ELECTRICAL REVIEW

FOUNDED 1872

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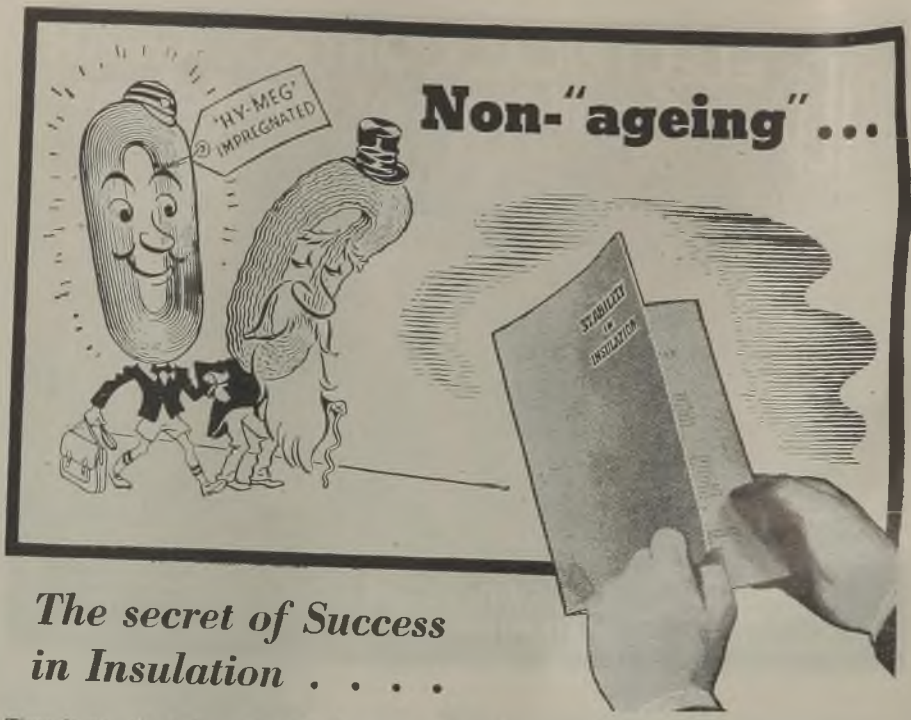

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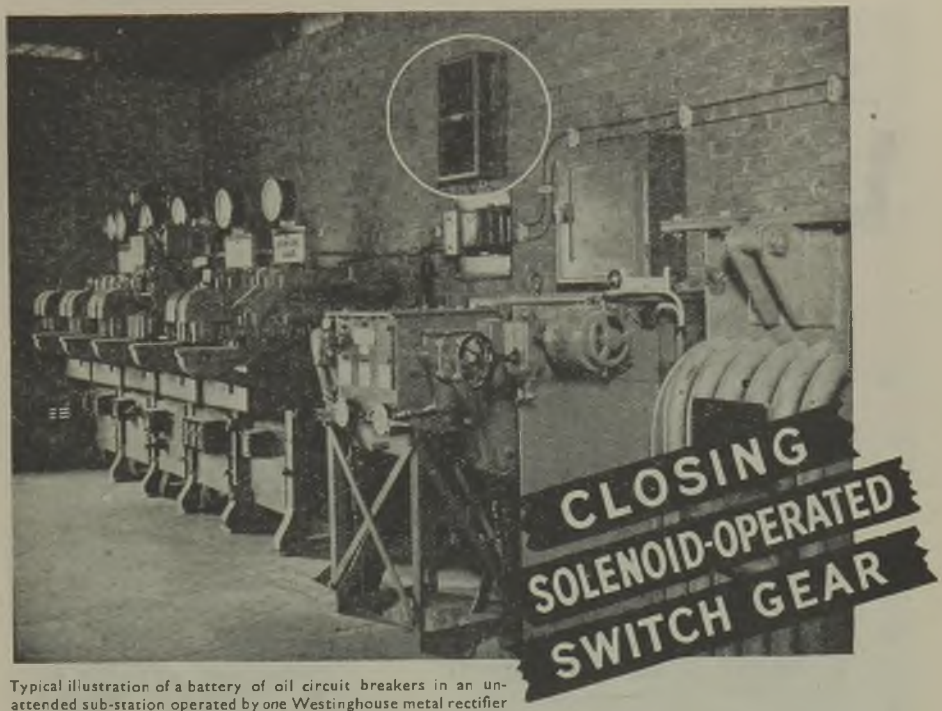

Typical illustration of a battery of oil circuit breakers in an unattended sub-station operated by one Westinghouse metal rectifier

Outstanding reliability and efficiency make Westinghouse Metal Rectifiers ideal for providing the direct current necessary to operate solenoids. Up to about ten switches may be operated from one rectifier, which, like the solenoids, is rated at 30 seconds per hour. A battery, trickle charged by a Westinghouse rectifier, can be used to trip the switches.

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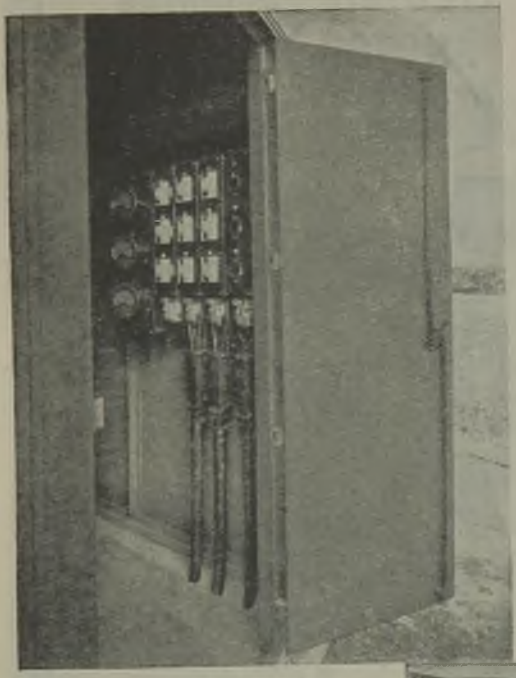


In addition to standard ranges of Henley Distribution Pillars and Panels, we can arrange for special assemblies to meet customers particular requirements. The Henley unit type construction is exceedingly flexible and by mounting meters, instrument panels, etc., on the same framework as the units themselves, space is saved and a neat layout is obtained.

On Left: A small substation panel fitted with bakelite shields and incorporating a meter panel. The units are of the HENLEY Dwarf Type.

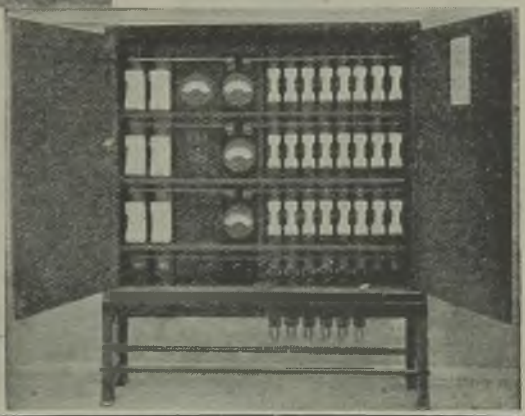
Below: A pillar assembly including two 500 amp. feeder units and eight 150 amp. distributor units, direct connected ammeter on each phase and voltmeter with selector switch for reading voltage on each phase.

HENLEY

UNIT TYPE

DISTRIBUTION PILLARS & PANELS

TRADE MARK



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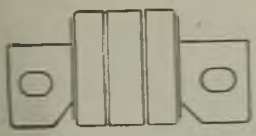

STANDARD

SLOTTED

FIXING CENTRES	CURRENT RATINGS	LIST No. PREFIX LETTERS
STANDARD		
3"	20A to 200A	J H
3¼"	20A to 400A	J P
3⅝"	20A to 600A	J S
SLOTTED		
3"	20A to 200A	96 T Y
3¼"	20A to 200A 250A & 300A 350A & 400A	95 T Y 95 T J 171 T N
3⅝"	20A to 300A 350A & 400A 450A to 600A	385 T J 386 T N 387 T W

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THE ENGLISH ELECTRIC COMPANY LTD.
— STAFFORD —

this change may take several seconds

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Osram

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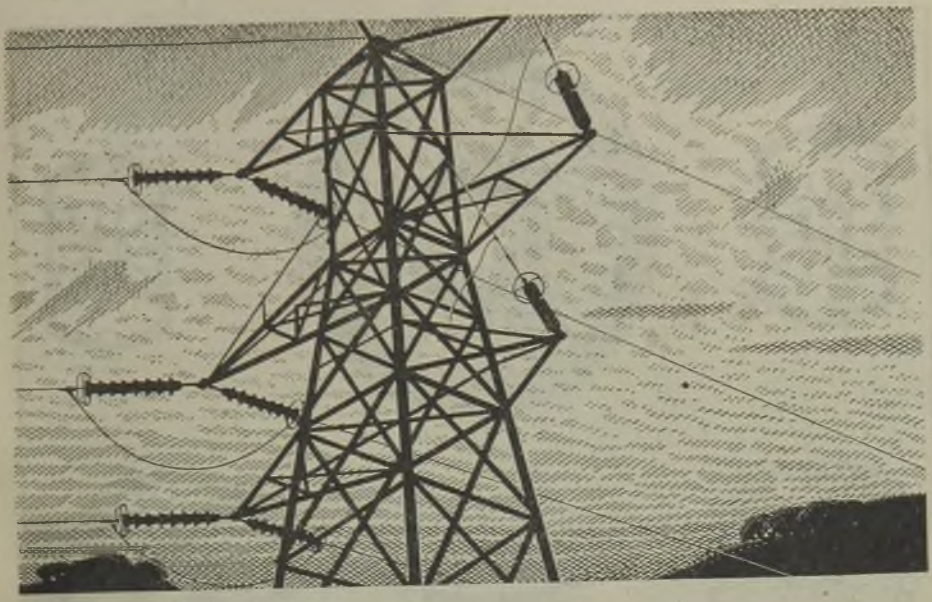
A G.E.C. PRODUCT



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After the war the young men and women who set up their homes will demand all the help electricity can give them. There are few places in this country where electricity is not available, so the millions of new houses that will be built will need millions of electrical installations.

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QUALITY IN QUANTITIES — In the self-contained M.E.M. factory electrical gear and equipment of high quality can be turned out in vast quantities at low cost. This is the New Craftsmanship which maintains high standards by good design and vigilant testing, at the same time cutting out waste by mechanisation and good management.

M.E.M. "Memroy" Switchfuse.

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ELECTRICAL REVIEW

September 22, 1944

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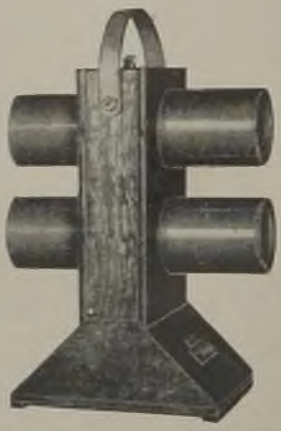

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXV. No. 3487. SEPTEMBER 22, 1944 9d. WEEKLY

Preventing Accidents

Lessons from Recent Industrial Mishaps

ALTHOUGH the number of accidents of electrical origin forms so minute a fraction (0·3 per cent.) of all those that occur in factories, it is as much to the advantage of electrical engineers as it is a part of their duty to the public to strive to eliminate them. Fear of shock or burns or of adding to fire hazards is a deterrent to the more widespread use of electrical appliances. Sometimes, more on emotional grounds than in accordance with statistical evidence, this has even led to the substitution of less suitable methods. The many indirect ways in which the use of electricity lessens dangers to life and limb—far more numerous than those in which it may add to them—is apt to be forgotten.

Neglect of Simple Precautions

Analysis of the extensive data collated by the Electrical Branch of the Factory Department, some particulars of which are included in this issue, shows the increase in the number of accidents during the past few years (an increase that is by no means incommensurate with war conditions of working, dilution of labour and shortage of skilled maintenance staff) to be due to trivial causes. Examples of these are neglect to provide and maintain efficient earth connections and simple but suitable protective gear, and failure to guard against contact with live metal.

Carelessness among unskilled and, more reprehensibly, skilled operatives has been responsible for most mishaps that are not traceable to defective maintenance. Lack of clarity in instructions, misuse of portable apparatus, and especially of its connections, and omitting to isolate switchgear before working on it are all too common occurrences. It is significant that in the majority of accidents in 1943 low voltages were involved, *i.e.* 250 V or less, indicating lack of understanding of the enhanced risks under conditions in which the contacts between the human body and earth may be of relatively large area and consequently of low resistance to the passage of current. Several victims of low-voltage shocks (none of which proved fatal) were restored only as a result of immediate and prolonged application of artificial respiration.

Makeshifts Must Go

Difficulties in the way of carrying out quantitative rather than merely visual tests and the keeping of proper records in present circumstances are obvious. It is to be hoped, however, that makeshifts now tolerated (and the habit of mind they engender) will not be allowed to continue after the cessation of hostilities, when considerable rewiring will no doubt be required as well as the making up of leeway in maintenance before many installations reach a reasonable standard of safety or even comply strictly with the Regulations.

With the introduction of new processes come new problems. In so far as these relate to design they would seem to offer little reason for concern. The most difficult are those presented by industrial gases, tests on which are now being carried out by the Electrical Research Association for the purpose of embodying in British Standards later. Yet, however good a design may be, the additional cost incurred

in making it flameproof, for example, is wasted unless the associated wiring and accessories possess similar qualities. The same principle applies in less complex cases. Safe operation and freedom from breakdown depends ultimately on the choice by managements of electrical engineers with the technical attainments and organising ability required to secure good plant-layout and maintenance systems.

I.M.E.A. Presidency

UNTIL quite recently the constitution of the I.M.E.A. was peculiar. Although local authority representatives were able to become members of the Council they were barred from the presidency, which from the beginning has always been occupied by an engineer. But a few months ago the articles of association were altered so as to remove this disability and, more recently, as an initial step towards the election of a "lay" president, Alderman W. Walker was appointed vice-president; in the natural order of things he should become president next June. Actually in Alderman Walker's case the distinction is without much difference, for although he is not an electricity supply engineer he is an electrical engineer with many years' association with the electricity supply industry. Thus it has been arranged that a change which some may regard as "revolutionary" will be made an easy transition.

Reorganisation Burden

THE period immediately ahead is likely to be even more strenuous for the I.M.E.A. president than the immediate past—which has been difficult enough. Mr. W. P. Lilwall, the present holder of the office, may not have to bear the main burden which any reorganisation scheme would impose, for it may be assumed that the Ministry of Fuel and Power cannot yet have a cut and dried plan ready. Or if it is cut and dried the present is not the most opportune time for its introduction. It seems possible, therefore, that it will fall to Alderman Walker to look after the interests of the municipal supply authorities when the upheaval really begins. With his knowledge of the industry and his experience on the Central Electricity Board (but now freed from his responsibilities in that direction) he is well equipped to handle the business.

Proposed Director

AT last year's annual meeting of the I.M.E.A. there was some discussion of the Council's proposal to appoint a director of the Association. It seemed then as if the Council desired to take early action in the matter but, probably on account of the nature of the discussion, it was generally understood that nothing could be done about it during the war. The subject was raised by a member at the Manchester meeting last week; he was informed by the president that the Council had not dropped the idea but it was difficult to find a suitable man for the job in wartime. It is still by no means clear what sort of a man the Association requires or hopes to engage. The Council itself contains a great variety of technical talent; if, on the other hand, the position is to be mainly a "political" one a post-war appointment will be rather too late to influence the trend of reorganisation in favour of the municipal authorities.

Electrical Publicity

A SERIES of slogans which aim at making people "electricity conscious" will shortly appear on poster sites throughout the greater part of the country, and they will also be seen in a number of London and provincial music halls and theatres. In this publicity scheme which the Electrical Development Association is undertaking fuel economy is not directly mentioned, but this aspect, which remains of immediate importance, is still to be underlined in the Association's national Press advertisements, and the two will no doubt be linked in the public mind. Another indication that E.D.A. is getting ready for a full-scale drive as soon as the time is opportune is that it has recommenced advertising in upwards of sixty professional and trade papers.

Entropy without Tears

FUEL efficiency bulletins giving admirably clear explanations of how steam works have been issued (free) from time to time by the Ministry of Fuel and Power. As a sequel to No. 25 (referred to in a recent issue), which described the effects of adding or subtracting heat to or from water or steam on the basis of molecular energy, comes No. 33, which deals with steam for power production on similarly scientific yet simple lines and includes an introduction to the

Mollier diagram without mathematics beyond elementary arithmetic. Another bulletin now available (No. 34), with a more limited range, that of the efficient operation of steam engines, possesses the same merits of lucid presentation. These publications should encourage a general improvement in fuel economy.

Underground Gasification

ALTHOUGH it would be possible to obtain gas from the collieries without the expenditure of labour in hewing coal and raising it to the surface, no process yet devised appears to give promise of economic results. A corrective to undue optimism is to be found in a contribution by Dr. G. E. Foxwell to the *Iron and Coal Trades Review*, in which it is shown that, whatever the potentialities might be in the application of the principle to poor or thin seams, underground gasification would be a most inefficient substitute for present methods of securing the heat value of coal of the kind now regarded as worth mining.

Gas for Power Stations

INVESTIGATIONS carried out in the U.S.S.R. indicate that gas obtained from carbonisation below ground has a very low calorific value and that three to five times as much coal is consumed as is turned into gas. For some purposes the gas would need to be enriched with oxygen. Although the raw gas might be usable for firing boilers with a view to generating electricity, the BThU cost would no doubt be considerably greater than it is with combustion on modern grates. That is not to say that the question of exploring the possibilities of utilising otherwise unworkable seams does not provide a very proper subject for fuel research.

Rural Extensions

COMPLAINTS continue to appear in the newspapers regarding the charges made by supply authorities for supplies in rural districts. Many of them relate to special cases and it is obvious that the writers do not appreciate all that is involved. In a letter to *The Times* this week two farmers refer to a " prospective levy " of £60 (afterwards reduced to £40) in connection with a supply of electricity to a village blacksmith's welder, not realising the possible effects of such plant on a small extension line. The same writers also imply that it is iniquitous of supply companies to pass on to consumers the purchase tax on electric cookers, but they do not suggest who else should pay it.

Immersion-Heater Loadings

A STUDY of the relationship between the current density of immersion heaters and the development of scale is being made in the research laboratories of the Hydro-Electric Power Commission of Ontario, whose annual report was reviewed in a recent issue. As a result of tests taken in iron tanks at a filtration plant, it was found that 90 per cent. of the scale formed on high-watt-density heaters was hard and adhered tightly, the remainder being soft and powdery. With low-watt densities only about 8 per cent. of the deposit was hard and firmly set.

Keeping off the Peak

IN the fuel economy campaign consumers have been particularly asked to keep off the mains, as far as possible, during the morning when the industrial load is at its greatest. A note from South Africa reminds us that there was a time when the oncoming lighting load was the bugbear. At Durban an appeal has been made to consumers to cut down the use of appliances and lighting between 4.30 and 6.30 p.m., especially during the period from May to August (the South African winter). Thus, it seems, in Durban the lighting load still possesses a weight no longer felt here.

Repairing Tyres

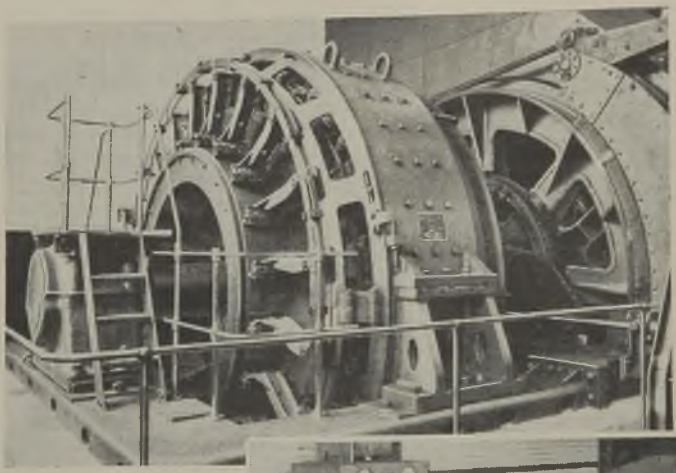
BY the use of electronic high-frequency heating, based on studies undertaken by the Canadian Army, the time taken in retreading tyres has been reduced from about two hours to ten minutes by a process recently developed for the United States Army Transportation Corps. In a paper read recently in Philadelphia, Lt.-Col. C. W. Voigt showed that temperature variations within the rubber (which are greater in these repairs than in manufacture) are considerably less than with conventional plant. A further advantage of the high-frequency unit is that with its auxiliary equipment it occupies only 12 sq. ft. of floor area and weighs no more than 500 lb. No difficulty has been experienced in screening it to prevent interference with radiocommunication.

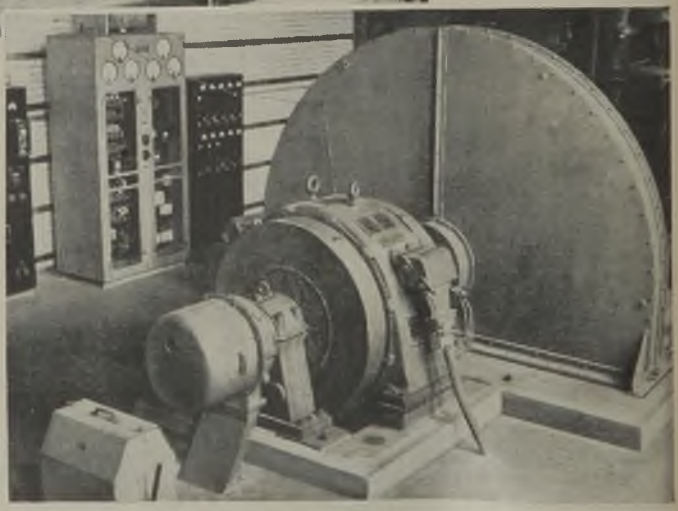
Colliery Winding

Up-to-date Installations

IN this article we propose to describe the new downcast and upcast winders installed at the recently completely electrified Treeton Colliery to which we have referred in two previous articles.

The winder at the downcast shaft has been primarily designed for raising coal from a depth of 1,245 ft. at a rate of 315 tons per hour. To enable the required output to be obtained, it has been found necessary to employ a maximum winding speed of 54·2 ft. per sec., an unusually high figure for electric winding practice in this country. The winder comprises a single fixed cylindrical drum directly coupled to a DC winder motor supplied from an equalised Ward-Leonard motor-generator set. The mechanical equipment has been manufactured by Fullerton, Hodgart & Barclay, Ltd., while the electrical equipment is a product of the Metropolitan-Vickers Electrical Co., Ltd., who acted as the main contractors.





The downcast winder comprises a single fixed cylindrical drum coupled to a 2,650-HP (continuous) DC motor. The Ward-Leonard set (right) embodies an asynchronous induction motor driving a DC generator and flywheel

The winding engine embodies a 14-ft. diameter cylindrical drum which is solidly coupled to the shaft of the winder motor, the complete rotating part so formed being carried on three pedestal bearings. The drum is helically grooved to accommodate 1¾ in. diam. locked coil ropes for which adjustable rope reels are provided, and it is furnished with an extensive steel enclosure which completely screens both the drum and ropes from the rest of the winder house. The brakes are of the curved suspended post type and are operated on the Metropolitan-Vickers compound system which combines the rapidity and sensitiveness of spring application with the safety of dead weight follow up and holding. The brakes are operated by a pair of pressure oil-operated brake engines controlled by the movement of a common hand lever. The necessary pressure oil is obtained from a dead weight

loaded oil accumulator which is kept charged by one of a pair of motor-driven oil pumps.

The winder motor is built on a large frame so as to furnish the high torque necessitated by the absence of reduction gearing. The

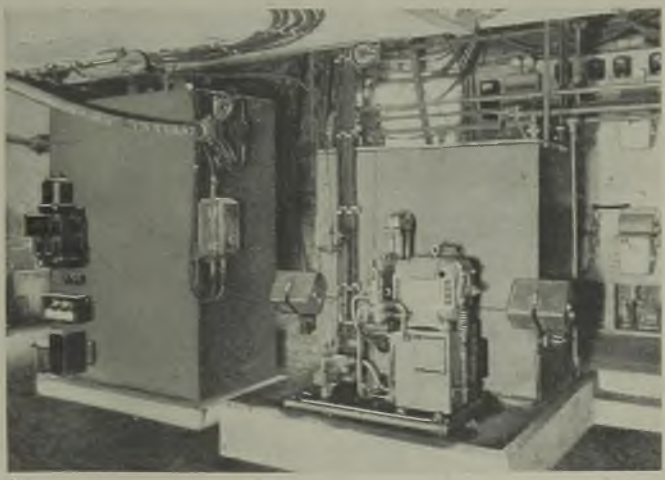
Centralised control of the complete m.g. set is afforded by a desk equipped for remote electrical operation of the circuit-breaker and mechanical operation of the reversing isolator

Ward-Leonard set embodies an asynchronous induction motor driving a DC generator and flywheel to which it is solidly coupled, the cyclic speed reduction necessary for the load equalisation being obtained by means of an electrical slip regulator. This is in the form of a variable liquid resistance in the rotor circuit of the induction motor, and it is also employed for starting up and shutting down the set. Relative movement of the two sets of electrodes is produced by pressure oil servo-gear, the control valve of which is mechanically operated by a torque motor whose rotor is constrained against the stop by the action of a spring.

The torque motor is energised from the secondary of a three-phase current transformer, the primary of which is connected in circuit with the main AC motor stator, and valve movement which separates the electrodes does not occur until the stator current exceeds a certain value as determined by the adjustment of the constraining spring, after which it increases in direct proportion. The consequent reduction in the speed of the set enables the flywheel to surrender a portion of its energy and limits the power demanded from the AC motor.

The method of retardation of the flywheel in an emergency is by the application of reverse power to the stator of the main AC motor, the resistance in circuit with the rotor having been suitably increased by the separation of the slip regulator electrodes. The flywheel energy is then dissipated in the rotor resistance. An increasing proportion of this resistance is then cut out by the gradual approach of the electrodes, so that the speed of the set can be quickly reduced to zero, at which juncture the stator switch must be tripped out to prevent reversal of rotation. Control of the electrodes during this process and during the starting-up period is effected by manual operation of the servo-gear control valve, and remote mechanical operation of the valve for this purpose is effected by a small handwheel mounted on the m.g. control desk.

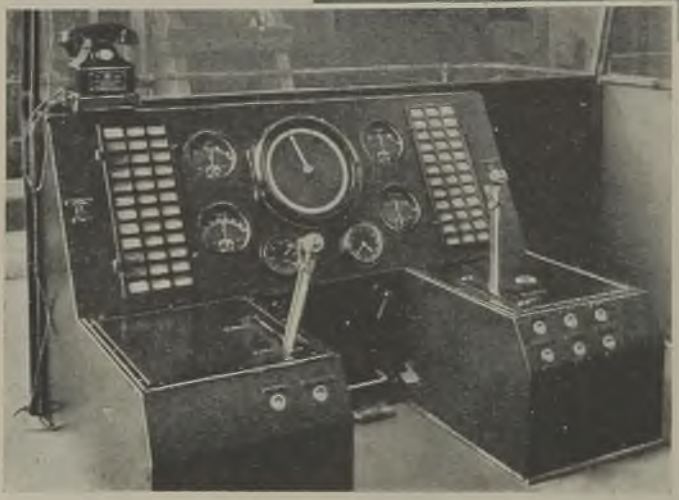
The h.v. supply to the AC motor stator is controlled by a 100-MVA rupturing capacity oil circuit-breaker embodied with reversing isolators in a sheet steel cubicle. Remote electrical operation of the oil circuit-breaker and similar mechanical operation of the reversing isolator are effected by means of push buttons and a handwheel mounted on the control board, thus centralising the complete control of the m.g. set. Variation of the generator voltage which governs the speed of the wind is obtained by means of a Ward-Leonard controller in the generator field



An electrical slip regulator for the m.g. set is in the form of a variable liquid resistance; circuit-breaker on left

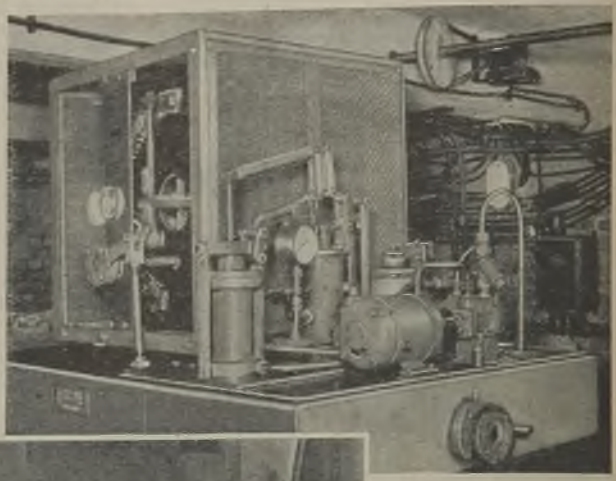
circuit. This is also of the pressure oil servo type, and it can be continuously operated by the driver with minimum fatigue. Further, the introduction of servo-operation enables advantage to be taken of automatic electrical regenerative braking, and renders unnecessary sudden automatic applications of mechanical braking which would otherwise be necessary to deal with emergency trips when the cages are travelling at high speed.

An outstanding development is the driver's control desk at which he is able to sit with all the levers and instruments within easy reach and view. In addition to the control levers and push buttons mounted on the front portion are the subsidiary instruments on the upright back panel. The latter panel also embodies the centrally mounted depth indicator with the shaft signals and indicating windows in columns on either side. A Lilly overwinder and a Metrovick slow banker together give adequate protection against a number of possible contingencies in spite of the high winding speed. The overwinder, which is sensitive down to 20 per cent. of full speed, carries responsibility for the protective duty during the major portion of the wind, but when the speed drops below this value the burden of protection is assumed by the slow banker.



An outstanding development is the winder driver's desk at which he is able to sit with all the levers and instruments within easy reach and view

The winder motor has a continuous rating of 2,650 HP with a peak load of 5,300 HP, and its speed is 73·5 RPM. The continuous rating, maximum torque and slip regulator setting of the induction motor of the m.g. set are 900, 1,800 and 1,000 HP, respectively,



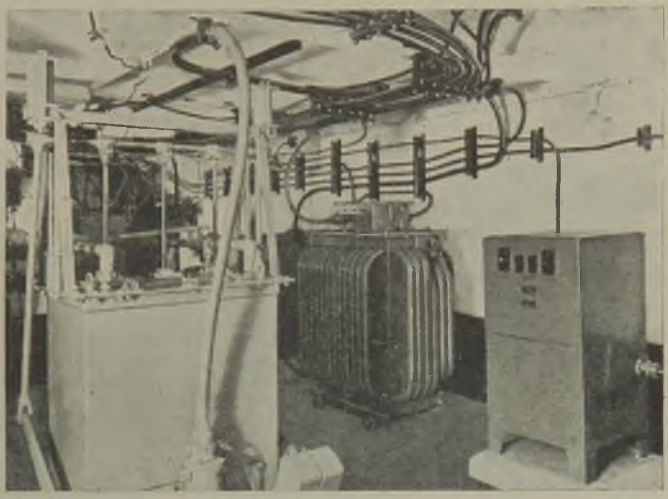
Variation of the generator voltage which governs the speed of the wind is obtained by means of a Ward-Leonard controller in the generator field circuit

while the continuous and peak ratings of the DC generator are respectively 1,650 kW and 3,300 kW. The effective weight of the 12 ft. diameter flywheel is 13 tons and the speed of the m.g. set is 750/640 RPM. The estimated consumptions per wind and per ton of coal raised are 9·7 kWh and 2·02 kWh, respectively.

For the new upcast winder the English Electric Co., Ltd., supplied all the electrical equipment, while all the mechanical equipment was supplied by Robey & Co., Ltd. The winding motor is specially strengthened both mechanically and electrically for winding engine duty. The starting and speed control of the motor is effected by a liquid controller which is fitted with an internal cooler to dissipate the rotor losses.

For reversing the direction of rotation an oil-immersed contactor-type reversing switch is employed, the contactors being

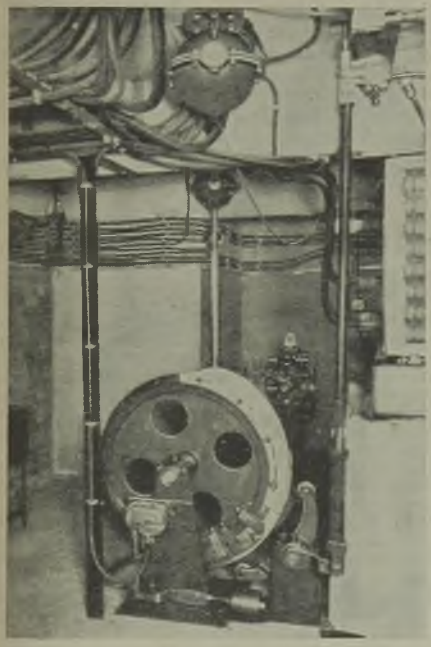
interlocked with one another mechanically so that it is impossible for the forward contactor to close until the reverse one is open, and *vice versa*. Further,



The new upcast winder (illustrated in the "Colliery Electrification" article) is driven by a 250-HP motor; the photograph shows some of the electrical equipment, including liquid resistance on the left

the contactors are interlocked electrically with the main circuit-breaker so that the latter is tripped in the event of any attempt being made either to lower the oil tank or remove the top cover.

The switchgear for the winder comprises a two-panel switchboard, one panel controlling the supply to the stator of the winding motor and the other the supply to a small transformer for the auxiliaries. The stator circuit-breaker is a high-rupturing-capacity airbreak unit operating at 3,000 V.



The overwinder is sensitive down to 20 per cent. of full speed and carries responsibility for the protective duty during the major portion of the wind, while the slow banker takes control when the speed falls below this value

The winder consists of a single drum keyed to the drum shaft which is fitted with two pairs of curved suspended post brakes operated by a self-contained oil pressure unit. The drum shaft is carried in three bearings, and the main transmission from the motor is through a flexible coupling to single reduction double helical gearing. A cast-iron bedplate carries the whole of the mechanical parts and the motor. The 250-HP motor has a full load speed of 360 RPM and the transmission gear to the drum has a speed reduction ratio of about 10 to 1. The rope speed is 1,074 ft. per min., and the size of the drum is 10 ft. long by 7 ft. in diameter.

The depth of the wind is the same as that of the downcast winder, that is 1,250 ft. The drum barrel is of steel and has machine grooves to ensure even coiling of the ropes. There are two rope reels inside the drum and the ropes are passed from the drum barrel to the interior to these reels, thus simplifying the handling of the ropes when adjusting or renewing.

The brakes are of the curved suspended types and they distribute the braking force equally over the whole face. The Robey-Crompton system of power brake operation and control is employed and this dispenses with the use of a falling weight when applying the brakes. An accumulator is charged with oil from one of the two motor-driven pumps and at the same time the constant pressure from the accumulator is applied to the top of the double-acting brake engine, *i.e.*, in the direction of brakes "on," and the safety weights are raised to the "off" position.

In normal operation the brakes are taken " off " when the driver's hand-lever operates the control valve to admit the pressure to the bottom of the brake engine.

The brakes are applied by operating the control valve with the driver's lever, thus opening the bottom of the engine to exhaust while constant pressure remains on top of the engine. Thus in normal operation the safety weights are not applied, nor are they applied in the event of an electrical emergency trip, in which case the brake engine control valve is opened to exhaust by the movement of a solenoid in exactly the same way as the weight-operated type of brake.

By means of the oil pressure the safety weights are maintained in the raised position and they would fall only in the event of a failure of oil pressure. As soon as the pressure falls below a safe limit the weights commence to fall and reinforce the remaining oil pressure. In the event of the immediate total loss of oil pressure the weights fall rapidly to apply the brakes. Should the brake be " off " when a pressure failure occurs, the falling weight would be immediately available to apply the brakes when the operating lever is moved to the " on " position.

Controlled Rate of Braking

The rate of braking is controlled by a fast and slow brake valve in the exhaust from the control valve. A profiled cam is geared to the drum shaft, making a little less than one revolution for the whole of the wind. The valve is actuated by this cam, so that during the full-speed portion of the wind the speed of braking is restricted. Towards the end of the wind the cam moves the fast and slow brake valve progressively to the fully open position, so that unrestricted braking is available. This ensures that the braking is fast enough at the critical part of the wind.

Protection against overspeed and overwind is afforded by a Lilly controller which operates the brakes through the medium of a solenoid. The speed of application of the brakes is regulated so that whenever the Lilly controller trips the main switch the winder is brought safely to rest.

About 50 per cent. of the duty of the winder is the lowering of men and material, consequently a considerable amount of braking is required. In the past this has been carried out either by using the drum brakes or by reverse current braking. Mechanical braking requires frequent brake adjustment, and reverse or counter current braking is difficult to control.

The problem has been studied very fully by the English Electric Co., and their well-known patented form of DC dynamic braking has been introduced. This system has been in operation at Treeton since August, 1943, and has given every satisfaction. Under normal operation the speed of the cages can be so reduced that it is only necessary to use the mechanical brakes during the last few feet of the wind.

In order to reduce the physical effort required to operate the liquid controller and to give definite controlled acceleration both for men and material, a special patented servo device has been developed and introduced. An interesting feature of this equipment is the driver's control desk which incorporates the depth indicator, all the necessary instruments and the shaft signalling gear.

Portable Electric Tools

Speeding-up Building Operations

THE use of electrically-driven hand tools in the building trade was the subject of an after-luncheon address delivered at High Barnet last week by Mr. F. C. Orchard (chief engineer and manager, Hornsey Corporation Electricity Department) to members of the northern area of the London Master Builders' Association.

Mr. Orchard commenced with the remark that post-war building operations must be speeded up and improved with the aid of tools. The fetish of minimum cost had hitherto militated against the utilisation of electric hand tools, and the worker did not like them because they shortened his job.

In America electro-magnetic vibrating tables had been employed to help the pre-casting of concrete of small water content, so increasing its crushing strength by 2½ times. Also by passing AC through the damp mass concrete blocks could be " cured " more quickly. When pre-casting concrete the reinforcing steel rods were first coated with thermo-plastic sulphur and an electric current passed through them at about 1·5 V per foot run. The metal was caused to expand slightly, in about two minutes, without harming the concrete because of the softening of the sulphur when heated. While the mass was thus strained, bolting nuts at the end were tightened to impart compressive stress to the mass. In that way the concrete was enabled to carry much more burden, relieving the reinforcing rods, the bond between metal and concrete being restored when the sulphur reset upon cooling.

Mr. Orchard explained why electric hand tools should not be standardised for less than 230 V and how the standardisation of building components would enable such things as doors and window frames to be produced in quantities at lower cost by means of machine tools in workshops.

A subsequent display and demonstration of portable tools by Black & Decker, Ltd., indicated how their power-weight ratio is being reduced and the wide variety of materials upon which they can be used, many of the 78 models which are available being multi-purpose tools.

Organisations of the Industry—XIV

The E.C.A. of Scotland

By Walter Finlay, W.S.

THE Electrical Contractors' Association of Scotland, while it may be, owing to its being confined to Scotland, one of the smaller bodies of the industry, is in point of fact one of the oldest electrical trade associations ; it was originally founded in Glasgow in the latter part of the year 1900. The first chairman was that hardy old pioneer of electricity in Scotland, Mr. Thomas Wright, of the well-known firm of Anderson & Munro, Glasgow, who ultimately was the third president of the E.C.A. Incorporated, the united association for Great Britain, during the year 1906-7.

The Glasgow contractors at the foundation of the Association realised there was a clamant necessity for organisation in order

Mr. J. B. Mackenzie and Mr. W. Y. McAdam (right) are respectively president and vice-president of the Association

to settle uniform rules to regulate the relations between employers and employees and also with corporations, manufacturers and architects. They accordingly resolved that an association should be formed at once and twenty-five members were enrolled as a result of a preliminary canvass by the late Mr. R. D. Cassells. Even at that date the question of registration was put in the forefront of the programme of the newly formed Association. Had State registration then been introduced one wonders if the use of electricity would not have been substantially stimulated and the class of work immensely improved to the credit of the industry and the permanent advantage of the consumer. The Association has always supported the present voluntary Register and is taking part in the conference in support of compulsory registration.

In April, 1904, at the suggestion of the Glasgow Association, a meeting was held in Edinburgh and immediate steps were taken for the formation of a local branch in the capital city. As just at this time the Electrical Contractors' Association was initiated in London, the Scottish organisation agreed to amalgamate with that body in one association for the whole country with a Scottish Section operating in Glasgow and Edinburgh. In 1907 the activities of the Association were extended to Dundee, where a branch was formed and a few years later another branch was set up in Aberdeen.

The Scottish Organisation

The Scottish Section operated as a part of the national body until November, 1911, when, for convenience of administration and in order to deal specially with many features which were peculiar to northern conditions, the Scottish members deemed it advisable to recast the Scottish membership into a separate entity and the Electrical Contractors' Association of Scotland, as now existing, was formed. At the same time it was agreed to work on all common questions in cordial conjunction with the English Association, and that course has been followed ever since.

The organisation of the Scottish Association operates through four main territorial branches:—Glasgow, Edinburgh, Dundee and Aberdeen, and sub-branches of these centres have been formed throughout the country as necessity has arisen, more

Mr. W. Finlay, the author of this article, is consultant and solicitor to the Association. His son, Mr. M. P. Finlay, W.S. (right), succeeded him as secretary in 1938 but during the war has been Senior Administration Officer, N.F.S., South-East Scotland

particularly in view of the extension of the areas of supply by the construction of the grid. All local electrical affairs are dealt with by these branches and the governing body of the Association is a Central Board with central officials. This Board meets monthly, usually alternately in Glasgow and

Edinburgh, and is composed of representatives elected by branches. It deals with the innumerable problems which are of mutual interest to contractors in Scotland such as relationships with supply authorities, conditions of trading with manufacturers and distributors, and labour problems involving working rules, wages and the numerous issues that arise therefrom.

For many years different standard rates of wages prevailed throughout Scotland and before the last war the standard rate of wages was discussed and adjusted locally. It was agreed by both sides that this created an anomalous position and ultimately it was arranged that there should be one standard rate throughout the whole of Scotland. A rate was settled, and ever since, as necessity arose, the position has been discussed between the Association, as representing the employers, and the Electrical Trades Union, as representing the employees, and satisfactory agreement generally has been reached. There is no automatic sliding scale in Scotland; the rate has always been fixed by joint conference after all the relevant factors have been considered.

In addition to adjusting the usual trade agreements in the interests of its members, the Association has negotiated many favourable arrangements, such as insurance schemes dealing with Workmen's Compensation and third-party liability, and all members are provided with a confidential jobbing price list on the loose-leaf system which is kept up to date in peacetime by the issue of new pages as may be required owing to substantial variations in the prices of materials or rate of wages.

Social Side

The Association has taken a leading part in the formation of local electrical societies which have provided a meeting place for all concerned in the industry. The winter social gatherings, which take the form of a dinner-dance at each of the four branches, are looked forward to as the electrical social functions of the year. A summer conference open to all is not promoted but members and their ladies meet each year for a week-end gathering at an attractive centre when the annual business meeting of the Association is held. Golf matches, bowling matches and angling contests are also arranged. The members look forward to these social activities being revived when peacetime comes.

The "Scottish Mode"

Early in 1915 a conference of architects, surveyors and representatives of all sections of the building industry in Scotland was called under the chairmanship of Sir George Askwith at which also representatives of Government Departments were present and it was resolved that a national code for building works in Scotland should be established. Representatives of the Electrical Contractors' Association of Scotland took a prominent part in this movement. After a prolonged series of meetings a Scottish Mode of Measurement, containing both general and particular regulations appropriate to each trade, was agreed upon, and it is generally held that that mode has been of the greatest benefit to the industry by co-ordinating what had up to then, in many cases, been somewhat indefinite rules.

For the majority of important contracts in Scotland this Mode is now the governing condition. It has stood the test of time well as it is only within the last few years that steps have been taken to revise it and bring it up to date in view of twenty-five years' experience of working. In the numerous schemes for reconstruction after the war it is expected that there will be a Mode for contract work throughout the whole country and the experience of the Scottish Mode will provide much useful data for the final adjustment of that national Mode.

Fair Trading

Shortly after the last war the Board of the Association came to the conclusion that an endeavour should be made to define and record in a concrete form what should be the proper relationship of all those who served the installation industry, manufacturers wholesalers and contractors, and a committee was appointed to explore the subject.

Eventually, definite proposals were agreed upon and a conference of those interested in the subject in Scotland was called in July, 1925, when a simple Fair Trading Agreement was submitted and approved. This agreement was signed on behalf of the Association and by practically all the local wholesalers and manufacturers, but the larger manufacturers who were concerned in the industry throughout the United Kingdom found difficulty in consenting to an agreement which would only operate in one locality. Ultimately, at the conference which followed on the passing of the Electricity Act of 1926, reference was made to the Scottish agreement by the municipal representatives who had not realised that the agreement had been framed long before the passing of the Act and the conference came to the conclusion that the proposals were worthy of detailed consideration with a view to some national scheme being prepared. The outcome of this decision was Committee "D," from which finally emerged the Fair Trading Council and Policy. The Association has always felt that Scottish supply authorities, both municipal and company, would have been willing to co-operate in the working of such a policy for Scotland and that, con-

sequently, complete unity would be obtained. The special war circumstances have imposed on the Association a great many additional services in the way of the Essential Work Order for the electrical contracting industry and advising its numerous members on the recruitment and regulation of labour and the control of supplies.

Technical Training

From the earliest days of the Association every endeavour has been made to encourage members to take particular interest in the technical training of their apprentices with a view to having the highest standard of labour available. Technical installation classes for apprentices are carried on in all the chief centres in conjunction with the education authorities. Representatives of the Association's branches take a leading part in the direction of these classes and prizes are provided by the Association's branches for the best students.

Much attention has been paid by the Association's Board to the future conditions of employment and training of appropriate boys to be apprentices to the industry and the feeling in Scotland is that for such purposes the industry is much more akin to the wide field of the engineering industry than to the various trades associated with the building industry. Many conferences have been held with the Scottish Education Department and the Electrical Trades Union as regards pre-vocational education for apprentices entering the industry and schemes for such education and programmes for both day school and evening school classes for apprentices during their apprenticeship are under discussion with these bodies. Schemes are also being adjusted with the Electrical Trades Union to regulate the conditions to apply to apprentices returning to the industry from the Forces.

The Association has always aimed at a reasonably high standard of technical qualification for its members or the technical manager of any firm or company desiring to become a member. At the same time it has been realised that many contracting businesses start in a humble way and the policy has been to encourage the founders of new businesses to join the Association early as the view is that only by belonging to such an organisation can a new contractor carry on his business on sound lines.

Electricity in Factories

Causes of Accidents in 1943

ALTHOUGH the review of "Electrical Accidents and their Causes" formerly issued annually by the Electrical Branch of the Factory Department has been suspended, we are able to present the following information for 1943, which has been obtained from Mr. H. W. Swann, Senior Electrical Inspector of Factories.

In our reference to the subject last week we mentioned that in addition to the 1,255 reportable accidents (*i.e.*, those causing full disablement for more than three days), others had come to the notice of the Department. These include the following fatalities: Domestic, 44; similar premises, 12; and miscellaneous industrial premises, 51. With the 58 reportable in factories, the total number of fatal accidents was thus 165 as against 181 in 1942. More than a quarter of the total of electrical accidents and nearly two-fifths of the fatalities last year concerned skilled electrical men.

Regarding the type of plant involved, welding was responsible for over one-third of all accidents (but none fatal)—the large majority having been caused by eye injuries to passers-by owing to inadequate screening; even plain glass spectacles afford some protection. Fusegear accidents (53) were in many instances due to insufficient rupturing capacity in relation to transformer output. Switchgear above 650 V was involved in 45 cases (7 fatal) and below 650 V in 164 cases (5 fatal). A thoroughly understood and clearly worded permit-to-work system should be adopted. In 32 of the fatalities, the voltage was below 250. Artificial respiration was successfully applied (due to prompt action) in 13 instances of apparent death. A large number of accidents with switchgear have been analysed and suggestions made to avoid recurrences.

Nearly one-tenth of the total and one-third of the fatal accidents were attributable to single-phase portable machines and handlamps, the number as well as the proportion being the highest yet recorded; this does not include 182 (8 fatal) caused by cables and flexibles. Accidents on three-phase portable machines are, however, rare.

Among the mishaps associated with portable appliances was one which emphasised the need to ascertain by an electrical test whether earthing connections have been made correctly and remain effective, even if identifying colours are used for the cables. Another illustrated the importance of preventing the earth core from being pulled away from the terminal in the plug on the machine and making contact with a live terminal or conductor. The sheathing of cables should be gripped at each end in such a manner that the cores are relieved of most of the mechanical stress. The earth core should be longer than the live cores so that, if the grip slips,

the earth core is the last to be parted from its terminal. Plugs should be marked as to polarity and the terminals should be segregated by insulating barriers. A break in the earth conductor of the flexible cable is not so immediately obvious as it is in a live conductor; continuity tests should therefore be made at low voltage and a current should be passed that is heavy enough to burn through the remaining strands of the earth core when the majority have broken.

The death from shock of a man engaged on boiler repairs, when using a handlamp at 250 V, indicates the following: The unnecessary risk incurred in earthing the guard of grip-type hand lamps; the necessity for regular inspection and test; the need for ensuring that electrical connections can withstand operating conditions; the desirability of voltage reduction where AC is used and the handlamp is not entirely constructed of insulating materials.

Electric Welding Precautions

The conductivity of the return path for the welding current between " work " and transformer neutral should be at least as good as that of the lead to the electrode holder in order to avoid the effects of stray return currents. Overload protection of welding plant may have to be set at too high a value for the current in an earth-fault circuit to operate the device, so that earth-leakage protection may provide the only solution. For welding transformers on board ships under construction, the provision of circulating current earth-continuity protection may be necessary. Artificial respiration had to be applied in more than one instance of 100-V AC shock.

Over-fusing is the commonest cause of fires attributable to electricity, often associated with defective earth continuity. In order to ensure the operation of protective gear on a heavy main circuit, an earth-continuity resistance below the combined resistance of the consumer's and the supply undertaking's earth electrodes and other parts of the earth-fault circuit are often required. Earth-leakage trips are being increasingly adopted where the fire risk is of unusual gravity; leakage indicators and recorders also give useful warning. Insufficient regard is paid to the sectionalisation of switchgear and transformers into groups of moderate capacity, preferably in different buildings or else separated by fire-resisting barriers.

Inflammable gases and vapours give rise to serious fire risks, which increase with the wideness of the range within which air mixtures are ignitible. For example, hydrogen has a range of from 4 to 74 per cent. and carbon bi-sulphide 1·25 to 50 per cent. Suspensions of finely divided solid matter and droplets of liquid in air constitute important fire risks. Combustion usually appears to be slower with dust clouds than with vapours, but the power may be greater. Surface temperatures of electrical fittings used in connection with cellulose deposits should be limited to 180 deg. F. Inflammable vapours may be given off as the result of arcing or tracking across the surface of certain synthetic insulating materials. Open electric fires should not be used in the presence of cotton or artificial silk or celluloid.

Portable tools are not generally flameproof and must be excluded from dangerous areas, where only flameproof or " intrinsically safe " lamps (in which the energy that can be liberated is limited) should be introduced. Flameproof lamps are now available only in heavy cast iron, while the intrinsically safe type does not always provide sufficient light. Pending the introduction of a lightweight flameproof lamp, some conditions have lent themselves to floodlighting by means of flameproof lamps mounted on trolleys.

During the inspection of cans that had been sprayed internally with a composition giving off inflammable vapour a miniature lamp broke causing an explosion which resulted in the user suffering burns. Both the essential requirements of such apparatus were absent, as the bulb was not protected by a stout outer glass and metal guard and the circuit was not intrinsically safe. Too frequently the flameproof qualities of apparatus are vitiated by the absence of these qualities from the wiring and fittings.

Curious Earth Fault

An example of the effects of an earth fault at a distance is afforded by shocks received by a householder who, while reclining in a bath, touched the taps, which were bonded together and earthed. The source of the trouble was a wireless set on the ground floor, where a fault between one side of the supply flexible and the earthed chassis allowed 3A to flow to earth. The earth electrode had a resistance of 83 ohms and a potential to the general mass of earth of 248 V, which enabled the fault current to persist without blowing the fuse on the radio circuit. Near by was another earth electrode connected to the lead sheathing of the telephone service cable which was in contact with a flat zinc roof and iron gutter. Resting on this roof was the lead waste-pipe from the bathroom on the first floor. Roof and waste-pipe were both alive at 50 V to earth and the latter transferred its potential to the outlet fittings of the bath. The bath coating of vitreous enamel provided sufficient insulation to allow of a considerable potential between taps and outlet.

Two fatalities are recorded as consequences of connecting single-pole switches in neutral conductors, one controlling an electric fire the other a lamp. In the latter case out of nearly 200 outlets in the factory 75 per cent. were found to be incorrectly wired.

CORRESPONDENCE

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

Phase Indicator

IN the article under the above heading in your issue of September 1st Mr. W. M. Gore states that his arrangement is a simple method of construction, but what could be more simple than the standard phase rotation indicator which is marketed by most instrument makers at a price of approximately £4. Surely an indicator which is suitable for any voltage from 80–550 V and is small enough to be carried in the pocket is simpler than that described by Mr. Gore.

The article states that the expense of an instrument (phase rotation instrument) is not always justified, but my experience is that this type of instrument can save many errors in connections with their resultant troubles which can mean considerable expense.

The standard type of instrument is provided with three flexible leads and no damage can occur to the indicator irrespective of how they are connected to the circuit under test.

London. E. W. SEMMENS, A.M.I.E.E.

Service Units

IN your issue of September 8th Mr. E. W. Faithfull described an interesting design of service unit, the engineering features of which one cannot help but admire. Few manufacturers make both meters and service cut-outs, and so the apparatus available to the electricity supply undertaking is the result of independent development without the requisite co-ordination. There is further lack of co-ordination between the manufacturers of the undertaking's apparatus and the consumer's own control apparatus.

As a consequence the collection of gear and wires found at the entry of the supply mains is generally most unsightly. The items comprising the undertaking's service apparatus are neat enough in themselves, but the assembly of v.i.r. connections, bonding wires and sealing wires do not look like an engineering job. The wooden meter board is of no value as an insulator when meter cases are either completely insulated or are earthed. It is much more important that the undertaking's apparatus be made into a compact and reliable assembly that can be left for years without attention, and which will make difficult any fraudulent interference with meter registration.

I believe that most supply undertakings would object to the additional cost and to the extension of their responsibility through enclosing the consumer's main fuses with their own service apparatus. I agree that the consumer should be encouraged to protect his installation adequately and to employ modern cartridge-type h.r.c. fuses. An undertaking has great difficulty in controlling the use of electricity by a consumer, once the supply has been commenced, but the known characteristics and improved reliability of the cartridge fuse should enable the service fuse to be more effectively applied as a load limiter as well as for protection to the general supply against excessive momentary demands by one consumer.

The design of service apparatus enclosure should allow for more efficient protection of the gear enclosed rather than for easy access to it. All cable sealing boxes, fuses, connections and meters should be totally enclosed in order to limit maintenance and avoid frequent inspection against fraudulent interference. The seal on the meter cover could well be placed at the back of the case, so as to be inaccessible to the consumer, and could be of such a type that special apparatus located in the meter department is required to effect resealing. When all service apparatus is totally enclosed, one seal only is required and the use of a lock is economically practicable.

The service apparatus should be accessible without entry into the premises supplied, especially as great advantages lie in the reading of meters monthly and in the rendering of monthly, instead of quarterly, accounts. I have seen many meters situated out of doors in India, and meter boxes in the front gardens of houses in South Africa. In America it is common practice to fix meters on the outside walls of houses.

Alterations and additions are a simple matter where, as in this country, everything is merely screwed on to a board and connected up, but if total enclosure is adopted the design must provide for extension without reverting to the conditions about which I complain. I suggest that a simple rectangular box should be employed, so that additional units can be mounted directly adjacent in either vertical or horizontal formation.

The meter might project through the front cover or it could be arranged for mounting in the fashion of controller type instruments, on top of the service-unit box. A standard size of meter case, would facilitate the inclusion of the meter within the service unit. If the case were round or a flange were fitted to enable an efficient joint to be made between the case and the service-unit cover much difficulty would be avoided. If the cover of the service unit is required to enclose the meter completely, the cost would be considerably increased, and the provision

of the additional glass window that might be necessary, would perhaps not be satisfactory under British climatic conditions. A hinged cover, to protect against weather, over the projection of the meter through the cover of the service unit, might be the solution. Alternatively, a back-connected weather-proof meter might be mounted on the front cover of the service unit.

Whether these suggestions are economically practicable or no depends on the demands of the industry and the possibility of production in quantity. The views expressed here are not intended to be conclusive, and it is hoped that others will put forward opinions and make constructive suggestions.

Bristol. G. H. BOWDEN, A.M.I.E.E.

Domestic Plugs and Sockets

WITH reference to Mr. A. K. Bott's letter in your issue of September 1st, round about 1907 there was on the market a really substantial concentric plug and socket; the plug was of cocus wood and the base of porcelain with cocus surround; it was rated at 5 and 10 A at 250 V and many examples are still to be found in country house plants even to-day. It died a natural death in this country on the advent of the two-pin variety. Recently, on a number of Continental ships plying in these waters, I came across quite a number of concentric plugs of recent manufacture—not a "competitive" type but a really sturdy job.

It appears to have been forgotten by many that standardisation was well on its way to being fulfilled with the production of the two-pin-and-earth plug. Contractors were warned that with the advent of British Standards all other manufacturers' gauges would gradually disappear from the market, to everyone's relief. When the poor consumer required a new non-standard plug fitted he was told that new B.S. plugs and sockets would have to be fitted throughout his house if he wished his accessories to be interchangeable. Such, however, is the price of evolution.

Even in pre-war days we had too many plugs and sockets. May I suggest a ruthless cut to start with by doing away with all 2-A stuff? It is only a nuisance and the difference in cost of material is infinitesimal, the cost of erection being practically the same as that for 5 A. For 99 per cent. of the houses of the future the following should be ample: 5-A and 15-A tumbler switches, B.S. only, surface, semi-sunk and flush; 5-A and 15-A combined switch plugs, double-pole, surface, semi-sunk and flush. For the safety of children with scissors they should be of the shutter type, but even then children can screw off the switch cover.

I venture to suggest that the multiplicity trouble of to-day is due to the number of insufficiently qualified persons in positions of authority endeavouring to justify their existence while without practical knowledge of the contracting industry.

Glasgow. R. W. CAIRNEY.

An Exhibition Centre

I AM glad to see that Mr. Raymond Berry has raised the important point of exhibiting our products. It is indeed a timely reminder and it is essential that we should have a real national plan now.

I am convinced that the site for an exhibition of the type similar to the British Industries Fair should undoubtedly be in the capital of our country. Anyone who has had much experience of the B.I.F. at Castle Bromwich will remember the difficulties of finding accommodation. Birmingham is not noted for its capacity to cater for travellers in *normal* times. One thing is certain—visitors to the B.I.F. at Castle Bromwich in February must have been impressed with our English cold and wet weather and its resultant mud, not to mention snow and slush. I am sure that many visitors entered the Fair feeling not quite so enthusiastic as when they started their journey.

The war has proved to the world that Great Britain can produce the goods, particularly when it comes to engineering. The part that electrical engineering has played will be apparent to most people, so let us be prepared for the switch over from war to peace and with real planning by the right people we shall also see the V-sign in showmanship.

London. E.W.S.

Birmingham Electric Club

WHEN surveying in his presidential address the activities of the Birmingham Electric Club since 1904, MR. A. T. HAYWOOD claimed it to be the oldest electric club of a public nature in the world. Its present membership, he said, was 418 and it had a financial reserve of nearly £1,500.

Papers and discussions had always been a prominent feature of the Club's activities; 210 papers had been read to its members and in many cases the subjects chosen were entirely new. He pointed out that the Club had for a number of years endeavoured to encourage the youth of Birmingham to study electricity and had presented annually five prizes for distribution at the Birmingham Central Technical College and a further research premium. He was critical of the lack of accommodation in Birmingham for large social functions and stated that the Club's dinners and ladies' nights had proved so popular that a room was necessary to accommodate at least 1,000 people. Snooker and golf were included in the programme each year and the Club members annually paid official visits to many industrial concerns.

Mr. Haywood asked for suggestions from members on possible improvements in the Club's activities, stating that it was proposed to hold for the first time in January next a children's Christmas party.

Manchester I.M.E.A. Meeting

Change in Presidency Rule Welcomed

AS readers are aware, it was considered desirable not to hold the annual general meeting of the Incorporated Municipal Electrical Association in London in June, as originally arranged. Instead the Association decided to meet in Manchester on Thursday last week. There was a very good and representative attendance at the Town Hall with, perhaps, a preponderance of northern and western representatives.

MR. W. P. LILWALL (Fleetwood), the

Messrs. W. P. Lilwall (President) and F. Nicholls (Leeds)

President, took the chair and presented the minutes of the last annual meeting and of the extraordinary general meetings in March and April last which considered the two memoranda on electricity reorganisation.

COUNCILLOR STEPHENSON (South Shields) asked if the acceptance of the minutes would mean that the Association approved the rejection of the South Shields amendment to the joint memorandum. Mr. Lilwall said that members were merely asked to pass the minutes as a correct record of the proceedings. The matter of the South Shields amendment was still *sub judice* and in any event he could not permit the discussion of principles on this motion. The minutes were confirmed.

Alderman E. E. L. Arkell and Mr. J. Rendell-Baker (Croydon)

MR. F. NEWEY (Lincoln) then presented the Council's report for 1944 which was summarised in the *Electrical Review* of June 16th last. He made special reference to the election of Mr. P. J. Robinson and Mr.

Councillor G. T. Ellison and Mr. C. Booth (Spenborough)

F. Forrest, past-presidents, as honorary members of the Association.

Upon the subject of post-war reconstruction MR. E. LOGAN (Erith) asked if the Council had entirely disposed of the question raised last year of appointing a director. Mr. Newey replied that they had not dropped the idea but pointed to the difficulty of finding a suitable man for the post in wartime. In due course the matter would receive further consideration.

Regarding the utilisation of reserve funds as an alternative to raising charges, Mr. Newey said that discussions had been proceeding with the Electricity Commissioners and he hoped that a report on the subject would soon appear in the Association's *Journal*. Another matter discussed with the Commissioners was bulk supply charges. A move was being made as regarded Yorkshire authorities and the company undertakings had set up a committee to deal with the matter.

Meter standardisation was a most difficult problem; it was very hard to get sixteen manufacturers and about six hundred supply authorities to see eye to eye. Nevertheless, some progress was being made.

Group including Alderman F. Kenyon, Mr. E. Binns, Mr. R. G. Whitehead and Alderman H. Shepherd, of Oldham; Alderman W. H. Shaw and Mr. E. J. Riley, of Walthamstow; Mr. H. Hall (Gillingham); Mr. J. D. Spark (Willesden); and Councillor T. P. Longworth and Mr. H. E. Annett, of Bolton

Mr. D. R. Stewart and Councillor J. H. Dicken (Prestatyn) and Alderman O. Jones and Mr. J. V. Chaplin (Colwyn Bay)

Alderman J. Randles, Mr. G. H. Holroyd and Mr. S. Abson, of Stockport

The proposed Bill to deal with war damage compensation to public utility undertakings had not yet materialised. Mr. Newey said that he hoped the war would be over before the Bill was brought forward.

The adoption of the report was seconded by Mr. Lilwall, who was asked if adoption

Group including Alderman R. Ashworth, Mr. P. Heyes and Mr. T. Stockwell (Rawtenstall) and Mr. A. H. Todd (Clitheroe)

signified members' approval of all that the Council had done. He replied in the negative; it was merely an account of the Council's activities.

The report was thereupon adopted as were the accounts presented by the hon. treasurer, COUNCILLOR J. SELWYN JONES (Newton-le-Willows) and seconded by ALDERMAN J. R. POTTS (Carlisle).

Mr. Newey then referred to the election of Mr. Lilwall as president. He said that for many years Mr. Lilwall had served the cause of the smaller undertakings but he had not neglected the wider interests of the industry and had been a very active vice-president, especially with regard to the preparation of the reorganisation memoranda. He and Alderman Walker, the new vice-president, would have many difficult questions to settle, particularly in relation to the post-war period. Mr. Newey concluded by expressing the hope that Mr. Lilwall would be able to arrange a full-scale I.M.E.A. convention during his term of office.

Mr. T. R. Evans (Rhondda), Mr. E. W. Jones (Mountain Ash), Councillor J. Travenen (Tredegar) and Councillor Morgan (Mountain Ash)

Bailie Davis (Glasgow), Mr. W. J. Cooper (Hamilton), Bailie Williams (Glasgow) and Mr. J. Morgan (Glasgow)

In thanking the members for his election, Mr. Lilwall echoed the hope that he would be able to invite them to a conference on the Fylde Coast next year. The Association had felt badly the lack of the convention atmosphere as a means of bringing members together socially for the exchange of ideas.

ALDERMAN G. B. BROOKS, O.B.E. (St. Marylebone), moved a vote of thanks to Mr. Newey, and included Alderman J. W. Rayment, chairman of the Lincoln Electricity Committee, for the facilities afforded to Mr. Newey by the Corporation. Mr. Newey was the only man who had occupied the chair for two successive years. In ordinary times this would have been a great burden, but during the war it had involved much greater stress and strain. His term of office was historic by reason of the decision that a local authority representative might become president. Another outstanding feature of the period was the large measure of co-operation between municipal and company undertakings which had been brought about. But Mr. Newey's principal work was the preparation of the memoranda upon the reorganisation of the electricity supply industry which had only been achieved by the exercise of much patience and understanding.

The vote of thanks was seconded by MR. B. HANDLEY (Portsmouth), who said that in wartime the whole story of Mr. Newey's work could not be told but it had been stupendous. ALDERMAN RAYMENT (Lincoln) associated himself with the appreciation of Mr. Newey's service and Mr. Lilwall presented Mr. Newey with the past-president's badge and the gavel and block which he had used during his term of office, " reconditioned " and inscribed.

In reply Mr. Newey said that his thanks were due to the Council and members for their loyal support. He had looked upon the presidency as an opportunity of rendering service to the great electricity supply industry. The average member did not realise fully the amount of work which the Council members put in, with some sacrifice of their

Mr. J. B. Lees (Sale) with Alderman A. Sugden and Mr. G. Sammons (Dewsbury)

own personal interests. He also thanked the officers of the Centres for the good work which they had done. He said that the Council welcomed constructive criticism; it kept them up to scratch.

Mr. Lilwall, in announcing the election of Alderman W. Walker (Manchester) as vice-president, said that this was a historic occasion for the I.M.E.A.—it was the first time that a local authority representative had been elected to the position. The electrical engineer members felt honoured that they were able to call upon the services of such a distinguished member of the electrical industry. Alderman Walker had done more than anybody else to secure the proper organisation and remuneration of the staffs of the supply industry and was for this reason mainly responsible for the excellent way in which they had been served by their staffs.

Messrs F. Swarbrick (Hove) and Mr. R. Birt (Ealing).

ALDERMAN WALKER, responding to these remarks, said that the I.M.E.A. could be a very awkward squad but it was their duty to give every opportunity for the expression and consideration of honestly-held points of view. Probably his year of presidency would coincide with the Association's fiftieth year and, it was to be hoped, more normal conditions would prevail.

Better Street Lighting

Methods Adopted in Manchester

MANCHESTER and other Lancashire towns were the first to illuminate their streets to the new permitted standards: in fact they anticipated the operation of the Order by several days. The effects in the principal streets of Manchester were very good to eyes accustomed to the gloom of the last five years, but the suggestion in some papers that the result was nearly as good as floodlighting was perhaps a little exaggerated. Apparently the gas lighting was overdone at first for the Chief Constable (the arbiter under the Order) requested the Corporation to tone it down a little.

More than 1,200 electric lamps, suitably modified to give the "moonlight" effect, were switched on in Manchester on the evening of Tuesday, September 12th, at less than twelve hours' notice, and by Sunday, September 17th, some 5,000 lamps in 135 miles of streets had been converted. The Electricity Department is proud of the immense effort put in by its seriously depleted street lighting staff. The conversion from "starlight" has been carried out in a variety of ways according to the circumstances and the mounting heights of the fittings. In some cases 15-W lamps have been replaced by 25-W lamps; in some, baffles have been removed from existing A.R.P. fittings, these fittings having been painted black inside. In a number of cases the original peacetime fittings are used with a 25-W lamp which has a portion of the bottom obscured by white paint. In all cases photometric tests have been made to ensure that the permitted standard of 0·02 ft.-candle has not been exceeded. Experience during this work confirms the ease and accuracy with which specified intensities of illumination can be obtained by varying either the size of lamps or the arrangement of the reflectors.

According to a report from Stockport, which was one of the first towns to take advantage of the relaxation of restrictions, the responsible officials found that the new regulations came into force on September 11th—not September 17th as had been supposed.

In Derby, it is claimed, most of the twenty miles of main streets are lighted to a brightness not far short of the normal peacetime level. The Newcastle tram routes are equipped with lanterns controlled by a main switch and the Great North Road has twin lights at intervals giving an excellent effect.

At Sheffield it was possible only to get about a quarter of the lamps into operation; the rest of the 25,000 "starlights" will be converted during the next month.

Liverpool was one of the cities which lit up in advance of the official date, at least in the central area. Since then the improved lighting has been extended to other streets.

Similar stories come from most of the other leading provincial centres. London alone, because of the much divided responsibility for lighting and a general lack of the necessary equipment, is not yet deriving advantage from the relaxation of restrictions.

Electricians' Wages

ON Tuesday last a conference of the E.T.U. passed a resolution, by 24 votes to 21, instructing the executive to press for the abolition of zoning for the purpose of electricians' wages in favour of one standard rate for the whole country and for all electricians, irrespective of the section of industry in which they were employed. The new rate should be consistent with the present standard of living and exclusive of overtime, payment on piecework rates or any other further payments. It was also proposed that workers in public utilities, not paid by results, should be given a special war award.

Another resolution welcomed women to the Union and urged the recruitment of more women to the industry on the principle of "the rate for the job."

PERSONAL and SOCIAL

News of Men and Women of the Industry

CHIEF engineers from neighbouring undertakings were present at the Cadena Café, Gloucester, last week when the local branch of the Electrical Contractors' Association made a presentation to **Mr. F. H. Corson,** the retiring city electrical engineer, to mark its appreciation of his work. Mr. J. P. Inglis, chairman of the branch, presided, and Mr. R. A. Parsons, the oldest member, handed to Mr. Corson a gift which took the form of a "collector's piece"—a silver tankard made in Edinburgh in 1752 by J. Main and bearing the coat of arms of the Blair family of Dunsky. Mr. Parsons spoke of Mr. Corson's friendship and fair dealing with the local contractors and referred to the results obtained in the development of the undertaking which had not been called upon to organise a wiring department or finance a "white elephant" in the shape of elaborate showrooms. A welcome was extended by the chairman to Mr. E. Braathen, Mr. Corson's successor.

Mr. F. S. Naylor, M.I.E.E., electrical engineer and manager of the Southwark Borough Council Electricity Department, has been appointed borough electrical engineer and manager at Gravesend in succession to Mr. N. R. Elliott.

Mr. Naylor served a five-year electrical engineer apprenticeship with the British Thomson-Houston Co., Ltd., Rugby, and received his engineering training at the City & Guilds (Engineering) College, Imperial College, South Kensington, where he obtained the qualifications of A.C.G.I. and B.Sc. (Engineering). After a period of power station testing he was appointed technical assistant to the chief electrical engineer of Imperial Chemical Industries, during the erection of the 93,000-kW Billingham station. From 1928 to 1935 he was technical assistant to the West Midlands J.E.A., and was engaged on the specification, design and construction of Ironbridge generating station, and the development of the Shropshire distribution scheme. Between 1935 and 1937 he held the post of technical assistant to the general manager of the Sheffield Corporation Electricity Department, in which post he was responsible for the co-ordination of generation and distribution, for the main h.v. switchgear design and layout, Central Electricity Board matters and the specification and purchase of practically the whole of the electrical equipment required by Sheffield.

Mr. F. S. Naylor

From 1937 until 1940 Mr. Naylor held the appointment of chief electrical engineer to Firth-Browns, Sheffield, which has one of the largest steelworks, electric arc and high frequency furnace installations in Europe. While serving as electrical engineer and manager at Southwark, from 1940 to the present time, he has been responsible for much reorganisation, including the development of a skeleton 11-kV ring main system, the planning of a complete DC/AC changeover and expansion of the system capacity at an estimated cost of £660,000. He was chairman of the I.E.E. Sheffield Sub-Centre in 1939 to 1940, and is at present on the E.R.A. Sub-Committee on Electricity Supply Costs and the E.D.A. Welding Tariff Sub-Committee.

Mr. R. Alan Thwaites, chief engineer and manager of the Manchester Corporation Electricity Department, has recently been appointed or elected to the following bodies: Consultative Technical Committee of the C.E.B. for the N.W. England and N. Wales Area; No. 10 (North-Western) District Coal (Electricity) Advisory Committee; District Joint Board and District Joint Industrial Council (No. 3 Area); and senior vice-chairman, N.W. Centre of the Institution of Civil Engineers. He has for some time been a member of the Area Committee of E.D.A. and of the Local Centre Committee of the I.E.E.

In last week's note relating to the presentation to **Mr. Frank G. Quance** it was mentioned that he had served as manager of the Cardiff branch of the G.E.C. Actually he was assistant manager under Mr. W. E. Hobbs.

Mr. J. E. Richardson, principal of the Oldham Municipal Technical College and formerly lecturer in electrical engineering and later head of the engineering department at the Hull Technical College, has been appointed principal of the Salford Royal Technical College.

It is reported from New York that **Mr. C. E. Wilson** has been re-elected to the positions of president and a director of the General Electric Company of America from which he resigned in 1942 to serve on the War Production Board. **Mr. P. D. Reed,** who gave up the chairmanship of the company with him for the same purpose, is at present heading an economic mission in this country. Both **Mr. G. Swope** and **Mr. O. D. Young,** who retired from the positions of president and chairman, respectively, in 1939 but came back in 1942 to fill the posts for the duration of the war, have now resigned.

Mr. C. A. Powel, manager of headquarters engineering of the Westinghouse Electric & Manufacturing Company, has been elected president of the American Institute of Electrical Engineers for 1944-45. He succeeds **Dr. Nevin E. Funk,** vice-president of the Philadelphia Electric Company. In his acceptance speech Mr. Powel told A.I.E.E. members that one of the major tasks facing the Institute during the coming year will be to aid in the education and eventual re-employment of the men who are released from the armed forces.

The Council of the Institute of Industrial Administration has awarded the Institute travelling scholarship to **Mr. A. G. Irvine,** B.Sc. (Econ.), Oxford, for his thesis on "The Purposes and Techniques of Market Research." This Scholarship, of the value of £250, enables the holder to spend three months in the United States studying American practice in his

particular field of management, assisted by the New York office of the donors of the scholarship, Stevenson, Jordan & Harrison, Ltd. through Mr. J. E. Currie, their London managing director. The Wilson medal of the Institute has been awarded to **Mr. A. W. Goldstaub,** B.Com.(Aust.), Reading, for his paper on "Internal Audit in Industry." The junior executive prize of books to the value of £5 has been won by **Mr. W. L. Kent,** Ph.D., B.Sc., Warrington for his paper on "The Application of Science to Industry", and **Mr. G. Kinnaird Evens,** M.A., London, whose paper was "The Future of Psychology in Industry."

St. Andrews University Court has appointed **Dr. J. T. Randall** to the chair of Natural Philosophy in the United College, St. Andrews. He was educated at the Victoria University of Manchester under Professor W. L. Bragg and before joining the staff of the research laboratories of the General Electric Co., Ltd., Wembley, carried out research work on the scattering powers of atoms for X-rays. In 1937 he was elected a Royal Society Warren Research Fellow, and joined Professor Oliphant in the University of Birmingham, where an intensive study of the mechanism of luminescence in solids was carried out.

At the outbreak of war Dr. Randall turned his attention to problems associated with radiolocation, and succeeded with Dr. H. A. H. Boot in introducing a new type of apparatus which has resulted in the saving of many lives at sea. For this work Dr. Randall and Dr. Boot were recently awarded the Thomas Gray Memorial Prize of the Royal Society of Arts. Since 1943 Dr. Randall has been a temporary lecturer in the Cavendish Laboratory, Cambridge.

Mr. F. A. Wingrove and **Mr. W. Holmes,** M.C., have been appointed to the board of Wingrove & Rogers, Ltd. Mr. Wingrove has had long service with the company as buyer and also manager of the B.E.V. electric industrial truck and storage battery locomotive department. Mr. Holmes has been for many years on the radio side of the business.

Mr. W. Fennell, M.I.E.E., general manager and engineer of the Mid-Cheshire Electricity Supply Co., Ltd., gave an address last week to the Blackburn Chamber of Commerce and outlined two schemes whereby employees would be enabled to participate in the prosperity of the industry in which they were engaged.

Mr. W. W. Watt will deliver his presidential address to the Institute of Welding at a general meeting to be held at the Institution of Civil Engineers, S.W.1, on Wednesday, September 27th, at 6 p.m. At the same meeting the Sir William J. Larke medal will be presented to the winner of the competition of 1944, Mr. H. W. Clark, M.Inst.C.E.

High Wycombe is advertising for a borough electrical engineer in succession to **Mr. C. T. Westlake,** who is retiring. A commencing salary of £900 is offered.

Mr. W. A. Boulting, who has accepted an invitation to be the next Mayor of Warrington, is the proprietor of a local electrical engineering and contracting business in Crown Street, Warrington, and is a member of the Warrington branch of the Electrical Contractors' Association. He was born in London and served his apprenticeship with Cromptons at Chelmsford. He has been in business on his own account for twenty-five years and has been a member of the Warrington Town Council for ten years.

We are pleased to learn that **Mr. J. Johnson Smith,** M.I.E.E., London branch manager of Johnson & Phillips, Ltd., has now resumed duty after his indisposition due to enemy action.

Mr. W. S. Scott has retired from the position of accountant, European Division, Western Union Telegraph Co. with whom he has served in various capacities for the past sixty-two years. He remains a director of British Western Union, Ltd.

An informal luncheon is being held by the Installations Section of the Institution of Electrical Engineers at the Waldorf Hotel, Aldwych, W.C.2, on Thursday, October 12th, at 12.30 for 1 p.m. Although the new session will then have commenced, the luncheon is part of the 1943-44 programme, circumstances not having been favourable for it to be held on an earlier date. **Mr. A. G. Ramsey,** O.B.E., B.Sc. (Eng.), the 1943-44 chairman of the Section, will be in the chair.

Tube Investments, Ltd., announces that **Mr. C. D. H. Macartney-Filgate** has been made a director.

Obituary

Mr. A. G. Seaman, whose death as the result of an accident was briefly recorded in our last issue, had been for twenty-seven years a member of the staff of the British Electrical and Allied Manufacturers' Association. He was born in London in 1870 and was educated at Christ's Hospital; he then spent some time in North Germany. He gained early experience in electrical affairs with the Electric Light Department of the G.P.O., the Smithfield Electric Lighting Station, London (chief engineer), the Simplex Electric Tramway Conduit System and the Electric Tester Lamp Co., Ltd. Later he joined the New Transport Co., Ltd., and was a co-inventor with A. W. Gattie of the Gattie-Seaman system for automatically sorting goods. After a period as manager of the British Schuckert Electric & Manufacturing Co., Ltd., he joined the British Westinghouse & Electric Manufacturing Co., Ltd., in 1904, becoming successively manager of the motor department and manager of the publicity and sales organisation.

The late Mr. A. G. Seaman

Mr. Seaman joined B.E.A.M.A. as a sectional secretary in 1918, and played an important part in the organisation and development of the Plant Sections. On the setting up of the Export Groups in 1940 he was appointed secretary of the Electrical Machinery Export Committee, and to him fell the task of building up the ten Electrical Machinery Export Groups. But perhaps his greatest success was in the organisation of the three Electric Welding Sections of the Association. He was a member

of the D.I.E.E. Advisory Panel on Electric Welding. In addition to his work with the Engineering Sections, Mr. Seaman was from 1928 secretary of the Insulations (Cloth and Tape) Section. He had been a member of the Institution of Electrical Engineers since 1901.

Flight-Eng.-Sgt. E. A. Madge.—The cremation took place at Efford, Plymouth, on September 14th, of Flt.-Eng.-Sgt. Eric Arthur Madge, who lost his life at the age of nineteen while flying on active service earlier in the month. He was the son of Mr. S. R. Madge, electrical and mechanical engineer. The firm of Madge & Son, the General Electric Co., Ltd., and the Electrical Contractors' Association were represented at the funeral.

Mr. J. H. Hart.—We regret to record the sudden death on September 7th, whilst on holiday, of Mr. J. H. Hart, of the electrical measuring instrument sales staff of Elliott Brothers (London), Ltd. Mr. Hart, who was born at Arborfield, Berks., in 1869, had just completed sixty years' continuous service with the firm which he joined in 1884 when it was at St. Martin's Lane. In 1910 he took charge of the sales department of the London office at Leicester Square, which was transferred to Westminister in 1912. Since 1923, when the London office was moved to Lewisham, Mr. Hart had become a well-liked and respected figure at the Century Works.

Mr. H. S. Hayden, of Barnet, who died recently in hospital, was for many years with Siemens Electric Lamps & Supplies, Ltd., and later held an executive position in the statistical department of E.L.M.A. until 1940 when he took charge of the statistical department of the Electric Lamp Export Group.

Mr. Sydney H. Rawlings, joint managing director of the Automatic Coil Winder & Electrical Equipment Co., Ltd., died on September 17th at his home. Cremation took place at Cambridge on Wednesday. A memorial service is to be held later.

Will.—Mr. W. C. Lusk, chairman of the British Thomson-Houston Co., Ltd., and deputy chairman and managing director of Associated Electrical Industries, Ltd., left £96,941 (net personalty £83,523).

Iraq's Electrical Imports

THE accompanying table, based on the recently issued foreign trade returns of Iraq, shows the values of the principal electrical imports in 1942. (Dinar = £1.) The total trade increased, the declines in radio and telegraph apparatus and cables having been offset by increases in plant, batteries and accumulators, and lamps. The United Kingdom remained the principal supplier, with the United States taking a small share of the trade and India also making an appearance in the lamp, insulated wire and meter business.

As in other countries of the Middle East there has been in Iraq a marked increase in the cost of living and in purchasing power, but with no increase in imports. There has been inflation, but danger of its getting out of control seems to have been averted. In the wartime boom resulting from heavy local expenditure by the Allied Nations, the Iraqi Government has not lost sight of the expediency of long-term planning, both industrial and agricultural.

Class of Goods	1942 Dinars	Inc. or dec.
*Dynamos, motors, convertors, transformers and choking coils for main distribution under Government approval**	8,700	+ 6,300
Dynamos, etc., for other purposes	8,400	+ 900
From United Kingdom	5,400	+ 200
,, United States	2,900	+ 700
Batteries, accumulators and plates for motor vehicles and vessels	29,200	+ 19,600
From United Kingdom	20,300	+ 15,700
,, United States	8,000	+ 3,000
Pocket lamp batteries	560	— 240
From United States	150	— 100
,, United Kingdom	370	— 30
Other accumulators and batteries	4,800	— 1,600
From United Kingdom	3,200	— 2,300
,, United States	1,300	+ 500
*Electro-mechanical and domestic equipment up to 15 kg.**	500	+ 150
*Heating units (resistances)**	60	— 370
*Other, unspecified, electro-thermic apparatus**	360	+ 40
Filament lamps and tubes	35,500	+ 26,000
From United Kingdom	31,500	+ 24,600
,, India	1,900	+ 1,900
*Arc lamps**	4,800	+ 3,700
Other lamps	650	+ 480
*Electro-medical apparatus**	220	— 930
Radio valves	1,700	+ 550
From United Kingdom	1,000	+ 350
,, United States	410	+ 30
Radio receiving apparatus	10,800	— 13,800
From United States	9,700	— 10,900
,, United Kingdom	950	— 2,850
*Other radio material**	800	— 1,100
*Telegraph & telephone apparatus**	8,600	— 24,400
*Transmission cables**	1,020	+ 320
*Telegraph and telephone cables and wire for authorised public purposes**	500	— 3,100
Ditto for other purposes	15,400	— 3,400
From United Kingdom	11,800	— 5,900
,, India	1,800	+ 1,600
Insulators	780	— 1,420
From United Kingdom	650	— 1,050
*Switch and regulating apparatus for main distribution under Government approval**	1,600	+ 1,300
Ignition apparatus (except for aircraft, vehicles and ships)	910	+ 510
Meters, etc.	1,900	— 2,500
From United Kingdom	1,400	— 2,300
,, India	500	+ 500
Electric fans	9,500	+ 3,400
From United States	3,000	+ 2,500
,, United Kingdom	6,000	+ 500
Other electrical appliances and accessories	22,000	+ 1,200
From United Kingdom	17,400	+ 2,900
,, United States	2,200	— 700

* Mainly from U.K.

Advances in Electronics

Inaugural Address to South Midland Radio Group

THERE was a crowded meeting, even standing room being all occupied, so that a considerable number of members failed to gain admittance to the James Watt Memorial Theatre in Birmingham on the occasion of the delivery by DR. W. WILSON (G.E.C. Development Department) of his inaugural address as chairman of the Radio Group at the South Midland Centre of the Institution of Electrical Engineers.

Dr. Wilson described electronics as the most modern branch of electrical engineering and one that is advancing with the greatest rapidity. Many of its achievements are widely known, but some of the most spectacular might not be divulged until hostilities cease.

The address commenced with an indication that the electronic principle is very old, its origin dating back to the beginning of electric light. The arc lamp was originally enclosed to minimise the burning of its electrodes and that wastage was later prevented by evacuation of the enclosure; hence the mercury vapour lamp came into existence. It was soon modified to serve purely as a rectifying bulb, subsequently developing into the continuously evacuated and, more recently, pumpless steel tank types.

Not long after electricity was first generated by frictional machines it was employed to produce luminous discharges in evacuated Geissler tubes, the colour and intensity of the light so emitted being modified by varying the amount of residual gas in the tube and fluorescent coatings on its inside surface. The Moore tube, containing nitrogen gas, enjoyed a short life as an illuminant about 1908, the principle being revived a quarter of a century later as the fluorescent lamp.

Cathode Ray Developments

Crookes' investigation of the nature of the discharge caused him to design a tube by which cathode rays (and incidentally X-rays) were generated while further developments by J. J. Thomson in 1897 led to the production of the cathode-ray oscillograph, which enabled the beam to be recognised as a stream of electrons. Modern industrial forms of that instrument differ only in detailed refinement, while the electron microscope is virtually the same thing with three carefully designed electron "lenses" instead of one or two.

The squirted-filament lamp made by Swan in 1879 was observed to discharge carbon particles on to the inside of the enclosing bulb, the positive limb casting a shadow that caused a thin streak of the glass to remain free from carbon. Fleming recognised that discharge in 1904 as an electron stream from the more negative part of the filament and he embodied the principle in his thermionic valve (hot cathode) while the third electrode (grid) was added by de Forest. The insertion of more grids made, for example, the pentode and the introduction of a trace of mercury vapour into the evacuated bulb produced the gas-filled rectifier (diode) and the thyratron (triode) so that, finally, a diode with a light-sensitive cathode (that varies its resistance to current flow in proportion to the intensity of light excitation) constitutes a photo-electric cell.

If the similar electronic basis of those three lines of research had been recognised at the beginning it is certain that the present state of development would have been anticipated by some years. Such "single track" procedure is unfortunately the rule rather than the exception in scientific progress.

Heavy-Current Applications

Realisation that all belong to the same family has enabled notable progress to be made by applying to one group features that have proved to be successful in another, which Dr. Wilson illustrated by outlining how the grid-controlled rectifier, the invertor, the ignition and so-called "magic eye" have been developed during the past ten years. His comparison afforded proof that the valuable attributes of the thermionic valve are not necessarily confined to circuits of small amperage, but can be extended to heavy current engineering. There would not seem to be any switching, controlling, or frequency changing operations which might not in the future be performed electronically with greater effectiveness and economy than by present means, whatever the kW or kVA capacity might be. Some forecasts of what may be possible in the near future were prefaced with comments on objections to electronic operation.

It does not involve the use of fragile glass bulbs and flimsy metal components; metal valves are already available, but glass bulb types have satisfied all requirements in action in warships and aircraft. The glass cathode-ray tube is far less liable to damage than any ordinary voltmeter and ammeter on account of the absence of risk of harm being done by over-deflection and the absence of mechanical bearings and suspension. Modern thermionic valves can be relied upon to do duty for about 10,000 hours and many actually last twice as long.

COMMERCE and INDUSTRY

Trade Union Conferences.

E.T.U. and Amalgamation

SPEAKING at the conference of the Electrical Trades Union at Blackpool on Monday, Mr. H. P. Bolton, the president, said he did not believe that a large-scale analgamation of trade unions was a panacea but the practical amalgamation of unions catering for the same class of worker would be a progressive step, strengthening the structure and negotiating powers of many unions. He saw a better future in the federated form of organisation than in inflated schemes of amalgamation.

The membership of the union was now approaching 130,000. They had reached out into new industries and established a special women's section. A large majority of the organisations and associations of the industry were in favour of compulsory registration, but it was an ideal not yet achieved. As they were in favour of the registration of contractors, they could not logically oppose the principle of registration of operatives.

The conference passed a resolution urging a minimum of two weeks' holiday with pay each year, and payment for statutory holidays.

Engineers' Claims

At a joint conference in London last week a claim for a 40-hour working week without wage reduction immediately the war ends was placed before the Engineering Employers' Federation by the Engineering Joint Trades movement. The present standard working week is 47 hours.

The conference also considered a claim for the amendment of the national agreement on wages and conditions of certain skilled time workers, maintenance men, "setters up," inspectors and "markers off." Another question under consideration was a claim for improvement in the wages of apprentices, boys and youths, an increase in the percentage rate on adult wages, according to ages, was asked for. The employers intimated that they would consider all the matters and make their reply in due course.

Lochaber Rating Appeal.

Valuation of Lochaber Undertaking

Last week the Lochaber District Valuation Appeal Court at Fort William considered an appeal of the Lochaber Power Co. against the Inverness county assessor's increased valuation of the company's hydro-electric undertaking in Lochaber, amounting to an approximate increase of £10,000 in rateable value.

Mr. G. R. Thomson, K.C., for the company, said that for the past nine years the county assessor had based his valuation on 4 per cent. of the capital expenditure on the undertaking and he saw no reason why a change should now be made. Sir William Halcrow, who was responsible for the design and construction of the works, said that the capital expenditure for the completed scheme amounted to over £4,000,000.

Mr. H. R. Keay, the county assessor, explained that the 4 per cent. was agreed on in 1935 in consideration of the fact that at that time only one third of the potential capacity of the works was capable of being utilised for production. Now that the works were completed he was applying strictly the contractor's principle without modification, and this worked out at 5 per cent. on land, 5 per cent. on civil engineering works, such as dams, tunnels, etc., 7 per cent. on buildings and 7½ per cent. on machinery. This was the principle applied to completed schemes of similar character in other parts of the country.

The Court upheld the assessor's proposal, with the exception of the power house excavation, which it classified as civil engineering works, entitled to the 5 per cent. figure instead of 7 per cent. which applied to buildings. The appellants asked for a stated case.

Falsification of Accounts

At Grantham Quarter Sessions, William Thomas Lings, who had been employed by the Mid-Lincolnshire Electric Supply Co., Ltd., for eleven years and rose to the position of chief accountant, was sentenced to twelve months' imprisonment, to run concurrently, on each of eight charges of falsification of accounts, the total amount involved being £184 10s. 11d. Charges of larcency from the company, the money in question amounting to over £1,000, were allowed to remain on the file, not to be proceeded with without leave of the Court.

Street Lighting Fittings

Relaxation of the "black-out" requirements and the Ministry of Home Security's permission to increase by varying degrees the illumination allowed in some (not all) localities will necessitate adjustment of many street lighting fittings. The Revo Electric Co., Ltd., Tipton, Staffs., announces that it now has in production a simple all-metal conversion device which can be fitted to existing "starlight" units of its own make by means of the four screens already provided. In addition new series of inexpensive adaptors have been designed for simply screwing into existing g.e.s. and e.s., or b.c. lampholders; they are already wired for use so as to avoid modifying existing circuits. The above devices provide for an intensity of 0 02 ft.-candle and a similar series is in production for situations where 0·2 ft.-c. is now allowable.

Rowlands Electrical Accessories, Ltd., Hockley Hill, Birmingham, 18, have likewise made emergency production arrangements for e.s. and g.e.s. to porcelain H.O. skirted b.c., with and without intensive reflector or detachable blue glass visor, as well as g.e.s. to s.c. brass batten b.c. lampholder adaptors.

Monmouthshire Industrial Exhibition

Monmouthshire County Council, in association with Newport Borough Council and local industrialists, is holding an exhibition at the Technical College, Newport, from October 7th to 14th. It is designed to show, not only the wide range of the county's products, but also the resources and potentialities of Monmouthshire as a site for new post-war industries. The

opening ceremony will be performed by the Minister of Reconstruction, Lord Woolton. Inquiries should be addressed to the Hon. Organiser, Monmouthshire Industrial Exhibition, County Hall, Newport.

Fire-Guard Relaxation

Authorised electricity undertakings have been notified of the extent of the relaxation of fire-guard duties recently announced. These duties will be entirely suspended during daylight hours. The " wakeful watch " is also suspended until further notice but all fireguards on duty should be prepared to turn out at two minutes' notice if an alert sounds.

" Ediswan " Lamp Publicity

The 1944-45 publicity programme of the Edison Swan Electric Co., Ltd., for its " Ediswan " lamps includes extended announcements in the Press. The first of a series of new advertisements visualises London ablaze with light and bears the words " Let's see a brighter future with Royal Ediswan Lamps." Advertising is being continued in the film magazine, *Signs of the Times*, and there is to be an increase in outdoor publicity. Throughout all the principal roads of the country the " Ediswan " day and night reflex signs familiar to pre-war motorists are being repainted and maintained. The accompanying photograph shows the company's attractive window display for the new season.

" Ediswan " window display

International Bibliography

We have received from the British Society for nternational Bibliography a programme of the meetings arranged by the Society for the 1944–45 session. These are to be held in the Council Room at the Institution of Electrical Engineers, Savoy Place, London, W.C.2, and the Society states that it is now able to revert to the practice of providing tea after the meetings, which commence at 2.30 p.m. For the opening meeting on Tuesday, September 26th, two papers have been arranged, one on some general principles of bibliographical classification, with application to universal decimal classification, by Dr. S. C. Bradford, and the other on the classification of literature in the technical department of an oil company, by Mr. C. L. Gilbert. Speakers at later meetings will include Mr. J. E. Wright (Post Office Research Station), Mr. L. S. Harley, M.I.E.E. (head of the Central Radio Bureau) Mr. W. C. Cooper (Ministry of Aircraft Production), Dr. J. A. Wilcken (editor, *Science Abstracts*), Mr. E. M. Bennett (principal examiner, Patent Office) and Mr. H. Rottenburg, M.A., M.I.E.E. (managing director, London Instrument Co., Cambridge).

Contract Price Adjustment Formulæ

The British Electrical & Allied Manufacturers' Association informs us that the following are the latest figures for its contract price adjustment formulæ: (a) " Rates of Pay " : the rate of pay for adult male labour at September 16th shall be deemed to be 90s. 6d. (unchanged); (b) " Costs of Material ": the index figure for intermediate products last published by the Board of Trade on September 16th is 176·2 (against 176·1) and is the figure for the month of August.

Fuel Position

Speaking at a fuel economy exhibition at Bristol last week the Minister of Fuel and Power (Major Lloyd George) said that relaxation of the black-out did not mean the end or even modification of the need for fuel economy this winter. In industry the economy campaign was now yielding its reward and the country now had more coal in stock to meet the winter demand than he had dared to hope for after the strike in the spring. The strain on supplies, however, was even greater than last year. People living in houses damaged by flying bombs, where only temporary repairs had so far been effected, might well need special consideration in regard to fuel.

During the flying bomb attacks, the gas and electricity repair squads in London had done " a gigantic job amazingly well." Altogether, 750 gas mains were affected, as well as one or two holders, including the one outside the Oval at Kennington. Electricity undertakings, too, made remarkable recoveries. When one power house was hit consumers were without electricity for only 64 hours. No praise could be too high for those who did these repairs.

Fatalities

Boy's Death.—A thirteen-year-old Eastleigh boy who was found dead in the garden of his home was, it is reported, apparently installing an amateur cinema projector in an Anderson shelter with the intention of operating it from an electric point in the scullery.

At the inquest on the boy, Norman Charles Stillwell, last week, evidence was given that he fixed a plug in the scullery light point and after the accident the switch was seen to be in the off position. The switch, however, was connected in the neutral conductor and the live wire carried direct to the lampholder. An installation inspector of the Southampton Corporation Electricity Department said that all the seals were missing from the meter and it was possible for the wires to be taken from the terminal box. Any inexperienced person who removed the wires might have replaced them wrongly because some were alike.

A meter tester stated that he examined the meter in October, 1942, in connection with an

alleged deficiency of collection of money. All the seals on the meter were broken and he resealed it; the seals were still intact on March 20th last. The boy's father said he reported to the Electricity Department that there was something wrong with his meter because he formed the opinion that he was not getting enough current for his money. He had no idea how the seals came to be broken. He had never seen his son tinkering with the installation apart from using wires from the points.

The Coroner, returning a verdict of "accidental death," said that there was ample evidence that some unauthorised person had been meddling with the meter, but it was impossible to say now who was the person really responsible for the accident.

Killed While Cleaning Motor Generator.—A wireless telegraphist in the Navy, John Stanley Lillico (23), received a fatal electric shock while cleaning a motor generator, it was stated at a recent inquest, when a verdict of "Accidental death" was recorded. Lieut. W. A. Wood said that deceased, an experienced man, was in charge of the wireless telegraphy office. Petty Officer A. E. King stated that Lillico was using a stick with the end wrapped in emery paper and covered with a piece of cloth. The stick must have slipped off the generator causing his hand to go past the door on to the commutator. Witness saw him switch off, but he must have switched on again, perhaps to make sure that the machine was running correctly.

Fatal Shock Through Fence.—At an inquest on a ten-year-old boy at Kilmallock, Eire, it was stated that he had been holding the barbed wire of a sports field fence which had come in contact with an electrically driven fan at motor engineering premises. The fan had been guarded but the protection had been removed by some unknown persons. Two other boys received shocks on the previous day.

Institute of Fuel

The annual luncheon of the Institute of Fuel at which the president, Dr. E. W. Smith, C.B.E. will preside, will be held at the Connaught Rooms, Great Queen Street, Kingsway, London, W.C.2, on Thursday, October 12th, at 12.30 for 1 p.m. Lord Woolton (Minister of Reconstruction) will be the principal guest. The luncheon will be followed at 2.15 p.m. by the annual meeting when the president will deliver his address and Dr. J. C. King, O.B.E., will present the Melchett Lecture.

The conference arranged jointly by the Institution of Chemical Engineers and the Institute of Physics in London on September 22nd and 23rd has been postponed as also have the meetings arranged at Birmingham for Wednesday, September 27th, and at Newcastle for Monday, October 9th and Monday, November 13th.

North-East Coast Institution

The sixty-first session of the North-East Coast Institution of Engineers and Shipbuilders commences on October 20th with the annual general meeting and address by the new president, Sir Summers Hunter. This will be followed on November 3rd by the Andrew Laing Lecture by Sir Stanley V. Goodall, Assistant Controller of Warship Production, whose subject is "Some Recent Technical Developments in Naval Construction." On December 15th Prof. C. E. Inglis will deliver the Parsons Memorial Lecture on "Creep, Self-excited Oscillations and other Problems relating to Turbine Design."

A committee of seven members of the Institution is considering a plan for attracting university students to the shipbuilding and engineering industries' technical staffs after the war. Professor C. J. Hawkes, of King's College, Newcastle-on-Tyne, is chairman. It is suggested that to encourage the entry of university men, salaries paid to university-trained employees between the ages of 21 and 25 should be about £1 a week higher than the customary wage. These men, it is recommended, should continue in the employment of their firm for at least two years after completing training.

Women's Engineering Society

A meeting of the Manchester Branch of the Women's Engineering Society was held on September 5th, at the Engineers' Club, Albert Square, Manchester, when Mr. E. T. Norris, M.I.E.E., Fellow A.I.E.E., chief designer to Ferranti, Ltd., spoke on "The Moving Coil Voltage Regulator." Miss D. Smith, A.M.I.E.E., was in the chair. Mr. Norris explained the basic principles involved in the design of voltage regulators, showing how, although easy in theory, the problem was a difficult one in practice. He mentioned the induction regulator and on-load tap-changing gear and then described in detail his moving-coil voltage regulator, which is based on the same principle as the toy shocking coil. Demonstrating the advantages of this type of regulator over others, he emphasised the lack of auxiliary equipment and the use of complete oil immersion. A short discussion on the relative costs of regulators and their finer limits of performance ended the meeting.

Appliances for New Zealand

A British company informs us that it has had inquiries for electrical goods for New Zealand, including vacuum cleaners. It wishes to get into touch with manufacturers who are planning post-war models which would be suitable for the New Zealand market.

Mining "Brains Trust"

The Yorkshire North-West Branch of the Association of Mining Electrical and Mechanical Engineers is holding a "Brains Trust" meeting to-morrow (Saturday) at the Hotel Metropole, Leeds, at 3 p.m.

Trade Announcements

The Simplex Electric Co., Ltd., informs us that its London offices are now once again in Tottenham Court Road. The premises include the site previously occupied, but with greatly increased accommodation. The address of the offices and showrooms is 217-9, Tottenham Court Road, London, W.1 (telephone, Museum 7001; telegrams, Loncreda, Rath, London). The trade counter is at 8, Alfred Place, W.C.1, at the rear of the offices.

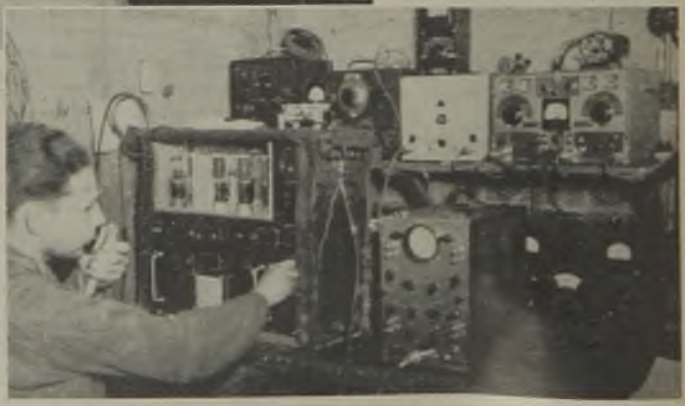
Julius Sax & Co., Ltd., have moved to 137-143 High Road, Chiswick, W.4 (telephone: Chiswick 4866/7).

U.S. Army Repairs

How Equipment is Made Ready for the Fighting Line

IN view of its long and exacting journey and the interval of time elapsing, every piece of equipment arriving in this country for the United States Army is checked and tested before passing on to combat units; furthermore, as design is never static and improvements are constantly being incorporated, modifications are almost certain to be required as well. Some time ago we were privileged to visit one of several depots which have been established to undertake these tasks. What impressed us particularly was the dependence of a modern army on electricity, not only in the operation of the actual weapons employed, but also in ensuring that the weapons get to the front line in first-class fighting condition.

Without electricity not a single tank, armoured car or other vehicle would even move, and in addition there are many applications, indispensable to-day, such as radio, telephone gear, teleprinters, fire control, lighting and various power uses in the field. In the repair and maintenance shops the electrically operated appliances include lathes, drills, saws, woodworking machinery, engine testing equipment, welders, elaborate radio and telephone testing apparatus and haulage trucks.



Testing dynamos and (right) a radio transmitter undergoing final inspection

Repair and maintenance work is classified, according to its nature and the skill required to deal with it, for attention by one of five echelons. Routine maintenance normally carried out by the users of the equipment in the field is graded as "first echelon" work, while at the other end of the scale "fifth echelon" attention covers practically the rebuilding of apparatus.

Most of the tanks and other vehicles, etc., arriving at the depot come straight from the docks, the smaller ones still in packing cases. All of them receive first echelon attention and any requiring further treatment are scheduled accordingly. For this the continuous flow system has been adopted wherever possible, the vehicles entering one end of the shops and travelling through various stages until the work is completed, when they are passed out at the other end.

In the radio installation department, for instance, it is no uncommon occurrence for vehicles to have their original radio equipment removed and a newer, improved type substituted. The vehicles are prepared outside the repair shops, the old sets being stripped out. To accommodate the new equipment a modification of the shelves on which it stands is generally required, involving a certain amount of welding. In a small room adjoining the main shops, cables are cut to the required lengths and the control boxes for the inter-communication telephones attached to the bases on which the radio sets are mounted. These bases are then mounted

on the vehicles and clamps fixed ready for the next stage, the installation of transmitters and receivers which have already been tested. With the addition of the accessories, antennæ and spares, the vehicles, after a final test, are ready for dispatch. In the particular depot that we inspected fifty vehicles can be thus treated within twenty-four hours.

The interior of a mobile wire repair shop and (right) setting a teletype machine

The radio sets on arrival at the depot go to a small radio testing room provided in a corner of the installation department, and if found in order are placed on racks ready for installation. Only the most elementary repairs are undertaken here, *e.g.*, changing of valves and testing for loose connections. If further attention is found to be necessary the apparatus is transferred to a special signal equipment repair section, where facilities are provided for dealing not only with radio equipment of all types, but also other kinds of instruments, telephones, teleprinters, etc. Here, after work sheets have been made out and labels attached, the apparatus is classified to await assignment according to priority arrangements.

Radio sets—there are about forty different types in use, including direction-finding apparatus—are grouped into four main types: frequency modulation vehicle sets, amplitude modulation vehicle sets, pack sets and mains operated sets. The work benches are laid out accordingly, with special sections dealing with particular components such as dynamotors and generators, transformers, etc. All the men engaged in this department are experts in their particular work and it is left to each individual to diagnose a fault in the apparatus on which he has been set to work. The overseers, or "technicians," to whom difficulties are referred, work at the benches with the men.

Two screened inspection rooms permit all checks, both electrical and mechanical, to be made to ensure that all apparatus conforms to U.S. Government specifications. The apparatus installed there includes an oscilloscope, an audio oscillator, a "Rider Chanalyst" which analyses and checks modulation and frequency visually at every stage, radio- and audio-frequency, low- and high-frequency signal generators, various types of frequency meters and a multi-range valve tester.

Types of signalling instruments other than radio are dealt with in a separate department. Cords, plugs and contacts cause the greatest amount of trouble in telephones, microphones, switchboards, etc., and apparatus is provided to facilitate the location and treatment of faults. Among special appliances for testing teleprinter equipment is a stroboscope.

Shortage of spares of any particular components is not permitted to hold up repair work or to prevent the incorporation of improvements or modifications found desirable in the light of experiences on the battlefield. Over 1,500 meters of various types have been repaired in this department by "cannibalising" and many radio sets have been fitted with guards to protect loudspeakers from damage from blast from adjacent guns. Every month hundreds of

radio sets and other instruments are repaired or modified.

In connection with the radio department, we were surprised to discover that an operation requiring such a high degree of accuracy as the grinding of quartz crystals for frequency control is undertaken in such an establishment. An output of about forty crystals a day to an accuracy to within 3/10,000ths of an inch is achieved, in all sizes. Checking of frequencies is done visually by means of an oscilloscope working in conjunction with a standard oscillator emitting signals on frequencies of 50 and 10 kc/s. The standard oscillator is checked by radio signals transmitted from the United States which are claimed to vary less than one-millionth of a cycle. Stability tests are also undertaken by means of an " icebox " at 5 deg. C. intervals from temperatures between −50 deg. C. to 55 deg. C. If a large number of crystals of the same frequency is required urgently the first one is made in the normal way and the remainder on a duplicator. With this method, however, it is not possible to secure such a high degree of accuracy. The widest deviation tolerated is 900 cycles.

Apart from separate departments where complete automobile engines of all kinds are tested there are several sections equipped to handle individual electrical components. Besides various types of testing equipment for generators, starters, magnetos and distributors, there is sand blasting apparatus for cleaning sparking plugs, growlers for armature tests, " Meggers " for checking insulation, compression testing gauges and portable kits of apparatus for use on the road.

Among heavier electrical apparatus employed in the various departments may be mentioned lathes, drills, grinders, portable welding sets of up to 200 A (used sometimes for welding direct on to tanks), heat treatment furnaces, hoists, compressors for sand blasting, paint sprayers and various woodworking tools including band, circular and hacksaws, shapers, planers, drills, etc. For use in the field there are mobile machine shops equipped with testing instruments, lathes, drills, soldering irons, etc. These are designed for operation in conjunction with portable 110 V, 6·3 kVA petrol-driven generators. Haulage of trucks around the depot is undertaken largely by small " Clarkat " electric tow motors which operate from nine 6-V batteries with a 90-Ah capacity at the 20-hour rate. Charging facilities for these are provided at a number of points.

While at the depot we also had an opportunity of inspecting one of the transmitting sets operated by the Radio Branch, Special Service Department, for broadcasting to the troops on the American Forces Network. Several of these units are now in operation in this country on various frequencies around 1,400 kc/s and with low power output. The whole apparatus including spare parts can be packed away into two suitcases. The programmes transmitted are received by land line from London.

Electricity in Liberated Countries

BEFORE the liberation of France factories had to receive licences before they could use electricity. These expired on August 29th. In order to keep the factories going the Provisional Government extended the licences until September 3rd. Meanwhile it was necessary to repair the transmission lines which had suffered severely during the fighting. The F.F.I. therefore made an order that the 220-kV lines linking the Massif Central and Paris must be repaired with all speed and that the F.F.I. must offer all aid and protection. Formations in the Correze, Creuse, Indre and Cher were ordered to give workers the necessary passes, travel permits and the loan of vehicles to aid this work. All specialists in the F.F.I. were returned to the electricity company in order that repairs should be expedited.

Restoring the electricity supply in liberated Italian towns is a task of considerable magnitude. It generally takes about three weeks for the Allied engineers to put parts of a power station back into some kind of working order. First demand, of course, comes from the forces themselves and they are served by portable generator sets of from ½ to 50 kW. As areas are cleared larger mobile sets are brought in, including trains.

Sometimes unorthodox methods have to be used. Three Italian submarines, for example, furnished power at Naples. Their 220-V DC generators were connected in series and cables were run to a tramway cable line. This was then connected to a tramway substation in which a 1,000-kVA synchronous-motor DC generator set was used in reverse, establishing 9-kV service to important water-pumping stations.

Power units have to be moved from plant to plant to meet the most urgent needs. A difficulty is the Italian use of 42, 45, 50 and 162·3 cycle frequencies.

In some instances, transformer tanks and radiators had been pierced by wreckers and in other cases coils had been cut. One problem is the restoration of transformer bushings and breakers which are very vulnerable to shell fire. When sections of transmission lines are blown out, conductors are merely spliced with clips. Sections of missing conductors can be made up by dismantling less important lines.

It is reported by the Diplomatic Correspondent of the *Daily Telegraph* that the production and distribution of electric power in Belgium has not been disturbed over most of the country. Brussels has not been without electricity or water for even a day. The gas supply has been somewhat irregular, but is now returning to normal. Belgian industry generally is in a surprisingly good condition.

ELECTRICITY SUPPLY

"De-Selection" of Ashton Station. Thanet Purchase Proposal.

Ashton-under-Lyne.—DE-SELECTION OF GENERATING STATION.—In connection with the proposal to alter the North-West England and North Wales Electricity Schemes, 1928 to 1942, by making provision for the generating station of the Ashton-under-Lyne Corporation ceasing to be a "selected station," notice is given by the Central Electricity Board that any authorised undertaking or other persons desiring to make representations must do so not later than October 16th. Copies of the amended Scheme—the North-West England and North Wales Electricity (Alteration) Scheme, 1944—may be obtained (price 1d.) from the Stationery Office, York House, Kingsway, London, W.C.2. Representations should be posted by registered letter to Mr. O. A. Sherrard, secretary, Central Electricity Board, Trafalgar Buildings, 1, Charing Cross, London, S.W.1.

Chard (Somerset).—STREET LIGHTING SCHEMES.—The Council has approved a report of its Post-War Planning Committee recommending that the Council's gas undertaking and the electricity company should be asked to submit schemes and estimates for street lighting throughout the borough.

Chipping Norton.—TRANSFER OF UNDERTAKING.—At a recent meeting of the Town Council the Mayor (Councillor F. Smith) stated that the Chipping Norton Electric Supply Co., Ltd., had been acquired by the Wessex Electricity Company and that one consequence of this would be a change-over from DC to AC.

Isle of Thanet.—PROPOSED ACQUISITION OF UNDERTAKING.—A special meeting of Broadstairs Council last week approved without comment a report from the Council's representatives on the Margate and Broadstairs Joint Committee for Electricity Supply. This Committee has had under consideration the desirability of purchasing the electricity undertaking and the report submitted recommended that, subject to approval of the Electricity Commissioners, the Isle of Thanet Electric Supply Company's undertaking should be purchased by the two local authorities on December 31st, 1945, in accordance with the terms of the agreement of August 19th, 1936, and the Margate, Broadstairs and District Electricity Act, 1937. The undertaking, if purchased as proposed, should, it was recommended, be controlled by a Joint Board constituted by members appointed by the two Councils in the manner provided by the Act of 1937.

Newport (I. O. W.).—FUTURE STREET LIGHTING.—As the pre-war contract with the Isle of Wight Electric Light Co. has expired and that with the Newport Gas Co. will have only a comparatively short period to run on the cessation of lighting restrictions, the Highways Committee has asked the borough engineer to prepare a scheme for future lighting for consideration.

Totnes.—"ANTIQUATED" LIGHTING.—Future public lighting of the borough came under discussion at a recent meeting of the Town Council The Mayor (Alderman G. C. Edgcumbe) expressed the opinion that the present system was antiquated and should be scrapped, but the town clerk (Mr. G. E. Windeatt) pointed out that there was an agreement with the gas company which covered a period of five years dating from the end of the war. The Mayor remarked that if they had to go on for five years under the pre-war system then they might as well continue with the black-out. It was resolved to invite representatives of both the gas and the electricity undertakings to meet a committee of the Council.

Overseas

Russia.—TURBINE RECONSTRUCTION.—The Soviet Home Service announces that the Urals turbine factory has reconstructed fifteen large turbines for the Donbas power stations as well as auxiliary equipment.

ELECTRICITY ON FARMS.—Before the war about 2,000 collective farms in the Ukraine were supplied with electricity. As more power stations are constructed and those destroyed reconstructed, farms are once again receiving supplies. In the Kiev, Vinnitsa and Kamenets-Podolsk provinces ten electric power stations are already operating. The present plan is to provide electricity for 424 farms as a first step.

MOBILE STATIONS.—Two mobile electric power stations have been sent to Lithuania, one of 1,000 kW to Vilna and the other of 1,500 kW to Kaunas.

Sweden.—ADDITIONAL POWER FOR STOCKHOLM.—It is hoped that the first stage of the Järpströmmen hydro-electric power station which is to furnish Stockholm with additional power, will be completed in November. Its initial capacity will be about 80,000 kW.—*Reuter's Trade Service.*

Visit to Power Station

NEARLY one hundred members of the South Wales Institute of Engineers were guests of the South Wales Power Co., on Thursday last week at one of its generating stations. On arrival there they were welcomed by Mr. L. Howles, general manager of the company, and before inspecting the plant they were given a brief address, with lantern slides, by Mr. E. McCabe, generation engineer.

As they commenced their tour the visitors saw demonstrations of the effect of shutting off the electrostatic precipitation plant. Particular interest was shown in the boiler and turbine plant unit construction, the remote control system, the latest methods of ash and dust disposal by pumping them away in the form of slurry, and the way concrete has replaced wood in the construction of the modern cooling tower.

In a vote of thanks to the company the president of the Institute, Dr. F. J. North, also expressed gratitude to engineers in the Forces whose recent successes on the Continent had helped to make their visit possible so unexpectedly soon after its postponement at the time of the invasion. The vote of thanks was seconded by Dr. Ivor David. Congratulations on the successful organisation of the tour were conveyed to Mr. J. Palmer Rees, station superintendent.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The County of London Electric Supply Co., Ltd., has acquired from the Southern Areas Electric Corporation, Ltd., the whole of the issued capital of 150,000 £1 ordinary shares of the Brentwood District Electric Co., Ltd. This has been done by the issue to the Southern Areas Corporation (with the consent of the Treasury) of 150,000 £1 ordinary shares of the County Company, which have a market value of £337,500. The Brentwood company was formed in 1920 and acquired by the Southern Areas Corporation in 1935. Its area (two miles radius from the centre of the town) was surrounded by the large Essex area of the County Company.

Lisbon Electric Tramways, Ltd.—The accounts for 1943 show a net profit of £53,738 (against £58,948 in 1942), after providing for all charges, including £91,000 (£79,128) payable to the municipality, £55,000 (same) to general and depreciation reserve and nil (£7,696) for gross debenture interest. The ordinary dividend is maintained at 5 per cent. by a final payment of 2½ per cent.

In a statement issued with the report and accounts Mr. A. N. Rye (chairman) says that an outstanding feature of the year's operations has been the maintenance of a full and uninterrupted service. Passengers carried numbered 196 million, an increase of 24 million. If the service had depended to any serious extent on motor-buses the transport system of Lisbon must have suffered severe dislocation. It was coal, mainly British coal, which saved the situation. At the request of the authorities a small experimental bus service has been inaugurated and the question of additions is being studied, but the chairman points out that, apart from wartime difficulties, fares must be higher than on trams, and any large increase in motor-buses would conflict with the intention of the Parliamentary Bill for large-scale hydro-electric development.

Telephone Rentals, Ltd.—Speaking at the company's annual meeting Mr. F. T. Jackson (chairman and joint managing director) said that a very satisfactory feature of the business done during the year was that it had come to them unsought, which was indicative of their goodwill. A series of advertisements had recently been commenced in the national Press designed to keep the company's factory services in the public mind for after the war, when they would be able to direct their energies to the further expansion of business. During the past eighteen months the opportunity had been taken of examining their whole organisation with the object of making it more efficient and sufficiently elastic in all sections to cope with future expansion.

The British Columbia Electric Railways report earnings of £398,028 for 1943, after providing for depreciation, sinking fund and renewals, against £432,809 for 1942. The final dividends are 2 per cent. on the preferred ordinary (making 5 per cent., against 5½ per cent.) and 3½ per cent. on the deferred ordinary (6½ per cent. against 7½ per cent.). The light and power system sold 653 million kWh (against 594 million) and passenger and freight traffic on the electric railways also showed a substantial increase. Discussions have been proceeding between the British Columbia Government and local authorities regarding the public ownership of public utilities, but so far no proposals have been made to the company.

Solus Teoranta (Eire) reports a profit of £15,978 for the year ended June 30th last against £17,079 for the previous year. Depreciation takes £6,339 and taxation provision £8,000. After paying a final dividend of 5 per cent. (again making 10 per cent. for the year) on the "A" and "B" ordinary shares, £2,357 is carried forward.

The Dubilier Condenser Co. (1925), Ltd., reports a profit of £25,862 for 1943-44, after meeting taxation, against £20,995 for the preceding year. After transferring £10,000 to war contingencies reserve, an ordinary dividend of 10 per cent. is again to be paid and £25,675 (against £18,841) is carried forward.

Radiovisor Parent, Ltd., reports a trading profit for the year to March 31st of £3,222. After deducting depreciation, etc., the net profit is £2,466, reducing the debit balance carried forward from £36,650 to £34,184.

Enfield Cable Works, Ltd., as for several years past, has declared an interim dividend of 6¼ per cent.

The Ransome & Marles Bearing Co., Ltd., is maintaining its distribution for the year at 20 per cent. by a final dividend of 11 per cent.

Telephone Properties, Ltd., is recommending an ordinary dividend of 6 per cent. for 1943, the first since 1939.

British Insulated Cables, Ltd., is again paying an interim dividend at 5 per cent.

British Ropes, Ltd., announces an interim dividend of 5 per cent. (same).

The Automatic Telephone & Electric Co., Ltd., is paying the usual interim dividend of 3 per cent. on the ordinary stock.

The Scottish Power Co., Ltd., announces payment of an interim ordinary dividend of 3 per cent. (same).

The Lancashire United Transport & Power Co., Ltd., has declared an unchanged interim dividend of 4 per cent.

The Midland Electric Corporation for Power Distribution, Ltd., announces an interim dividend of 3 per cent., the same as last year.

The Woking Electric Supply Co., Ltd., is again paying an interim ordinary dividend of 3 per cent. free of tax.

Stothert & Pitt, Ltd., are again paying an ordinary dividend of 10 per cent. but the bonus is raised from 2½ to 5 per cent.

The Hoffmann Manufacturing Co., Ltd., is paying an interim ordinary dividend of 7½ per cent. tax free for the seventh successive year.

(A short series of open letters by L.S.E., commenting on some notable letters of the past.)

To Michelangelo, whose art was hampered by the customer's requirements

Norwich, 1944

Sir,

In your letter to the Papal Architect you ask not to be vexed as to where the work is to be done, and in return you undertake to provide within five years 'a work without equal in the world.'

A fair offer, yet you had to suffer years of changes and countermanded plans before the heirs of the Pope finally abandoned the plan for a magnificent tomb and gave you instead a little job of painting on the wall of the Sistine Chapel.

You have our sympathy. As creative artists ourselves, in a rather more commercial sphere, we know only too well how annoying customers can be! But although you were disappointed at not completing that marvellous tomb, you may be glad to know that the painting (The Last Judgment) has been described as the greatest single-handed work of art that man has ever produced.

We like your phrase 'without equal in the world.' That is the standard we try to attain in the manufacture of electric motors – but we have to make our delivery promises a lot shorter than five years!

Yours with sympathy and understanding,

LAURENCE, SCOTT & ELECTROMOTORS LTD.

The India Rubber, Gutta Percha & Telegraph Works Co., Ltd., has given notice of its intention to redeem, on March 25th next, the company's 5 per cent. first mortgage debentures. The outstanding amount is stated to be £333,800 and the company has the option of redeeming them at 101½.

The Wolseley Sheep Shearing Machine Co., Ltd., reports a net profit for 1943 of £9,273 (against £8,308). It is maintaining the dividend at 12½ per cent. and transferring £3,000 to deferred repairs (against nil).

New Companies

Unifurnaces, Ltd.—Private company. Registered September 13th. Capital, £10,000. Objects: To carry on the business of engineers, manufacturers of furnaces and kilns (electric, gas or otherwise) for the ceramic, metallurgical or other industries, and of gas producers, gas cleaning plant, etc. Subscribers; C. F. Scott and E. J. Gilbert of 4, Throgmorton Avenue, E.C.2.

Sidney Terry, Ltd.—Private company. Registered September 13th. Capital, £10,000. Objects: To acquire the business of an electrical, contractor, radio engineer, etc., carried on by Sidney Terry at 88, St. Dunstan's Street, Canterbury. S. Terry, Linden House, Linden Grove, Canterbury, is permanent managing director.

Progress Cables (Southampton), Ltd.—Private company. Registered September 5th. Capital, £2,000. Objects: To adopt an agreement with Progress Cables & Accessories Co., Ltd., and to acquire the business of wholesale electrical distributors carried on by Shimwell Alexander & Co. at 13, Omdurman Road, Highfield, Southampton. Directors: S. A. Harrowell, Sydenvan, Dollis Lane, N.W.7 (director of Progress Cables & Accessories Co., Ltd.); E. C. Darby, 35, Hillcote Avenue, S.W.16; and F. H. Hislam, 74, Elspeth Road, S.W.11. Registered office: Regent House, Eversholt Street, N.W.1.

F. M. Bell & Co., Ltd.—Private company. Registered August 22nd. Capital, £3,000. Objects: To acquire the business of lift and general engineers, carried on by R. G. Bell, Harriet J. Bell and Lilian Ethell, at Trumpet Street, Gaythorne, Manchester, as F. M. Bell & Co. Directors: Robert M. Bell, 32, Norman Road, Brooklands, Ches.; Mrs. Harriet J. Bell and Mrs. Lilian Ethell, both of Middle Cottage, Old Road, Furness Vale, via Stockport. Registered office: Trumpet Street, Gaythorne, Manchester.

Companies' Returns

Statements of Capital

Electrical Distribution of Yorkshire, Ltd.—Capital, £3,200,000 (£1,283,333 6 per cent. cumulative preference stock, £1,500,000 ordinary stock and £416,667 unissued). Return dated April 3rd. £1,283,333 6 per cent. cumulative preference and £1,500,000 ordinary stock taken up. £2,700,000 paid. £83,333 considered as paid. Mortgages and charges: £500,000.

Tudor Accumulator Co., Ltd.—Capital, £100,000 in 10,000 shares of £10 each. Return dated May 25th. All shares taken up. £29,000 paid (being £10 per share on 2,600 and £2 10s. per share on 1,200). £71,000 considered as paid (£10 per share on 6,200 shares and £7 10s. per share on 1,200 shares). Mortgages and charges: Nil.

Mather & Platt, Ltd.—Capital, £2,500,000 in £400,000 preference stock and £1,363,660 ordinary stock (all £1 units) and 736,340 shares of £1 each. Return dated March 10th. All preference and ordinary stock taken up. £630,660 paid. £1,333,000 considered as paid. Mortgages and charges: Nil.

Denman's Electricity, Ltd.—Capital, £1,500 in 500 preference shares of £1 each and 20,000 ordinary shares of 1s. each. Return dated March 31st. 300 preference and 20,000 ordinary shares taken up. £300 paid. £1,000 considered as paid. Mortgages and charges: Nil.

Ilfracombe Electric Light & Power Co., Ltd.—Capital, £50,000 in 10,000 ordinary shares of £5 each. Return dated May 1st. All shares taken up. £50,000 paid. Mortgages and charges: Nil.

Wellingborough Electric Supply Co., Ltd.—Capital, £50,000 in 5,000 shares of £10 each. Return dated May 30th. All shares taken up. £50,000 paid. Mortgages and charges: £25,000.

North Lincolnshire & Howdenshire Electricity Co., Ltd.—Capital, £500,000 in 500,000 ordinary shares of £1 each. Return dated May 29th. All shares taken up. £480,191 paid. £19,809 considered as paid. Mortgages and charges: Nil.

Newmarket Electric Light Co., Ltd.—Capital, £30,000 in 3,000 ordinary shares of £10 each. Return dated May 10th (filed July 15th). 2,656 shares taken up. £26,560 paid. Mortgages and charges: £14,200.

Liquidations

Mosbrough Electric Supply Co., Ltd.—Winding up voluntarily. Liquidator, Mr. J. Gadsby, 17, Gluman Gate, Chesterfield.

Killamarsh & District Electric Supply Co., Ltd.—Winding up voluntarily. Liquidator, Mr. J. Gadsby, 17, Gluman Gate, Chesterfield.

Bankruptcies

W. S. Handley and **G. Taylor,** carrying on business at 55, Lower Union Street, Bristol, in co-partnership under the style of Handley & Morgan, wireless dealers (separate application of W. S. Handley).—Application for discharge to be heard at the Guildhall, Bristol, on October 6th.

J. Gibbons, carrying on business at 176, Abbey Street, Derby, as radio dealer, and lately carrying on business at 240, Abbey Street, Derby.—Application for discharge to be heard at the Court House, 20, St. Peter's Churchyard, Derby, on October 25th.

A. R. Carter, electrical contractor, 2, Priory Avenue, Mile End, Bridgend, Glam.—Proofs for dividends by September 30th to Mr. R. Betts, Official Receiver, Government Buildings, 10, St. Mary's Square, Swansea.

T. Johnson, electrician, lately carrying on business at 25, Granville Street, Sheffield, as Tom Johnson & Co., mechanical and electrical engineer and contractor.—Supplemental dividend of 7s. 1d. in the £, payable September 30th, at 55, Queen Street, Sheffield.

STOCKS AND SHARES

TUESDAY EVENING.

STOCK Exchange markets are pursuing a switchback course. At one time last week, evidence was forthcoming of an apprehension on the part of the public that recent prices would not be maintained. The impression seemed to get abroad that the general decline which took place was only the prelude to further selling, against which no support was likely to be forthcoming. There were some fairly heavy falls, particularly in the higher-priced shares of the industrial market. Within the past few business days, however, a decided change for the better has come over the Stock Exchange markets as a whole.

Calcutta Trams

After being up to 79s. earlier this year the price of Calcutta Tramways shares fell last week to 60s. 6d. upon the statement that the Bengal Government is inquiring into the details of the financial arrangements in case of purchase by the Calcutta Corporation. Estimates mentioned here from time to time have suggested £4 per share as the possible price. By calling for information the Bengal Government has introduced a new phase of unsettlement. The price fell sharply upon sales by holders who read into the Bengal Government's inquiry the likelihood of the transaction either not being completed or, if it is, upon terms less favourable than those the optimists had expected.

Further Falls

Following upon the fairly heavy falls of last week, the further declines in the present lists have brought many prices to a level well below the recent best. General Electrics, up to 98s. last month, are back to 90s. Murex went over £5 and are now 96s. 3d. British Insulated, Callender's and Henley's have come back several shillings. Johnson & Phillips, Siemens, English Electric, Associated Electrical, Consolidated Signals and Westinghouse Brake are amongst the shares which are lower. The week's fall has been fairly comprehensive. Babcock & Wilcox, Mather & Platt, Ever Ready, Enfield Cables are representative of the various sections in which falls were experienced. Some of the declines were partially recovered, but by no means all of them. Preference shares fell back, along with the ordinary, Brush preference, for example, being 1s. 6d. lower at 25s. 6d.

Repayment of Debentures

The India Rubber Gutta Percha & Telegraph Works Co., now in its 81st year, has given notice of the board's intention to redeem £324,500 5 per cent. first mortgage debentures that will be outstanding on March 25th next. The re-payment price is 101½. These debentures were offered 18 years ago at 93, and the market price for some time past has been about 103. The company's manufactures include telegraph cables, tyres and general rubber products. The last balance sheet, up to the end of September, 1943, showed a very satisfactory position and the debentures are being repaid out of the company's cash resources. The 5½ per cent. preference shares are quoted at 23s. 6d. and, as our tables indicate, yield at that price £4 13s. 9d. per cent.

Lancashire Dynamo

Lancashire Dynamo & Crypto has again declared an interim dividend of 5 per cent. for the sixth consecutive year; this will be paid on October 2nd. For the full year, the dividend has recently been made up to 22½ per cent., less tax. For 1937 and 1938 the dividend, including bonus, was 25 per cent.; in the next three years, 20 per cent. annually. The present price of the shares, 93s.6d. ex dividend, is nearly the highest touched over the past ten years. In 1940 the price fell to 45s. The company manufactures electric motors, generators, etc. The issued capital was raised last year by £2,160 to £402,160 and the profits have shown a steady increase from 1939 to 1943 inclusive.

Southern Areas

The Southern Areas Electric Corporation has sold to the County of London Electric Supply Company 150,000 ordinary shares of the Brentwood District Electric Company. The County Company has paid for the shares with 150,000 of its own ordinary shares, the price of which stands at 44s. 6d. The purchase price therefore is about £333,000. The Southern Areas Electric Corporation has held the Brentwood District Electric shares for nine years. Southern Areas' authorised capital is £850,000 in ordinary shares of £1 each; of these, 783,484 have been issued. The company also holds all the share capital of the Sussex Electricity, Salcombe Gas & Electricity, Seaton District Electric Light, Leominster Electricity Supply, and the Peacehaven Electric Light. The company has been paying annual dividends of 5 per cent. on its ordinary shares and at the present price, 23s., the yield comes to £4 7s. per cent. It is understood that none of the 150,000 County Company shares included in this transaction are likely to come into the market.

Radio Shares

Electric & Musical Industries went to 31s. on one day and to 34s. two days later. On balance, the shares are amongst the few exceptions to the general dull tendency.

(*Continued on page* 430)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend Previous	Dividend Last	Middle Price Sept. 19	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies					
Bournemouth and Poole	12½	12½	64/6xd	+6d.	3 17 4
British Power and Light	7	7	33/6	..	4 3 7
City of London	7	5½	30/–	–1/-	3 13 4
Clyde Valley	8	8	42/–	..	3 16 0
County of London	8	8	44/6	+1/–	3 12 1
Edmundsons:					
7% Pref.	7	7	34/6	..	4 1 4
Ord.	6	6	31/–	..	3 17 5
Elec.Dis.Yorkshire	9	9	45/6	..	3 19 6
Elec. Fin. and Securities	12½	13½	60/–	+1/–	4 10 0
Elec. Supply Corporation	10	10	49/–	+6d.	4 1 8
Isle of Thanet	Nil	Nil	19/6	+6d.	—
Lancs. Light and Power	7½	7½	37/–	..	4 1 1
Llanelly Elec.	6	6	26/6	..	4 10 7
Lond. Assoc. Electric	3	4	25/6	..	3 2 9
London Electric	6	6	30/6	+6d.	3 18 8
LondonPowerRed. Deb.	5	5	103½	..	4 16 7
Metropolitan E.S.	8	8	44/–	+1/-	3 12 9
Midland Counties	8	8	41/6	..	3 17 0
Mid. Elec. Power	9	9	44/–	..	4 1 9
Newcastle Elec.	7	7	31/6	..	4 9 0
North Eastern Elec Ordinary	7	7	35/-xd	+3d.	4 0 0
7% Pref.	7	7	35/-xd	+3d.	4 0 0
Northampton	10	10	50/6	..	3 19 6
Notting Hill 6% Pref. (£10)	6	Nil	11	..	—
Northmet Power:					
Ordinary	7	7	44/6	+6d.	3 2 9
6% Pref.	6	6	30/6	..	3 18 8
Richmond Elec.	6	6	25/6	..	4 14 1
Scottish Power	8	8	41/6	..	3 17 2
Southern Areas	5	5	23/–	..	4 7 0
South London	7	7	29/–	..	4 16 7
West Devon	5	5	23/6	..	4 5 1
West Glos.	4½	3½	24/6	..	2 17 0
Yorkshire Elec.	8	8	43/–	..	3 14 5
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	7/6	..	—
Calcutta Elec.	6*	6*	47/–	–1/-	2 11 0
Cawnpore Elec.	10	7	40/–	..	3 10 0
East African Power	7	7	34/6xd	+6d.	4 1 4
Jerusalem Elec.	7	5	29/6	..	3 8 0
Kalgoorlie (10/–)	5	5	11/6	..	4 7 0
Madras Elec.	4*	Nil	30/–	–1/–	—
Montreal Power	1½	1½	23¾	..	—
PalestineElec."A"	4*	5*	40/–	..	2 10 0
Perak Hydro-elec.	6	7	14/–	..	—
Shawinigan Power	83cts.	90cts.	16	..	—
Tokyo Elec. 6%	6	6	28	..	—
VictoriaFallsPower	15	15	4 4/16	..	3 11 7
WhitehallInv.Pref.	—	6	25/6	+1/–	4 14 0

Company	Dividend Previous	Dividend Last	Middle Price Sept. 19	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	114½	..	4 7 4
1951–73	4½	4½	107	..	4 4 1
1963–93	3½	3½	104½	..	3 7 0
1974–94	3½	3½	101	..	3 4 4
London Elec. Trans. Ltd.	2½	2½	97½	..	2 11 3
London & Home Counties 1955–75	4½	4½	111	..	4 1 1
Lond.Pass.Trans.Bd.					
A	4½	4½	120½	..	3 14 8
B	5	5	121½	..	4 2 4
C	3	3½	67	..	4 17 0
West Midlands J.E.A. 1948–68	5	5	107½	..	4 13 0
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	121½	..	4 18 9
Def.	1½	1½	30	..	5 0 0
Anglo-Portuguese	8	8	28/6	..	5 12 4
Cable & Wireless:					
5½% Pref.	5½	5½	115	..	4 15 1
Ord.	4	4	81	–1	4 18 9
CanadianMarconi $1	Nil	4cts.	9/–	–1/-	—
Globe Tel. & Tel.:					
Ord.	8½*	5*	40/–	..	2 10 0
Pref.	6	6	30/–	..	4 0 0
Great Northern Tel. (£10)	Nil	Nil	30	..	—
Inter. Tel. & Tel.	Nil	Nil	21½	..	—
Marconi-Marine	7½	7½	36/–	..	4 3 4
Oriental Tel. Ord.	16	10	51/9	..	—
Telephone Props.	Nil	6	21/3	+ ⅛	5 13 0
Tele. Rentals (5/–)	10	10	11/3	..	4 9 0
Traction and Transport					
Anglo-Arg. Trans.:					
First Pref. (£5)	Nil	Nil	2/6	..	—
4% Inc.	Nil	Nil	7	..	—
Brit. Elec. Traction:					
Def. Ord.	45	45	1200	–45	3 15 0
Pref. Ord.	8	8	180	..	4 9 0
Bristol Trams	10	10	57/–	..	3 10 2
Brazil Traction	$1	$1¼	25⅛	–⅜	6 18 7
Calcutta Trams.	5½	6½	60/6	–10/-	2 1 8
Cape Elec. Trams	5	6	25/6	..	4 14 1
Lancs. Transport	10	10	45/6	..	4 8 0
Mexican Light:					
1st Bonds	5	5	105½	..	4 14 9
Rio 5% Bonds	5	5	105½	..	4 14 9
Southern Rly.:					
5% Prefd.	5	5	73⅛	–1½	6 15 4
5% Pref.	5	5	114½	–1	4 7 4
T. Tilling	10	10	60/–	..	3 6 8
West Riding	10	10	46/–	..	4 7 0

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price Sept. 19	Rise or Fall	Yield p.c. £ s. d.
Equipment and Manufacturing					
Aron.Elec.Ord.	10	15	61/–	..	4 18 4
Assoc. Elec.:					
Ord.	10	10	50/6	–1/6	3 19 4
Pref.	8	8	39/–	..1/–	4 2 0
AutomaticTel.&Tel.	12½	12½	59/–	..	4 4 3
Babcock & Wilcox	11	11	49/–	–1/–	4 9 9
British Aluminium	10	10	48/–	–6d.	4 3 4
British Insul. Ord.	20	20	5 5/8	– 1/8	3 13 6
British Thermostat (5/–)	18½	18½	20/–	–9d.	4 12 6
British Vac. Cleaner (5/–)	15	30	29/–	–1/–	5 3 5
Brush Ord. (5/–)	8	9	10/9	..	4 3 9
Burco (5/–)	15	17½	17/–	..	5 3 0
Callender's	15	20	5 1/8	– 1/8	3 15 2
ChlorideElec.Storage	15	15	88/9	..	3 6 7
Cole, E. K. (5/–)	10	15	30/9	..	2 8 9
Consolidated Signal	24	27½	6 1/8	– 1/8	4 3 6
Cossor, A. C. (5/–)	7½*	10*	24/–xd	..	2 1 9
Crabtree (10/–)	17½	17½	41/–	–6d.	4 5 4
Crompton Parkinson Ord. (5/–)	20	22½	32/–	..	3 7 3
E.M.I. (10/–)	6	8	34/-	–1/6	2 7 1
Elec. Construction	10	12½	60/–	..	4 3 4
Enfield Cable Ord.	12½	12½	58/–	–2/6	4 6 2
English Electric.	10	10	50/–	– 1/8	4 0 0
Ensign Lamps (5/–)	25	15	21/3	..	3 10 8
Ericsson Tel. (5/–)	22*	20*	51/3	– 1/8	1 19 1
Ever Ready (5/–)	40	40	41/6	–1/–	4 16 5
Falk Stadelmann	7½	7½	34/6	–6d.	4 7 0
Ferranti Pref.	7	7	31/3	..	4 9 7
G.E.C.:					
Pref.	6½	6½	32/6	..	4 0 0
Ord.	17½	17½	90/9	–6d.	3 7 0
General Cable (5/–)	15	15	15/–	..	5 0 0
Greenwood & Batley	15	15	43/9	–1/9	6 17 0
HallTelephone(10/–)	12½	12½	30/6xd	..	4 2 0
Henley's (5/–)	20	20	25/3	–1/9	3 19 0
4½% Pref.	4½	4½	24/–	..	3 15 0
Hopkinsons	15	17½	68/9	..	5 1 9
India Rubber Pref.	5½	5½	23/-xd	..	4 15 9
Intl. Combustion	30	30	6 3/8	..	4 10 8
Johnson & Phillips	15	15	75/–	–1/3	4 0 0
Lancashire Dynamo	22½	22½	93/6xd	–6d.	4 16 5
Laurence,Scott(5/–)	12½	12½	13/6	..	4 12 7
London Elec. Wire	7½	7½	37/6	..	4 0 0
Mather & Platt..	10	10	52/6	– 1/8	3 16 0
Metal Industries (B)	8	8½	50/6	..	3 7 6
Met.Elec.CablePref.	5½	5½	21/3	..	5 3 6
Murex	20	20	96/3	..	4 3 4
Pye Deferred (5/–)	25	25	35/–	..	3 11 5
Revo (10/–)	17½	17½	43/–	..	4 1 4
Reyrolle	12½	12½	72/6xd	..	3 9 1
Siemens Ord.	7½	7½	34/–	–6d.	4 8 3
Strand Elec. (5/–)	7½	10	8/–	..	6 5 0
Switchgear & Cowans (5/–)	20	20	19/–	..	5 5 1
T.C.C. (10/–)	5	7½	22/6	..	3 6 8
T.C. & M.	10	10	56/–	..	3 11 6
TelephoneMfg.(5/–)	9	9	11/6	–6d.	3 18 3
Thorn Elec. (5/–)	20	20	25/–	..	4 0 0
Tube Investments	20	20	92/6	–9d.	4 6 5
Vactric (5/–)	Nil	22½	17/3	–3d.	6 10 7
Veritys (5/–)	7½	7½	8/–	..	4 13 9
Walsall Conduits(4/–)	55	55	49/6xd	–6d.	4 9 0
Ward & Goldstone (5/–)	20	20	28/9	..	3 13 6
WestinghouseBrake	12½	14	75/–	–1/–	3 14 8
West, Allen (5/–)	7½	7½	7/9	..	4 16 0

* Dividends are paid free of Income Tax.

Stocks and Shares (*Continued from page* 428)

The yield on these 10s. shares, £2 7s. 1d. per cent., is less than the return on National War Bonds, but the E.M.I. company is credited with being one of the first that will develop television on a large scale after the war. Upon this impression, hopefulness builds the expectation that E.M.I. shares will stand higher in the future. E. K. Cole give a yield of £2 8s. 9d. per cent. Cossor pay the equivalent of £4 3s. 6d. per cent. gross, with tax at 10s. in the £. Pye deferred at 35s. return £3 11s. 5d. per cent. on the money. In the dollar group, Canadian Marconis at 9s. are 1s. down.

Miscellaneous Matters

The price of British Electric Tractions has come down to 1200, a fall of 45 points, following upon the £50 lost last week. The Home Railway market, after being dull to weak, recovered sharply from the lowest prices reached, and the high yields that the stocks afford at the present figures drew a certain amount of money into the junior issues. Thomas Tilling shares keep firm at 60s. and West Ridings at 46s. Berry's Electric results, given in the *Electrical Review* last week, show an increased profit of £13,000. There is no London market in the company's ordinary shares, but the 7½ per cent. convertible notes occasionally change hands on the basis of 100. Electricity supply shares remain a good market. Relaxation of blackout restrictions has brought in buying orders. Metropolitans at 44s., and Electric Finance & Securities at 60s., are 1s. higher.

Telephone Properties

Telephone Properties returns to the dividend list in respect of its ordinary shares for the first time since the outbreak of war. It may be remembered that the preference dividend fell into arrears which were cleared up last year. The company then paid off £120,000 of 6 per cent. first mortgage debenture stock, and now the ordinary are to receive, as mentioned, 6 per cent. The company is one of the Telephone & General Trust group. Its previous name was the Venezuela Telephone Company, the shares in which five years ago stood at 12s. 6d. The preference shares receive 8 per cent. dividends and are quoted at 27s. 6d., giving at that price a return on the money of £5 16s. 6d. per cent.

NEW PATENTS

Electrical Specifications Recently Published

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

AUTOMATIC Telephone & Electric Co., Ltd., T. P. Preist and G. W. Thompson.—" Electrical signalling systems suitable for use in mines or the like." 3145. February 26th, 1943. (563815.)

C. A. Barron and H. D. Barron.—" Dies for wire-drawing machines." 7338. May 10th, 1943. (563827.) " Wire-drawing machines." 7339. May 10th, 1943. (563828.)

Bendix Aviation Corporation.—" Piezo-electric crystal holder." 7563/43. April 20th, 1942. (563838.)

A. D. Bone.—" Pendulum-operated switch." 7688. May 14th, 1943. (563848.)

Briggs Motor Bodies, Ltd., H. Uren and R. T. A. Dallisson.—" Electrical welding machines." 7474. May 11th, 1943. (563833.)

British Thomson-Houston Co., Ltd.—" Modulable electric-discharge lamps and operating means therefor." 1928/43. February 12th, 1942. (563767.) " Means for preventing bouncing of electric switch contacts." 7538/43. May 16th, 1942. (563835.) " Electric switches suitable for electric-discharge lamps." 7697/43. May 20th, 1942. (563841.) " Electric relays." 7698/43. May 16th, 1942. (563842.) " Shaft bearings." 7804/43. May 16th, 1942. (563845.)

British Thomson-Houston Co., Ltd., and A. H. Maggs.—" Dynamo-electric machines." 9537. July 9th, 1942. (563854.)

British Thomson-Houston Co., Ltd., and R. Pohl.—" Dynamo-electric machines." 6248. May 8th, 1942. (563887.)

F. Carlsson and N. B. E. Rang.—" Process for electro-polishing metal articles." 7265. May 7th, 1943. (563823.)

A. C. Cossor, Ltd., and L. Woodbridge.—" Cathode-ray tubes." 3195. February 26th, 1943. (563817.)

A. C. Cossor, Ltd., A. H. A. Wynn and L. H. Bedford.—" Tuning systems for variable-frequency oscillators." 3194. February 26th, 1943. (563786.) " Tuning arrangements for oscillatory circuits." 3660/44. February 26th, 1943. (Divided out of 563786.) (563788.)

Electric Transmission, Ltd., and K. Dannenberg.—" Electrical circuit opening device." 16333. November 18th, 1942. (563849.)

C. C. Ellis and Wild-Barfield Electric Furnaces, Ltd.—" Apparatus for lifting lids or doors of furnaces and similar lids or doors." 3199. February 26th, 1943. (563818.)

Express Lift Co., Ltd., S. T. Hunt and F. W. F. Goffe. — " Electro-magnetic step-by-step switches." 7241. May 7th, 1943. (563808.)

Ferranti, Ltd., and H. Wood.—" Multi-vibrators." 5608. April 8th, 1943. (563794.)

F. Lambach.—" Electrical control system for a warping or beaming plant." 10376/42. November 21st, 1941. (563857.) " Electrical control system for the operation of braking means of a warping or beaming plant." 14762/43. November 21st, 1941. (Divided out of 563857.) (563879.)

Mavor & Coulson, Ltd., J. B. Mavor and W. S. Galloway.—" Mining machines." 18075. December 19th, 1942. (563780.)

J. F. O'Brien.—" Connector unit for electric wiring system." 2554. February 16th, 1943. (563894.)

Sangamo Weston, Ltd.—" Photo-electric cells." 3081/43. April 16th, 1942. (563774.)

Siemens-Schuckert (Great Britain), Ltd., and E. A. J. Tunnicliffe.—" X-ray apparatus." 18325. December 24th, 1942. (563890.)

Standard Telephones & Cables, Ltd.—" Method of fabricating vacuum tube." 3167/43. May 12th, 1942. (563776.) " Metal-plate electric rectifier." 7263/43. June 18th, 1942. (563822.)

Standard Telephones & Cables, Ltd., H. Wolfson and S. C. Shepard.—" Sealing of wires into glass." 3060. February 24th, 1943. (563784.)

J. Stone & Co., Ltd., and L. R. Nixon.—" Electric regulators of the carbon pile type." 2773. February 19th, 1943. (563891.)

Switchgear & Cowans, Ltd., and A. Upton.—" Metalclad withdrawal electric switchgear." Cognate applications 7390/43 and 11110/43. May 10th, 1943. (563830.)

F. W. Thorpe, Ltd., and F. W. Thorpe.—" Electric lamps and reflector fittings." 2698. February 18th, 1943. (563771.)

Westinghouse Electric International Co.—" Speed control of multi-drive work units, particularly the stands of a tandem rolling mill." 2925/43. February 21st, 1942. (563866.)

H. Wooldridge and C. A. Searle.—" Electric heaters applicable for preventing freezing in water pipes." 428. January 8th, 1943. (563763.)

L. Young and A. Young.—" Electro-dynamic devices for interconverting electrical oscillations and sound waves." 16776. November 26th, 1942. (563756.)

TRADE MARK APPLICATIONS

RECENT applications for British trade marks include the following, objections against which may be entered within one month from September 13th :—

AISH. No. 628,888, Class 9. Electrical instruments and apparatus, and parts thereof. Also No. 628,889, Class 11. Installations and apparatus for lighting, heating, cooking, refrigerating, drying and ventilating (all electrical goods) and parts not included in other classes.—Aish & Co., Ltd., Yelverton Road, Bournemouth.

TABBAT. No. 629,477, Class 9. Electrical instruments and apparatus not included in other classes.—Ever Ready Co. (Great Britain), Ltd., Ever Ready Works, Hercules Place, N.7.

POLAR CUB. No. 628,226, Class 11. Electric fans (not parts of machines), electric heaters and electric hair dryers.—The A.C. Gilbert Company, Blatchley Avenue, New Haven, Connecticut. Address for service, c/o Stevens, Langner, Parry and Rollinson, 5-9, Quality Court, Chancery Lane, London, W.C.2.

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.

Chepping Wycombe.—September 25th. Town Council. Supply and installation of an additional multi-stage high-lift centrifugal surface pumps and electric motor to pump 50,000 g.p.h., together with control and switchgear, etc. —S. Young, borough water engineer, 70-71, Easton Street, High Wycombe (deposit £2 2s.).

Kesteven.—Public Assistance Committee. Supply of electric lamps to P.A. Institutions and children's homes for six months. Forms of tender, etc., from the Public Assistance Officer, County Offices, Sleaford, Lincs.

New Zealand.—November 28th. Public Works Department. Plant for Maraetai power station and 220-kV substations; turbine and generator plant; transformers; switchgear; synchronous condensers; overhead travelling crane, etc.

North-West Midlands.—October 10th. Joint Electricity Authority. Various works in connection with new power station. Forms of tender and specification may be obtained from Sir Alexander Gibb & Partners, Queen Anne's Lodge, Westminster, London, S.W.1 (returnable deposit £5 5s.).

Plymouth.—September 30th. City Electricity Department. Low-voltage distribution board with accessories, and two outdoor transformers. (September 15th.)

Orders Placed

Altrincham.—Installation of electric lighting in houses in Ellesmere Place for Town Council.—Lewis and Daniels.

Bradford.—Health Committee. Accepted. Two electric mixing machines (£250).—Hobart Manufacturing Co.

Contracts in Prospect

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

Alfreton.—Houses for U.D.C.; H. Taylor, architect, Regal Chambers, Cavendish Road, Chesterfield.

Ardwick.—Works additions; Taylor & Young, architects, 195, Oxford Road, Chorlton-on-Medlock, Manchester.

Argyllshire.—Erection of kitchen at Kinloch Millknowe School, and proposed dining halls at Kinloch and Grammar Schools; county architect, County Offices, Lochgilphead.

Bradford.—Four school kitchens and nursery, Greaves Street; city engineer.

Bury.—Additions to mill, Elton; W. B. Ovenden & Sons.

Bury St. Edmunds.—New omnibus garage at Ixworth; M. H. Khan, consulting engineer, 8, Whiting Street, Bury St. Edmunds, Suffolk.

Caerphilly.—Rebuilding portion of bus garage, Mill Road, U.D.C.; T. H. Richards, surveyor, Council Offices, Caerphilly.

Cheetham.—Clothing factory, Heywood Street; A. M. Isaacs, architect, 136, Middleton Road, Crumpsall, Manchester 8.

Cromer.—Pump house for U.D.C.; J. C. Melliss & Co., 7-8, Bury Street, London, E.C.3.

Dunfermline.—Houses (20), Brucefield; Town Clerk's Office, City Chambers.

East Suffolk.—Kitchen, etc., Leiston (£3,024); county architect, Burlington Road, Ipswich.

Elgin.—Fire station for N.F.S.; borough surveyor, South Street.

Gateshead.—Offices, etc.; Clarke, Chapman & Co., Ltd., Gateshead.

Girvan.—Temporary houses (150); burgh surveyor, General Offices, High Street.

Glasgow.—Buildings at Meadowside Shipbuilding Yard (D. & W. Henderson, Ltd.); manager.

Additions at Shieldhall Works, for Scottish Co-operative Wholesale Society; manager.

Additions to Possilpark tramway depot and school at Killearn Street; city architect.

Extensions to works at Balmore Road for A. P. Newall & Co., Ltd.; manager.

Leigh.—Proposed school, Nel Pan Lane; T. A. Clare, borough surveyor, Town Hall, Leigh, Lancs.

Llanfyllin.—Pump house, etc., for waterworks (£3,375); Intrade, Ltd., Fresh Wharf, Barking.

London.—Completion of block of flats (£5,000); A. Bluston, 13, King's Road, Doncaster.

Luton.—Houses (22), Leagrave Estate (£15,450); David Nott, builder, Brackendale, Trinity Road, Limbury, Luton.

Paisley.—Houses (1,100) with schools, community centre and church for Corporation (post-war project); John McGregor, master of works.

Salford.—Foundry extensions; Eagle Brass Foundry Co., Ltd.

Sheffield.—Extension of Hastings Road food depot (£5,446); J. Laver & Sons, Ltd., builders, 44, Greenhill Road, Woodseats.

Southport.—Canteen for transport traffic staff; H. L. Bunting, borough surveyor.

Stanley.—Shirt factory; Wakefield Shirt Co., Leeds Road.

Stockport.—Offices, workshop, etc.; G. & J. Weir, Ltd., 190, Wellington Road North.

Stretford.—Works additions, Ashburton Road; J. Laing, Son & Co., Ltd.

Swadlincote.—Houses (12), Meadow View Road, for U.D.C.; A. H. Taylor, builder, 27, Glenmore Road, Nottingham (£7,444).

Wellington (Somerset).—Houses (30), and flats (12); E. T. Howard, surveyor, 35, Fore Street.

Every time a designer or production engineer decides to use some form of Spire fixing, he puts a few thousand (or a few million) nuts and washers out of a job. No more fumbling and holding the bits together with one hand while you get to work with the other. Spire fixing can tackle and simplify most light assembly jobs. The best thing is to send us the job — or the drawings. If a Spire fixing will improve the job we'll design it for you and show it to you in a week or two. Then you can judge for yourself.

THAT'S Fixed THAT!

Type CA 725

Fixing knobs to shafts. Sounds simple but if you're a radio manufacturer you know what a headache it can be. The Spire fixing was designed to solve that particular problem. The CA 725 is made to measure for shafts of various diameters. Then it is snapped into position in the hub of the knob and the knob pushed straight on to the shaft. Don't think of Spire as a 'kind of nut.' It is a great deal more than any nut. It is a simplified and sure method of fixing. Especially awkward fixings!

Spire

✶ **A BETTER way of fixing**

Simmonds Aerocessories Limited · Great West Road · London · A Company of the Simmonds Group

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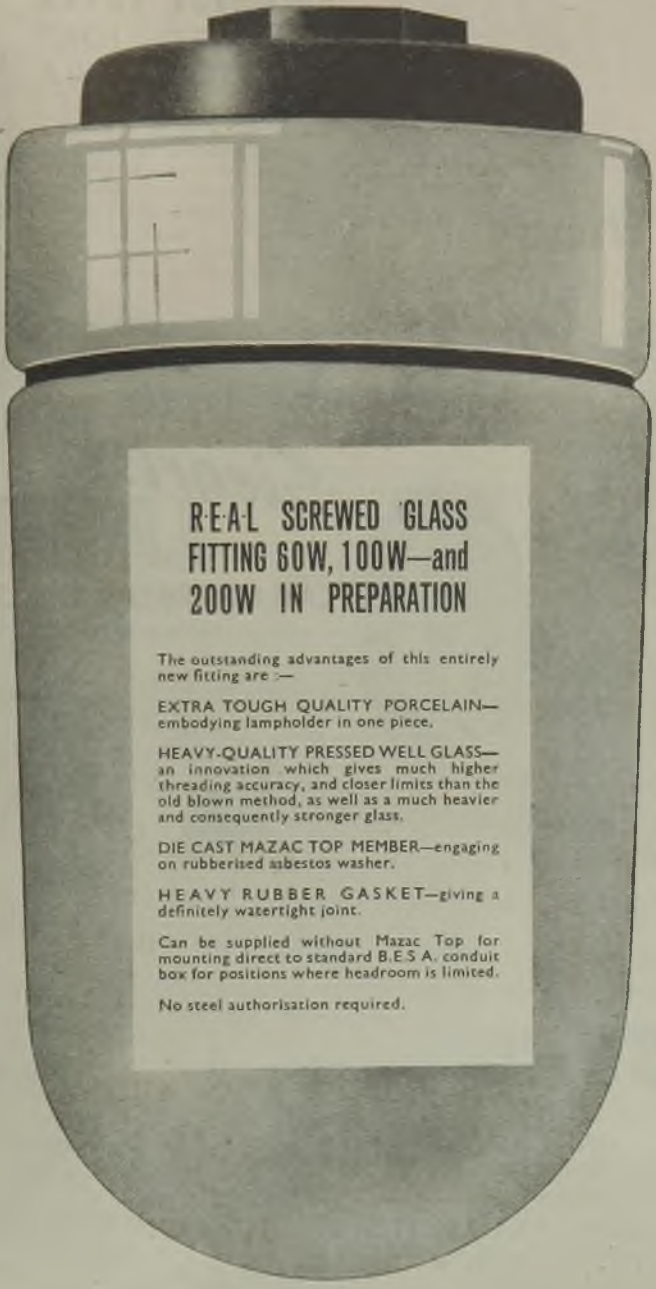
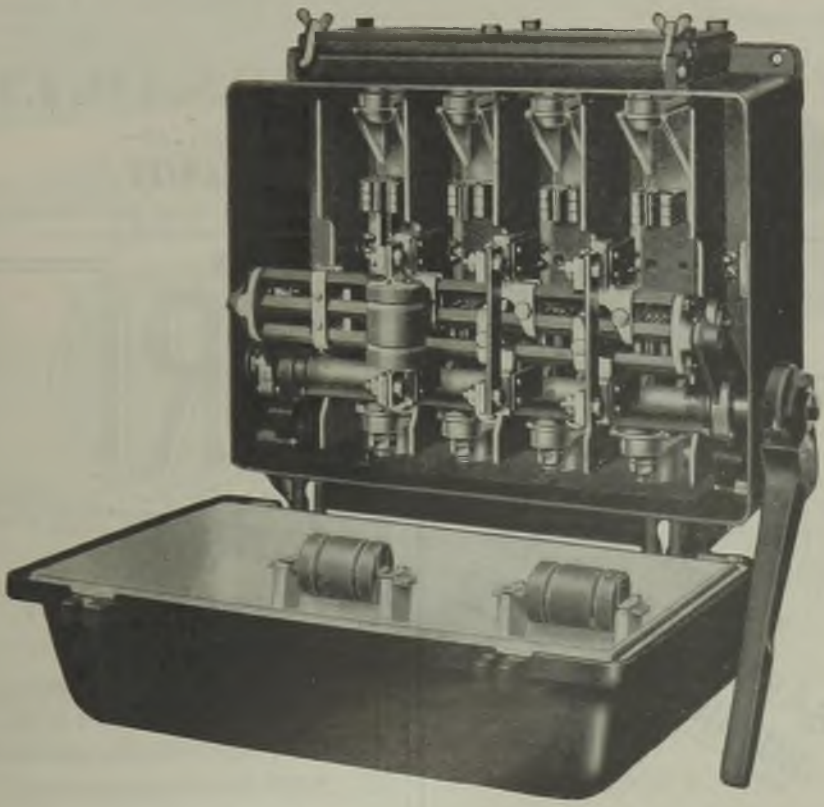


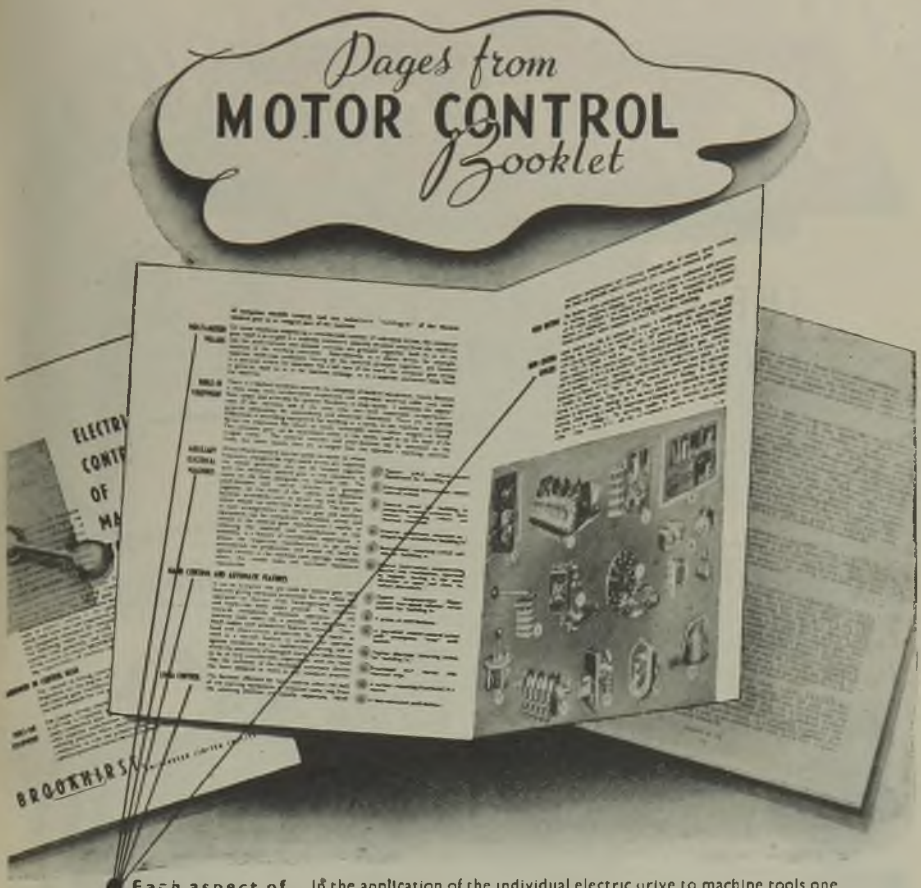
Issued by Rowlands Electrical Accessories, Ltd., Hockley Hill, Birmingham 18

SIMPLEX



COMPLETE IMPREGNATION. The high dielectric strength of Crompton Paper Cable is ensured by the method of impregnation in which the cable is first de-aerated and de-hydrated under vacuum, and then impregnated under pressure. The process is continuous and complete impregnation is obtained without the ingress of air or moisture. Crompton Cables comply with the specifications of the British Standards Institution, Government Departments, and of the Cable Makers Association—of which we are members.

CROMPTON PARKINSON
LIMITED
HOUSE, LONDON, W.C.2 and Branches



Each aspect of machine-tool control is dealt with in a general descriptive manner under appropriate subheads, and the various pages exemplify control equipment for a wide variety of machines, both as regards type and make.

In the application of the individual electric drive to machine tools one effect has been the substitution of full comprehensive electric control, for mechanical methods involving clutches, gears, and loose pulleys, not only on machines with single drives, but on machines where the control facilities now available, has encouraged the use of separate electric drives for each of several mechanical motions.

Brookhirst have been closely linked with the development of electric control in this sphere, and the Machine Tool Booklet gives as a minimum some indication of the part they have played, and the extent to which they are equipped to deal with present and future requirements of machine-tool manufacturers.

BROOKHIRST

BROOKHIRST SWITCHGEAR LIMITED CHESTER

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.

OFFICIAL NOTICES TENDERS, ETC.

ELECTRICITY (SUPPLY) ACT, 1926

North West England and North Wales Electricity (Alteration) Scheme, 1944

WHEREAS the Electricity Commissioners have prepared and transmitted to the Central Electricity Board a Scheme bearing the above title and hereinafter referred to as "the new Scheme," for altering the North West England and North Wales Electricity Schemes, 1928 to 1942, by making provision for the generating station of the Ashton-under-Lyne Corporation ceasing to be a "selected station."

Notice is hereby given that the Central Electricity Board have caused the new Scheme to be published and that any authorised undertakers or other persons interested in the new Scheme and desiring to make representations thereon may do so by forwarding the same by registered letter addressed to the undersigned and posted not later than the 16th day of October, 1944.

Copies of the new Scheme may be obtained at the price of One Penny each from H.M. Stationery Office, York House, Kingsway, London, W.C.2.

Dated this 15th day of September, 1944.

O. A. SHERRARD, Secretary,
Central Electricity Board.

Trafalgar Buildings,
1, Charing Cross, London, S.W.1.
7/9/44. 634

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.

CHELTENHAM ELECTRICITY UNDERTAKING

Lady Demonstrator

APPLICATIONS are invited for the temporary position of LADY DEMONSTRATOR of electric cooking and other appliances. Candidates must be ineligible for National Service, have had a good general education, hold a diploma in cooking and/or electrical housecraft, and have a thorough knowledge of domestic electric appliances; they must be competent to conduct lecture-demonstrations and to advise on the selection and use of apparatus.

Salary £210 per annum, rising to £240 by annual increments of £10, plus war bonus, at present amounting to £36 8s.

The successful candidate will be required to contribute to the Corporation's Superannuation Scheme, and to pass a medical examination.

Schedule of duties and application form can be obtained from the undersigned. Applications, giving full particulars of training and experience, with copies of recent testimonials, to be sent to the undersigned not later than the first post on Monday, 9th October, 1944.

R. W. STEEL,
Borough Electrical Engineer.

Municipal Offices,
Cheltenham.
13th September, 1944 652

COUNTY BOROUGH OF SWANSEA

Electricity Department

Appointment of Deputy Chief Engineer

APPLICATIONS are invited from persons not over the age of 45 years for the above position, at a commencing salary of £900 per annum, rising by annual increments of £50 to £1,100 per annum, plus a war bonus, variable by the Council from time to time (at present £33 16s. per annum), and a car allowance (at present £50 per annum). The appointment will be subject to the Local Government Superannuation Act, 1937, and the successful applicant will be required to pass a medical examination.

Specialised knowledge and experience of the installation, operation and maintenance of large and up-to-date station plant is indispensable.

Candidates should possess an engineering degree and/or be Corporate Members of the Institution of Electrical Engineers, have held a similar position of major responsibility in a large selected generating station of not less than 100,000 kWs, and have sound administrative ability and experience in the control of staff.

Applications, which must be made upon a prescribed form obtainable from the Borough Electrical Engineer and Manager, Guildhall, Swansea, together with copies of not more than three recent testimonials, must be delivered to the undersigned not later than Thursday, the 28th September, 1944.

Canvassing, either directly or indirectly, is prohibited and will be a disqualification.

T. B. BOWEN,
Town Clerk.

Guildhall, Swansea.
7th September, 1944. 622

BOROUGH OF HIGH WYCOMBE

Appointment of Borough Electrical Engineer

THE Council invite applications for the above appointment at a commencing salary of £900, rising by annual increments of £50 to £1,000 per annum, plus war bonus.

Candidates should have recent and extensive experience in the operation of a generating station and the distribution of both generated and grid supply; also commercial experience in the administration and development of a modern and progressive undertaking. Further particulars of qualifications and duties may be obtained from the undersigned.

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

Applications, giving particulars of age, qualifications and experience, should reach the undersigned, together with two recent testimonials, not later than the 9th October, 1944.

The appointment will be subject to three months' notice on either side and to such other conditions and regulations as may be prescribed by the Council.

Dated this 19th September, 1944.

PHILIP B. BEECROFT,
Town Clerk.

Municipal Offices,
High Wycombe. 670

BIRMINGHAM CENTRAL TECHNICAL COLLEGE
Suffolk Street, Birmingham, 1
(Principal, Dr. D. S. Anderson)

Department of Electrical Engineering

APPLICATIONS invited for post of Assistant Head of Department, £450-£20-£600, plus war bonus £52. Candidates should have honours degree or equivalent, good teaching and industrial experience, preferably on heavy current side. Form of application and particulars of appointment obtainable from Principal on receipt of stamped addressed foolscap envelope.

P. D. INNES, Chief Education Officer.
648

A leading London Advertising Agency has a vacancy on the creative staff for a person with specialised or general knowledge of engineering, electrical and allied trades and who is able to interpret this knowledge in good clear English and with fertility of ideas to both the general public and the trade. Experience of agency routine is preferred but not essential. This post offers great scope to the right person. Address applications to—Director of Production, The London Press Exchange Ltd., 110, St. Martin's Lane, W.C.2. 639

ELECTRIC Cookers. First-class man required to control design and development of all types of electric cookers. Must be fully experienced in modern manufacturing process. Only those having held such an appointment or one similar should apply, stating full details of experience, salary required and when at liberty to commence.—Box 651, c/o The Electrical Review.

ELECTRICAL and Radio Wholesalers. Manager for Leicester branch with sound commercial experience of the trades. Applications in writing only, stating age, experience and salary required, addressed confidentially, to —The Secretary, E. A. Wood Ltd., 100, Aston Road, Birmingham, 6. 6237

ELECTRICAL Engineer with practical experience in the manufacture of electrical accessories required in a permanent, part-time advisory capacity by small, progressive manufacturer. Our staff are aware of this advertisement, and strictest confidence in every way will be observed. Write fully to—Box 654, c/o The Electrical Review.

ELECTRICAL Wholesalers require a Clerical Assistant, conversant with trade and materials as handled.—London Electrical Co. (Blackfriars) Ltd., Blackfriars Road, S.E.1. 24

EXPERIENCED Cable Foreman wanted by non-association cable company, Manchester area. Small rubber and P.V.C. cables. Preferably one familiar with all processes. Write in confidence, giving age and experience.—Box 660, c/o The Electrical Review.

EXPERIENCED Electrical Salesmen required by electrical wholesalers, North-East Coast district, E.L.M.A. lamps, non-ring cables. Salary, expenses and commission. Write, stating age and experience.—Box 6265, c/o The Electrical Review.

LAMP Sales Representative required for Essex, Kent and S.E. London districts. Permanent progressive post with salary, expenses and commission; previous experience of lamp market and man with connection preferred but not essential. Write, giving age and full particulars of experience, to—Lamp Sales Manager, Ekco Works, Southend-on-Sea. 638

NEW Zealand Hutt Valley Electric Power Board. Appointment of Engineer and General Manager. Applications are invited for the position of Engineer and General Manager to the above Board. Candidates must possess a University Degree of Engineering, or be Chartered Electrical Engineers, and have had wide experience in administration and management of Electric Supply Undertakings. The appointment carries a commencing salary commensurate with ability and qualifications—not less than £1,000 per annum (New Zealand currency). Successful applicant must join the Board's superannuation scheme. Applicants should write, quoting D.931A, to the Ministry of Labour and National Service, Room 432, Alexandra House, Kingsway, London, W.C.2, for the necessary forms and conditions of service, which should be returned completed on or before 7th October, 1944. 635

PHYSICIST or Engineer, B.Sc. grade, wanted for scientific instrument development work, Oxford area. Permanent post for right man. Salary £500 upwards, according to experience. Applicants should write, quoting A.584XA, 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 2nd October, 1944. 650

OVERSEAS Employment: Armature Winder required for Freetown, Sierra Leone, West Africa, for tour of twelve to eighteen months. Essential to have experience in repair work, A.C. and D.C., up to 50 horse-power. Salary and allowances approximately £600 a year. Free passages and quarters. Written applications (no interviews), giving the following essential details: (1) Full name; (2) Date of birth; (3) National service registration number; (4) Local office shown on address side of registration card, N.S.2; (5) Medical grade, if known; (6) If discharged from the Forces, particulars of service number, rank, unit, and reasons for discharge; (7) Industrial training and experience; (8) Name and address of present employers; (9) Details of present work, should be sent to The Secretary, Overseas Manpower Committee (Ref. 1515), Ministry of Labour and National Service, Alexandra House, Kingsway, London, W.C.2. Applications will not be acknowledged. 657

PATENT Agent. Well-established firm requires a Patent Agent of British nationality, preferably specialising in Electronics, as Assistant in Patent Department, permanently or for duration of war. Subjects, mechanism, control apparatus, electronics. Salary £600-£700 or upwards, according to qualifications and experience. Applicants should write, quoting F.2592XA, 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 2nd October, 1944. 636

REPRESENTATIVE for North and North-west London, with knowledge of domestic and industrial wiring supplies.—Wm. Pryor & Co. Ltd., Electrical Wholesalers, 3, Kingsland High St., Dalston Junction, London, E.8. 646

REQUIRED for progressive post, Technical Assistant for Laboratory attached to engineering firm, N.W. London district. Knowledge of electrical and mechanical engineering, and knowledge of building construction would likewise be an asset. Salary from £400 to £500 per annum according to qualifications and experience. Applicants should write, quoting C.2278XA, 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 2nd October, 1944. 637

SALES Representative for Scotland, permanent progressive position for man with knowledge of power application of A.C. and D.C. motors. Apply—Higgs Motors Ltd., 74, York Street, Glasgow, C.2. 618

TRAVELLER required for Leeds and area covering approximately 15 miles radius, E.L.M.A. manufacturer. State connections, references, salary required.—Box 663, c/o The Electrical Review.

TWO Estimators required with experience in estimating and dictating tenders for electrical machinery and centrifugal pumps to clients' specifications. Technical knowledge necessary up to at least Higher National Certificate standard. Shop practice advantageous. Salary £250 to £400, according to age, experience and qualifications. Applications to—Employment Exchange, Alloa. 671

WANTED, Photo-Engraving: Superintendent to take charge of photo-engraving department firm specialising in metallic label and dial making, South London. Post-war employment.—Box 645, c/o The Electrical Review.

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

A Constructional Engineer (37), with 19 years' experience with supply companies and contractors engaged on overhead and underground electrification, erection of substation equipment, cable jointing, surveying, office routine, control of labour, etc., seeks progressive position. Free now.—Box 6239, c/o The Electrical Review.

A Technical Representative, A.M.I.E.E. (37), wide general electrical and mechanical experience in executive positions. Home or overseas. Replies treated confidentially.—Box 6214, c/o The Electrical Review.

A.M.I.E.E., specialising meters, relays, automatic protective gear, desires responsible position with manufacturers, supply authority, consultants or Government department, preferably London area.—Box 6223, c/o The Electrical Review.

BAKELITE Moulding Foreman seeks position, long practical experience, excellent references, immediate release.—Box 6209, c/o The Electrical Review.

CHARTERED Elect. Engr. (43), wide experience in various responsible posts, knowledge accounts, reliable, desires post.—Box 6216, c/o The Electrical Review.

CHARTERED Electrical Engineer, B.Sc., A.M.I.E.E., seeks appointment with good post-war prospects: 21 years' wide administrative experience of electricity—supply, railway, consulting, commercial, contracting and Government Department work, both in England and overseas. Not liable for military service. Free now.—Box 6217, c/o The Electrical Review.

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Borough Electrical Engineer.

Electricity Offices,
Tiviot Dale, Stockport.
11/9/44. 662

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Town Hall,
Manchester, 2.
14th September, 1944. 661

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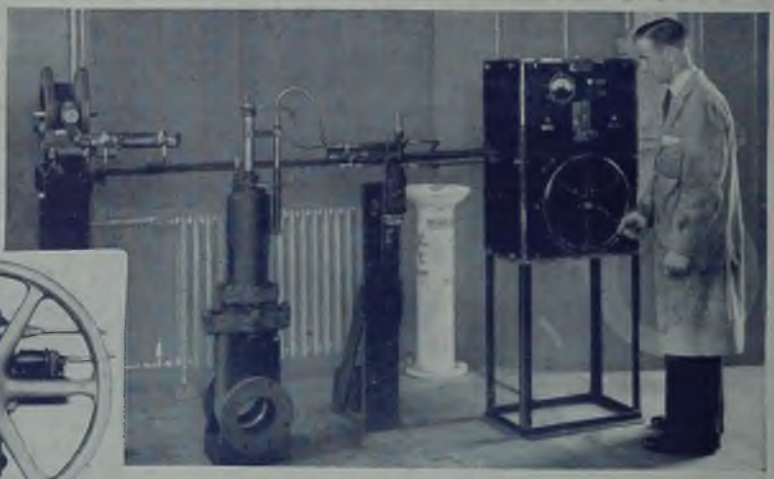

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