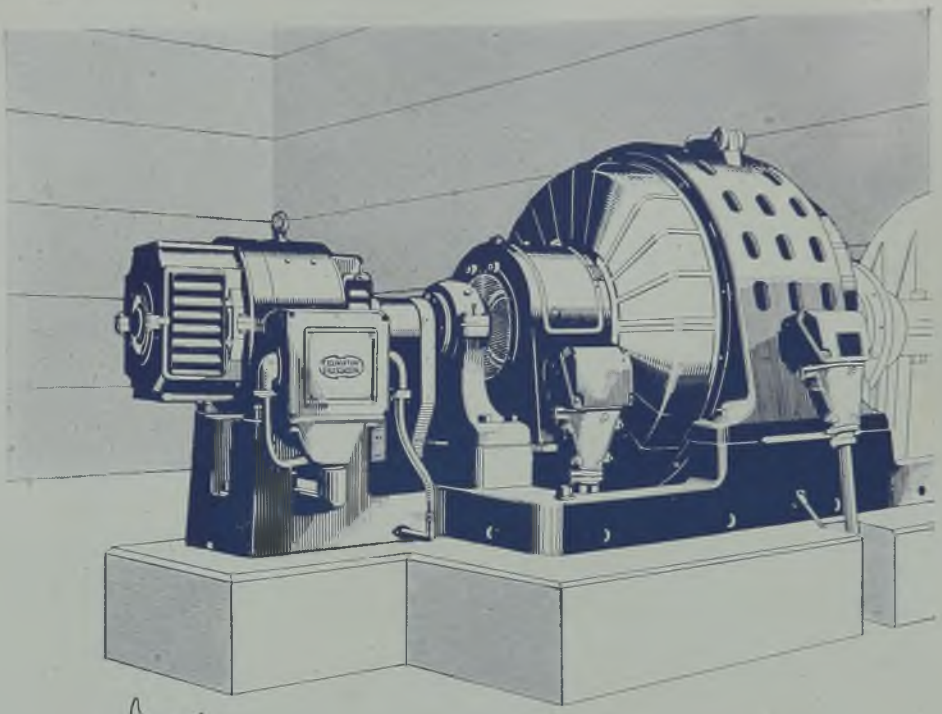
ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXXIV. No. 3471 JUNE 2, 1944 9d. WEEKLY



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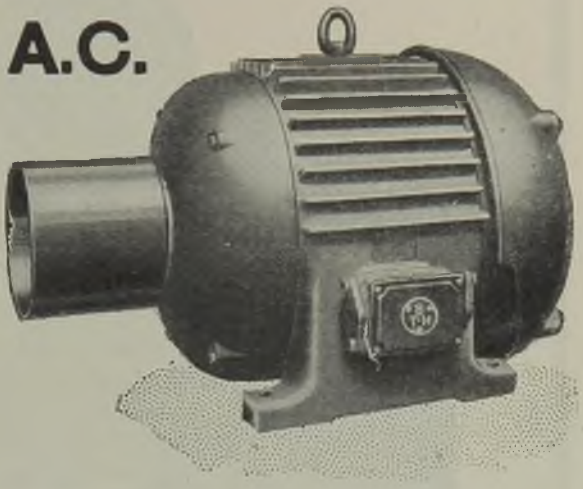

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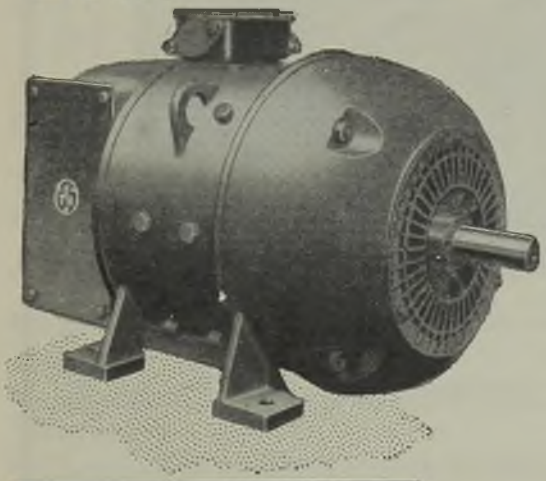

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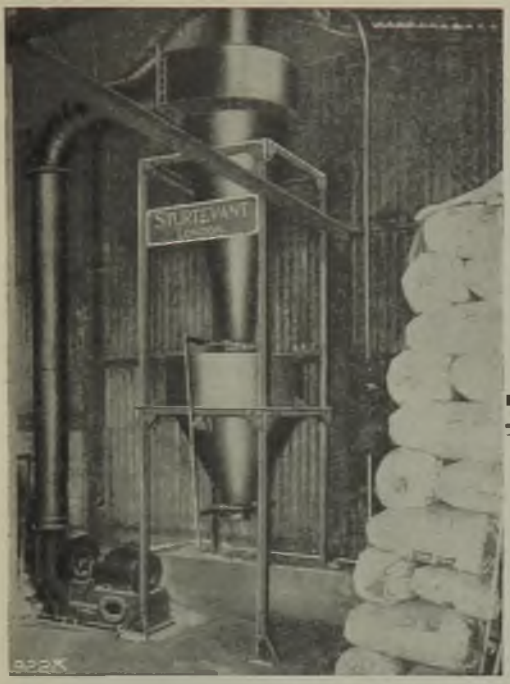

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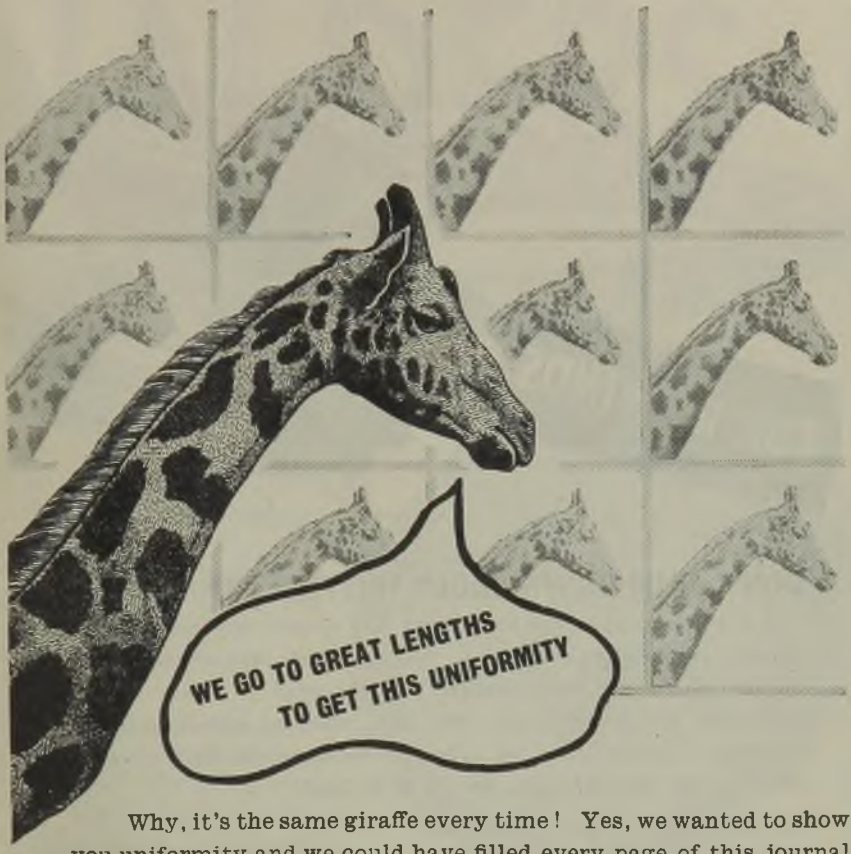

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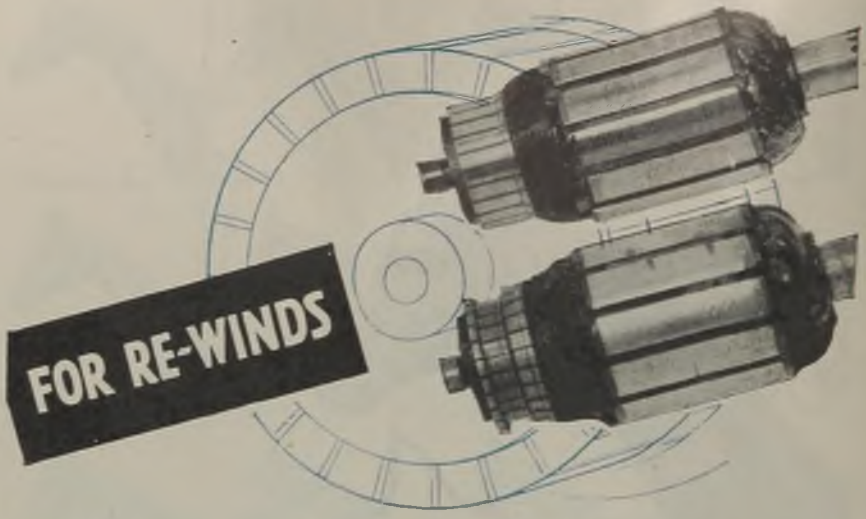

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ELECTRICAL REVIEW

June 2, 1944

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXIV. No. 3471. JUNE 2, 1944 9d. WEEKLY

Rural Supply

Costs and Benefits

THERE is undoubtedly a great and growing feeling among farmers that electricity can do much to aid them and improve their working and living conditions. Equally there is a strong desire upon the part of the electricity supply industry to provide those benefits. Only the matter of cost stands in the way of fulfilment.

The business of supplying electricity, similarly to that of producing food, cannot be run at a loss. If revenue fails to cover expenses the business must eventually peter out, unless assistance is afforded from an outside source. In the case of farming the fixing of more remunerative prices has been insufficient generally to stave off bankruptcy and other forms of aid have had to be applied.

Justification for Subsidies

Subsidies, broadly speaking, are not healthy, but they can often be justified by special circumstances. They have proved essential during the war to maintain and stimulate the agricultural industry; can they legitimately be extended to meet the cost of electrification? If it can be proved (as we believe it can) that electrification will raise farming efficiency and increase production then the expenditure is an investment for the nation. And if the farming community cannot meet the capital cost the money should be found somehow.

It has been contended, notably by the Scott Committee on Land Utilisation in Rural Areas, that a supply of electricity in these areas could be achieved by throwing the cost on to the urban consumers. The Committee went so far as to suggest that in the end the townsman would actually get his electricity cheaper as a result. But it had in view a unified national supply. As things are at present, it would be grossly unfair to expect consumers in a small country town to bear the cost of electrifying an extensive surrounding rural area.

Expenditure for the whole nation's benefit should undoubtedly be a national charge so that if subsidies are unavoidable they should be paid from the Exchequer. This step is being taken in Eire where the Government proposes to give a supply to all farms in the country within ten years at a cost of £20,000,000. Half of this sum will be provided by the State; the remainder will presumably be found by the Electricity Supply Board and recovered in the ordinary way. One outcome of this will be the provision of useful work for many people over a lengthy period.

Another Form of Assistance

There is another way out which might prove practicable. If the farmer is to benefit substantially from electrification it will ultimately prove a remunerative investment for him. Would he be willing to meet the cost if he could be given a long-term loan at a low rate of interest? Perhaps a body on the lines of the United States Rural Electrification Administration is possible here. Under this scheme (which has met with considerable success) the prospective consumers get together

and form "co-operatives" to which the R.E.A. lends money on reasonable terms for the running of distribution systems and the wiring of farms and homes.

Undoubtedly something has to be done about this matter, but in the meantime we must not forget that great strides are being made even under existing conditions. A further article demonstrating the truth of this appears in this issue.

Competing Services

THERE is one point in connection with the subsidisation of rural consumers by town dwellers which should be borne in mind. It was mentioned by Mr. H. B. Style, general manager of the Wessex Electricity Co. in a rotary club talk at Salisbury last week. Mr. Style said that the possibility of equalising charges as between town and country depended on the readiness or otherwise of the townsman to pay a little more for his electricity. But electricity was a competitive service and the question of charges in the towns had to be carefully watched in relation to the charges for alternative services.

Generous Treatment

WHEN a municipal electricity undertaking seeking a new engineer offers more than the generally recognised salary it is an event in the history of the supply industry. Too often it is the other way round and advertisements are accompanied by A.M.E.E.-E.P.E.A. "banning" notices. Wimbledon Corporation for some years has recognised the wisdom and justice of treating its engineer generously and is continuing in that vein by offering a salary for a new "chief" about £200 above the "Walker Scale" figure—plus a special allowance for extraneous Corporation work. In this way it should be sure of getting a worthy successor to the indefatigable Mr. McKenzie and it sets an example which engineers would like to see widely copied.

Allowances for Research

WHEN the Chancellor of the Exchequer stated that it was the Government's intention to allow income tax abatement in respect of research expenditure after the war it was generally felt that while the principle was a good one the limitation upon its operation was unfair. Pressed by the Federation of British Industries, the Chancellor has come to the same conclusion and is to rectify the matter in a separate Finance Bill which will be introduced between now and the next Budget Day. This will provide that from the "appointed day" expenditure already incurred shall qualify for relief. The decision will be welcomed by those who are already carrying out research and will encourage others to do likewise in so far as war conditions will permit. There was a danger that the confinement of the relief to post-war expenditure would have led to a deferment of research and this would have proved a grave handicap.

Two Trades

So interwoven have applications of electricity become in a number of instances with the affairs of other industries that a good proportion of electrical engineers may find it advisable in future to specialise in two subjects—one electrical and the other not. For example, their view that those responsible for the construction of houses do not fully appreciate the conditions under which the full potentialities of electricity can be realised is no doubt, with the appropriate verbal changes, reciprocated (cordially, it is hoped) by architects. The suggestion was advanced a year ago by Messrs. G. Smith & W. Jacobi that a new type of technician was required to translate the ideas of both into practice. Their I.E.E. paper, however, dealt with "the distant view," whereas something of the kind is needed immediately.

High-Voltage Supplies

A CONSIDERABLE responsibility is laid upon undertakings by No. 30 of the Electricity Supply Regulations of the Commissioners. An undertaking may not or, in some instances need not (which usually implies much the same thing), commence or continue to give a supply voltage unless certain conditions are fulfilled. This obligation entails keeping in close touch with the electrical staff of a consumer after the initial stage of installation. There are obvious advantages in putting this collaboration on an agreed and organised basis, and Mr. J. F. Wright in this issue, describes the method adopted by Swansea Borough Council. The good-will engendered by a service, whatever form it takes, that gives consumers the benefit of the experience and facilities of a supply undertaking may

be expected to have effects that reach far beyond immediate questions of installation and maintenance.

Full Employment

IN the White Paper on "Employment Policy" the Minister of Reconstruction presents a valuable survey of all the conditions likely to arise at the end of the war and sets out very well the various steps which should be taken to meet them. It seems clear that the Government will have to take a much bigger part in economic affairs than we have been accustomed to in peacetime and that its policy can only succeed if industry (both employers and employees) gives it the greatest possible support. Very few, we think, wish to see a repetition of the scramble which occurred after the last war. There were big profits for some, but the effect upon the nation was calamitous. This time there must be no profits for the few at the risk of crippling national industry.

Exports and Home Trade

GREAT stress is laid upon the importance of overseas trade. Priority in the allocation of labour and still-scarce materials will be given to exporters to enable them to rebuild those markets which the war has forced them to neglect. But it is very often the case that export business can only be successfully maintained if it is based upon a firm and substantial home trade. This is a problem which the White Paper seems to overlook but it will have to receive due consideration when it comes to putting the policy into operation.

Refrigerators after the War

No electrical appliance has a more promising future than the refrigerator. From being in the luxury class it bids fair, if the Ministry of Works prefabricated all-steel house and similar projects are anything to go by, to be adopted for post-war "working-class" homes as a more or less standard feature. Evidently refrigerator manufacturers are fully alive to the great potential market that is opening up for their products and probably no section of the electrical industry has its plans more advanced for resuming its normal peacetime activities. In this connection, can anyone tell us why refrigerators produced in recent years so often have right-handed doors? Unless required for special positions, cookers always have their doors hung on the left and it would appear to be an advantage in kitchen planning if new refrigerator models were similarly arranged.

Spare Plant

WHERE the power-driven unit is a single large mill, the case for electrification is less easily established than where a number of smaller units are installed. Particulars like those given by Mr. R. W. Murray in his chairman's address to the I.E.E. Dundee Sub-Centre, based as they are on first-hand experience, are always welcome to consumers' engineers. The price of public supply has to be low to be competitive, but the figures given by Mr. Murray are apparently based upon the assumption that the private steam plant needs no stand-by, whereas the electricity undertaking has to make allowance for this. An appropriate margin between the two figures should surely be allowed to cover insurance against the possibility (however remote) of a breakdown that might be prolonged.

Veteran Equipment

ALTHOUGH a forward-looking attitude was never of greater consequence in electrical engineering than it is to-day, an occasional glance at the far-from-dead past has the merit of helping to preserve a correct perspective of development. Just as records of the lives of electrical pioneers are of more than literary worth, so opportunities to examine the structural details of early plant may possess an interest that is not based merely on sentiment. There is some risk lest zeal for meeting the country's present need for metal may permit the scrapping of old plant of historic value. Engineers coming across instances of this kind would do well to communicate with the Institution of Electrical Engineers, which has already preserved similar museum pieces.

Dear Wiring

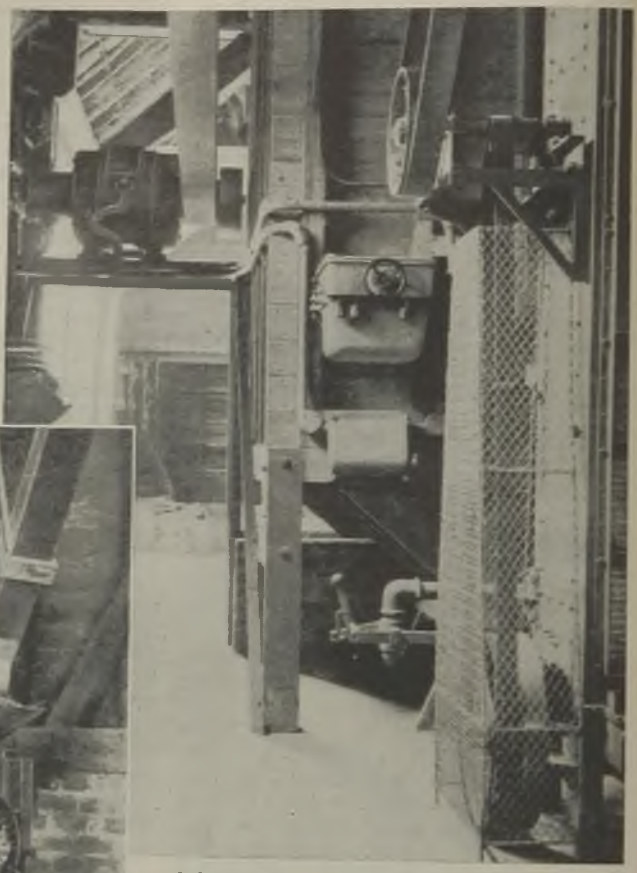
CABLE makers are losing money by selling their smaller products to electrical contractors; they would do much better to go into the hair curler business. A correspondent sends us a 7-in. length of twin p.v.c. wire which, he says, his wife bought at a store, with two other pieces, for 10½d. Six shillings a yard is a pretty good price for scrap ends of this material.

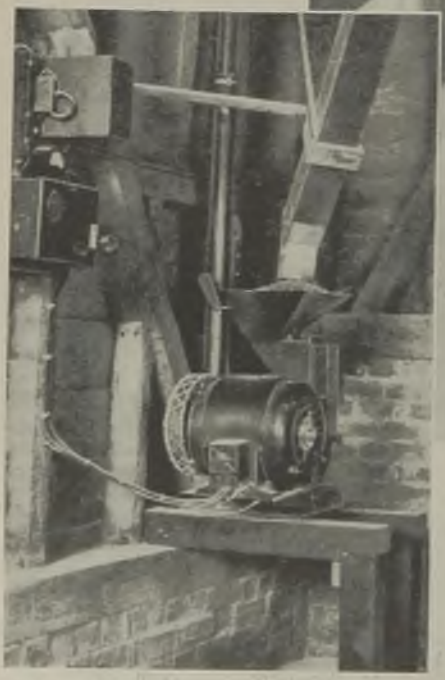
Helping the Farmer

Satisfactory Results in the Wessex Area

TO judge from statements made from time to time in the Scott Report, the Press and elsewhere, the extent of the services that are already being rendered by the electricity supply industry to the rural community in general and to farmers in particular is by no means generally appreciated. Neither, it seems, do criticisms of electrical facilities furnished take into consideration the fact that supply authorities are at present prohibited by Defence Regulations from extending supplies except in cases approved by the Electricity Commissioners as necessary in connection with the war effort or to relieve hardship.

In actual fact, but for the war, in a very large number of areas supplies would by now be available to all but the most remote rural premises and even to some of these as well. This is very apparent from a study of the achievements of an undertaking such as the Wessex Electricity Company. This undertaking, which forms one of the Edmundsons' group of companies, has during the fifteen years of its operation brought supplies within the reach of 80 per cent. of the premises in its





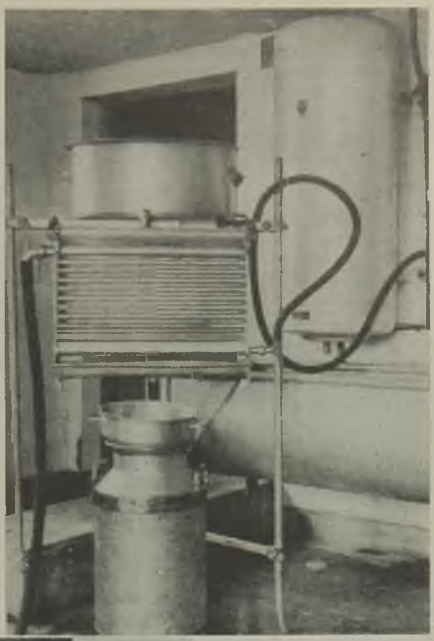
A 25-HP motor driving a corn dryer at Mr. R. Roadnight's farm, Britwell Priory and (left) an "Essex" hammer mill installed at E. W. G. Wilson & Son's farm grinds 14 bushels an hour; it is operated by a 3-HP motor

area of nearly 4,000 sq. miles and covering parts of eight counties. Its predominantly rural nature may be judged by the fact that it contains only fourteen towns of over 5,000 population and only two of over 15,000. It speaks well, too, for the attractiveness of

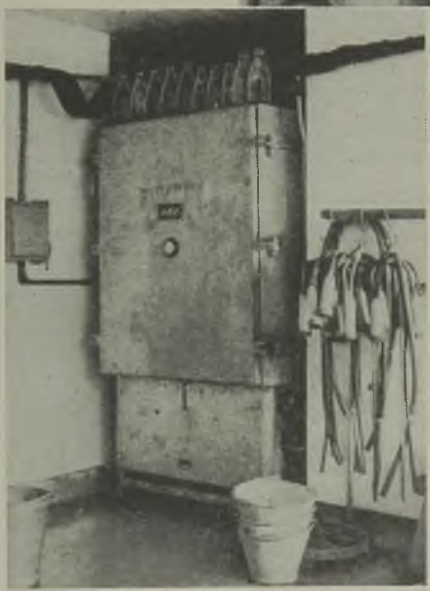
the tariffs and installation facilities that no fewer than 137,200 consumers, or more than three-quarters of the potential consumers, are already connected, and that many more would take advantage of the services available but for the wartime restrictions.

It is particularly interesting to note that of the 1,149 towns and villages supplied 644 are villages of less than 250 population (the limit which figures so prominently in the Scott Report) and 347 of less than 100 population. Only thirty-one villages of over 250 population are still without supplies and most, if not all, of these would have been connected to the system but for the war. A clearer picture of the degree of development is obtained if it is borne in mind that the village of 100 population represents only about twenty-five houses.

Farms are often in isolated positions and consequently are difficult to link up with general schemes of electrification. Nevertheless, nearly one-third of the ten thousand farms of over 50 acres in the area have been given supplies and even under wartime conditions others are still being connected where a supply of electricity will materially benefit food production. In this connection the company has recently started experiments with a new scheme for isolated farms and other premises whereby instead of asking for a capital contribution towards the special transformer and spur line required and/or an annual minimum guaranteed revenue, the company itself bears the full capital cost and makes a " line rental charge " based on a proportion of the capital expenditure (to cover interest and depreciation only), less a rebate of one-third of the annual revenue received from the kWh charge. Thus it will be seen that under this arrangement, if the use of electricity is comprehensive, no line rental charge may have to be made. Besides eliminating the capital contribution the consumer is encouraged to make full use of electricity and so reduce the average price per kWh which he pays.



A 30-gal. water heater provides hot water for Dr. Jacobi's dairy



A 9-kW G.E.C. steriliser at Dr. Jacobi's Manor Farm, South Weston

A study of a few actual accounts of consumers under the farming tariff gives some idea of the low cost of electrical service generally. Under the special tariff applicable to farms there is a fixed charge of 14s. per annum for each 1,000 sq. ft. of floor area of farm outbuildings (minimum 56s. if a separate service cable is required or if the domestic two - part tariff is not adopted for the farmhouse), with a " unit " charge of 1d.

For his dairy farm and house Mr. Jagger, of Oakwood Farm, Beenham, employs a chaff cutter, crusher and rolling mill, root pulper, saw bench, steriliser, wash boiler, milking machine, milk cooler, cattle clipper and sheep shearer, cooker, fires, two radio sets, vacuum cleaner and fifty lighting points. The average price per kWh for the 14,189 kWh consumed last year worked out at 1·27d. Mr. H. Baylis, who runs an arable farm at Peasmore, has corn drying and

dressing plant and a hammer mill, all driven by a 25-HP motor, together with a domestic installation comprising a refrigerator, radio, vacuum cleaner, toaster, iron, etc. His consumption of 5,839 kWh averaged 1·64d.

A wash boiler is an economical method of supplying hot water (A. Hunt & Son's farm at Upper Assenden)

per kWh. Producing day-old chicks only, Mr. H. Betts, of Manor Farm, Hampstead Norris, uses a maize kibbler, a deep well pump, two 16,000-egg incubators and an eight-point lighting installation, the approximate installed load being 8 kW. For a consumption of 11,497 kWh his average cost per kWh was only 0·86d., as a special rate is offered for thermostatically controlled heating. By comparison, the average price paid by domestic and commercial consumers on two-part tariffs (75 per cent. of all domestic and commercial consumers) was 1·8d. per kWh. In considering these charges it should be borne in mind that over half the amount paid to the company by the consumer goes to the Central Electricity Board or other bulk supplier for electricity purchased by the company.

A point that is not often realised by farmers is that the cost of electricity is only a fraction of the cost of one farm labourer. With the farm labourer's present minimum wage of £3 10s. the annual electricity bills for the three farmers mentioned above represent in one case a little more than one-third of one farm labourer's wage, and in the other two cases less than one-quarter of a farm labourer's wage.

Purposes for which electricity is used on farms in the Wessex area are extremely varied. Apart from milking, pumping, chaff cutting, root crushing and grinding, there may be mentioned sterilising, water heating, grass and grain drying, incubating, egg washing and grading, potato sorting, cattle clipping and sheep shearing and agricultural machinery maintenance and repair work.

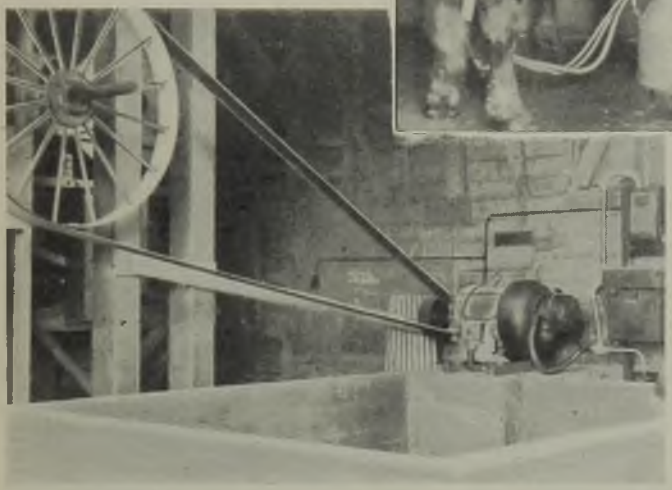
A new appliance regarding which both the company and the users are most enthusiastic is the "Essex" hammer mill, which has been developed by the British Electrical and Allied Industries Research Association and is being produced by Christy & Norris, Ltd. Employing only a 3-HP motor, it does the work of grinders previously requiring 20-HP motors. It is equally suitable for all kinds of cereals, peas, beans, etc., and has an output up to 14 bushels an hour. Being fully automatic, it can be left running until its hopper is empty, when it will switch itself off. One of already more than fifty users in the area, Mr. Wilson, of Bournefield Farm, Bradfield, who works 420 acres and has 119 head of cattle, finds that the "Essex" unit does more in an hour than the mill he previously used did in two days, and it costs weekly 8s. 2d. compared with 16s. 8d. for his old machine for petrol alone, excluding lubricating oil, etc. Furthermore, like other farmers, he finds that the milk output from his cows shows a tendency to rise owing to the improved grinding.

Following the success of this mill, the Wessex Company considers that there is an excellent opportunity for similar research work in connection with the full electrification of grain and grass dryers. It suggests that, instead of endeavouring to convert coke-operated apparatus which does most of its drying by direct heat, electrically operated and heated plant might be developed to

Electricity is much in demand for pumping (A. Hunt & Son's farm)

make full use of fans with only the minimum of heating. As it is, there are many electrically operated coke-fired grain dryers of capacities ranging from one to five tons an hour in the area with more in the course of installation, as well as a dozen or so grass dryers. To even out the load, most of the grass dryers are, at the company's suggestion, fitted with centrifugal clutch pulleys.

Electric milking machines in use are too numerous to keep count of and, since the beginning of the war, 150 sterilisers and ten steam raisers have been installed by the Wessex Co. alone. The popularity of the G.E.C. sterilisers has been greatly increased since the elements have had safety devices.



Corn drying and dressing plant and a hammer mill are all driven by a single 25-HP motor at Mr. H. Baylis's farm at Peasmore

The supply undertakings' link with the farmer must be covered by men with farming as well as electrical knowledge. Mr. S. T. Harman, the Wessex Company's agricultural specialist, enjoys these two qualifications and to him must be given a fair share of the credit for the happy relations generally existing between the farmer and the company. In anticipation of the post-war demand the company hopes to build up a team of men of this type.

An interesting sidelight on the extent of the development of the company's area of supply is given by the Ministry of Health's recent scheme for construction of farm workers' cottages. Of a total of 284 such cottages erected or being erected within the company's area 200 are being supplied from existing mains, and with the approval of the Electricity Commissioners the company has undertaken to supply seventy-four of the remainder, although comparatively

Electric milking machines in use are too numerous to keep count of. This one is at A. Hunt & Son's farm

lengthy and uneconomical extensions are required. Only four of the whole 284 have gas available.

Practically all the cottages wired have provision for electric cooking. In addition, supplies and cooking facilities have been made available to a considerable number of farm workers' hostels and the effect of giving these facilities has resulted in an ever-increasing demand for electricity for existing cottages which it is hoped to be able to meet when normal times return. To provide all these widespread supplies the company has now 4,344 miles of mains, of which only 45 per cent. is low voltage, and 2,724 substations, including 2,227 pole-type transformers. Supplies throughout the area are given at the standard 230/400 V, AC system.

The educational work undertaken by the company was just beginning to bear fruit when the war broke out. Added to this, the shortage of labour has further increased the demands on the company's services. With restrictions removed the company can look forward to highly intensified development.

We should like to thank the staff of the company, in particular Mr. Style, general manager, Mr. G. E. Taylor, commercial manager, and Mr. Harman, for their assistance in the preparation of this article.

Quality Control

Application in a Department

By D. Williams, M.Sc., A.Inst.P.

THE application of quality control to repetition work from an automatic machine has been adequately covered by many excellent books and articles, but the departmental head who wishes to apply the system to the many and varied operations under his control will have to search more diligently for guidance. Quality control as applied to a department is not merely the sum total of its application to a number of individual machines. Although the questions which arise are fundamentally administrative in character, they are peculiar to the system and must consequently be considered as an integral part.

An example of a department in which quality control could be extensively applied would be one manufacturing a small precision-made component undergoing some of the following processes—cutting, forming, welding, drilling, cleaning (electrolytically or chemically), plating or spraying. If the rate of production is high the only way to ensure a reasonable standard of quality under normal inspection methods is to carry out a complete final inspection using a comparatively large number of trained inspectors and to rely on charge hands to maintain quality at intermediate stages.

Reduction of Numbers

With quality control methods the output can be controlled at a low proportion of rejects by a comparatively small number of girls. There may be objections in the first instance to the acceptance of a possible 2 per cent. rejects as against the former 100 per cent. perfect consignments, but it should not be difficult to demonstrate that even the best inspection system is by no means foolproof.

Acceptance of a given standard of quality is only of value if the department's own quality reaches the same or a higher standard, otherwise a large proportion of the work is rejected by quality control and requires full inspection. Here critics may point out that although the regular inspectors can be reduced in number when good work is being turned out, they must always be kept in reserve in case the quality of the work deteriorates. The obvious way to avoid such a dilemma is to control all intermediate operations so that reject components can never reach the final control in large numbers. As the number of controls will probably be extensive, simplification is essential. For the majority of operations the plotting of rejects will be sufficient, and this possesses the additional advantage of being readily understood by the operator.

Charts with squares big enough to take a star-shaped rubber stamp are an advantage as they are easily seen at a distance by both the charge-hand and operator. The usual measurement charts with control lines and engineering limits are satisfactory for the tool room or machine shop, but are too complicated and detailed for more general use. Simplifying the recording of results does not imply a low standard of inspection. In fact, owing to the variety of operations covered, the patrolling inspectors have to be particularly versatile; they should be able to distinguish between material, machine and operator faults for each process.

Ensuring Continuity

Intermediate quality controls require specially trained personnel and it is here that a difficulty arises. Under a 100 per cent. inspection system a number of inspectors are doing the same or similar jobs and although the absence of one or two of them means a reduction in the total inspections, deliveries can be maintained by working overtime. A department run strictly on quality control lines may have fewer inspectors, but as each one is a specialist whose work is essential to the maintenance of the general level of quality there must be no missing links in the chain.

To overcome this difficulty inspectors must be able to cover each other's work in pairs. If one is absent her section can be inspected by her partner who will be able to cover both sections at double the interval of sampling. This may not provide a perfect solution, but it should help to eliminate any fear that reassembling of the normal inspection department will one day be necessary in order to deal with an unprecedented number of rejects.

Intermediate Processes

Before embarking on an extensive scheme of quality control, the limits to which every operation in the department can be controlled must be known. Control of a completed component for 2 per cent. rejects is not to be expected if some intermediate process cannot be controlled at less than 5 per cent. Even when such conditions do arise the saving in scrap and the labour may justify the apparent paradox of quality control on intermediate operations while at the same time retaining 100 per cent. inspection of the completed component.

High-Voltage Consumers

Comprehensive Installation and Maintenance Service

By J. F. Wright, A.M.I.Mech.E., A.M.I.E.E.
Chief Technical Assistant, Swansea Electricity Department

THE installations of large power consumers, in particular high-voltage cables, switchgear and protective gear, generally form an integral part of a supply undertaking's high-voltage system. The performance of this plant is therefore a direct concern of the supply authority, because faults occurring on it can frequently produce disturbances on the public distribution system which affect adversely the supply of electricity to other consumers.

It is customary for supply authorities to advise consumers about the requirements with which high-voltage installations must comply, but they usually pay far less attention to such installations than to similar equipment installed in their own distribution substations.

Very few industrial companies have engineers on their staffs who are specialists in high-voltage electrical installations, and as a result the standards of industrial installations have tended to fall far below those of the supply undertaking. Even where the consumer installs the most suitable apparatus, the lack of adequate commissioning tests and subsequent maintenance frequently results in unsatisfactory performance, particularly in respect of the protective gear.

For the past four years the Swansea Electricity Department has operated the scheme described by the author for the installation and maintenance of consumers' high-voltage equipment with considerable benefit to both parties

It is unfortunate that such conditions, unsatisfactory both to the consumer and to the supply undertaking, should exist, particularly when it is borne in mind that all but the smallest supply undertakings carry technical and maintenance staffs in the district who specialise in this class of work. In an endeavour to overcome these difficulties the Swansea Electricity Department has instituted a scheme under which the services of its technical and maintenance staffs are available to deal with all points arising in connection with consumers' high-voltage installations. The charge made for this service is only just sufficient to cover the undertaking's expenses, as it is felt that the correct functioning of consumers' high-voltage apparatus is of real benefit to the undertaking and that the fullest use of this service by consumers should therefore be encouraged by maintaining costs at the lowest possible level.

The work covered by this scheme can be divided broadly under two headings as follows. The first relates to the supply of new, or extension of existing, electrical installations. The basis of charging for this work is to ascertain at the completion of the contract the net cost to the supply undertaking of all direct labour charges in respect of manual workers and of all plant and materials used on the contract and to add to this sum 15 per cent. to cover technical and clerical supervision, use of tools and testing equipment, and the undertaking's overhead charges.

The second aspect is the maintenance and repair of existing installations and testing and commissioning of new plant supplied and installed by a contractor to the direct order of a consumer. Work carried out under this heading is charged for on the same basis as in the first, except that an additional charge is made to cover the salary of the staff engineers engaged on the work. This variation is made because in this class of work the engineer's salary is a much larger proportion of the total cost of the job than it is in the other.

When carrying out complete installations or extensions the undertaking's technical staff usually first discuss the consumer's requirements with him and then prepare a detailed estimate and description of the scheme submitted. On receipt of the consumer's order to proceed with the work, the undertaking places orders for the switchgear, transformers, cables, etc. Many undertakings have contracts with the manufacturers for the supply of such plant at prices substantially lower than would have to be paid by the consumer if he placed the orders direct with the manufacturers. The purchase of plant by the undertaking under these contracts is therefore often of financial benefit to the consumer.

Detailed drawings of any building and foundation work required are then prepared by the undertaking and submitted to the consumer so that he may get this part of the work completed while the plant is being manufactured. The consumer is generally advised when carrying out this work to provide for future extension of the high-voltage switchgear both in respect of the undertaking's incoming feeders and his own outgoing feeders.

When the plant is delivered to site it is installed by the undertaking's normal distribution construction staff. Upon completion of this work the undertaking's testing staff carry out a complete series of tests on the installation in precisely the same manner as they would for a new extension of the under-

taking's own plant. These tests include the following.—

Switchgear : Insulation - resistance with 2,500-V " Megger " ; insulation-resistance of all current- and voltage-transformer secondary circuits, each of which is checked to see that it is earthed at one point only; pressure, including tests on insulating oil in each chamber; operation ; closing and tripping at extremes of permitted voltage ; measurement of circuit-breaker pre-arcing tripping times ; and primary-injection to check the ratio of instrument current transformers and the calibration of the instruments.

Feeders : Insulation-resistance tests with 2,500-V " Megger " ; direct-current pressure; and impedance and capacitance measurements.

Transformers : Dielectric strength and acidity of oil samples from each compartment; insulation-resistance with 2,500-V " Megger " ; operation of tap-changing equipment and calibration of voltage-regulating relay if fitted ; and operation of cooling equipment and control gear and of temperature alarms.

Protective Gear : Insulation-resistance of pilot wires and all protective circuits not included in the tests carried out from the current and voltage transformers at the switchgear ; primary-injection to prove that current-transformer ratios are correct and that the gear is stable or operative as is necessary under the varying service conditions ; secondary-injection to check the calibration of all relays at their working settings ; Buchholz protectors and their auxiliary relays ; and DC tripping and intertripping, including tests at 50 per cent. rated voltage on all DC-operated relays.

Method of Procedure

The consumer is advised of the times at which the above tests will be carried out and is invited to have a representative present. When the testing work is satisfactorily completed, the consumer's staff is instructed in the operation of the gear and the installation is made alive and handed over.

A duplicate set of final drawings and reports embodying the results of the tests is then prepared and submitted to the consumer, together with the invoice for the work. The consumer is advised that the undertaking will be prepared to carry out all necessary maintenance on the installation under the terms previously detailed in this article. If the consumer decides to avail himself of this service, all maintenance details are arranged by direct contact between the consumer's staff and the undertaking's maintenance and testing staff. The standard of maintenance aimed at is of the same order as is applicable to the undertaking's own plant.

This scheme has now been in operation for about four years and over this period the undertaking's staff has carried out a very considerable number of installations of varying sizes. No particular difficulties have been experienced in operating the scheme and the consumers have invariably expressed their satisfaction with the work. From the undertaking's point of view three main advantages have been obtained in respect of these installations.

Advantages to Undertaking

First, all plant used is of suitable type and high quality and has been carefully installed under the supervision of engineers who may generally expect to have to maintain it. Moreover, the consumer's high-voltage switchgear is of the same type as that used by the undertaking for the incoming feeders and the need for awkward sections of busbar trunking to connect the busbars on two different types of switchgear does not arise. These factors have resulted in reliable installations which can be expected to cause little disturbance to the undertaking's distribution system as a result of breakdown.

Secondly, the protective gear has been selected by the undertaking's own staff and completely tested by them prior to commissioning, with the result that it is co-ordinated with the other protective gear on the undertaking's distribution system and is known to function correctly. Thirdly, maintenance of the plant and protective gear by the undertaking's specialist staff ensures that it will continue to function reliably.

How the Consumer Benefits

From the consumers' viewpoint the following advantages have been obtained :—

(1) The planning and supervision of the work by specialists has ensured that the installation meets the consumer's requirements in the most economical way. Cases have been known where the consumer, after receiving details of the undertaking's scheme, has investigated the cost of installing exactly similar plant by direct contracts with the manufacturers but has found that the cost would then be higher than that quoted by the undertaking. This is probably accounted for by the more favourable terms usually available to supply authorities for the purchase of plant and by the fact that manufacturers would have to pay out-allowances for their site staffs, whereas the supply authority uses local labour.

(2) The consumer has at his disposal the services of specialists in this class of work who are equipped with all the necessary maintenance and testing apparatus. Without this service economic reasons would force the consumer to attempt to carry out maintenance and testing work with his own staff, who are generally relatively inexperienced in this class of work and very much more poorly equipped.

(3) The consumer enjoys higher reliability of electricity supply because his installation

has been properly selected, installed and maintained.

(4) When a breakdown necessitating the replacement of some components of the plant does occur, it is of great advantage to the consumer that the plant should be of the same design as is normally used by the local supply authority for its distribution work, because the supply authority will undoubtedly maintain a large stock of spares which the consumer can call on and thereby avoid the delay usually experienced when ordering replacements from the manufacturer.

An unexpected development of the testing service has been its use by manufacturers who have supplied and installed plant for local consumers under direct contracts. These manufacturers have found that the carrying out of their commissioning tests by the undertaking's staff has saved them considerable expense which would otherwise have been incurred in bringing a testing engineer and all the necessary testing equipment from a distant depot.

It is believed that this service has been of especial benefit under war conditions because there can be no doubt that it has resulted in the utmost economy of skilled manpower.

Electrical Terminology

Importance of Avoiding Obsolete Expressions

By E. H. W. Banner, M.Sc., M.I.E.E.

STANDARD terminology is necessary to avoid confusion, as soon as any term can be generally defined and agreed upon. Unfortunately, many engineers (and others) are not aware of current terminology, including the use of the approved abbreviations and symbols, with resulting confusion. This is frequently noticeable in the case of instructors, who should especially guard against the teaching of incorrect or obsolete terms and symbols in their lectures to their students.

Much of the present standard terminology has the obvious advantages of correct foundation and of unification or rationalisation. Clearly it is better for one word termination, or one symbol or abbreviation, to represent the same thing always, independently of the rest of the word or symbol to which it is added, and this principle is now widely applied. Due to finite alphabets, both English and Greek, it is impracticable to ensure that one symbol represents only one term in all branches of science, or even in electrical engineering, but generally the subjects are sufficiently diverse to avoid confusion. One such example is the use of μ as a prefix before an abbreviation, and also meaning permeability, whilst in pure science it represents the refractive index and in mechanics the coefficient of friction.

TABLE I

Abstract	Symbol	*Concrete*
*Resistance	R	Resistor
*Conductance	G	Conductor
Impedance	Z	
Admittance	Y	
Susceptance	B	
Self inductance	L	Self inductor
Mutual inductance	M	Mutual inductor
Capacitance	C	Capacitor
Reactance	X	Reactor
Insulance		
Leakance		

* These terms are also included in Table II.

Word terminations are now standardised to differentiate between abstract and concrete quantities as applied to practical units. The ending -ance applies to the abstract and -or to the concrete. Table I gives common examples.

Another trend of terminology differentiates between the amount of an electrical quantity as a constant of the material and that for the same material but of given dimensions. The ending -ivity is used for the former and -ance for the latter. Examples are given in Table II.

TABLE II

Specific: as property of the material	Applying to given dimensions
Volume Resistivity	*Resistance
Conductivity	*Conductance
Reluctivity	Reluctance
Permeability	
Permittivity	

The symbols for practical units are generally well known and only few now persist in using C for current, ω for ohms, Ω for megohms, and other very-long obsolete symbols. On the other hand the symbols for multiples and sub-multiples are still not correctly used in some instances: m is sometimes used for micro, as in mFd or mfd or mf, whereas μ is standard and of universal application, as μA, μV, μF, $\mu\mu$F (which may be written pF), $\mu\Omega$, μW, μH, etc. Similarly k and M are also of universal application. k$M\Omega$ is quite in order; so is kA, although it is less well known than are kV, kW and kVA.

The ending -s is used by some to indicate the plural of electrical quantities when using abbreviations. This is quite incorrect; the abbreviation serves both singular and plural. Both s and sec. are correct for seconds of time; mAs is therefore correct for milliampere-seconds, a common term in X-ray engineering, but it is misleading and wrong to use it as the plural of milliampere.

Other terminological changes in recent years which are not always realised include the disuse of the mark ∿ for cycles per second. It is correct as a general symbol for alternating current, however. Permittivity has the symbol κ (Greek kappa). It replaces ϵ (Greek epsilon) for dielectric constant, which is now obsolete, and the still longer obsolete term specific inductive capacity. It will be seen that the ending -ivity is in accordance with the general principle given earlier. "Frequency" has long been correct, but occasionally periodicity is met; its use is deprecated.

The confusion of several wire gauges, each quite arbitrary and independent, is well solved by the now correct B.S.I. method of specifying the diameter in inch units.

In many cases several terms are used to apply to the same thing. Whilst no serious error or confusion may arise, it is obvious that one standard term is to be preferred,

TABLE III

Correct term	*Obsolete terms*
Peak	Crest
RMS (root mean square)	Virtual; effective
Mean	Average; arithmetic mean
Active(voltage and current)	Energy-, power-, in-phase-components
Reactive „ „	Wattless-, idle-, quadrature-components
Voltage between lines	Line voltage; star voltage
Voltage to neutral	Phase voltage; delta voltage

although it may have no more basis of authority than any displaced term, as such. Some examples are included in Table III.

The universal decimal classification (U.D.C.) is now becoming widely used. It is based on the original Dewey system, which may be summed up by the statement that the whole of human knowledge is considered as unity, divided into ten domains as principal subject branches, each expressed as a decimal. Any number is necessarily less than unity, so for convenience the first decimal point is omitted, but it is implied. Division carries on indefinitely as any subject is more and more specifically defined. Thus a six-figure U.D.C. number is more general than is one of nine figures.

In electrical engineering all U.D.C. numbers are made up under 6, as applied science, under 62 as engineering, and then under 621 3 as electrical engineering.

In electrical physics all U.D.C. numbers are made up under 5, as pure science, under 53 as physics and finally under 537 as electricity and 538 as magnetism. Several numbers dealing with a particular aspect of a given subject may be linked with a colon sign. For two or more independent subjects the + sign is used between them. Other numbers in brackets, etc., show country of origin, language and other particularisations.

The practical electrical units in use are the international units. No appreciable changes have occurred in these; the only slight changes in the values of absolute units as measured over periods of time being too small to have any effect on practical use. C.G.S. units are used as the basis for practical units.

The introduction of metre-kilogramme-second units was tabled for 1940, but has been indefinitely postponed owing to the war. But it should be realised that only calculations of basic quantities will be changed, generally simplifying by powers of 10, and other constants. No change in practical units will result. The ohm is still as defined by the mercury standard as the practical unit; similarly with the other units.

The authority for all standardisation in this country is the British Standards Institution (B.S.I.) and it should be noted that the term B.E.S.A. is long obsolete (the "besa" gun in some tanks is quite another matter.) British Standard No. 205—1943 is a series of parts and sections covering a Glossary of Terms used in Electrical Engineering and B.S. No. 204—1943 deals similarly with Terms used in Telecommunications. B.S. No. 560—1934, Engineering Symbols and Abbreviations, also deals with this subject. For graphical symbols two British Standards serve electrical engineering—B.S. No. 108—1933, Graphical Symbols for General Engineering Purposes and B.S. No. 530—1937, Graphical Symbols for Telephony, Telegraphy and Radio Communication. Copies of these may be obtained from the British Standards Institution, 28, Victoria Street, S.W.1.

Swiss Electrical Survey

AN official survey of the Swiss electrical industry shows its growth since 1900. A table gives the plant capacity in 1900 as 131,000 kW, producing about 200 million kWh, and in 1940 as 2,034,000 kW, producing about 8,200 million kWh.

The report goes on to say that Switzerland has a total potential capacity of 21,000 million kWh and that production is developing at an average rate of 220 million kWh per annum. Yearly consumption per capita is 1,600 kWh, which places Switzerland third among the countries of the world, with Canada first and Norway second. The Association of Swiss Electricians and Union of Power Producers have a ten-year plan which will not only include the building of very large plants, but the expansion of smaller ones and the stepping up of their efficiency. The report expresses the belief that over-production is not to be feared. It stresses the need for simplification of tariffs and some reorganisation in the industry so that the utmost use can be made of water power.

In 1941 Switzerland possessed 6,030 power plants but 95 per cent. of the total capacity was contained in 130 of these. Water power is responsible for 99 per cent. of the total output. Ownership is divided as follows: 57 per cent. canton or municipally owned plant; 10 per cent. mixed enterprises; and 33 per cent. private enterprise.

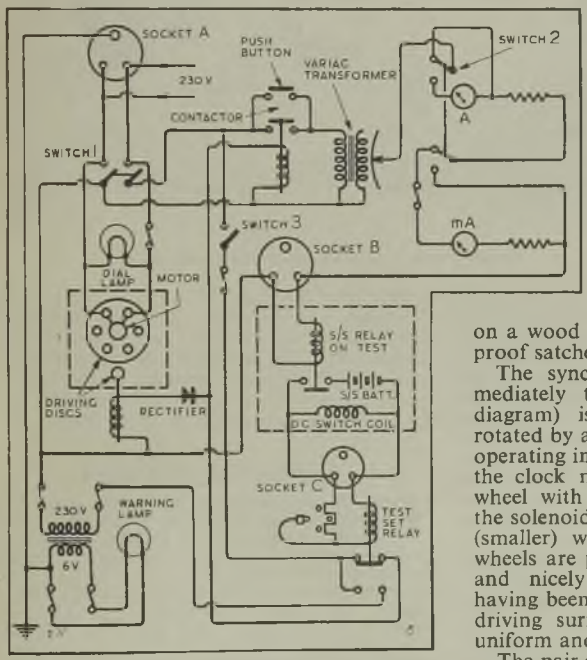
Relay Test Set

Automatic Timing for Secondary Injection of Substation Relays

By G. A. Thompson,
A.M.I.E.E.

THERE has been a long-felt need for an accurate and, at the same time, portable test set of the secondary injection type for automatically determining *in situ* the operating times of relays employed for tripping switchgear in substations.

An instrument designed and applied in actual practice is in a teak cabinet measuring 24·5 by 12·75 by 10·75 inches with carrying handles protruding 1·75 inches, its total weight being 78·5 lb. The various components are enclosed under a panel and the front of the cabinet is recessed to accommodate the projecting handles of two mains switches, linked 15 A fully sunk, as well as the dial knob of the resetting synchronous clock and the push button for resetting the relay. The lid is made deep enough to cover the regulating wheel of the " Variac " loading transformer (with resistances) and a pilot lamp to indicate cessation of test current. Within the lid is a dry battery for use outside substations when there is no other source of low-voltage input.



Circuit diagram for automatic relay-timing by secondary injection

There are illuminated clock and loading meter dials (with change-over switch), one reading 0 to 15 A for adjusting the injected load and the other 0 to 100 mA for gauging relay current for balanced core protection; also " Slydlok " fuse cases and a heavy-duty push button for pre-selecting load current. The connecting leads terminate in 15-A three-pin plugs and sockets with " crocodile " clips at their free ends for attachment to the terminals of switchboard instruments under test. The leads can be wound on a wood former and carried in a weatherproof satchel.

The synchronous clock is energised immediately the mains plug A (see circuit diagram) is inserted. Its dial pointer is rotated by a small wheel driven by a solenoid operating in the following way. Fitted on to the clock motor rotor spindle is a (larger) wheel with a driving face while attached to the solenoid operating drum is a spindle and (smaller) wheel with a driven face. Both wheels are perforated to reduce their weights and nicely balanced, particular attention having been paid to making the rims of the driving surfaces of both wheels absolutely uniform and perfectly smooth.

The pair of wheels are made of " Staybrite " steel, their rims finely ground, as any irregularity or trace of dust or rust on the rims would be detrimental to the accuracy of the instrument. It is imperative that the dial pointer movement shall be quite smooth

and regular. Therefore a dust-proof case covers the whole of the driving mechanism.

Test current is applied to the substation switchboard relay undergoing test from the 15-A socket B, while a DC 12-V relay within the instrument is energised simultaneously with the operation of the switchboard relay furnishing DC to the instrument relay coil through the 5-A socket C from the substation tripping battery. A dropper resistance in the instrument with 12-, 24-, 36- and 48-V tappings enables any battery of more than 12 V to be utilised.

Having determined the operational current required, closing the 5-A tumbler switch (marked 3 in diagram) produces the following effects all simultaneously:—Closes solenoid coil circuit and thereby causes the 5-sec. pointer to rotate instantly; closes the contactor in parallel with the push button to the primary side of the "Variac" transformer; injects the predetermined current into the substation switchboard relay under test, which itself will close and thereby operate the test set relay from the "on" position to the "off," open-circuit the solenoid coil and stop the pointer from rotating. The time, therefore, can then be read off in direct figures on the dial.

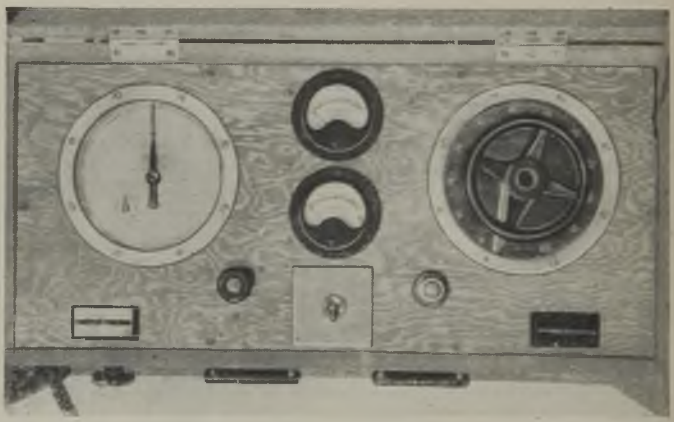
Energising the relay testing set starts the synchronous motor and the operation of the 5-A switch energises the solenoid through the test set relay; the smaller wheel is thereby moved forward to take up a friction drive on the rim of the larger motor flywheel. Immediately the circuit of the solenoid is broken by the operation of the test set relay, the smaller wheel (being spring loaded) comes out of drive and, due to an automatic brake on its driving surface, will not over-run on time, its cessation of movement being absolutely instantaneous. Fitting to the spindle of the smaller wheel is a pointer rotating over a 6-in. dial, divided into 5 sec. and each second sub-divided in 100ths, so that actually it is quite easy to read accurately to 100th part of a second on any time test made.

When connected in step with a very reliable chronoscope there was a discrepancy between the two instruments of only 0·02 sec. over a period of 100 sec.

The solenoid coil is connected in series with a small half-wave metal rectifier which feeds DC to the coil to prevent chatter of the small wheel as it revolves on the driving rim of the large wheel.

To stop any stray fields from affecting the steel driving wheels, the solenoid coil is entirely shrouded by a copper screen and the latter earthed. A small dial geared from the main pointer spindle and divided into multiples of 5 sec. and registering up to 50 sec. is used to check the revolutions of the main pointer if the test operation exceeds 5 sec. A resetting device on the front panel returns both pointers to zero.

The setting of the correct amperage of the injected load is very simple. Merely depress the heavy duty starter knob and rotate the wheel of the "Variac" transformer until the required load to be injected is dialled on the ammeter and immediately release the starter knob. The last action is very important because it open-circuits the "Variac" transformer and so minimises the heating-up of the switchboard relay under test. The advantage of this procedure cannot be too greatly stressed as the correct operational time of the relay depends very greatly on the temperature of the coil.



Arrangement of the top panel of the instrument

Smithsonian Institution

THE Smithsonian Institution was created by Act of Congress in 1846 under the will of James Smithson, of England, who bequeathed his property to the United States for founding in Washington an establishment "for the increase and diffusion of knowledge among men." Its annual report for 1942, a bound volume of 421 pages and many illustrations, is a record of the activities of the Institution and its numerous sections. The general appendix to the report contains reprints from various sources with the object of furnishing brief accounts of scientific discovery in a variety of subjects, such as solar radiation and the state of the atmosphere, the sun and the earth's magnetic field and ultra-violet light sanitation.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Wimbledon Borough Council is advertising for a borough electrical engineer to succeed **Mr. A. E. McKenzie.** A salary of £2,000 per annum is offered, plus a further £250 for undertaking responsibility for the installation and maintenance of engineering plant for other departments of the Corporation. Applications may be sent in up to June 23rd and the successful candidate will be required to take up the duties not later than December 1st next.

Mr. McKenzie is to retire in February next. He was asked to continue in office for a further period but considered that three years extra was a sufficient extension. His successor will not assume the title of chief engineer and manager until Mr. McKenzie's retirement.

Two vacancies for deputy chief engineers are advertised in this issue by the Ministry of Labour and National Service. The first is at Manchester where **Mr. R. Alan Thwaites,** the present deputy, is succeeding **Mr. H. C. Lamb** as chief engineer and manager. The commencing salary is £1,200 per annum. St. Helens also wants a deputy to take the place of **Mr. G. T. Allcock,** who has been appointed to the Great Yarmouth position upon the retirement of **Mr. P. E. Rycroft.** In this case the salary offered is £761 per annum.

Mr. R. F. Cole, one of the senior radio officers of Siemens Bros. & Co., Ltd., was recently awarded the M.B.E. for courage and devotion to duty when the ship in which he was serving was torpedoed and sunk.

The Stoke-on-Trent City Council has approved a recommendation of its Electricity Committee that **Capt. T. Lockett,** O.B.E., shall be appointed general manager of the electricity undertaking, consequent upon the impending retirement of **Mr. H. L. Mills,** the engineer. When the late Mr. C. H. Yeaman retired from the position of city electrical engineer of Stoke-on-Trent in 1940, Capt. Lockett, who had been commercial assistant since 1926, was appointed manager (in charge of the commercial side of the undertaking), with Mr. Mills as engineer. Capt. Lockett will now take control of the whole undertaking.

Mr. G. H. Bowden, is leaving the consulting engineer's department of the Anglo-American Corporation of South Africa in Johannesburg with which he has been an assistant electrical engineer since January, 1941, and intends to return to England soon. He left England in September, 1939, to take up the position of commercial engineer to the Cawnpore Electric Supply Corporation and to act as secretary to the Association of Supply Companies, United Provinces, India. The climate of India did not suit his family and himself and he was on his way to England *via* the Cape when he was persuaded not to continue the journey, but to stay in South Africa. His work in Johannesburg has been in connection with the new hydro-electric generating station at Lunsemfwa Falls in North Rhodesia, the extension of the existing station at Mulungushi and the 66-kV transmission system to the Broken Hill Mine. From 1930 to 1939 Mr. Bowden was change-of-frequency engineer for the S.W. England and South Wales Area of the Central Electricity Board.

Many of our advertisers will be interested to hear that **Mr. P. J. Haskell,** of the *Electrical Review,* has just celebrated the jubilee of his connection with this journal. He joined the Advertisement Department in 1894 when the offices were in Paternoster Row (now, alas ! no more) and he later became manager of the department, a position which he held until his appointment as a director in 1942. To mark the occasion Mr. Haskell has received presentations from the directors and staff.

To mark the retirement of **Mr. A. G. Beaver** (Sun Electrical Co., Ltd.) from the Council of the Electrical Wholesalers' Federation, a presentation from the members was made to him at the recent annual luncheon of the Federation. Mr. Beaver is a founder member of the Federation and from its inception in 1914 has taken a very active part in its affairs. He has been president three times, 1922 and 1941-2, hon. secretary from 1915 to 1921, and for many years its hon. treasurer. He now relinquishes this office and his seat on the Council in order that younger men may be able to participate in the future work of the Federation.

Mr. A. G. Beaver

In acknowledging the gift, Mr. Beaver said he appreciated the kindly thoughts and sentiments that had prompted a cheque being presented to him, so that he might purchase when the times were more propitious a memento of his long years of friendly association with the members. After carefully reviewing how to allocate this splendid gift, he felt that it would give him greatest pleasure if he were permitted to give £100 to the E.I.B.A., a decision which was endorsed with acclamation by the members.

Miss Margaret Page, youngest daughter of Sir Archibald and Lady Page, was married at South Croydon on May 23rd to Capt. Douglas Simpson, East Yorkshire Regiment.

Sir James Devonshire, owing to ill health, has resigned the chairmanship of the Bedfordshire, Cambridgeshire & Huntingdonshire Electricity Company and of the Newmarket Electric Light Co. (two of the Edmundsons group), but is to remain on the boards of these companies. He is succeeded as chairman by **Brig.-Gen. Wade H. Hayes.**

Mr. W. Kidd, chief construction engineer to the Manchester Corporation Electricity Department, has been elected chairman of the North-Western Centre of the Institution of Electrical Engineers for 1944-45. **Dr. J. L. Miller,** chief

engineer, British Insulated Cables, Ltd., is to be vice-chairman.

Mr. F. E. Pitt (mains engineer, West Devon Electric Supply Co., Ltd.) has been nominated as next session's chairman of the I.E.E. Devon and Cornwall Sub-Centre, with **Mr. P. S. Grant** (engineer and manager, Teignmouth Electric Lighting Co., Ltd.) as vice-chairman.

Fulham Electricity Committee reports the resignation of **Mr. K. F. T. Coe,** assistant control engineer, who has obtained an appointment with the Woolwich Borough Council.

Mr. E. H. Ball, manager of the Transformer Sales Department of the British Thomson-Houston Co., has been elected a director of the company.

Richard Johnson & Nephew, Ltd., have made the following appointments:—London sales manager, **Mr. E. B. Agg**; home sales manager (iron and steel), **Mr. W. B. Ard**; home sales manager, **Mr. H. Moore**; and export sales manager, **Mr. W. Garside.**

Sixty-one employees of W. T. Henley's Telegraph Works Co., Ltd. (Paper Cable Works and Research Department) and seven of Henley's

Sir Montague Hughman presenting long-service certificates to Henley employees

Tyre & Rubber Co. were presented with long-service certificates on May 15th by **Sir Montague Hughman** in recognition of twenty years of faithful service with the company.

At the annual meeting of the Scottish Road Transport Association held in Edinburgh, **Councillor W. Collins,** convener of Aberdeen Corporation Transport Committee, was elected president, and **Mr. E. R. L. Fitzpayne,** general manager, Glasgow Corporation Transport Department, vice-president.

Mr. F. C. Pyman, vice-chairman of the Iron Trades Employers' Insurance Association, has been appointed chairman of the Association in succession to the late Sir Frederick N. Henderson, K.B.E.

Mr. Robert Kelso, chairman of the General Steam Navigation Co., has been elected president of the Institute of Transport for 1944-45.

Mr. E. C. Murray, assistant constructional engineer to the Hackney Borough Council Electricity Department, is recommended for promotion to the position of constructional engineer to fill the vacancy caused by the retirement of Mr. W. Barham.

Sir Frank Smith has been elected president of the Institute of Physics. The vice-presidents are **Professor J. D. Cockcroft, Mr. T. Smith** and **Dr. F. C. Toy.**

Mr. J. Hutchison has been elected president of the Lothians Branch of the Association of Mining Electrical and Mechanical Engineers.

Lighting Fittings

Technical Structure of the E.L.F.A.

IN order to deal more effectively with the various aspects of the technical work in which the Electric Light Fittings Association is interested, a survey of the technical structure has been made and a scheme evolved by the Technical Committee was adopted by the Council at a recent meeting.

Under the Technical Committee there are to be seven sub-committees composed of members with special knowledge of, and interest in, their particular subject. When necessary, the sub-committees will appoint joint committees or panels with representatives of other interested bodies to deal with special aspects of their work. The chairman of each sub-committee will be elected by the Technical Committee from among its own members. Other members, to the number considered necessary, will be elected by the Technical Committee from its own members or nominated from technical men associated with member-firms.

Technical representatives of member-firms may be temporarily co-opted on to sub-committees to advise on particular problems of which they have special knowledge, when such problems are under discussion. The chairman of the Technical Committee will be eligible for election as a member of any sub-committee or panel, apart from his right to attend in *ex officio* capacity.

Scope of Sub-Committees

The sub-committees will advise the Technical Committee on all matters referred to them and their respective scope is as follows:—No. 1, electric light sources and associated auxiliary equipment. No. 2, properties, performance and application of materials employed in the construction of lighting fittings. No. 3, fundamentals of lighting technology. No. 4, street lighting, illuminated aids to movement, and safety devices on roadways, including the principles underlying the satisfactory performance and testing of lighting equipment for these purposes, and also the examination of specifications, reports or regulations dealing with the subject. No. 5, industrial lighting, including the testing and performance of industrial lighting fittings, and also the examination of specifications, reports or regulations. No. 6, commercial lighting, including testing and performance of commercial lighting fittings, and also the examination of specifications, reports or regulations. There will be a seventh sub-committee to deal with school and domestic lighting, when required.

CORRESPONDENCE

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

Compulsory Registration

MY interpretation of "Consumer's" remarks in your issue of May 26th is that he is against compulsory registration and that he wishes to retard progress in that direction.

Would "Consumer" be good enough to answer two questions:—(1) Can electrical dangers be over-emphasised? (2) Why should the I.E.E. Sub-Committee be disinterested in a matter which should be their direct concern?

Glasgow. ALEX. MILNE.

Power Station Ownership

MR. FIELD'S article would seem to be the complement of my earlier article on the same subject. The first part is an admirable statement of fact, except for that portion relating to spare plant kilowatts, and here I suggest that there is an aspect of this case that favours the selected station owner which should be presented to make it complete. The remainder of the article deals mainly with the two essential points (one fundamental), about which we are in disagreement: they are, in fact, the two underlying and basic points upon which this whole controversy really turns, as I tried to indicate in my article.

The first of these points is that of "subsidising." Whilst not giving an answer, I asked "whether an individual or a community has a right to enjoy special local benefits exclusively and without reference to less favoured communities?" and I understand Mr. Field's answer to be that that right should be preserved and that each of us should live to ourselves, without any sharing or subsidising. My answer would be that electricity supply has always been based upon the principle of one consumer, or class of consumer, subsidising others, and we are bound to continue with this unless we were to achieve the impossible condition of charging each consumer at a separate, costed, rate. This feature was clearly demonstrated in two papers read before the Institution before the war.*

Surely it is time we appreciated that electricity supply has achieved the same importance, and is as much a necessity, as piped water supply or sewage disposal schemes. Hence, I maintain that we must be prepared to provide electricity to every dwelling in the country and, *if it is necessary*, to equate, in some way, the burden of loss over all the consumers. I would go further and state that the alleged "inevitable loss on these isolated units" is far less than we have been led to believe. This desire to concentrate on the paying load and to refuse to undertake obligations in respect of the unremunerative supplies, is a black mark in the history of municipal electricity supply.

The second point of difference is in respect of Mr. Field's endorsement of the principle that "there should be no change merely for the sake of change." I am very much afraid that the six words at the end of that phrase in the "White Memorandum" are really put in to "bolster up the argument" and the first five are the operative ones. Incidentally, I think that Mr. Field's last paragraph suggests that he has read into my article meanings which were certainly not intended to be there. My article was not an examination of the "Brown Memorandum," but of the arguments of its opponents. I do not, therefore, state that "we should agree to this Memorandum because it is a twentieth-century tendency of business organisation." It is the London Power Company, the 1919 and 1926 Electricity Acts, the Scottish Hydro-Electric Corporation, etc., and not the "Brown Memorandum," that are the twentieth-century tendency of business organisation. I accept Mr. Field's thesis that we should leave organisations like the London Power Company, etc., in being, and I am of the opinion that it would be wise for Parliament to commence the integration of generating authorities by forming a number of units with a similar form of organisation and retaining these for some years before deciding what the next step in integration should be.

The last two paragraphs of my article should be read carefully; I desired there only to indicate the position in a general way and without particularising. If I were to particularise I would say that the movement towards large integrated units of generation (and distribution) is inevitable, and we should try to decide upon the maximum size of integrated unit to give the maximum efficiency. It is obviously wise to proceed gradually and, as a first step, to form for the whole country some fifteen or twenty integrated district generating units, provided a suitable type of organisation is adopted. But the danger which I foresee (particularly after reading the "White Memorandum") is that of the creation of a series of area authorities responsible for both generation and distribution which will, in effect, become Joint Boards or Joint Electricity Authorities. Only a few persons have experience in

* *I.E.E. Journal*, Vol. 81: No. 490: J. A. Sumner; Vol. 71. Woodward & Carne.

administering integrated units with such a constitution and representation and I am, therefore, more than doubtful as to their success, particularly if distribution is combined with generation for each district. It is chiefly on this account that I would recommend the separate administration of generation in the integrated organisation which seems inevitable.

In conclusion, I suggest that Mr. Field is wrong in suggesting that the Central Electricity Board is responsible to a Government Department: the expert criticism of the twentieth-century boards, or public corporations, is that they are *not* responsible to a Government Department.

Norwich. J. A. SUMNER.

IN his article in your issue of May 19th, Mr. Field expresses his views against the subsidising of communities by the large urban undertakings. He states that "the real cause of high cost of electricity in such communities is high distribution charges, which overwhelm the extra cost of the bulk supply, and these can only be reduced by cheaper and more efficient technical methods of distribution."

Tables of costs published in 1939 show that this is a gross mis-statement. The generation and or bulk supply costs per kWh sold throughout the industry varied from 1·91d. to 0·12d. that is, a difference of 1·79d. per kWh sold, whereas distribution costs varied from 0·53d. to 0·01d. or a difference of 0·52d. per kWh sold. In other words, energy costs fluctuated 3½ times more than distribution costs; furthermore, wartime costs will have undoubtedly increased this comparison due to higher fuel costs and reduced distribution costs resulting from increases in consumption and load factor.

Paisley. F. OVERSTALL.

MR. FIELD is an energetic engineer with a keen brain and a wide experience for his age, and there is much in his article which merits consideration. As his nearest municipal neighbour, and I hope, his friend, I trust he will not mind my saying that at times he is a little apt, without thought, to jump to conclusions on aspects of our profession which he possibly regards as secondary to his main interest, generation.

I particularly wish to question his statement in the fifth column of his article, where he writes of the high costs of small town distribution, that "these can only be reduced by cheaper and more efficient technical methods of distribution." His following paragraph is just a bit of exaggeration.

To those engineers who think small undertakings are inefficient, I wish to say that the truth of the matter is, that many of us compare very favourably with larger undertakings in the matter of efficient technical methods of distribution and economical management, according to our circumstances, and also in the matter of cables in all streets and percentage of houses connected. Our difficulties are due to low density of population, which, in coastal holiday resorts, is intensified in the winter, when hotels and boarding houses are empty.

There is also the high cost of bulk supply tariff, which a national standard would alleviate, and perhaps the burden of the purchase price of an old "company" network and plant which had to be scrapped.

I hope that the questions raised in Mr. Field's article will be well aired in your columns, and that unity in the I.M.E.A. will again be preserved.

North Berwick. EDWIN T. POUND,
Burgh Electrical Engineer.

PARLIAMENTARY NEWS

By Our Special Reporter

Electricity for New Houses

IN the House of Commons last week Sir Waldron Smithers asked the Parliamentary Secretary to the Ministry of Works whether, in considering what electrically-operated amenities he would put into the new houses, he has taken into consideration the price per unit of electricty.

Mr. Hicks said that the equipment of the emergency house was designed to give an economic and efficient use of the different methods of heating and cooking. Electric cookers would not be used unless the price of electricity was suitable.

National Certificate Courses

Mr. Watson asked the President of the Board of Education how many schools in England and Wales had higher national certificate courses in mechanical and electrical engineering; how many held external examinations and how many internal examinations in these courses; and in how many were compulsory questions introduced in these examinations.

Mr. R. A. Butler said that in 1943 higher national certificate courses in mechanical engineering were held at 100 schools and in electrical engineering at 85 schools. The schools normally conducted their own examinations which were subject to revision of the examination papers and of the marking by assessors appointed by the professional institutions, but for mechanical engineering eleven schools and for electrical engineering eight schools made use of examinations conducted by regional examining unions which were subject to revision in the same way as school examinations. No statistics were available as to the number of compulsory questions in higher national certificate examination papers, but their inclusion was infrequent.

Lightning Damages Plant

A serious interruption of the supply of electric power to the Kolar goldfield has been caused by lightning damage to the Mysore Government's generating plant. The *Financial Times* reports that this will affect the operations and output of the mines.

COMMERCE and INDUSTRY

Unlicensed Installation. Contractors' Right of Entry.

Holidays with Pay

THE National Joint Industrial Council for the Electrical Contracting Industry has made an agreement to ensure that all "Category II" employees receive each year a week's holiday with pay subject to conditions set out in the agreement. These conditions provide that the holiday shall be given during the period from June 1st to October 31st and to qualify an employee must have been registered by his employer at least two months immediately before June 1st. The rate of pay is to be that for a standard 47-hour week, plus the cost-of-living (war) addition payable at the time. Arrangements are made for employees who reach the age of twenty-one between October 31st in any year and the following June 1st. Holidays cannot be "carried over" to a later period.

The Inland Revenue authorities have decided that payment for the week's holiday must be made without deduction of tax. The tax will be recovered during the ensuing year.

Discharge Lighting Summons

Fines totalling £50 were imposed at Leicester last week on Mr. Norman Maguire, who was charged with installing and using certain discharge lamp apparatus at an engineering works without having obtained authority. The prosecution stated that under an Order of September, 1943, the installation, except under licence, of such lamps, was prohibited. Defendant had obtained secondhand sets and had applied for a licence, but this had been refused.

For defendant, who pleaded guilty, it was stated that he had been told that no licence was needed to purchase the sets and had been mistaken in thinking he could install them. The Order should have been framed, he submitted, so that persons could not be supplied without first obtaining a licence.

Recovery of Installations

In the King's Bench Division on May 25th Mr. Justice Cassels concluded the hearing of an action by Electrical Facilities, Ltd., against the Portslade-by-Sea Urban District Council which raised the question of the plaintiffs' right to enter houses owned by Council and remove installations they had placed in them under hire-purchase agreements with the tenants, with the consent of the Council, when the instalments were in arrears.

From 1934 onwards plaintiffs installed electrical installations in the defendants' houses on a housing estate under an agreement with the Council. Plaintiffs' case was that the tenants entered into a hire-purchase agreement for the purchase of the installation and that it was an implied term that where there were arrears they had the right to re-enter a house and remove the installation. There had been many cases of arrears and the Council had refused to give plaintiffs the right to enter the houses to remove the installations. They now sought a declaration that they were entitled to exercise their rights, as the defendants had consented to the plaintiffs supplying the installations.

Defendants admitted the agreement, but denied the terms alleged by the plaintiffs. The alleged refusal of entry into the houses was not admitted. Defendants pleaded that they had no right or obligation to allow the plaintiffs to enter the tenants' premises. Defendants further pleaded that the installation were fixtures and also that the action was barred by the Limitation Act, 1939, section 21.

His Lordship, in giving judgment, said that in his opinion the plaintiffs had not made out any implied agreement to a right to the plaintiffs to re-enter. He could not see how the defendants could give the plaintiffs the right to enter a house when the tenant was in possession. The action therefore failed and there would be judgment for the defendants with costs.

Price of Iron and Steel

The Control of Iron and Steel (No. 34) Order, 1944 (S.R. & O. 1944, No. 565), which came into force on May 19th, amends the Control of Iron and Steel (No. 33) Order, 1943, by the revision of the Fifth Schedule (which contains basic maximum prices) and of certain of the Related Price Schedules. In addition, prices are instituted for the first time for tube steel billets and pipe and tube joints.

Cable Makers' Wages

The Joint Industrial Council for the Electrical Cable Making Industry has decided that the base rates for adult males in Districts Nos. 1 and 2 shall be so adjusted as to include the recent increases in differentials made under reclassification; and that to these earnings shall be added the cost-of-living bonus in the case of adult males 31s. 6d. in District No. 1 and 33s. 3d. per week in District No. 2. These decisions take effect on the first pay day in June in respect of the period covered by that pay day.

Consequent upon the increases in differentials in the grades for male workers in the industry it becomes necessary to amend the rates of wages payable to female workers temporarily engaged on men's work in the third stage of the probationary period. This entails the addition of 75 per cent. of the male increase to the rates for the six grades and the payment of the amended rates has been made retrospective to the third pay day in March last for the period covered by that pay day.

Cutting Tool Order Rescinded

The Control of Machine Tools (Cutting Tools) Order No. 2 (S.R. & O. 1942 No. 760) relating to the flash butt-welding of high-speed steel cutting tools has been rescinded with effect as from May 22nd.

This Order prohibited the production (save under licence) of cutting tools from rectangular material with cross-sectional dimensions exceeding ½ in. (unless the smaller of the two dimensions

was under ½ in.) or cylindrical cutting tools of over ⅜ in. diameter, otherwise than by welding or brazing the high-speed steel operating portion to a steel shank containing no tungsten, vanadium or cobalt.

It is hoped that manufacturers and users will continue to utilise butt-welding in all instances where the use of such facilities has proved economical, having particular regard to the most efficient utilisation of high-speed steel, labour and fuel. Licences for the acquisition of high-speed steel under the control of Iron and Steel (No. 32) Order, 1943, will still be necessary.

Health Advice at Fulham

Fulham Borough Council Staff Committee, at the request of the Electricity and Lighting Committee, is recommending the appointment of an industrial doctor for the period of a year, the matter to be reviewed at the end of that time. A doctor has for some time been retained by the Electricity Department for the purpose of carrying out medical examinations of newly appointed hourly-paid employees and also in connection with the sickness of employees, and it is now proposed that his duties should be extended to include advice in the widest sense on the best methods of preventing sickness and securing satisfactory working conditions in the undertaking from the health point of view. He will be responsible for developing a preventive system, including sun-ray treatment.

Lamp Prices

A wartime edition of its lamp price list (OS.9632) has been issued by the General Electric Co., Ltd., and is available on request. It covers every domestic and industrial type of lamp now obtainable for general purposes at normal and low voltages, including "Osira" discharge lamps and "Osram" fluorescent tubes with such of their associated gear as starting switches and radio interference suppressors; also photographic lamps and a variety of motor car bulbs. The company points out that the supply of all types listed cannot always be guaranteed.

Rotary Switches

Multi-circuit rotary reciprocating switches, which are made for moderate loads by Diamond H Switches, Ltd., Gunnersbury Avenue, London, W.4., are described in technical brochure No. 76, containing detailed information for both designers and buyers. It is laid out to perform the dual function of index and quick reference list, indicating the maximum number of poles possible for any given circuit. All types are designed with an even number of positions and their dimensions remain constant (excepting depth) throughout the whole range of about 80 circuits. The capacities are AC from 15A at 125V to 10A at 250V and DC from 15A at 12V to 0·5A at 250V.

Women Welders Broadcast to America

A group of women welders employed by Johnson & Phillips, Ltd., recently took part in the weekly programme in the British Broadcasting Corporation's North American Service

J. & P. women broadcasting to America

in which British people greet their opposite numbers across the Atlantic. They came straight from the factory and were dressed in the overalls and headgear which they wear when at work.

Factory Managers

The next meeting of the Institution of Factory Managers, South Eastern (London) Branch, will take place at the Bonnington Hotel, Southampton Row, W.C.1, on Saturday, June 17th, at 2.45 p.m., when there will be a discussion on "Current and Future Problems in Factory Management."

Institute of Physics

The annual report of the Institute of Physics, which this year is issued in abbreviated form, records plans now being made so that this young profession can continue its service for the development of industries when hostilities cease. In particular, the board of the Institute is in touch with the Government regarding the position of physicists and those desiring to enter the profession during the demobilisation period and, through the Joint Council of Professional Scientists, is co-operating with qualified men and women practising in other branches of science.

The Institute's report on the education and training of physicists, which was one of the first of its kind to be issued, was very well received, both at home and overseas and steps have already been taken to follow up the recommendations contained in it. Thus the report making recommendations for changes in the method of teaching mathematics to prospective physicists, which has been prepared by a joint

committee of the Institute and the Mathematical Association, is about to be issued, and the inquiry into the possibility of including the various branches of technical physics within the framework of National Certificates and Diplomas has made good progress.

Directors Talk with Employees

For the third successive year the directors of the Brush Electrical Engineering Co., Ltd., recently met a representative gathering of the company's employees for a talk on the activities and position of the organisation. Mr. Alan P. Good, managing director, who opened the meeting, said he thought it a benefit to employees to have some understanding of the financial side of the company's affairs.

Sir Ronald W. Matthews, chairman of the company, explained the financial operations and referred to the company's increased income and other points in the balance sheet. Improvements, he said, had been effected in the organisation. The Brush board's conservative policy of paying back a considerable proportion of profits to ensure advantage being taken of improvements in machinery and equipment had resulted in increased turnover and output during the past twelve months. A very sound foundation had been laid by the company for post-war activities.

In proposing a vote of thanks, Mr. E. A. Clarke, deputy convener of shop stewards, spoke of the increased mutual understanding created throughout the organisation, due largely to the company's policy since Mr. Alan P. Good and his co-directors had taken over. The vote was seconded by Mr. J. C. Sargent, a foreman.

Cargo Vessel Propulsion

Various methods of propelling post-war cargo vessels will be considered at the June meeting of the Institute of Marine Engineers (13th and 14th in the hall of the Institution of Mechanical Engineers, Storey's Gate, S.W.1). The president Engineer Vice-Admiral Sir George Preece, K.C.B., will preside and eight papers will be read, including one on turbo-electric machinery by Mr. C. Wallace Saunders (G.E.C.) and another on Diesel-electric machinery by Mr. D. E. Jewitt (B.T.H. Co.).

Heating Apparatus Supplies

The Limitation of Supplies (Heating Apparatus) (No. 4) Order, 1944 (S.R. & O. 1944, No. 591) which covers the restriction period June 1st to November 30th, 1944, makes no changes in the control of supplies of domestic gas and electrical space-heating apparatus, the quota remaining at 15 per cent. The Heating Apparatus Trades Register will not be revised during this restriction period.

Boiler Patent Application

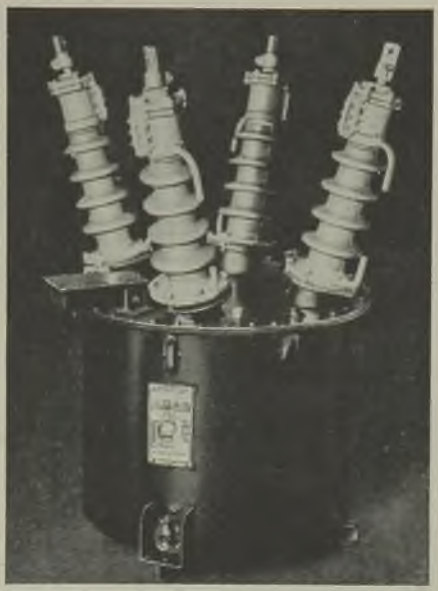
Application has been made by Sir Harold E. Yarrow and Yarrow & Co., Ltd., for an extension of four years and one month of Patent 316,058 of 1928 for the invention of "Improvements in Water Tube Boilers." The application is to come before the High Court on June 27th and opposition must be lodged at least eleven days before that date.

Electricity Fraud

Sentence of 28 days' imprisonment with £10 costs, or a further 14 days, was passed on a defendant at the North London Police Court who admitted having used a method of fraudulently abstracting electricity from the Islington Electricity Department's mains between December 22nd and March 19th. When a meter reader called and found what had happened defendant said he was very sorry; he had come in the previous night and found he had not got a shilling, so he did it as a temporary measure. The magistrate, passing sentence, said that it was a most serious case done with great deliberation and it was highly anti-social.

Five-limb Transformer

A three-phase voltage transformer of somewhat unusual arrangement has been manufactured by the Metropolitan-Vickers Electrical



A 35,000/100 + 100 V transformer with a five-limb core

Co., Ltd. It is of compact outdoor type, designed for 35,000/100 + 100 V, and is provided with a five-limb core with four oil-filled condenser bushings, including a fully insulated high-voltage neutral bushing, star-connected secondary winding and also a broken delta winding for directional earth fault relays, etc. When used for any of the purposes for which five-limb characteristics are required, the high-voltage neutral is earthed, but it may also be used with the neutral insulated if desired.

Trade Announcement

E. K. Cole, Ltd., have opened an "Ekco" lamp trade counter at their Manchester depot, 55, Whitworth Street, Manchester, under the control of Mr. E. G. Green.

Research Expenditure

Extension of Allowances

DURING last week's Commons debate on the second reading of the Finance Bill several members, including Sir Peter Bennett and Sir Arnold Gridley, urged the Chancellor of the Exchequer to give immediate effect to the proposed income tax allowances in respect of expenditure by industrial concerns upon research.

In the course of his reply, Sir John Anderson said that he could not agree to any relief in respect of funds which had been merely set aside for research or for industrial development. It was a vital part of the proposals that the relief should be granted only in respect of money actually expended for the purpose. The Federation of British Industries had represented to him and to the Board of Inland Revenue that it would be unjust to those incurring research expenditure now if they were treated less favourably than those who postponed their expenditure until after the war; and that the deferment of relief until after the war might induce firms to postpone research expenditure until then. He and the Board had been impressed by these representations and they contemplated that as from the appointed day expenditure already incurred should qualify for relief.

The expenditure might have been written off to some extent under existing provisions, but when the appointed day came the outstanding part of the expenditure would qualify to be written off as if it were expenditure incurred after the appointed day. If it were capital expenditure it would be written off within a period of five years.

The Chancellor said that there was a great deal of work to be done before the novel proposals could be cast in a form suitable for embodiment in legislation. He hoped to incorporate the whole of this important matter in a special Finance Bill to be introduced before the next Budget date.

Purchase Rights

"Public Interests Threatened"

FURTHER criticism of the Joint Memorandum on electricity distribution which has been accepted by the I.M.E.A. is expressed in a report by the General Purposes Committee of the London and Home Counties J.E.A., presented at this week's meeting of the Authority.

A point particularly dealt with is the effect of the Memorandum on purchase rights. The proposals, it is stated, would render impracticable the exercise of such statutory rights held by the J.E.A. over a number of undertakings in the outer area of the London and Home Counties Electricity District, several of which mature in the immediate future. They would also, presumably, have the effect of preventing the transfer to the Authority of the electricity supply companies' undertakings within the County of London either at or before 1971, in pursuance of the provisions of the London Electricity (No. 1) and (No. 2) Acts, 1925. Local authorities throughout the country would be similarly prevented from exercising their rights of purchase. How seriously the public interests would be threatened by any attempt to give effect to these proposals, the Committee says, may to some extent be measured by the fact that approximately 1,250 local and public authorities—holding purchase rights probably considerably in excess of this number—would lose the power to exercise those rights. According to the latest available information (which may need correcting slightly on a present-day basis) from 40 to 45 per cent. of these statutory purchase rights of local and public Authorities may be exercised during the next five years, while within a period of ten years from the present time, about 50 per cent. of them may be exercised.

The Committee declares that possible solutions of the problem much more satisfactory from the point of view of the public interest than the recommendations of the Joint Memorandum have already been submitted to the appropriate Government Departments, and others are under discussion by responsible bodies.

In the Authority's district alone, about 80 local and public authorities (including the J.E.A.) would be prevented from exercising approximately 141 purchase rights. The proposals would therefore prevent the Authority from carrying forward its schemes for the effective exercise of such purchase rights, and the combined and progressive development of the undertakings, taken over, in accordance with schemes in which the Authority would actively co-operate with the local authorities concerned. It is recalled that this is the kind of development already carried out by the Authority in other parts of its district, which the McGowan Committee quoted as an example of the type of reorganisation which it recommended.

The Committee points out that the local authorities and public bodies possessing purchase rights over electricity supply undertakings were not consulted upon the proposals in the Joint Memorandum affecting such rights.

Forthcoming Events

Saturday, June 3rd.—*Cardiff.*—At South Wales Institute of Engineers, 4 p.m. Association of Mining Electrical and Mechanical Engineers (South Wales Branch). Annual general meeting.

Tuesday, June 6th.—*Coventry.*—At Corporation Electricity Showrooms. Coventry Electric Club. "The Stellar Universe and its Relation to Electricity," by Mr. V. A. S. Bradley (Post Office Engineering Department).

Tuesday, June 13th.—*London.*—Lighting Service Bureau, Savoy Hill, 6.15 p.m. A.S.E.E. Three winning papers in branch papers competition.

Wednesday, June 14th.—*London.*—I.E.E., 3.30 p.m. Measurements Section. Continued discussion on "The Consumer's Supply Control Unit of the Future and its Effect on the Design of the Electricity Meter." The meeting will be preceded by an informal Section luncheon to be held at the Connaught Rooms, Great Queen Street, at 12.30 for 1 p.m. (tickets 9s. 6d. each).

Monday, June 19th.—*Birmingham.*—Grand Hotel, 6 p.m. Birmingham Electric Club. "Modern Applications of Mercury Arc Rectifiers," by Mr. J. C. Milne.

Employment Policy

Government's White Paper

LAST week the Government issued its long-awaited "Employment Policy" in the form of a White Paper (Cmd. 6527, Stationery Office, 6d.) presented to Parliament by the Minister of Reconstruction. In a foreword it is pointed out that the maintenance of a high and stable level of employment depends as much on external as internal demand; the Government aims at creating favourable international conditions. There will be no problem of general unemployment immediately after the war, but there may be unemployment due to the dislocation involved in the gradual change from war to peace.

Chapter I outlines the international and industrial background and, while stating what the Government has done and is doing to ensure effective international collaboration, points out that it is with industry that the responsibility and initiative must rest for making the most of opportunities of recovering export markets and finding fresh outlets. There must also be a general steady progress in efficiency of production.

The transition will probably involve about seven millions of the 23 millions now in the forces and in gainful employment and this will be accompanied by a vast transformation in the nature of the demand for the products of labour.

Steps to Facilitate Transition

The change will not be so abrupt as after the last war and to reduce resulting unemployment to the minimum the Government is preparing to assist firms to switch over as quickly as possible; to find out where skilled labour will be most urgently required; to arrange for the allocation of labour and raw materials; to arrange that curtailment of munitions production shall take place in areas where the capacity and labour can be used for civilian products of high priority; to arrange that the disposal of surplus Government stocks shall not prejudice the re-establishment and development of normal trade channels; and to regulate the disposal of Government factories in such a way as to help in restoring employment.

To maintain price stability the public must support the Government in the continuation for a time of rationing and price control. The saving habit must still be encouraged and the use of capital will have to be controlled and directed.

Certain broad priorities in the allocation of materials and some measure of labour control will be essential for three reasons. First, export trade must be expanded and home demand must not be allowed to divert the resources needed for exports. Secondly, production for the home market must be directed primarily towards necessities and, thirdly, production of the capital goods necessary to re-start and re-equip industry at the highest pitch of efficiency must be rapidly expanded.

Siting of New Factories

It is aimed at securing a balanced distribution of industry and labour to guard against localised unemployment in particular industries and areas. This will be done by so influencing the location of new enterprises as to diversify the industrial composition of areas; by removing obstacles to the transfer of workers from one area or one occupation to another; and by providing training facilities to fit workers from declining industries for jobs in expanding industries.

Control and influence will be exercised to secure the most favourable siting of new factories and priority will be given in development areas to the building of new factories or the extension of existing ones. The Government will continue and extend the policy of erecting in development areas factories on individual or collective sites, for sale or lease, including factories which can be rented in sections. Financial assistance will be afforded to concerns which conform to the Government's policy and show good prospects of commercial success.

The training of workers will generally be left in the hands of the employers, but, to meet cases in which training can better be given in separate schools or institutions, facilities for this will be developed and extended.

It is considered essential to the securing of full employment that the total public and private expenditure on goods and services should be maintained and methods of ensuring this are set out. They comprise monetary control; the encouragement of privately-owned enterprises to plan their capital expenditure in conformity with a general stabilisation policy; the use of public investment as an instrument of employment policy; the adjustment of consumption expenditure by varying social insurance contributions; and an endeavour to secure Budget equilibrium.

In practice the policy will involve the establishment of a permanent central staff qualified to measure and analyse economic trends and submit appreciations of them to the Ministers concerned. There must also be regular collection of statistics, including an annual census of production for the main groups of industries.

Future Electrical Service

Rural Problems Not Insuperable

THE very important part electricity supply will play in the post-war world was emphasised by MR. E. E. HOADLEY last week in an address to the Town and Country Planning Association. Taking as his subject "Electricity Service after the War," Mr. Hoadley said that the electrical industry must go all out for betterment of living conditions. There was no denying that many housewives were living and working in conditions which men would not tolerate. A lavish supply of electricity all over the country would do much to ameliorate the position. The availability of electricity would also help to improve conditions in factory districts by making it possible to establish light industries in rural areas without damaging amenities.

Voltage Standardisation

Turning to the question of improvements that might be made in electricity supply, Mr. Hoadley declared that there was not much wrong with the existing system. He hoped that the service would never be nationalised; in fact, it would be ludicrous to nationalise electricity without the other two fuel industries, coal and gas. There were, however, certain anomalies that required straightening out. Some years ago £25 million had been found by the electricity supply industry for the standardisation of frequency. What was to stop the industry from spending £17½ million to standardise the pressure throughout the country? A standard voltage would simplify and cheapen manufacture of apparatus considerably and it would save consumers having to change equipment on moving from one district to another.

A universal form of tariff was another thing that was very desirable, and it should be as simple as possible so that consumers could understand it without difficulty. There should be a very large expansion of electricity supply to rural areas and from his own experiences at Maidstone he thought that if the matter were tackled boldly there was no reason why it should not be an economic proposition. Seven years after his undertaking had obtained a Special Order to supply twenty-six parishes, supplies had been given to every one and after ten years the whole area was remunerative. The tariff was only 10 per cent. above that in Maidstone and after the war it might well be made the same.

The supply industry had to deal with the problem on very much broader lines after the war and must adopt the attitude that what was lost on the swings was made up on the roundabouts. It was wrong to regard each rural development scheme from the aspect of "How much are we going to lose?" Undertakings spent money regularly on publicity. Was not the bringing of electricity to the countryside one of the best forms of publicity?

Reasonable Rural Charges

Indicating how the supply industry had grown in the ten years from 1928 to 1938, Mr. Hoadley said that capital invested had increased from £270 million to £560 million, the number of consumers from just over 2½ million to just under 10 million and kWh sold from 7,000 million to 19,000 million. He said that the charges for electricity supplied to rural areas must be such that consumers living there could afford to use electricity liberally. The more electricity was used the cheaper it became and the cheaper it was the more uses to which it could be put.

An investigation into the requirements of three million women disclosed an overwhelming demand for electricity and for constant hot water. They wanted to be able to use the labour-saving apparatus that only electricity could operate. It must be the aim of the electrical industry to give consumers what they wanted and the more their desires were consulted the more prosperous the industry would become. Manufacturers must play their part by studying the public and by standardising the main designs of their products so as to secure interchangeability of all working parts. There should be a single plug suitable for every type of apparatus and it should not be necessary to nearly stand on one's head to put it in its socket.

Replying to a question on the practicability of having power stations sited close to mines so as to avoid the transport of coal, Mr. Hoadley said that the difficulty was that a large station would very quickly consume all the coal available there. On the risk of failure of electricity in an all-electric home, he pointed out that in all the "blitzes" the longest time for which any town was without electricity was 54 hours and there the plant was practically obliterated.

Scientific Workers

THE Association of Scientific Workers has signed an agreement with the Engineering and Allied Employers' National Federation, by which the engineering employers recognise the Association as the body to represent scientific and technical staff in the industry. The Association now has 15,000 members.

ELECTRICITY SUPPLY

Choice of Service. Southend's Post-War Plans.

Airdrie (Lanarkshire). — COOKING IN COUNCIL HOUSES.—The Housing and Town Planning Committee is considering a proposal for providing municipal houses with all-electric service. At the last meeting of the Committee a letter was read from the Clyde Valley Electrical Power Co. pointing out that the Scottish Housing Advisory Committee had found that electric cookers were very popular with working class tenants. Referring to the existing all-electric Council houses, it was stated that the amount paid per annum for an "all-electric" service varied in different schemes but the average for all schemes was £6 1s. per house for 1942 and the average all-in rate approximately ¼d. per kWh. The Committee agreed to recommend that the gas manager should be instructed to report as to the advantages of continuing to pipe the houses for gas for cooking as against electricity so that consideration might be given to the type of service to be used.

Chesterfield. — COMPANY'S APPLICATION OPPOSED.—In connection with the application to the Electricity Commissioners by the Derbyshire and Nottinghamshire Power Company, seeking to extend the company's area of distribution in North-East Derbyshire, Chesterfield Corporation, Chesterfield Rural District Council and Bolsover and Staveley Urban District Council have joined together to oppose the scheme and are to engage consultants to advise them on the technical and legal problems involved.

Clitheroe.—RURAL DEVELOPMENT.—The Electricity Committee, after considering the future policy of the undertaking, has decided that the Council should, as far as possible, proceed with development in rural areas.

Cupar (Fife).—PUBLIC LIGHTING.—When the Town Council at its last meeting discussed street lighting Bailie Walker said that an argument put forward in Committee that only gas should be used was all wrong. It was agreed that the town clerk should write to the Fife Electric Power Co. to inquire whether it would be in a position to give a supply.

Glasgow.—PUMPING PLANT.—Some time ago the Water Committee decided to install electrically driven pumps in substitution for the existing coal-fired boilers and steam pumps at the hydraulic station. It has been informed, however, that the Secretary of the Department of Health for Scotland is unable to issue the desired consent to the purchase of pumps and to the work of installation, but that he would be prepared to consider, as an alternative to the proposal to install new electrically driven pumps the conversion of the existing pumps to electric drive. The Committee has appointed two members, together with the water engineer and the general manager of the Electricity Department to meet the Secretary of State for Scotland to discuss the matter.

SCHOOL HEATING.—The Education Committee has authorised the directors to obtain tenders for a new heating installation at Greenhead Special School at an approximate cost of £870.

Guildford.—CONTINUOUS METER READING.—Having considered a report by the borough electrical engineer the Electricity Committee recommends the adoption of the continuous system of meter reading. Mr. Affleck said he was entirely satisfied that the system of continuous reading would definitely prove much more economical and certainly much more efficient than the present method.

Mansfield.—COST OF METERS.—Arising out of the estimates in connection with post-war works, the Electricity Committee has given consideration to the high cost of meters due to the extensive use of the prepayment type. The Committee decided that, in future, the practice of fixing two separate prepayment meters for lighting and heating should be discontinued and that where supplies for lighting and heating were required the consumers should be offered a supply under the rateable value tariff with one prepayment meter, or, alternatively, by quarterly accounts with two standard meters. It was further resolved that the present practice of collecting deposits from consumers taking a supply by ordinary meters should be discontinued except in special cases.

Northern Ireland.—PROPOSED CENTRAL AUTHORITY.—A series of discussions on post-war electricity supplies between the Ministry of Commerce and representatives of Belfast Corporation Electricity Committee has resulted in a memorandum being drafted by a sub-committee of the latter body for consideration by a special committee representative of the Ministry and the Corporation. This memorandum is stated to favour the various supply sources being treated as a whole, under a central authority. The memorandum is not in favour of the present system by which all electricity undertakings are supervised by the Ministry of Commerce, hence the recommendation of a central authority.

LOAN GUARANTEES.—According to the *Belfast Evening Telegraph* a statement issued by the Ministry of Finance shows that a guarantee of £900,000 has been given in respect of a loan raised by the Electricity Board for Northern Ireland up to March 31st, 1949. Guarantees amounting to £850,000 expired on March 31st last. Of guarantees in respect of loans amounting to £2,400,000 raised by the Electricity Board £1,958,634 was outstanding on March 31st.

Southend-on-Sea.—POST-WAR EXPENDITURE.—In reply to the inquiry by the Electricity Commissioners the borough electrical engineer (Mr. A. C. Johnson) estimates that in the five years following the end of the war deferred revenue expenditure of £10,000 and capital expenditure of £427,500 will have to be incurred. These estimates are made up as follows: Consumers' services, £54,000; meters, £14,000; consumers' apparatus and wiring, £250,000; high and low voltage mains, £46,000; transformer kiosks and equipment, £25,000; electricity showrooms, etc., £30,000; replacement of DC generators by alternators, £7,500; change of system of supply from DC to AC, £1,000.

Sources of Plastics

Great Britain's Situation

RAW materials upon which the plastics industry depend, with emphasis upon the fact that many can be produced in Great Britain, were the subject of a recent address by DR. W. J. WORBOYS (Imperial Chemical Industries, Ltd.) to the Institute of Plastics Industry.

The speaker pointed out that the industry embraced such widely different processes as chemical synthesis at pressures of the order of 1,000 atmospheres and at temperatures approaching minus 100 deg. C.; materials varied according to sectional needs (powders for compression and injection moulding, compounds for extrusion, wrought sheet, rods, tube for fabrication), most of them generally being organic chemicals, which Dr. Worboys proceeded to group according to sources.

Phenol, cresol and benzene were coal-tar distillation products; phenol, methanol, formaldehyde, urea and nitric acid were products of synthesised nitrogen, which itself was based on coal. Therefore their derivatives should be available in the required quantities and at prices that would enable Great Britain to compete anywhere in the world.

Carbide Production

But calcium carbide was the source of the acetylene needed for the vinyl group. Pre-war requirements were imported from Scandinavia and Canada where there was cheap water power. Two plants based on power generated from coal were now manufacturing in this country carbide from which vinyl resins were obtained. Without discussing the post-war economics of home-produced carbide, Dr. Worboys stressed the important influence that the price of coal exercised.

For those plastics at present being manufactured in Great Britain, the only truly non-indigenous substances were those based on alcohol made by the fermentation of molasses (acetic acid, acetone and ethylene), so that if this country wished to recover them from substitutes for molasses she must solve not inconsiderable technological problems of concentration and separation, if the ethylene was to be sufficiently cheap.

Many of the newer plastic materials (cross-linking resins) appearing on the American market and the wider range of plasticisers enjoyed in that country were based on less common derivatives of petroleum. But it must not be assumed that Great Britain's lack of oil would necessarily exclude her from new developments. Until recently, she had neglected her coal industry as a source of organic chemicals and Dr Worboys thought that really active work in that field would produce surprising results.

The largest tonnage of synthetic (rubber) polymer made to-day was not based on oil. In the United States and Russia substantial amounts of artificial rubber were made from alcohol rather than petroleum gases, although both those countries possessed oil.

Better Use of Coal

The conclusion Dr. Worboys drew was that so far as the synthesis of new polymers and interpolymers was concerned, development in this country should not be inhibited by any lack of suitable raw materials, but he urged that serious consideration should be given to coal as a source of organic chemicals.

Production costs would vary with the scale of operations as well as with the chemical route followed, but there were additional factors related to economic production.

First, raw material frequently represented only a small proportion of the total cost of the article finally sold to the public. Secondly, there was increasing evidence that purity of raw materials often had a profound effect on the course of polymerisation reactions and consequently on the properties of the resulting polymer. In certain cases it might mean that the cheapest source of a raw material was not always the best.

Dr. Worboys hesitated to prophesy what new plastic materials were likely to appear in the next few years, thinking they would very largely be complementary to existing ones. As an example he predicted that there would certainly be new fibre-forming polymers. From them fibres would be spun which, while they would certainly find some normal textile applications, would because of their specialised properties also find specialised and industrial applications. He considered that the plastics industry should make a substantial contribution towards the country's post-war export trade.

Venezuelan Telephone Shortage

A CARACAS *Reuter's Trade Service* report says that the Compania Nacional Telefones de Venezuela has addressed an urgent request for telephone equipments, spare parts, etc., to manufacturers in England, the United States and Canada. So far no supplies have reached the country and it is unlikely that any such orders will be executed before the end of the war. Owing to the extreme shortage of equipment and spare parts districts of Caracas are without telephone service and there are over 4,000 applications which cannot be dealt with.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

W. T. Henley's Telegraph Works Co., Ltd.—An increase in net profit from £331,379 to £354,566, after providing for taxation, is shown in the report for the past year. A sum of £50,000 is again transferred to war contingencies reserve, £13,247 (against nil) is reserved for special depreciation and obsolescence, and £10,000 (against nil) is put to the pension fund. After paying a final dividend of 10 per cent. with a cash bonus of 5 per cent. (maintaining the total distribution at 20 per cent. for the year), a balance of £402,475 (against £390,156) is carried forward.

The Electrical Finance & Securities Co., Ltd., is paying a final dividend of 6 per cent., with a bonus of 3½ per cent., making 13½ per cent. for the year, as compared with 12½ per cent. for 1943. The net profit rose from £62,093 to £68,184.

Callender's Cable & Construction Co., Ltd., is again paying a final dividend of 10 per cent., and a cash bonus of 5 per cent., making 20 per cent. for the year.

The River Plate Electricity & Other Securities Corporation reports a net revenue of £31,537 for 1943-44 (against £28,643). The final ordinary dividend is 5 per cent., again making 7 per cent. for the year.

The Skefko Ball Bearing Co., Ltd., reports net profits amounting to £178,081 for 1943, compared with £176,195 for the preceding year. A final dividend of 10⅛ per cent., tax free, is to be paid, again making 17½ per cent., tax free, for the year.

Crompton Parkinson, Ltd., announce the payment of an interim dividend of 7½ per cent. (same).

Siemens Bros. & Co., Ltd., are maintaining their ordinary dividend at 7½ per cent. for the past year.

Edmundsons Electricity Corporation, Ltd., is maintaining its final dividend at 3½ per cent., again making 6 per cent. for the year.

The B.E.T. Electric Supply Co., Ltd., is again paying 5 per cent. for the past year.

New Companies

Trafalgar Batteries, Ltd.—Private company. Registered May 18th. Capital, £1,000. Objects: To carry on the business of engineers' agents and merchants, manufacturers of, and dealers in, electrical accumulators and batteries, etc. Subscribers: J. Dootson, Grand Buildings, Trafalgar Square, W.C.2, and F. E. Smith, 38, Brompton Road, S.W.3. Secretary: F. E. Smith. Registered office: Grand Buildings, Trafalgar Square, W.C.2.

E. J. Munday (Electrical Accumulators), Ltd.—Private company. Registered May 18th. Capital, £1,000. Objects: To carry on the business of engineers' agents and merchants, manufacturers of, dealers in, and repairers of, accumulators, dynamos, batteries and electrical plant, etc. Subscribers: E. J. Munday, Station Road, Liss, Hants; and F. E. Smith, 38, Brompton Road, S.W.3. Registered office: Station Road, Liss, Hants.

Companies' Returns

Statements of Capital

Edward Wilcox & Co., Ltd.—Capital, £5,000 in 900 preference and 4,100 ordinary shares of £1. Return dated August 27th (filed December 1st). All shares taken up. £4,600 paid on 600 preference and 4,000 ordinary shares. £400 considered as paid on 300 preference and 100 ordinary shares. Mortgages and charges: £5,955 2s. 8d.

Increase of Capital

Ulvir, Ltd.—The nominal capital has been increased by the addition of £4,900, in £1 ordinary shares, beyond the registered capital of £100.

Receivers Appointed

Victor Battery Co., Ltd.—G. R. Lowe, River Plate House, Finsbury Circus, E.C.2, was appointed receiver on May 5th, under powers contained in debenture dated October 5th, 1943.

British Lion Battery Co., Ltd.—H. Zamit, 20, St. Mary's Grove, Canonbury, N.1, was appointed receiver on April 6th, under powers contained in instrument dated May 27th, 1943.

Liquidations

Notley Machine Tools, Ltd., 76, Petty France, Westminster.—First meetings held May 31st at Bankruptcy Buildings, Carey Street, London, W.C.2.

Princely Battery Co., Ltd., 99/103, Fonthill Road, London, N.4.—First meetings held June 1st at Bankruptcy Buildings, Carey Street, London, W.C.2.

Bankruptcies

F. E. V. Hooper, electrical engineer, 277, South Road, Walkley, Sheffield, and also carrying on business as "Hooper's Service Station," Walkley Road, Walkley.—Supplemental dividend of 6s. 10¾d. in the £ payable June 7th at 55, Queen Street, Sheffield.

H. Lee and **A. W. Verity,** trading as "Verity & Lee," electrical contractors, 143a, Leeds Road, Bradford.—First and final dividend of 4s. 4d. in the £ payable June 8th at the Official Receiver's Office, Hallfield Chambers, 71, Manningham Lane, Bradford.

H. Lee (separate estate).—First and final dividend of 4s. 4d. in the £ payable June 8th at the Official Receiver's Office, Bradford. Order made for discharge as from April 21st, 1944.

M. Skulnick, battery manufacturer, 83, Wellesley Court, Maida Vale.—Public examination June 20th, at Bankruptcy Buildings, Carey Street, London, W.C.2.

STOCKS AND SHARES

TUESDAY EVENING.

NOTWITHSTANDING the various handicaps and obstacles presented to Stock Exchange business, the volume of activity in the markets is by no means poor. In some directions a good deal of business goes on. The Whitsun holiday hardly diminished the flow of orders, nor does the ever-present expectation of invasion do more than place a check upon speculation. Even speculation is in evidence nowadays amongst, for instance, shipping and motor shares and, to a lesser extent, in the shares of companies connected with radio work, television being the name with which to conjure.

Home Rails Quiet

The tightening of the ban upon railway travelling, with its suspension of a good many trains, had no effect, of course, upon stocks and shares in the Home Railway market. Prices are maintained, Transport "C" for example being 72 and Southern Railway preferred 79. The fall of 2¼ points last week in Southern Railway preference, an unusually large movement for a trustee security, brought in a few buyers, but without, however, altering the nominal quotation of 117½. Presumably some of the people who bought the stock lower down were not averse from taking their profit. Hopes of the Government consenting to modify its bargain with the railway companies are still alive.

Price Fluctuations

Northmet Power ordinary, with a rise of 6d. to 29s. are the only shares in our list of thirty-three Home issues to show any quotable change this week. In the overseas group, Montreal Power and Shawinigan Power are better by a dollar and half a dollar, respectively. Atlas Electric are beginning to creep up again, showing, at 6s. 9d., a gain of 6d. Opposite movements in Anglo-American Telegraphs, the preferred being down 10s. and the deferred up £1, have the curious result of giving the deferred a lower yield than its senior, although the relative dividends are alike. Calcutta Trams are another 1s. higher at 39s. 6d. and Calcutta Electric Supply retain last week's advance to 38s. Oriental Telephones have risen 1s. 6d. to 46s. 6d. A rise of 25 points lifted British Electric Traction deferred to 1185 ex dividend. Thomas Tillings are changing hands freely up to 60s.

Equipment and Manufacturing

The keenness of appetite for good-class industrial ordinary shares is plainly observable in the improved prices of electrical manufacturing and equipment companies. Ever Ready at 42s. 9d. and Lancashire Dynamo at 97s. are both 1s. 9d. better. Chloride Electrical Storage have put on 2s. 6d., at 4¼. British Insulated, Callender's, Ericsson Telephones, Telegraph Condensers, Enfield Cables, Revo, Reyrolle and Siemens are amongst those with gains to their credit this week. Henley's at 26s. 9d. are unchanged upon the maintenance of the 20 per cent. dividend for the year. Tube Investments recovered the deducted dividend. Mather & Platt fell a florin last week and have now regained it. Metal Industries are 1s. higher at 48s. 6d. and English Electrics are 1s. up at 51s. 6d.; De la Rue are higher at 9⅛.

Speculation is mostly concerned, at the moment, with shipping companies' shares, but the radio group is not excluded from attention. Philco is the centre of considerable dealings. The price rose to 15s. before easing off a trifle. Pye deferred at 27s. 9d. are slightly better. E.M.I. hardened to 31s., and A. C. Cossor at 25s. 6d. are 6d. higher.

Demand for Ordinary Shares

The list of ordinary shares in commercial and industrial companies is the subject of the investor's unceasing examination. There is plenty of money about, available for investment purposes. Not all of the capital realised by the recent repayment of Conversion Fives has yet found a permanent home, and for that portion of the money which is not already earmarked for subscription to national war issues, the ordinary shares of front-rank industrial companies are the object of attention. Last week a line of Johnson & Phillips ordinary shares came on offer at 74s. 3d. The majority of the shares have already been taken, and in amounts ranging from 50 up to 1,000, most of the bargains being nearer the former figure. These shares yield 4 per cent. on the money at the present price, and by comparison with some of the other gilt-edged stocks in the same group, are relatively cheap. Henley's, British Insulated and Callender's all return about 3¾ per cent. There has been further demand for Consolidated Signals, and, allowing for the rise in price to 6½, the return is £4. 4s. 6d. per cent. on the money, while Westinghouse Brake give barely 3¾ per cent.

G.E.C.

This same rate, 3¾ per cent., is available from General Electric ordinary at their advanced price of 93s. 9d. The dividend is declared, as a rule, early in July and the market anticipates a repetition of last year's 17½ per cent.; that is, 3s. 6d. per share, less tax. Lord Hirst, the late chairman, was known to favour conservative views. There is mild speculation at the present time whether his successor in the chairmanship of the company will be willing to restore the dividend to the 20 per cent. that used to be

(*Continued on page* 792)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend Previous	Dividend Last	Middle Price May 30	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies					
Bournemouth and Poole	12½	12½	60/6	..	4 2 8
British Power and Light	7	7	33/–	..	4 4 10
City of London	7	5½	28/–	..	3 18 7
Clyde Valley	8	8	41/6	..	3 17 0
County of London	8	8	41/–	..	3 18 0
Edmundsons:					
7% Pref.	7	7	34/6	..	4 1 4
Ord.	6	6	29/–	..	4 2 9
Elec.Dis.Yorkshire	9	9	45/6	..	3 19 6
Elec. Fin. and Securities	12½	12½	55/–	..	4 11 0
Elec. Supply Corporation	10	10	46/6	..	4 6 0
Isle of Thanet	Nil	Nil	18/–	..	—
Lancs. Light and Power	7½	7½	36/–	..	4 3 4
Llanelly Elec.	6	6	26/–	..	4 12 4
Lond.Assoc.Electric	3	4	22/6	..	3 8 1
London Electric	6	6	28/–	..	4 5 9
LondonPowerRed. Deb.	5	5	104½	..	4 14 7
Metropolitan E.S.	8	8	40/–	..	4 0 0
Midland Counties	8	8	40/6	..	3 19 0
Mid. Elec. Power	9	9	44/–	..	4 1 9
Newcastle Elec...	7	7	30/6	..	4 12 0
North Eastern Elec.:					
Ordinary	7	7	33/6	..	4 3 7
7% Pref.	7	7	35/–	..	4 0 0
Northampton	10	10	48/–	..	4 3 4
Notting Hill 6% Pref. (£10)	6	Nil	11	..	—
Northmet Power:					
Ordinary	7	7	39/–	+6d.	3 11 9
6% Pref.	6	6	30/6	..	3 18 8
Richmond Elec.	6	6	25/6	..	4 14 1
Scottish Power	8	8	40/–	..	4 0 0
Southern Areas	5	5	23/–	..	4 7 0
South London	7	7	28/–	..	5 0 0
West Devon	5	5	23/6	..	4 5 1
West Glos.	4½	3½	24/6	..	2 17 4
Yorkshire Elec...	8	8	43/–	..	3 14 5
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	6/9	+6d.	—
Calcutta Elec.	6*	6*	38/–	..	3 3 2
Cawnpore Elec...	10	10	35/–	..	5 14 3
East African Power	7	7	33/–	..	4 4 10
Jerusalem Elec...	7	5	28/6	..	3 10 2
Kalgoorlie (10/–)	5	5	10/–	..	5 0 0
Madras Elec.	4*	Nil	23/–	..	—
Montreal Power	1½	1½	24	+1	6 5 0
PalestineElec."A"	4*	5*	41/–	..	2 8 9
Perak Hydro-elec.	6	7	10/–	..	—
ShawiniganPower	83cts.	90cts.	15½	+½	—
Tokyo Elec. 6%	6	6	15	..	—
VictoriaFallsPower	15	15	4½	..	3 12 7
WhitehallInv.Pref.	—	6	24/–	+6d.	5 0 0

Company	Dividend Previous	Dividend Last	Middle Price May 30	Rise or Fall	Yield p.c. £ s. d.
Public Boards					
Central Electricity:					
1955–60 (Civil Defence)	3	3	100	..	3 0 0
1955–75	5	5	115	..	4 7 0
1951–73	4½	4½	107	..	4 4 1
1963–93	3½	3½	103½	..	3 7 8
1974–94	3½	3½	100	..	3 5 0
London Elec.Trans. Ltd.	2½	2½	97	..	2 11 3
London & Home Counties1955–75	4½	4½	113	..	3 19 8
Lond.Pass.Trans.:					
A	4½	4½	122½	..	3 13 6
B	5	5	122½	..	4 1 8
C	3	3½	72	..	4 10 3
WestMidlandsJ.E.A. 1948–68	5	5	108½	..	4 12 4
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	120½	–½	4 19 7
Def.	1½	1½	31	+1	4 16 9
Anglo-Portuguese	8	8	26/–	..	6 3 1
Cable & Wireless:					
5½ Pref.	5½	5½	113½	..	4 17 0
Ord.	4	4	82½	..	4 17 7
CanadianMarconi$1	Nil	4cts.	9/3	..	—
Globe Tel. & Tel.:					
Ord.	8½*	5*	39/6	..	2 10 8
Pref.	6	6	30/–	..	4 0 0
GreatNorthernTel. (£10)	Nil	Nil	21½	..	—
Inter. Tel. & Tel.	Nil	Nil	16	..	—
Marconi-Marine	7½	7½	34/–	..	4 8 3
Oriental Tel. Ord.	16	10	46/6	+1/6	—
Telephone Props.	6	Nil	17/–	..	—
Tele.Rentals (5/–)	10	10	12/–	+3d.	4 3 4
Traction and Transport					
Anglo-Arg.Trans.:					
First Pref. (£5)	Nil	Nil	2/6	..	—
4% Inc.	Nil	Nil	6	..	—
Brit.Elec.Traction:					
Def. Ord.	45	45	1185xd	+25	3 16 0
Pref. Ord.	8	8	175xd	+2	4 11 5
Bristol Trams	10	10	56/6	..	3 10 10
Brazil Traction	$1	$1¾	26½	–½	6 13 0
Calcutta Trams.	5½	6½	39/6	+1/–	3 5 10
Cape Elec. Trams	5	6	26/–	..	4 12 4
Lancs. Transport	10	10	45/6	..	4 8 0
Mexican Light:					
1st Bonds	5	5	103½	+1	4 16 7
Rio 5% Bonds	5	5	105½	..	4 14 9
Southern Rly.:					
5% Prefd.	5	5	79	..	6 6 7
5% Pref.	5	5	117½	..	4 5 1
T. Tilling	10	10	59/6	..	3 7 3
West Riding	10	10	44/6	..	4 10 0

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price May 30	Rise or Fall	Yield £ s. d.
Equipment and Manufacturing					
Aron.Elec.Ord. ..	10	15	60/–	..	5 0 0
Assoc. Elec. :					
Ord.	10	10	53/–	..	3 15 3
Pref.	8	8	39/6	..	4 1 0
AutomaticTel.&Tel.	12½	12½	67/–	..	3 14 9
Babcock & Wilcox	11	11	50/6	..	4 7 3
British Aluminium	10	10	47/6	..	4 4 1
British Insul.Ord.	20	20	5 1/16	+ 1/32	3 13 6
British Thermostat (5/–)	18½	18½	21/–	..	4 8 1
British Vac. Cleaner (5/–)	15	30	30/–	..	5 0 0
Brush Ord. (5/–)	8	9	9/–	..	5 0 0
Burco (5/–) ..	15	17½	15/6	..	5 13 0
Callender's ..	15	20	5 1/16	+ 1/16	3 15 6
ChlorideElec.Storage	15	15	82/6	+ ⅛	3 12 10
Cole, E. K. (5/–)	10	15	30/3	+3d.	2 9 7
ConsolidatedSignal	24	27½	6½	+ 1/16	4 4 6
Cossor, A. C. (5/–)	7½*	10*	25/6	+6d.	1 19 6
Crabtree (10/–) ..	17½	17½	38/–	..	4 12 1
Crompton Parkinson Ord. (5/–) ..	20	22½	30/6	..	3 14 9
E.M.I. (10/–) ..	6	8	31/–	+3d.	2 11 8
Elec. Construction	10	12½	52/–	..	4 16 2
Enfield Cable Ord.	12½	12½	56/6	+6d.	4 8 6
English Electric	10	10	51/6	+1/–	3 18 0
EnsignLamps (5/–)	25	15	21/3	..	3 10 8
Ericsson Tel. (5/–)	22*	20*	56/3	+9d.	1 15 7
Ever Ready (5/–)	40	40	42/9	+1/9	4 13 7
Falk Stadelmann	7½	7½	33/6	..	4 9 7
Ferranti Pref. ..	7	7	30/–	..	4 13 4
G.E.C. :					
Pref.	6½	6½	34/–	..	3 16 6
Ord.	17½	17½	93/9	+9d.	3 14 9

Company	Dividend Previous	Dividend Last	Middle Price May 30	Rise or Fall	Yield £ s. d.
General Cable (5/–)	15	15	15/–	..	5 0 0
Greenwood&Batley	15	15	42/6	..	7 1 2
HallTelephone(10/–)	12½	12½	28/6	..	4 7 9
Henley's (5/–) ..	20	20	26/9	..	3 14 9
4½% Pref. ..	4½	4½	24/–	..	3 15 0
Hopkinsons ..	15	17½	66/3	..	5 5 8
India Rubber Pref.	5½	5½	23/6	..	4 13 9
Intl. Combustion	30	30	6½	..	4 12 4
Johnson & Phillips	15	15	74/–	–6d.	4 1 1
LancashireDynamo	22½	22½	97/–	+1/9	4 12 9
Laurence,Scott(5/–)	12½	12½	13/–	..	4 16 2
London Elec. Wire	7½	7½	39/–	..	3 17 0
Mather & Platt ..	10	10	52/–	+2/–	3 17 0
Metal Industries(B)	5	8	48/6	+1/–	3 6 1
Met. Elec.CablePref.	5½	5½	21/3	..	5 3 6
Murex	20	20	105/9	..	3 15 6
Pye Deferred (5/–)	25	25	27/9	+3d.	4 10 0
Revo (10/–) ..	17½	17½	42/6	+1/–	4 2 4
Reyrolle ..	12½	12½	70/6	+6d.	3 11 5
Siemens Ord. ..	7½	7½	33/6	+6d.	4 9 7
Strand Elec. (5/–)	7½	10	7/9	..	6 9 0
Switchgear & Cowans (5/–) ..	20	20	18/6	..	5 8 1
T.C.C. (10/–) ..	5	7½	22/6	+ 1/16	3 6 8
T.C. & M. ..	10	10	53/–	..	3 15 6
TelephoneMfg.(5/–)	9	9	11/6	+3d.	4 0 0
Thorn Elec. (5/–)	20	20	25/–	..	4 0 0
Tube Investments	20	20	97/–xd	+1/–	4 2 4
Vactric (5/–) ..	Nil	Nil	14/6	–3d.	—
Veritys (5/–) ..	7½	7½	7/6	..	5 0 0
WalsallConduits(4/–)	55	55	48/6	..	4 10 7
Ward & Goldstone (5/–)	20	20	26/9	..	3 15 6
WestinghouseBrake	12½	14	75/–	..	3 14 9
West, Allen (5/–)	7½	7½	7/3	..	5 3 5

* Dividends are paid free of Income Tax.

Stocks and Shares (*Continued from page* 790)

paid regularly before the war. The reduction to 17½ per cent. has been regarded in some quarters as a measure of finance as sound as it was austere.

Edmundsons Electricity

Edmundsons have declared a final dividend of 3½ per cent. for the year ended March 31st last on their £6¾ million ordinary stock. This makes 6 per cent. for the full year and continues the rate distributed annually since 1939. For the year ended March, 1938, the dividend was 9 per cent. and a capital bonus of 50 per cent. was given, so that the present-paid 6 per cent. on the increased capital is equivalent to the 9 per cent. which was paid previously.

The shares in days gone by provided a little speculation, but Edmundsons are now regarded as one of the sound industrial investments and the price rarely shows more than slight fluctuation. At the current 29s. the yield on the money comes to £4 2s. 9d. per cent. The price is almost the highest reached since the capital bonus distribution mentioned above. The company controls, or is financially interested in, electricity supply undertakings which are owned by associated companies. Edmundsons also carry on business as electrical engineers and contractors. The total issued capital is £8½ millions out of an authorised £11½ millions.

Electric Construction

The Electric Construction Co. makes up its accounts to the end of March; they usually appear early in July. On the assumption that the dividend will be maintained at the increased rate paid last year of 12½ per cent., the price of the shares keeps very firm at 52s. The company manufactures all types of electrical plant and equipment. The dividend record shows sharp variations. For the year ended March, 1935, the company paid 3½ per cent., doubled this in the next year, and raised it to 10 per cent. for 1937. There followed two years' dividends at 12½ per cent. per annum. Then came three years at 10 per cent. The present price of 52s. is the highest touched for some time and compares, at the other end of the scale, with 25s. in 1940 and 1941. Patents and goodwill stand in the balance sheet at £1.

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) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

AKTIEBOLAGET Elektrolux.—"Absorption refrigerating apparatus." 1142/43. January 26th, 1942. (561316.)

Akt.-Ges. Brown, Boveri & Cie.—"Ultra-high-frequency generators." 7404/41. February 28th, 1940. (561199). "Methods and means for combining or joining together metallic and ceramic bodies." 1596/42. February 14th, 1941. (561201.)

Automatic Telephone & Electric Co., Ltd., R. Taylor and G. T. Baker.—"Telephone systems." 15863. November 10th, 1942. (561276.)

British Insulated Cables, Ltd., and E. G. L. Roberts.—"Manufacture of electric insulated wires and cables." 595. January 12th, 1943. (561312.)

British Thomson-Houston Co., Ltd.—"Construction and manufacture of cathodes for electric discharge devices." 10560/42. July 29th, 1941. (561177.) "Synthetic resinous products." 982/42. January 28th, 1941. (561232.) "High-frequency antenna systems." 16196/42. November 15th, 1941. (561251.) "Resinous condensation products." 8210/42. June 18th, 1941. (561327.)

British Thomson-Houston Co., Ltd. (General Electric Co.).—"Temperature conditioning apparatus." 18512. December 30th, 1942. (Convention date not granted). (561195.) "Television." 10946. August 5th, 1942. (561209.)

J. H. Cozens and Telegraph Condenser Co., Ltd.—"Electrical condensers." 2553. February 16th, 1943. (561258.)

L. W. C. Edwards.—"Bi-metallic heat-measuring, indicating or controlling devices." 17845. December 15th, 1942. (561287.)

C. H. Flurscheim and Metropolitan-Vickers Electrical Co., Ltd.—"Air-or gas-blast electric switches." 10683. July 30th, 1942. (561178.)

Foster Transformers & Switchgear, Ltd., and R. G. Lowe.—"Electrical fuse-switches, combined switch-fuses, distribution fuses, cut-outs, and the like." 16090. November 13th, 1942. (561278.)

G. R. Fountain, Ltd., H. J. Houlgate and G. C. Wheeler.—"Apparatus for generating electric signals." 15558. November 4th, 1942. (561304.) "Frequency modulating arrangements." 20359/43. November 4th, 1942. (Divided out of 561304.) (561322.)

H. Hyman.—"Portable electric flashlights." 448/42. February 8th, 1941. (561292). "Portable electric flashlights." 8499/43. February 8th, 1941. (Divided out of 561292.) (561320.)

G. Kent, Ltd.—"Electrical measuring system." 14090/42. February 19th, 1942. (561269.)

W. Partington and Metropolitan-Vickers Electrical Co., Ltd.—"Dynamo-electric machines." 18435. December 28th, 1942. (561289.)

Patelhold Patentverwertungs & Elektro-Holding Akt.-Ges.—"Arrangements for the frequency modulation of a high-frequency oscillation." 14016/42. October 28th, 1941. (561323.)

Siemens Electric Lamps & Supplies, Ltd., and J. N. Aldington.—"Metal vapour electric discharge lamps." 16606. November 24th, 1942. (561282.)

Siemens' Electric Lamps & Supplies, Ltd., J. N. Aldington and A. J. Meadowcroft.—"Metal vapour electric discharge lamps." 16605. November 24th, 1942. (561281.)

P. A. Sporing and Telegraph Condenser Co., Ltd.—"Tubular containers for electrical condensers or other apparatus." 16133. November 14th, 1942. (561279.)

Standard Telephones & Cables, Ltd., and L. J. Heaton-Armstrong.—"Antenna systems for defining a blind approach path." 15893. November 10th, 1942. (561277.)

D. & J. Tullis, Ltd., and R. Wilson.—"Ironing machines." 13987. October 6th, 1942. (561268.)

Westinghouse Electric International Co.—"Elevator control systems." 11093/42. September 4th, 1941. (561264.)

TRADE MARK APPLICATIONS

APPLICATIONS have been made for the following British trade marks. Objections may be entered within a month from May 24th :—

AUTAC. No. 626,798, Class 7. Various items, including electric motors (not for land vehicles), dynamos, magnetos, carbon brushes (electric), and sparking plugs.—Associated Automotive Supplies, Ltd., Phipps Lane, Burtonwood, Warrington, Lancs.

DURITE. No. 627,401, Class 9. Lids for electric batteries and stoppers therefor.—Gordon Equipments, Ltd., 161, Queen's Road, Buckhurst Hill, Essex.

REFLUX. No. 627,491, Class 17. Insulating varnish and insulating materials.—Pinchin Johnson & Co., Ltd., 4, Carlton Gardens, London, S.W.1.

SABAVAR. No. 627,742, Class 17. Synthetic resin varnish for electrical insulation purposes.—Joseph Sankey & Sons, Ltd., Albert Street, Bilston, Staffs.

INFORMATION DEPARTMENT

GENERAL 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 makers of the following :—

S.A.M. electric pump.

ZEDO electric pump.

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.

Dunfermline.—June 7th. Town Council. Various works, including electrical, in connection with extensions at Maternity Hospital. Schedules and forms from C. R. Douglas & Son, F.S.I., Prudential Chambers, East Port.

Greenock.—Corporation. Various works, including electrical, for 200 houses, Grieve Road. Schedules from Director of Housing, Municipal Buildings.

West Midlands.—Joint Electricity Authority. July 25th. Circulating water pumps and pump house. (May 19th.)

Orders Placed

Glasgow.—Municipal Transport Committee. Cable (£17,165).—Scottish Cables. Battery plates.—Edison Swan Electric Co.

London.—JOINT ELECTRICITY AUTHORITY.—Local Distribution Committee. Accepted. Kiosks (extension of contract for twelve months).—Crompton Parkinson.

Mansfield.—Electricity Committee. Accepted. 300-kVA transformer (£326).—British Electric Transformer Co.

Northumberland. — Education Committee. Accepted. Electric lighting and power installation at a central kitchen at Alnwick (£201).—I. & E. Morton. Similar work at East Chevington Red Row central kitchen (£234).—Gray Bros.

Smethwick.—Gas Committee. Accepted. Switchboard (£315).—G. W. Ellison. Portable electrically driven oxide disintegrator (£396).—Crone & Taylor, Ltd., St. Helens.

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.

Ancoats.—Works additions; J. Gerrard & Sons, Ltd., builders, Pendlebury Road, Swinton, Manchester.

Billericay.—Hutments, St. Andrews Hospital (£5,307); Pevitt Bros.

Birmingham.—Flats in Nechells and Dudleston districts; H. J. Manzoni, city engineer, The Council House.

Bishop's Castle.—Houses, Kerry Green and Corick's Meadow sites; A. B. Deakin, architect, Talbot Chambers, Shrewsbury.

Bolton.—Central school kitchen, north district; C. Herbert, borough engineer, Town Hall.

Bromsgrove.—Maternity and child welfare centre, West Heath Council Senior School site; Midland Building Trust, Ltd., builders, 388, Lodge Road, Winson Green, Birmingham, 18.

Chorlton-cum-Hardy.—Dairy, Brook Farm; C. Sunter, architect, 6, Meadowbank, Chorlton-cum-Hardy.

Croydon.—Nurses' training school; borough engineer.

Daventry.—Houses, Braunston Road site; A. J. Paxman, borough surveyor.

Essex.—Central kitchen, Ingatestone; remand home, Southend; dining hall, etc., Whitehall Road School, Chingford (£2,429); clinic, Tilbury.—County architect, Chelmsford.

Hillingdon.—Maternity department, Middlesex County Hospital (£5,197); W. S. Try, Ltd.

Hinckley.—Extensions and new nurses' home (£25,000); Col. E. C. Atkins, president, Hinckley and District Hospital, Hinckley.

Leyland.—Works canteen; Brook Mill (Leyland), Ltd.

Manchester.—Works additions, Hulme; Smith & Allcock, Ltd., builders, 471, Chester Road, Old Trafford.

Middlesex.—School huts at Harrow and Twickenham (£10,600), gauge inspection centre at Enfield Technical College (£2,000), and additions to Laleham House School, Staines (£2,625); county architect.

Oldham.—Works canteen; Iris Mill, Ltd., Hollins Road.

School kitchen, Werneth; G. E. Hardy, borough engineer, Municipal Offices, 75, Union Street.

Rochdale.—Extensions to Birch Hill Hospital; S. H. Morgan, borough surveyor, Town Hall.

Sedgley.—Extensions, safe works, Dudley Road; S. Cox & Sons, Ltd.

Smethwick.—Extensions, Dale Street works, Smethwick Laundry Co., Ltd.

Swansea.—Alterations, Landore; Welsh Boxes, Ltd.

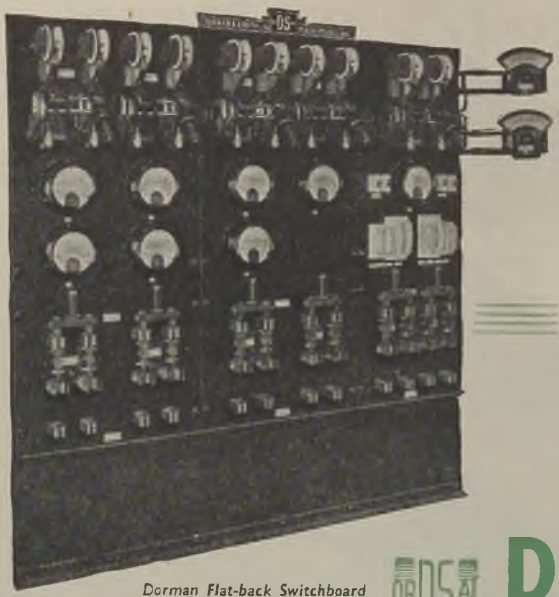
Tadcaster.—Houses; Needham and Thorpe, architects, 3, Duncombe Place, York.

Urmston.—Works extensions, including compressor house; Geigy Colour Co., Ltd.

Wakefield.—Extensions, Clayton Hospital and Wakefield Dispensary; secretary.

Palestine Development Plan

AN irrigation plan for Palestine comparing in size with the Boulder Dam in the United States is now being prepared by American scientists and engineers, the Commission on Palestine Surveys announced last week. The project, requiring a capital investment of £44,250,000 over a period of years, would mean the irrigation of 500,000 acres of arid and semi-arid land by diverting existing waters and creating a network of artificial streams, and the erection of hydro-electric power plants. It is estimated that the change-over in farming practice and development of cheap power would make it possible to double the present farm population of the country and double or treble the present total population.—*Reuter.*



Dorman Flat-back Switchboard recently installed in a large Industrial Undertaking.

It's Sixty Years Ago

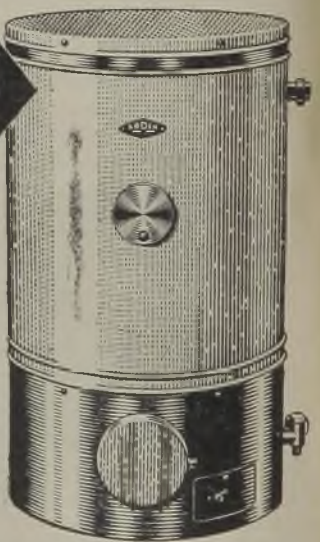
. . . since we built our first switchboard and the skill and experience gained over the years, the painstaking research and experiment we have made through the generations, are built into our products of to-day—reliable, efficient, distinctive . . . worthy products in the renowned Dorman tradition.

DORMAN
PRODUCTS

DORMAN & SMITH LTD. · MANCHESTER · LONDON · GLASGOW

ERIJ44

The post-war SADIA



In the near future, the housewife will demand hot water in any part of the house. The new SADIA Type UDB (Under Draining Board) is the reply to that demand. It combines two heaters into one.

(1) It provides hot water ready for use as required, whether it be a few gallons at the sink or a full bath.

(2) Simple to install: it can work with an existing hot water system.

(3) It can be placed "Under the Draining Board" or in a cupboard out of sight, saving space where space is valuable.

(4) It needs the minimum of maintenance: the SADIA once fitted can be forgotten.

(5) It is economical of current and therefore cheap to run. It has the highest efficiency yet attained in electric water heaters.

The SADIA Type UDB will be available in two sizes, 15 gallons and 20 gallons capacity, for installation in post-war homes. Write for further particulars.

At ½d. per unit it compares favourably with any other type of water heating.

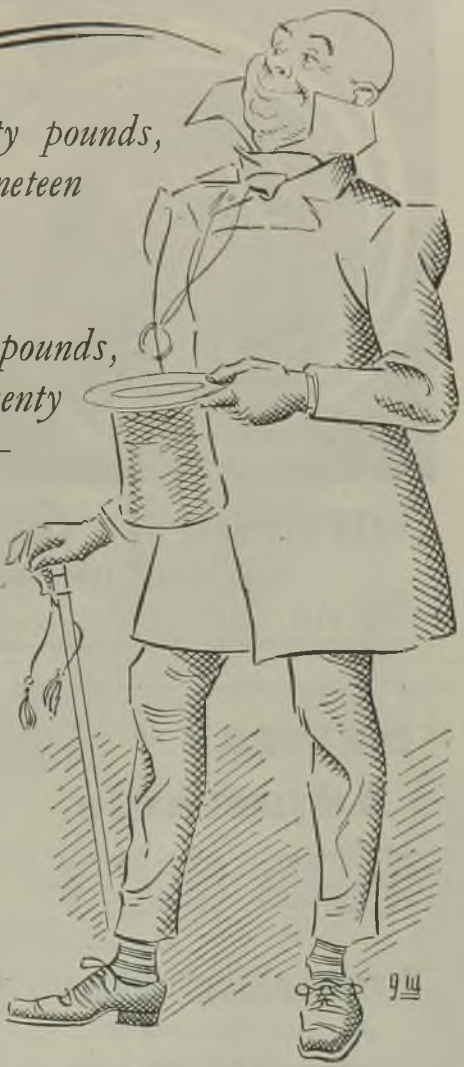
SADIA TYPE U.D.B.
AUTOMATIC ELECTRIC WATER HEATER

Aidas Electric Limited, Sadia Works, Rowdell Rd., Northolt, Middx. Phone: WAXlow 1607.

Scottish Agents: W. Brown & Co. (Engineers) Ltd., 89 Douglas Street, Glasgow, C.2.

"Annual income twenty pounds, annual expenditure nineteen nineteen six—result, happiness.

Annual income twenty pounds, annual expenditure twenty pounds ought and six—result, misery."



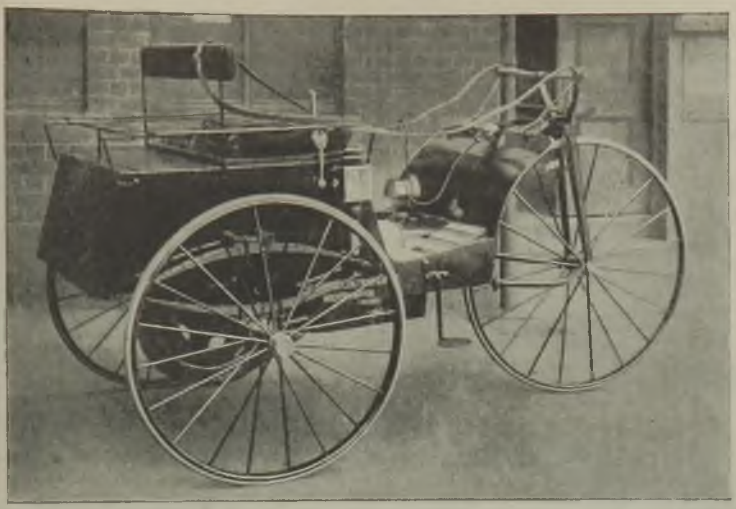
MR. MICAWBER'S irrepressible philosophy is equally applicable to the load on the network and its maximum demand rating. Off-peak load control will help you to sail as close to the wind, but on the side of happiness as it was Mr. Micawber's object to do.

D.C. BIAS SYSTEMS

FOR STREET LIGHTING AND OFF-PEAK LOAD CONTROL

Particulars gladly upon request.

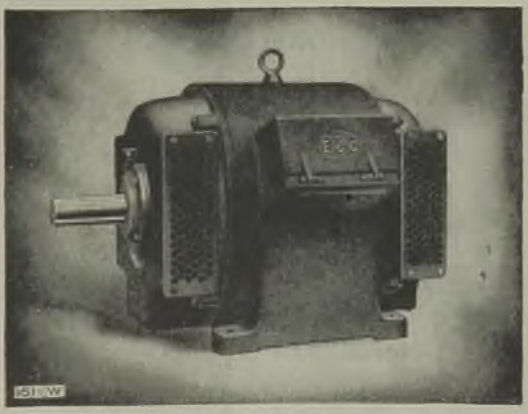
STANDARD TELEPHONES AND CABLES, LTD., NEW SOUTHGATE, LONDON, N.11. *'Phone: ENTerprise 1234*



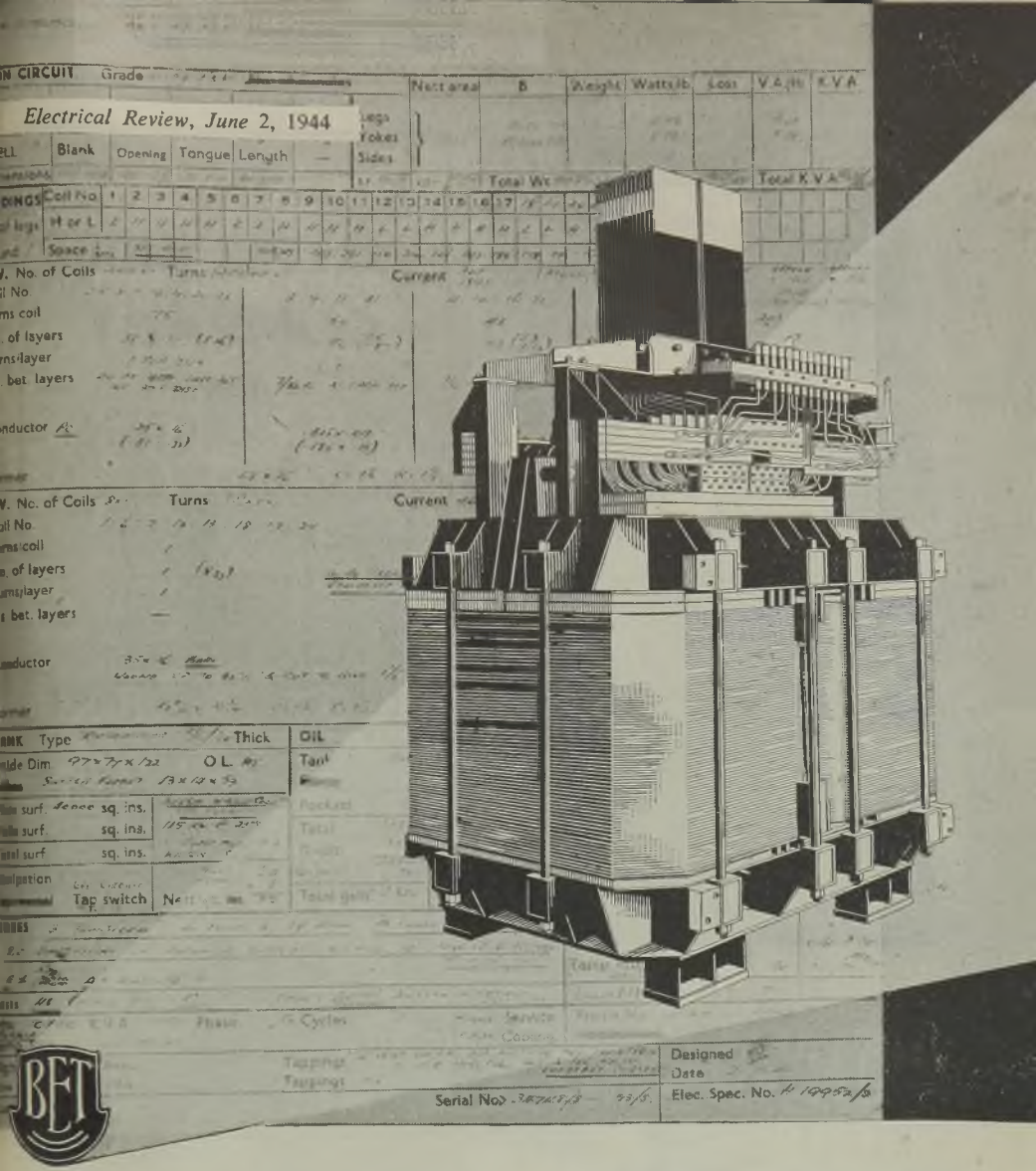
What has this to do with E.C.C.?

The Electric Construction Co. Ltd.

were the pioneers of many Electrical devices such as the electric dog-cart illustrated, built in 1896. Some of these inventions were handed to others for development. Many were retained by E.C.C. and made in thousands right up to the modern products in evidence to-day.



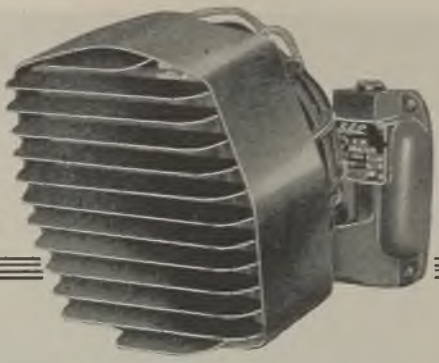
THE ELECTRIC CONSTRUCTION CO. LTD.
WOLVERHAMPTON



80,000 amps. for ARC FURNACE

Another example of B.E.T.'s technical resources. A 30,360 kVA 3-phase, 50 cycle, 33,000/220 volts O.F.W. cooled Furnace Transformer bank capable of an output of 80,000 ampères (one-phase shown). Three 3-phase banks have been supplied to one user.

The
British Electric Transformer
Company Limited
...ssociation with CROMPTON PARKINSON LIMITED



G.E.C. 2½ kW

ELECTRIC UNIT HEATERS

(Single phase A.C. only)

FOR INDUSTRIAL PURPOSES

The G.E.C. 5 to 20 kW range of Unit Heaters is serving industry well. But this new and smaller addition to the range is badly needed for numerous places where the larger units are rather too powerful.

The 2½ kW unit, like the larger ones, is simple to install, wholly economical and, further, is adjustable at will for direction of warm air flow. Vertical adjustment, below the horizontal is 45 degrees, and in the horizontal plane through 120 degrees. Warmth is directed just where it is wanted. The fixing bracket is part of the unit, which can be placed on any convenient wall or partition.

Weighing just 17 lb. and with overall dimensions approximately 9″ × 11¾″, the unit is unobtrusive and runs almost noiselessly. It is finished in metallic bronze cellulose.

This unit can be used with direct thermostatic control (needing no contactor) and the heater can be cut out and only the fan operated when desired.

WRITE for descriptive Leaflet No. HO.9615

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. 8 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.

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.

Original testimonials should not be sent with applications for employment.

SITUATIONS VACANT

None of the vacancies for women advertised in these columns relates to a woman between 18 and 41 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.

SUNDERLAND EDUCATION COMMITTEE

The Technical College

(Principal: F. H. Reid, B.Sc., Wh.Ex., M.I.Mech.E.)

APPLICATIONS are invited for the POST of LECTURER in the ELECTRICAL ENGINEERING Department, to commence duties in September, 1944. Salary: Burnham Technical Scale plus £52 War Bonus.

The commencing salary will include an allowance for approved industrial or professional experience (after the age of 21 years) up to seven years, or in special cases up to 10 years. An addition to the scale of £20 per annum will be paid, after 3 years' service, in respect of "special work of an advanced character."

The standard of the full-time day course is that required for an Honours degree and the evening courses are of Higher National Certificate standard.

Candidates must possess a good Honours degree in Engineering, or its equivalent, with qualifications in Electrical Machine Design, and should have had industrial and teaching experience. A knowledge of Telecommunications will be an advantage.

Forms of application and further particulars may be obtained by sending a stamped addressed envelope to The Registrar, Technical College, Sunderland. Applications should be returned to the undersigned not later than 17th June, 1944.

W. THOMPSON,
Director of Education.

Education Offices,
15, John Street,
Sunderland, co. Durham. 192

BOROUGH OF WIMBLEDON

Appointment of Borough Electrical Engineer

APPLICATIONS are invited for the above appointment from fully qualified Chartered Electrical Engineers. The salary to be paid is £2,000 per annum.

The person appointed will also be responsible for the installation and maintenance of Engineering Plant for other Departments of the Corporation, for which he will receive an additional salary of £250 per annum.

Candidates must have been engaged in the business of electricity supply for an extended period, and have had practical experience in the generation and distribution of electricity.

Form of application and conditions of appointment may be obtained from the undersigned. Last day for receipt of applications, Friday, 23rd June, 1944.

The person appointed will be required to take up his duties not later than 1st December, 1944.

Canvassing, either directly or indirectly, will disqualify.

EDWIN M. NEAVE.
Town Clerk.

Town Hall,
Wimbledon, S.W.19. 191

BOILER HOUSE ENGINEER

BOILER House Shift Engineer required in 94 M.W. Power Station to be responsible to the Charge Engineer for operation of H.P. water tube boilers, including combustion efficiency control. Experience of H.P. boiler control essential. Salary in accordance with N.J.B. Schedule, Class J, Grade 9, at present £372 per annum. Applications, giving details of qualifications and experience, to be addressed to the General Manager, Hull Corporation Electricity Department, Ferensway, Hull, not later than 9th June, 1944. 176

CLERK wanted by well-known electric motor repair firm in South London. Good salary and prospects to live and intelligent man.—Box 143, c/o The Electrical Review

DEPUTY Borough Electrical Engineer. Location: County Borough of St. Helens. Salary: In accordance with Class G, Grade 1, of the N.J.B. Schedule, commencing at £761 p.a. Candidates, who should preferably be not more than 45 years of age, should possess an Engineering Degree or its equivalent and also Corporate Membership of one of the leading Engineering Institutions. Thorough experience in generation, distribution and the commercial development of an electricity supply undertaking, owning a selected generating station, is essential, particularly in regard to the layout and erection of modern power station plant. The successful candidate will be required to pass a medical examination and contribute to the Council's superannuation scheme. Copies of not more than three testimonials are required. Applicants should write, quoting D.851XA, to the Ministry of Labour and National Service, Room 432, Alexandra House, Kingsway, London, W.C.2, for the necessary forms, which should be returned completed on or before 21st June, 1944. 198

DEPUTY Chief Engineer. Location, City of Manchester. Commencing salary £1,400 p.a. Applicants must be fully qualified Electrical Engineers with administrative experience (preferably in a large electricity undertaking). They must possess a wide knowledge of electrical and mechanical engineering practice, have held a position of high responsibility, and must be Corporate Members of the Institution of Electrical Engineers. The appointment will be subject to the City Council's Superannuation Scheme, and the successful applicant will be required to pass a medical examination. Copies of testimonials are required. Applicants should write, quoting D.834XA, to the Ministry of Labour and National Service, Room 432, Alexandra House, Kingsway, London, W.C.2, for the necessary forms, which should be returned completed on or before 21st June, 1944. 188

ELECTRICAL Engineers (London) require Sales Correspondent-Estimator for Electric Motors and Equipment. Good post-war prospects, commencing salary up to £350 p.a. Full details of age, education, training and experience to—Box 190, c/o The Electrical Review.

ELECTRICAL Wholesalers require Representative (S.E. London) with knowledge of electrical material and previous experience. Permanent promising position for keen man. Salary, commission and expenses.—Box 189, c/o The Electrical Review.

FEMALE Assistants required for the supervision of interesting statistical and technical work in an Electric Lamp Factory. At least secondary education and fair aptitude for simple calculations and record keeping desirable. Permanent and progressive positions with good post-war prospects are offered, but temporary services of really suitable applicants will be considered. Apply at once for particulars to—Cryselco Limited, Kempston Works, Bedford. Phone, Bedford 3277. 128

ELECTRICAL Wholesalers require a Clerical Assistant, conversant with trade and materials as handled.—Box 24, c/o The Electrical Review.

RELIEF Switchboard Attendant. Required, for power station in West Country, Switchboard Attendant, N.J.I.C. conditions. Zone "B." Present wage, 27.14d. per hour, rising to 28.09d. in immediate future. Candidate must be accustomed to synchronising and controlling large turbo-alternators and to grid operation. Position is permanent and pensionable to suitable man. Before applying, candidates should ascertain if release from present employment will be agreed to, if appointed.—Box 150, c/o The Electrical Review.

SALES Engineer, experienced, with good connections, required by manufacturers of first-class special transformers up to 1,000 kVA. Excellent post-war prospects for the right man.—Box 73, c/o The Electrical Review.

SALES Representative required for Yorkshire for Electrical Goods, by very old-established manufacturers and factors. Knowledge of all wiring supplies essential. Permanent and progressive situation. State age, experience and salary required. Replies confidential.—Box 187, c/o The Electrical Review.

SECRETARY required by General Manager of a firm of Electrical Engineers. Write, stating experience and salary required, to—Personnel Dept., British Electric Transformer Co. Ltd., Hayes, Middx. 202

SENIOR Clerk required by Electrical Manufacturing Company (Ealing district). Successful applicant will be appointed Cashier with control of small machine bookkeeping and wages staff. Permanent position carrying good salary will be paid to experienced, reliable man under 45 years of age. Write full details.—Box 201, c/o The Electrical Review.

WANTED, Experienced Buyer to take charge of London buying office for group of Eng. Cos. For first-class man, even part time at present considered. Applications to—Box 207, c/o The Electrical Review.

WELL-known West London firm requires services of two Electronic Engineers; must be fully conversant with high frequency electronic development. Location of work, London area. Permanent post, salary from £800 p.a., according to qualifications and experience. Applicants should write, quoting A.488XA, to the Ministry of Labour and National Service, Room 432, Alexandra House, Kingsway, London, W.C.2, for the necessary forms, which should be returned completed on or before 21st June, 1944. 194

APPOINTMENTS FILLED

Dissatisfaction 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.

SITUATIONS WANTED

COMPETENT Electrical Engineer, 24 years' commercial background, invalided from forces, not disabled, but pre-war activity curtailed through service, seeks permanent post as draughtsman and/or technical writer, or correspondent in publicity, sales or estimating dept., London area preferred. Sound administrator, well recommended, some journalistic experience, trained supply co. and manufacturer. Commencing salary £500 p.a.—Box 5927, c/o The Electrical Review.

ELECTRICAL and Mechanical Engineer (33), apprenticeship, sound experience electrical machinery, including design, production, repair and sales, seeks post with good firm, A.M.I.E.E.—Box 5892, c/o The Electrical Review.

ELECTRICAL and Refrigeration Engineer, A.M.I.I.A., M.R.S.E.S., at liberty to take post as business manager or partner for immediate activity.—Box 5906, c/o The Electrical Review.

ELECTRICAL Engineer (29), specialising in the design and manufacture of electrical measuring instruments and allied equipment, seeks to contact company who can offer a suitable field of activity; post-war, or possibly in the near future.—Box 5907, c/o The Electrical Review.

ELECTRICAL Engineer (49) desires position as representative or agent in London and Southern Counties, connection with Government departments, supply authorities and trade.—Box 5887, c/o The Electrical Review.

ELECTRICAL Supervisor (38), free, requires position. 24 years' experience, contracting, construction, planning, office routine, labour organising.—Box 5929, c/o The Electrical Review.

REPRESENTATIVE, good connection electrical contractors and wholesalers, etc., West of England, requires an additional line.—Box 5928, c/o The Electrical Review.

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61 AUTO TRANSFORMERS AND
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Particulars and form of tender from Mr. H. C. Lamb, Chief Engineer and Manager, Electricity Department, Town Hall, Manchester, 2.

Tenders to be delivered by 10 o'clock, a.m., on Tuesday, 13th June, 1944.

R. H. ADCOCK,
Town Clerk.

Town Hall,
Manchester, 2.
24th May, 1944. 199

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GUARANTEED HEAT GENERATORS.
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M.E.C. APPARATUS, DULL EMITTER SYSTEM.

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Electricity Department

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18/24, Lower Clapton Rd., E.5.
Tele.: AMHerst 2361.

Your offer to be made by letter addressed to:
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Hackney Borough Council,
Town Hall,
Hackney, E.8. 197

FOR SALE

150-kW Generating Set, comprising BELLISS & MORCOM 215-h.p. compound engine, steam 150 lbs., speed 450 r.p.m., direct coupled to 230-volt D.C. Generator by MATHER & PLATT, with control panel.

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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). 5881

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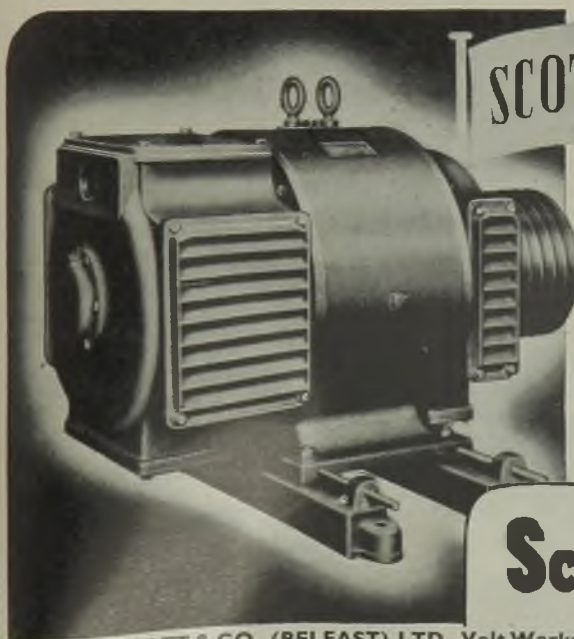

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The fact that goods made of raw materials in short supply owing to war conditions are advertised in this Journal should not be taken as an indication that they are necessarily available for export

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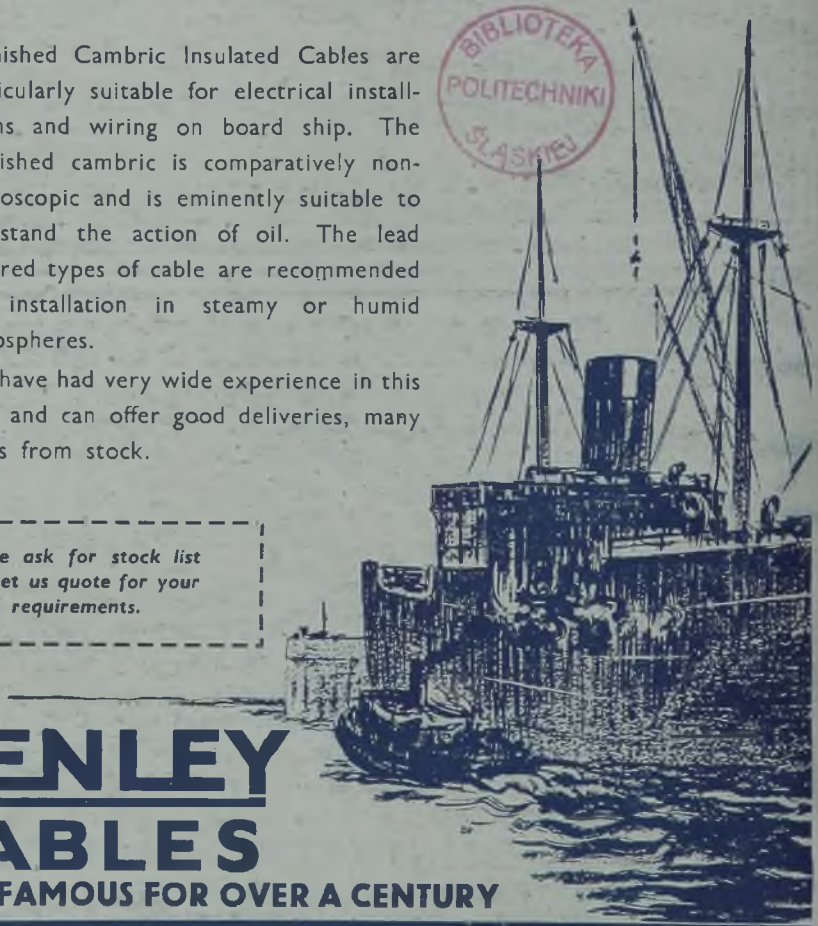

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