ELECTRICAL REVIEW

FOUNDED 1872

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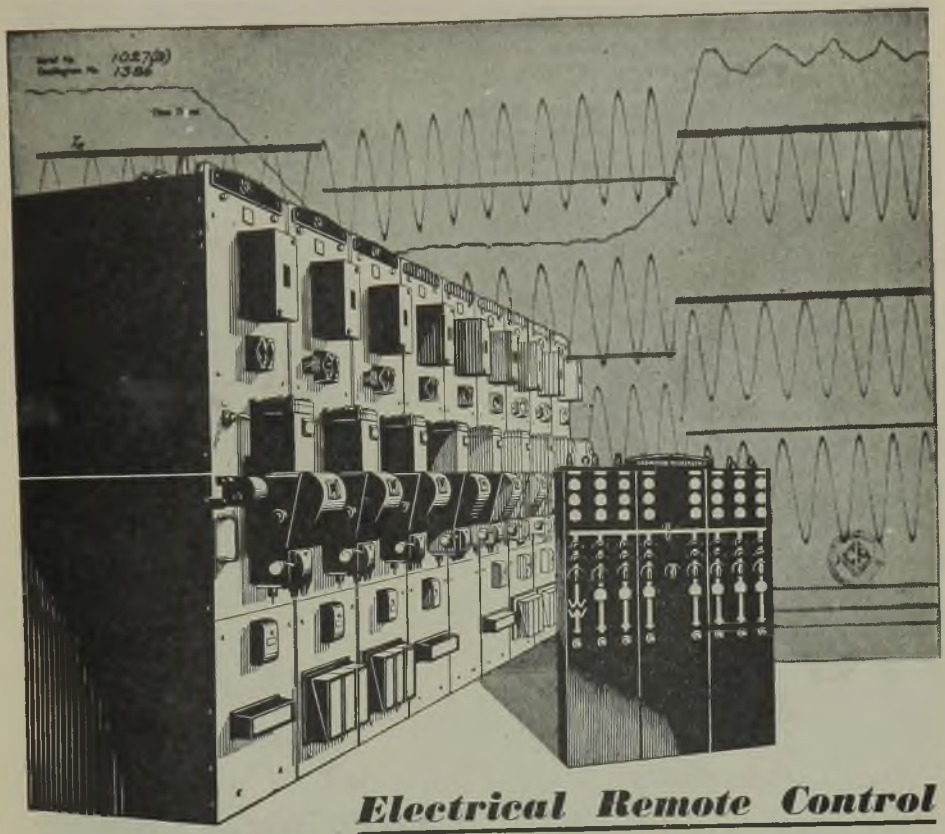

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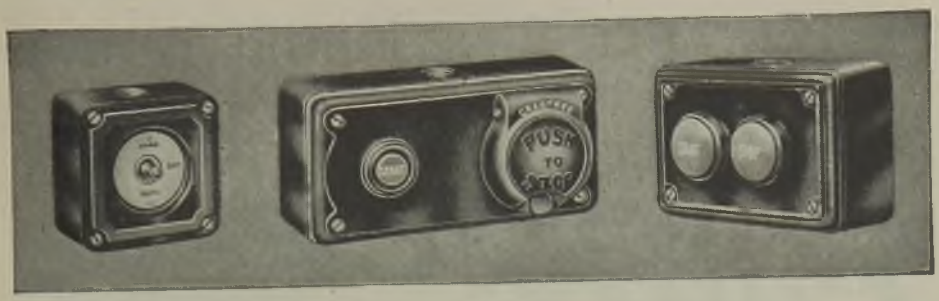

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H.R.C. FUSES — 250AC3 & DC3 (Max. rating 25 Amps.)

WAYS	LIST NUMBERS		MAX. SIZE OF INCOMING CONDUIT KNOCKOUT
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4	SWD 254S	SWD 254D	1″
6	SWD 256S	SWD 256D	1¼″
8	SWD 258S	SWD 258D	1½″
10	SWD 2510S	SWD 2510D	1½″
12	SWD 2512S	SWD 2512D	1½″
14	SWD 2514S	SWD 2514D	1½″
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6	NT 6	NTN 6
8	NT 8	NTN 8
10	NT 10	NTN 10
12	NT 12	NTN 12

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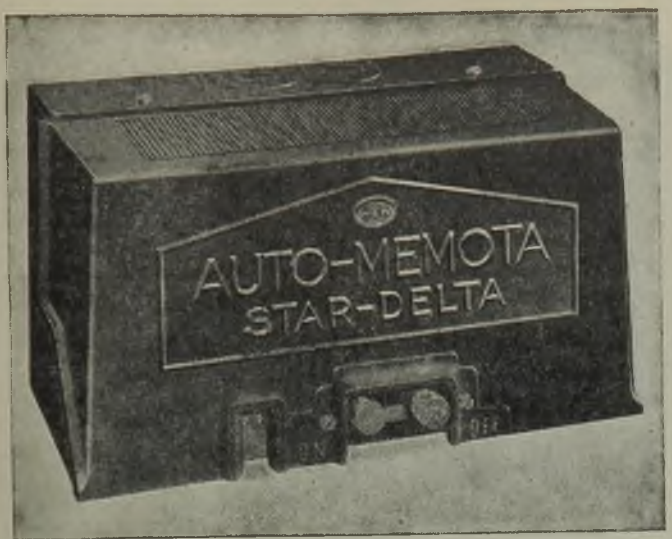

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ELECTRICAL REVIEW

June 9, 1944

Managing Editor :
Hugh S. Pocock, M.I.E.E.

Technical Editor :
C. O. Brettelle, M.I.E.E.

Commercial Editor
J. H. Cosens

Contents :—

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ELECTRICAL REVIEW
THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

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Engineers and Managers

Separate or Combined Functions?

LAST week we reported the appointment of Capt. T. Lockett as general manager of the Stoke-on-Trent Electricity Department. He had been manager of the undertaking since the retirement of the late Mr. C. H. Yeaman, exercising joint control with Mr. H. L. Mills (who is now retiring) as engineer to the Department.

The appointment was made on the recommendation of the Electricity Committee which raised a discussion at the Council meeting involving the old question whether an engineer or a commercial man was the better equipped to take charge of the modern electricity supply undertaking.

No Generating Plant

In the opinion of a very large majority of the Committee the fact that the Department no longer operated a generating station made the technical aspect of the business of less importance than the commercial side. This view secured general support at the Council meeting, but Alderman H. Leese, a former chairman of the Electricity Committee, put the case for the other side.

He said that although they had one or two brilliant young engineers in their service the Committee regarded them as "back-room boys." This was a matter which he viewed with great concern. If large industries came to the district after the war and wanted to open big works there, the presence of a chief engineer in charge of the undertaking was essential. Without such an official the city would be degraded in the electrical world to the third rank.

The general subject was discussed at some length in our columns before the war and since then the progressive closing down of power stations has strengthened the position of those who consider the business side of an undertaking to be paramount. While, of course, the absence of a power station does not mean freedom from all technical responsibility it is probably true that there are more engineering problems on the generating side than in distribution. But it might be said that this is also an argument for the appointment of a commercial manager, free from technical worries, in a generating undertaking. This is apparently the doctrine held at Hull, an outstanding example of a first-line undertaking with a business man at its head.

Changed Conditions

In the early days, electricity supply was primarily an engineer's business. Only an engineer could cope with the day-to-day problems requiring immediate decisions without reference to higher authority. But the engineering aspect has become more settled, though still not merely routine, and the emphasis is now upon service and sales. The head of a supply undertaking must be an expert organiser, administrator and salesman.

Consequently, a somewhat narrow engineering training may be a handicap, but this is true only of those who do not look beyond the undertaking's fuses into the consumers' minds. Many examples

have proved that engineers are capable of progressive management and that a combination of commercial and technical ability is the thing to seek. The broadening of the engineer's training which is now recognised as very desirable should provide a greater supply of such men.

Engineers and Scientists

WHILE the border line between science and engineering may conveniently be traced from the point at which economic factors come into play, what is needed in reality is a method of striking a balance between various competing claims for attention within the framework of practical conditions. Broadly, this balance equates true expenditure on plant with cost of energy throughout its life. Mr. D. J. Bolton's article in this issue shows that the tendency shown in British electrical products is of the right kind and, indeed, might be profitably extended. It will be necessary, however, to educate the public to appreciate that the advantages are worth paying for.

"Brown" Memorandum

AT a meeting of the Council of the Incorporated Municipal Electrical Association last week it was decided that that body's proposals concerning the ownership of distribution and generating stations and a national standard bulk supply tariff should be submitted to the Minister of Fuel and Power. That, however, was not the last of the memoranda for the municipal selected station owners who, generally, do not agree to the handing over of their plants to the Central Electricity Board, have also produced a document which presumably shows why they should be allowed to retain their stations. The pros and cons of this subject have been well stated by Messrs. J. A. Sumner and J. F. Field in the articles which they have contributed to the *Electrical Review*. Mr. Sumner's article, whatever its merits, plainly showed that selected station owners are not unanimously against the acquisition of their stations by the Central Board.

Large and Small

THE smaller members of the I.M.E.A., who form a substantial majority, evidently consider that considerable advantages would result from central ownership of all generating stations. At least they have no fear that it would harm them in any way, and so they have had no qualms in suggesting that the stations should be taken over. Naturally the feeling of the present owners is against the change, but their numbers were insufficient to prevent the Memorandum from going forward as the views of the Association. This has naturally caused them to doubt whether the present method of counting heads, irrespective of the owners' size, is a fair way of deciding such matters as this. After all, they contend, subscriptions are proportional to output and it would be reasonable for voting power to rest upon the same basis.

Common Purpose

ASSOCIATIONS can only hold together where members have common interests; indeed that is their reason of being. Fundamental and irreconcilable differences may exist in other directions, but they should be excluded from association discussions, attention being devoted solely to policies in which agreement is possible, or in which disagreement is on detail not basis. Otherwise the association will fall apart. The I.M.E.A. members have much in common and together have accomplished a great deal. It would be a pity if there were a split on this subject, particularly when, after all, the reorganisation of distribution—not generation—is the immediate consideration.

Multitude of Counsellors

UPON receiving the "Brown" Memorandum of the I.M.E.A. and the selected station owners' comments upon it Major Lloyd George will have the considered views of all sections of the electricity supply industry. What he will make of them we cannot guess, but they will certainly need a great deal of squaring up. Broadly speaking, the "private" undertakings desire to be left alone, so far as change of ownership is concerned, while the public authorities wish to extend public ownership—which is not necessarily State ownership. The last is, of course, advocated by the Labour Party, which has also produced a report. The only common lines are those set forth in the "White" Memorandum produced jointly by the different groups—from which the Power Companies' Association (but not all of its members) held aloof. It is widely held that the Minister has a scheme all ready. If he has we may hear

about it soon. In the meantime the industry will continue to go forward at its not inconsiderable pace.

United Nations Standards

At the end of the last war not much time was lost before the International Electrotechnical Commission started work again by introducing a number of much needed standards. Similar resumption of activity on a full international plane can hardly be expected for several years after the close of the present war, but discussions between engineers of different countries will be more desirable than ever. The steps taken to set up a Standards Co-ordinating Committee of the United Nations, further particulars of which are given in this issue, should be of great importance in aiding the restoration of those areas that have suffered most from the ravages of war.

Smaller Loadings

While the advantages of speeding up processes by the use of electricity are generally appreciated, there are many less well-known ways in which better economy and improved results are obtainable by the same means, but through not being in too much of a hurry. A notable example of this was given in our last issue, namely the substitution of 3-HP automatic hammer mills for 20-HP units for grinding foodstuffs on farms. Hot-water storage is outstanding in this category and the potentialities of long-hour thermal cooking in reducing the kW/kWh ratio remain to be exploited. A large field awaits development in low-temperature heating for keeping houses dry as distinct from the relatively high loadings required for the warming of individual rooms.

Canada's Future

With a population only a quarter of that in these islands Canada to-day holds the position of the second greatest manufacturing country in the British Empire and the third trading nation of the world. This, the Dominion Water and Power Bureau says, has been achieved through the utilisation in war and peace of the country's great natural resource—water power. Before the war Canada's annual electricity production equalled our own and by last year it had risen to more than 40,000 million kWh. When peace comes the large new power schemes which have aided the expansion of munitions production will be available to enable the Dominion's industries to develop. These are dependent upon an abundant and cheap power supply, particularly the metallurgical industry. During the war the range of minerals mined has been added to by the development of a mercury mine which since the middle of 1942 has been producing sufficient mercury to meet all of Canada's essential requirements and 20 per cent. of Allied needs. Some 95 per cent. of all the nickel and 40 per cent. of the aluminium used by the United Nations is produced in Canada.

Trolley-coaches in America

Statistics published in *Mass Transportation* show that American trolley-coaches carried 1,175 million passengers last year. This is a fairly small proportion of the total for all forms of transport (22,000 million), but it reflects a considerable gain when compared with the 68 million passengers carried by trolley-coaches ten years ago. A point of interest is that they tend to be favoured mostly in towns which come within the middle population group (100,000 to 500,000), being used to only a minor extent in the largest and smallest towns.

Inspection Lamps

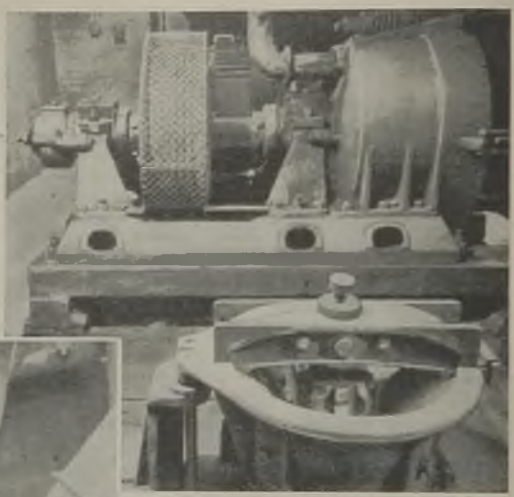
Accidents that have occurred during inspection of apparently empty petrol tanks have made it necessary for the Electrical Branch of the Factory Department to point out that these often contain enough vapour to cause explosion on breakage of a lamp. Momentary exposure before destruction of the hot filament on the shattering of the bulb may be enough to ignite the vapour unless the energy content of the lighting circuit is very small, as in the case of a dry battery. "Intrinsically safe lamps" which have especially robust glass enclosures and fittings of appropriate dimensions should be used for this purpose and, indeed, wherever there is a risk of the presence of gases having a low ignition and flame temperature. These precautions, however, are of no avail with hydrogen, carbon bi-sulphide and acetylene, which so far have defeated attempts to devise comparable safety methods.

Carbon Rod Production

Group and Individual Power Drives

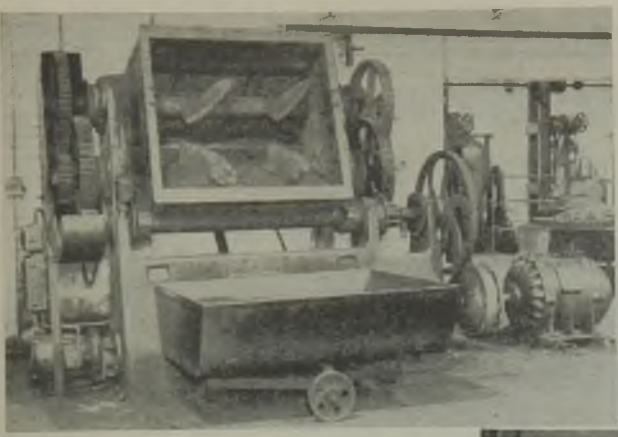
THE Ministry of Supply factory with which we are concerned in this article is laid out for the quantity production of carbon rods for batteries of all descriptions, the bulk of the rods varying in sizes from 5 mm. to 8 mm. in diameter. Apart from the interest attaching to the manufacture of so important an electrical product, there are some excellent examples of both group and individual power driving.

The main raw materials are coke, pitch and graphite, but the early part of the " process line " deals only with the coke which is first reduced to a fine powder in a separate self-contained section of the factory installation. This Sturtevant plant includes rough crushers (vertical kibblers) into which the coke is first introduced and broken up between the cogs of a central vertical revolving shaft and the stationary blades of an outer container. Each vertical kibbler is driven by a 25-HP motor which is housed in a pit and transmits *via* V-belting and worm gearing to effect an overall reduction from 720 RPM to about 40 RPM (actual) at the shaft of the machine. The material from the rough crusher is then bucket elevated to mechanically vibrated screening plant immediately overhead. The elevator and the screens are operated by a 10-HP group drive with primary belt transmission up to the top drum of the elevator and secondary transmission down to the screens. Fines from the screens flow down to emery millstones and the coarse material is fed to a ring-roll mill which is served by a 10-HP motor and in which pulverisation is effected in a groove in a revolving ring by means of a revolving roller which is engaged by the groove. Each millstone is driven by a 30-HP, 975-RPM vertical motor with straight V-belt transmission, with about three-to-one ratio reduction, between the bottoms of the motor and mill shafts.



Above : Crushed coke from the rough crusher (foreground) is elevated to screens, the coarse material from which is fed to a ring-roll mill (background)
Left : Each millstone is driven by a 30-HP vertical motor with V-belt transmission between the bottoms of the motor and mill shafts

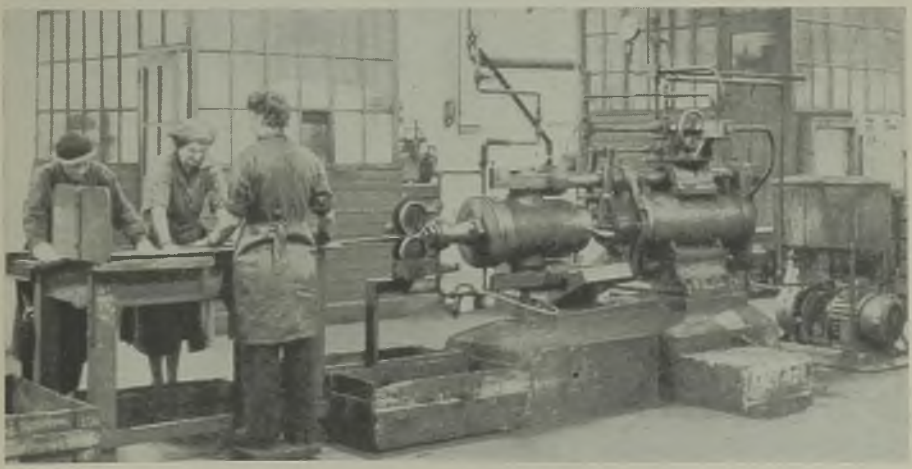
The crushers and ring mills are all connected to overhead air separation plant in which a suction fan removes all the light material continuously and passes it on to mechanically shaken bag filters. The



Above: Each mixer has two individual drives, one for the mixing blades with transmission *via* a fluid flywheel coupling and one for the tilting; gear guards removed for photograph Right: To ensure efficient dust filling of the loaded crucibles these are treated on vibrating machines

shaker gear and the fan have a common 5-HP drive, and from the 1,440-RPM motor there are two V-belt transmissions, one of one-to-one ratio to the fan and one to the shakers through a countershaft with an overall reduction of about 7 to 1. Material which will not pass the bag filters is also passed on to the millstones which are served by another separation plant immediately above. Each of the separators proper in this equipment has a selector for varying the mesh as required, and is served by a 5-HP, 1,440-RPM, directly coupled motor-driven fan which draws the fine material from the millstones *via* a cowl over each stone. Bag filters are also associated with this separation plant, the material from the bags being screw-conveyor fed to a bagging station as the basic raw material for subsequent processes.

The next major process is mixing the prepared powder from the coke with the other ingredients. The mixing is effected in Baker Perkins steam-heated machines which



Extrusion is effected in horizontal steam-heated presses with oil-hydraulic ram operation by pump on right; from the cutting wheels the lengths are run off on to a steam-heated plate on the left

operate on the same principle as the makers' dough-mixing machines. Each mixer has two individual drives, one for the two lines of internal mixing blades and one for the tilting gear by means of which the mixture is readily unloaded into suitable trolley trucks for transport to the next processing equipment. A 30-HP, 720-RPM motor serves the mixing equipment proper, and transmission is first through a fluid flywheel coupling to overcome the heavy-torque demand when the powders are changing into a plastic material, and then by chain to a pinion shaft which serves a train of gears connecting the blade shafts at either end of the machine. The overall reduction is of the order of 50 to 1. The tilting is performed by a 4-HP motor, and backward and forward overrunning are prevented by two limit switches, one on the front shaft of the tilting-gear train and one on a screw at the back of the machines.

Firing is effected on the continuous-firing principle in ring-type producer-gas furnaces

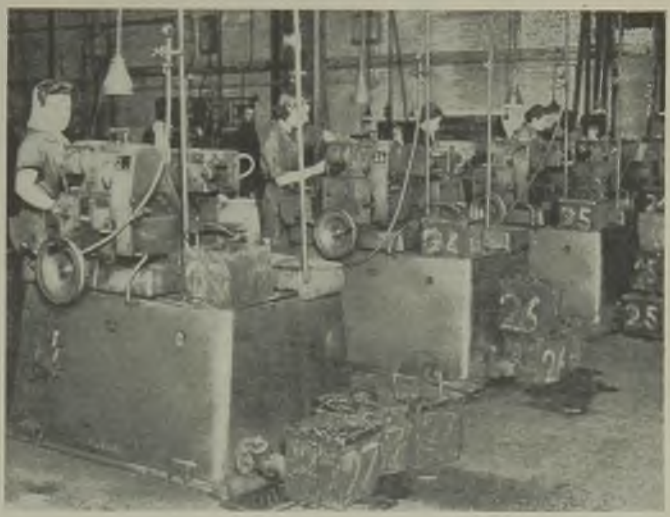
After it has cooled, the mixture, now hard, is crushed in brickworks-type pan and roller mills and then remixed, thus again becoming plastic. This time, while hot and plastic, the material is compressed into cylindrical blocks suitable for the extruding machines. The compression is effected in drop stamps in each of which a central overhead cam lifts and releases the ram. The stamps are arranged as parts of group drives with other equipment, but a line of seven stamps requires about 20 HP for its operation, making allowance for machine diversity.

Extrusion is effected in horizontal steam-heated presses with oil-hydraulic ram operation. The block is first put into the mass cylinder, which is hinged for easy reception of the block, and when this is back in line with the hydraulic cylinder again pressure of from 3,000 lb. per sq. in. to 6,000 lb. per sq. in., according to the size of the rod being produced, is applied at the far end of the hydraulic cylinder, so that the ram passes into the mass cylinder and forces the plastic material through the die at the other end.

On each "flatting" machine the rods are fed into grooves longitudinally in the surface of a drum which revolves between and normally to a pair of grinding wheels

For withdrawal of the ram the oil flow is transferred to the other end of the hydraulic ram by suitable reversing gear in the pipeline system. The oil pressure is provided by a 5-HP motor-driven directly coupled Mono-Radial pump at floor level.

The rate of extrusion is such that the rods are cut off automatically at their correct lengths, about 18 in., for further manufacturing requirements. This is arranged by passing the rod immediately after it leaves the die through the annular space formed by grooves in the peripheries of two wheels arranged vertically one above the other, so that the annular space is in line with the die on the centre line of the cylinders. The movement of the rod itself propels the wheels within each of which is a knife on a radially disposed rod which engages with the cam at the wheel centre. Thus at the end of each revolution of each wheel the two knives bear on the rod, one at the top and one at the bottom, so severing the length which has already passed through the wheels from the main extruded piece.



Cylindrical grinding on centreless grinders imparts the required finish to the longitudinal surfaces and controls the rod diameters

The extrusion dies are made of very carefully selected abrasion-resisting steel (on account of the very abrasive nature of the extruded material) and they are highly finished by grinding and lapping (polishing with diamond dust), so as to produce a surface free from annular marks and scratches which would, of course, be liable to initiate cracking of the rods. The dies are made to produce rod within the limits of 0·05 mm. of the required or specified manufacturing diameter, and wear on the dies is watched very carefully to keep the tolerances of the diameters within the required limits.

On leaving the press the rod tends to cool off, but from the cutting wheels the lengths are run off on to a steam-heated plate, so that they are kept hot and pliable during hand-straightening operations which involve packing the lengths into box trays in which the rods cool and become brittle. In this state they are handled normally and they are first subjected to very careful inspection.

The next major process is firing the carbons, but the first operation in preparation for this is bundling the rods into packs in cardboard. The packs are placed in clay crucibles or pots—the space between the pots and the packs being filled with carbon dust. To ensure efficient filling the pots are treated on a vibrating machine. To the underside of the vibrating plate is bolted a small shaded-pole motor with its shaft so weighted as to cause out-of-balance running, with resulting mechanical vibration, or what would normally be regarded as a "rattle" fault. The firing pots are made in the factory by means of specially installed electrically driven pug-mixing and extruding machines of the type often used for clay-duct making.

Firing is effected on the continuous-firing principle in ring-type producer-gas-fired furnaces situated below floor level, so that they are loaded and unloaded by crane from the top. Every furnace has 36 chambers, each about 6 ft. square and 8 ft. deep, arranged in two parallel lines. Between the two lines of chambers is a raw-gas flue feeding from the producer-gas plant, and on either side of the double line of chambers is an exhaust-gas flue; both of these exhaust flues are connected to a chimney. There are suitable connections from the raw-gas flue to each of the chambers, from each of the chambers to the exhaust-gas flues, and between adjacent chambers, so that by suitable arrangements for connecting, disconnecting and interconnecting the flues and chambers, any number of chambers may be in use at one time with progressive heating and cooling from chamber to chamber, while other chambers are open for final cooling and loading and unloading.

Each chamber has a crane-handled clay-

sealed cover, and the crucibles stand vertically in the chambers during firing operations. The new crucibles are themselves pre-fired at the same time as the rods, and they are distributed throughout the furnace for this purpose at the ratio of about one new crucible to ten loaded crucibles. A firing operation takes about 72 hours from start to finish, say, 50 hours for heating and 22 hours for cooling, and the maximum firing temperature is about 1,250 deg. C.

On completion of the firing of the rods and removal of the crucibles from the furnace, the crucibles are tipped over a floor grille through which the packing dust falls into a hopper, to be drawn off by a motor-driven fan. The rods, which are now tough, are next unpacked and placed on mechanically agitated conveyors on which the dust between the rods is thoroughly shaken out. The rods are then bundled up for the stock from which the finishing department is supplied.

Final inspection and boxing are carried out on benches served by specially disposed fluorescent lighting fittings

After careful inspection to ensure that only perfectly straight rods are passed on, the fired rods are cut into short lengths to suit the requirements of the batteries for whose manufacture they are intended, and they are cut to limits which provide for a subsequent operation of "flatting." On each cutting machine the rod is fed to a stop to give the required length through a hole formed by grooves in a pair of knife edges, the hole being a trifle smaller than the rod itself when the knife edges are brought together. The top cutter only moves by operation of an eccentric and crank device which is belt driven from the machine shaft, and the action is such as to nip off the short length of rods rather than to cut the carbon. The cutting machines are the subjects of interesting group drives and, to give one example, a 3-HP, 950-RPM motor serves four machines, with V-belt transmission.

The short lengths are fed into perforated steel containers in which they are immersed in hot paraffin wax for an hour. They are then tipped into a motor-driven rotary saw-dusting machine in which all the surplus wax is removed from the rod surfaces by a riddling process, and then passed on to the flatting machines. Flatting determines the precise length of rod, with suitably finished ends, for the battery maker. On each machine the rods are fed into grooves longitudinally in the surface of a drum which revolves between and normally to a pair of grinding wheels, so that as each rod is carried round in the drum its ends bear on the abrasive surfaces of the revolving grinding wheels simultaneously. Each flatting machine has three belt transmissions down from an overhead group-driven line shaft, one for each grinding wheel and one for the rod-carrying drum. A 30-HP, 450-RPM motor serves about 25 flatting machines through a common countershaft, and a 25-HP motor-driven fan is employed in the dust-extraction scheme for about 30 of these machines.

The "flatted" rods are next subjected to cylindrical grinding to impart the required finish to the longitudinal surfaces and to control the rod diameters to within $\pm$ 0·05 mm. of the specified diameters. The rods are mechanically fed into the space between the grinding wheels on each machine which has four motors, all under the common control of one start and stop push-button unit and all with thermal cut-out protection. The four incorporated motors are a 5-HP unit on the grinding-wheel head, a $\frac{3}{4}$-HP motor on the control-wheel head and two $\frac{1}{2}$-HP units for the water pump and the hydraulic truing-up head.

After drying, the rods are passed through gauges as a final check for incorrect sizes and bends, and then passed on for final inspection and boxing ready for dispatch. One operative works at each bench, and about 18 in. above the working plane is a 5-ft. G.E.C. fluorescent fitting.

All the motors throughout the installation are totally enclosed machines, supplied by the General Electric Co., Ltd., and with the exception of one case, the crucible making plant, where very heavy starting torque demands a s.r. motor, all are s.c. machines with starting arrangements as follows: direct-on up to 5 HP, star-delta from 5 to 10 HP, and auto-transformer starting from 10 to 40 HP.

Engineering and Economics

Choosing Plant for Minimum Total Costs

By D. J. Bolton

THERE is no need at this date to stress the importance of economics in engineering practice. To define engineering as applied physics and chemistry would be to give only half the picture—it is just as much applied economics. To a physicist, silver is a better conductor than copper, and gold better than aluminium, but to an engineer these orders are reversed. The reason is that money has now come into the picture, and the term " better " comprises costs as well as conductivities. The engineer has to find, not merely what works, but what works best for least money—not merely *a* solution, but the cheapest solution of the problem.

Properties and Prices

It must be granted that the physicist has the easier task, for at least his materials are stable and constant. He deals in the eternal verities, whereas the engineer is the slave of humanity and must change with every whim of his master. The conductivity of silver will be the same in a thousand years time, but its price may change to-morrow, and engineering practice must change with it. If in the course of time the price of copper were to go up and the price of steel to go down, there would (or at least there should) be a complete change in the transformers and motors issuing from our works though nothing had happened to Ohm's law or the magnetic properties of steel.

It will be noted also that the real cost of things like busbars not subject to depreciation is merely the interest on their first cost plus a small margin for risk insurance. In a recent case in America, banks loaned silver for this purpose, realising that it might as well be in the power station conducting current as in the bank vaults lying idle. Thus a purely fortuitous change in banking practice altered what was " best " engineering practice.

Designers may resent the notion that their meticulous constructions rest on data as fickle as a fashion, but so it is. They make their busbars of aluminium rather than of silver or gold, not because it conducts better but because it is cheaper. And the high price of gold results from a host of factors some political, aesthetic and traditional, but all of them the properties of human beings rather than the properties of matter.

For the most part the economics is implicit and the engineer is no more aware of it than of the air he breathes. If all the components are in the same time plane, no problem arises. When several alternatives offer the same service it is merely a question of adding up costs and choosing the cheapest. Frequently, however, the events concerned in the problem do not all occur together. We hear much of planning nowadays but to the engineer this is nothing new. Engineering involves planning. Largely it concerns the making of tools, plant and capital equipment generally; and the essence of capital is that it represents an expenditure of present labour in order to save future labour.

But the extent to which one should drain the present for the future varies with the circumstances. Consider a typical capital structure such as a river bridge. Its construction absorbs present labour, but saves far more labour in the future, as compared with fording or swimming across. When the immediate needs are paramount (*e.g.*, in war) fording may be necessary, or at most only a temporary pontoon structure is justified. When times are somewhat more settled and some reserves are in hand a wooden bridge may be built with a life of perhaps fifty years. Still more leisurely times and greater margin and security will justify a bigger present expenditure on a long-life steel or concrete structure.

This balancing of present and future needs is the outstanding question in engineering economics, and one that must be answered every time we construct anything to last more than a few weeks. How is one to assess relative urgencies, for clearly no exact equality can be established? *Now* and *then* are two different things, and to say that one pound now is equal to two pounds in ten years time is like saying that one pint of beer is equal to two bananas. But just as the satisfactions of thirst and hunger can be assessed on the common basis of money, so the needs of then and now can be compared by a mutual index—the rate of interest. The loan forms the coupling device: interest on capital is its measure and provides the time calculus of human needs. At some risk of over-simplification one may say that whilst the price of an article expresses the ratio of demand to supply, so the rate of interest or price of a loan expresses the relative eagerness of borrowers and lenders.

Life Estimates and Interest Rates

There is no escaping the fact that every engineering plan involving future events necessitates an estimate on two cardinal points—life of plant and rate of interest. Some engineers will shy at this statement

and will feel that calculations so based are unrealistic. It is true that one does not know just how long a particular plant will last, any more than one knows what will be the yield point of some particular member. A life estimate, like a breaking stress, is a working hypothesis not a prophecy of fact, and it is a hypothesis without which the right engineering structure cannot be designed. Similarly with interest rates. Calculations are sometimes made "neglecting interest", which is a little like designing a motor neglecting Ohm's law. It may work, but it is hardly likely to give the best result.

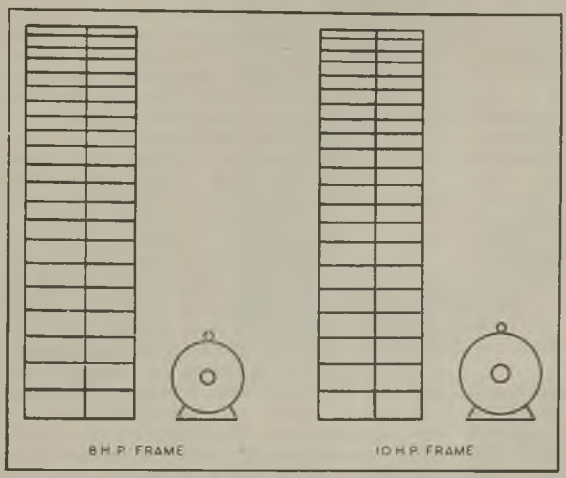


Fig. 1.—Interest rate 5 per cent.

To take a very simple example, suppose one is choosing between two machines, similar in other respects, one of which has 1 kW more constant loss than the other. With an average factory connection (say, forty-eight hours a week and fifty weeks a year) and with energy at 1d. a kWh the difference in the cost of the losses will be £10 a year. In order to assess the relative economic merits of the two machines one must know two things—the probable life in the situation planned, and the rate of interest. The former tells us how many £10s must be allowed for, and the latter tells us what to allow now for the various £10s in the future. If interest is at 5 per cent. the kW losses occurring in the first ten years have a present worth of £81, whilst those in the next ten years are worth £50. Interest at a high rate such as 10 per cent. puts a smaller value on future savings as compared with present needs. The savings in the second ten years are now only worth £26, and if the life went on another eighty years the additional savings would only be valued at £16.

An important practical result is that exact life estimates are not vital to the calculation. Particularly when the interest rate is high there is relatively little difference between the results for a short and for a long life estimate (*e.g.* at 7 per cent. a thirty-year life is valued at only 1·8 times a ten-year life). Since many industrialists strongly object to spending present money to secure future savings (however substantial) more than a few years ahead it may be politic to make only moderate claims for longevity.

The effect of interest rates is shown graphically in Figs. 1 and 2. The data are taken from a paper recently read before the Institution of Electrical Engineers.* For a certain 8-HP service the first cost of a normally rated motor is represented by the motor area on the left of Fig. 1. The cost of the electrical losses is represented by the left-hand column of rectangles, each being divided up into copper (left) and iron (right). The bottom rectangle is the cost of the first year's losses, the next one is the present value of the second year's losess, and so on for a total life of twenty years. By using a somewhat larger motor (normally rated at 10 HP) and suitably under-running it, a saving in losses is obtained materially greater than the extra cost of the motor. The result is represented by the areas on the right of Fig. 1.

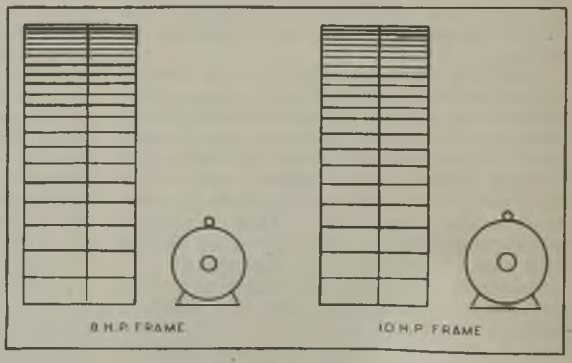


Fig. 2.—Interest rate 10 per cent.

Now consider the same situation but with

* *Electrical Review*, Dec. 3rd, 1943. Figs. 1 and 2 were shown as slides when the paper was introduced.

an interest rate of 10 per cent. (Fig. 2). The bottom rectangles are the same as before, but later ones shrink at a much faster rate, and there is very little value attached to savings after the first few years. The purchase of smaller losses through a more expensive machine is now less attractive.

Efficiency is Not Enough

The process of buying a bigger or better machine in order to save running costs is generally known as "paying for efficiency." This, however is only a very rough and crude form of economic selection. If one visualises an electro-magnetic machine in its simplest form as an iron core carrying a copper

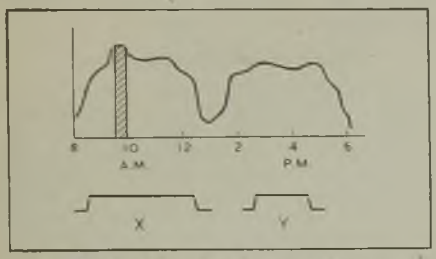


Fig. 3.—Diversity of constant loss

winding, it is clear that if the iron and copper sections are increased for the same service there will be less iron and copper losses, and a higher efficiency. The losses which previously cost, say, £100 per annum now cost £90. But if the initial cost was analysed it might be found to be made up of £80 for iron losses and £20 for copper losses. Instead of reducing each by 10 per cent. it would probably have been much better to have reduced the iron losses by a bigger amount and kept the copper losses constant or even to have increased them.

In an AC machine there are three distinct forms of electrical loss consumption, namely, copper loss, iron loss and magnetising component. Each of these varies in a different way, bears a different relation to the tariff and must be separately assessed. The friction loss can frequently be omitted from the economic comparison because it will be the same in each of the alternatives considered. When it has to be included it can usually be grouped with the iron loss.

The best starting point in solving economic choice problems is to find the capitalised cost of 1 kW or 1 kVAr of copper loss, iron loss and magnetising consumption for the particular conditions involved. This figure will depend upon the tariff, the hours and conditions of loading and the assumed life and interest rate. Once found it can be used to evaluate the difference in electrical running cost between alternative proposals.

In the case of economic choice calculations on large supply transformers the following figures were used. The tariff is approximately the grid tariff with pre-war coal prices.

Assumed data :—
- Life: 20 years and zero salvage value (or 18½ years with salvage value = 10 per cent. of first cost)
- Interest: 5 per cent. on loan and 3½ per cent. on reserve fund (or 5½ per cent. if single rate)
- Price of supply: Standing charge per annum per kilowatt = £3 + 4s. 6d. per 0·1 of power factor below 0·85
- Running charge per kWh = 0·2d.
- Duty: Continuous connection, 28 per cent. load factor at 0·8 power factor

Constants calculated therefrom :—
- Present worth of £1 per annum over life period: £11·8
- Capitalised cost of 1 kW of full-load copper loss: £35·3
- Capitalised cost of 1 kW of iron loss: £122
- Capitalised cost of 1 kVAr of magnetising consumption: £8·85

There are certain difficulties which have to be overcome in each of these calculations. The cost of the copper loss depends not only on the value of the full load loss, but also upon the load factor or mean height of the load curve and upon its shape. An empirical assumption can usually be made about the shape so that these square-law losses can be estimated. The chief difficulty with the iron loss evaluation concerns the diversity, and here again an empirical formula can be used. It is clear that a machine X connected for four hours out of an eight-hour factory shift has only a certain probability, less than

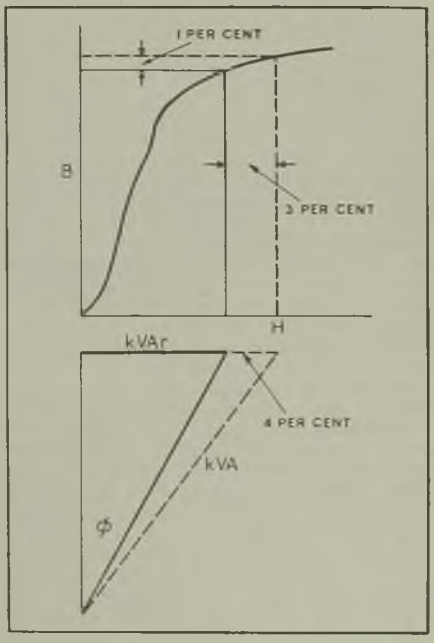


Fig. 4.—Flux change and tariff incidence

unity, of affecting the factory maximum demand reading (shaded slice, Fig. 3). Another machine Y connected for only two hours is less likely to do so but it could not be said to be only *half* as likely. This is because the mere fact of a maximum demand at a particular time implies a certain predilection on the part of any machine for connection at this time. This behaviour can be empirically represented by assuming a diversity factor equal to the reciprocal of the load factor raised to a power less than unity.

A third difficulty concerns the cost of the reactive consumption. A very small change in the iron rating, *e.g.*, a 1 per cent. increase in flux density, will produce a much bigger proportional change, say 3 per cent., in the magnetising current owing to the flatness of the B-H curve at the usual working point (Fig. 4). This will mean a 4 per cent. change in the kVAr. The cost of this change will depend both upon the size and upon the character of the power factor penalty in the tariff. Thus the grid tariff charges 4s. 6d. per annum per kW for each 0·1 reduction in power factor below 0·85. This is approximately equal to 15s. per annum per kVAr, and corresponds to a charge of about 25s. per annum per kVA increase when working round about 0·8 power factor.

Transformer Flux Densities

There have been several inquiries into the feasibility of increasing our present transformer flux densities, whether with the existing materials, by using better quality steel or by making use of magnetically oriented laminations. In general the economics of the change has been disregarded except on that short-term view which may be called "first-cost economics." It has been tacitly assumed that if the same output can be obtained from a smaller quantity of active materials, and if most of the saving is passed on in the transformer price, the result will be a gain to all concerned. Since, however, the user has to pay for the losses as well as for the transformer, an increase on the former may well obliterate any gain on the latter.

In order to investigate this point I have taken a few sample cases of large supply transformers, such as are used on the lower-voltage sections of the grid, and examined the economic effect of a 10 per cent. increase in flux density, supposing such a thing to be technically possible. Assuming the grid tariff and a normal duty, the extra cost of the losses was found to be many times greater than the extra market value of the increased-output transformer. (In two particular cases it was found to be five to twelve times as great.)

The actual method of making the comparison was as follows. Starting with a normally rated transformer A of some given size, the purchase and operating costs were evaluated on the capitalised costs basis, using the constants given in the table above. This transformer was then presumed to be run with 10 per cent. higher flux density, A′, giving 10 per cent. increase in output, approximately 19 per cent. increase in iron loss and a very considerable rise in magnetising consumption. The results were compared with those for a hypothetical normally run transformer B of 10 per cent. larger size. B will have lower iron loss and magnetising consumption than A′, but higher copper loss. A cash value must therefore be assigned to all these differences before a full comparison can be made.

Under-running Advantageous

If over-running costs many times what it saves, under-running will save considerably more than it will cost. Slightly larger transformers will be required but they will not take up more room because the tanks need not be so big, and the overall costs will be less. The question then arises—"How far should one go, and what is the optimum or economic value for the transformer flux density?" The answer must necessarily be tentative since so many variables are concerned; and the present calculations are based entirely on prices existing some years before the war. But with this proviso they do give some idea both of which way to move and of how far to go.

Taking two sizes at random in a range of large supply transformers the disadvantage of over-running the iron by 10 per cent. was expressed as a ratio of extra losses cost divided by extra plant saving. A third size was selected because it had a specially low initial flux density, and the three results were tabulated as follows. The implications are unmistakable that with this data the economic density is in the neighbourhood of 10·6 kilo-gauss.

Output and Voltage	Normal flux density kilo-gauss	Economic disadvantage ratio (10 per cent. over-run)
15 MVA 66 kV	13·0	12½
2·5 „ 33 „	11·3	5
4 „ 33 „	10·75	1½

Steel Quality

Another economic point of great importance to the user concerns the quality of the transformer steel. The particular technique of economic choice which is developed in the paper already referred to and illustrated in the present article can be applied to any change, either quantitative or qualitative, in any of the active materials of an electrical machine. It has a very

immediate application to this problem of steel quality.

Instead of reducing the iron losses by working at a lower flux density it would obviously be more attractive to use steel which would have smaller losses at the same (or even a higher) density. The iron loss reduction would then be a clear gain instead of being partially off-set by increased mean turn and therefore copper loss.

It is impossible to forecast what may result if after the war some fraction of our present energies are devoted to metallurgical research in this direction. But even with our present knowledge a substantial improvement is technically possible and this waits only upon economic or commercial considerations.

As regards economics the case is beyond question, and a rough check may be had from the 15-MVA transformer shown on the first line of the above table. The iron loss is 29¼ kW, and assuming a loss of 1 W per lb. for 14-mil sheet with B_{max} = 13 kilo-gauss this indicates 29,250 lb. of active iron. At a pre-war price of £30 per ton this iron would cost £392. If the quality could be improved merely to the extent of reducing the iron loss and magnetising consumption by 10 per cent. the reduction on the tariff and service indicated would save the user £54 per annum or a capitalised value of £638, *i.e.*, 60 per cent. more than the whole cost of the iron.

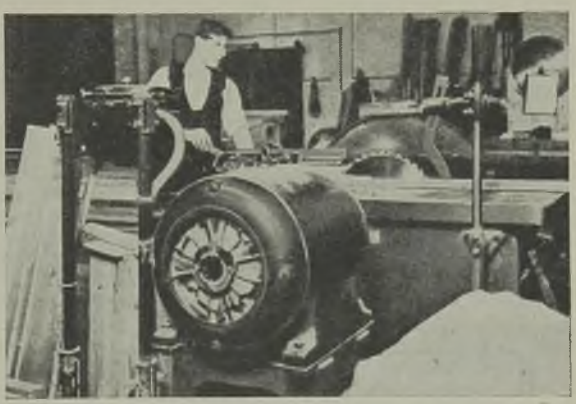
Sawmill Change-over

Fuel Saving Through Electrification

A CHANGE-OVER from steam to electric drive in a sawmill has resulted in a great saving of fuel. Before the war the plant was driven by a 150-HP steam engine through a main shaft running in a pit across the main shop floor and three countershafts to which the following machines were connected: four 36-in. diameter circular saws, a floorboard machine, two planers, a 36-in. band saw, a horizontal saw, a band rack, an exhaust fan for drawing the waste from the machines to the boiler, a group of small machines driving saw sharpeners, a mortising machine, a spindle moulder and a drilling machine. Steam was generated by a Lancashire-type boiler fired by the wood waste.

Electrification had been contemplated for a long time because of the saving of floor space by dispensing with the long belt races, and the large output which could be obtained by maintaining the correct cutting speed on all machines. Against these advantages had to be considered the capital cost of the new plant, an increase in power costs and the problem of disposing of the waste material. Under wartime conditions the whole position changed, as the waste, instead of consisting of dry shavings with a percentage of sawdust, was wet sawdust, and it was necessary to purchase 177 tons 5 cwt. of coal at 32s. per ton during twelve months in order to generate the required quantity of steam. It was estimated that 96,000 kWh would be consumed if the plant was electrified; this represented a saving of 102 tons of coal per annum, based on the assumption that 1·75 lb. of coal is required to generate one kWh.

Permission was granted to proceed with the scheme and, in addition; a new band rack driven by a 25-HP motor was installed and the existing 7-ton hand crane was electrified. Including this additional load, the annual consumption is 51,000 kWh, which shows a coal saving of 137 tons. The consumer purchases electricity on a flat rate of 1d. per kWh with a penalty if the power factor is not corrected. Under normal conditions the power factor would have been corrected, so in comparing the electricity cost with the cost of coal, the matter has been considered with and without the p.f. penalty.



Crompton Parkinson "Klosd" motor driving wood-working machinery in a converted sawmill

Neglecting the penalty, electricity costs £212 per annum compared with £282 for coal, a saving of £70 per annum in fuel or £30 per annum if the p.f. penalty is taken into account.

The incoming supply is controlled by a Crompton Parkinson "Klad A" oil switch. All the motors are of the C.P. "Klosd" type and are controlled by Ellison oil-immersed starters with an emergency push-button on each machine table. Wigglesworth's "Texrope" drives are used throughout. These motors, which are made in both squirrel-cage and slip-ring types from 5 to 150 HP, are especially suitable when conditions make it impossible to use protected or screen-protected motors.

Special Slide Rule

Deriving Power Factor Directly from kW and kVAr

By W. M. Gore

WHEN the power factor is required to be determined from kW and kVAr the operation of an ordinary slide rule is a comparatively long process as $\frac{kVAr}{kW} = \tan \phi$ and the corresponding cos ϕ have to be found by reference to tables, but if a rule could be made that would complete the calculation much time would be saved and the possibility of error would be reduced.

Scales C and D on a normal slide rule will give $\frac{kVAr}{kW} = \tan \phi$ directly, and if the corresponding cos ϕ can be marked on scale A, then unity on scale B will indicate power factor. Scale A is chosen for power factor so that there shall be plenty of room for the figures. Such a slide rule can be made quite easily and cheaply. The materials required are a piece of wood 10 in. by 2 in. by 3/16 in. for the back, some strips of thin wood or fibre to build up the scales and slide, and some logarithmic graph paper.

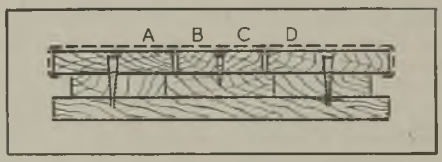


Fig. 1.—End section showing how rule is built up

Method of Construction

First cut the strips and mount them with glue (Fig. 1) with the slide built up to fit, but about ¾ in. longer than the rule so that it is easier to operate. When cutting the strips care must be used to keep their edges straight so that the slide will run easily. A good method to ensure this is to clamp the strips between two old saw blades and, using the backs of them as a guide, to trim the strips with an old file. When they are satisfactory, stick the strips with glue and clamp them down until the glue sets. The strips on the rule can then be screwed down to the wood for further strength.

When all is set and the slide has been made to run easily cut a piece of the graph paper and stick it with glue over the slide and rule (Fig. 2) so that scales B, C and D are made; a piece of plain paper is put on for scale A. After the glue has set, run a razor blade down the nick between scales C and D so that the slide is free again and the rule will be ready for marking out.

Marking the Scales

First mark the figures on the graph paper for scales C and D; if in doubt refer to a normal slide rule which has the same scale. Mark scale C for kVAr and scale D for kW; tan ϕ will then be indicated on scale C at unity on scale D; against unity on scale B mark out cos ϕ (power factor) on scale A.

When marking out this scale neglect unity power factor (which can be observed easily without a rule) and mark ·99 in red ink (ringed in Fig. 2) or it will be confusing later on. Refer to trigonometric tables for the location in the following way: tan ·142 ∝ cos ·99 so place ·142 on C against unity on D and against unity on B mark (in red) ·99 on A, then proceed with the other markings in black drawing ink right down to ·7 power factor. This will be at the end of the scale so that if it is required to go to lower power factors a start must be made at the other unity of scale B, hence the reason for marking ·99 in red, otherwise it would confuse the ·57 and ·56 readings.

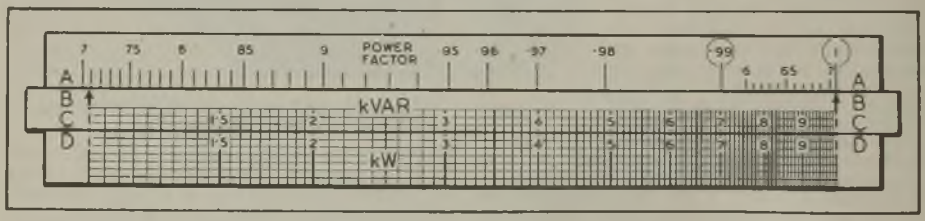


Fig. 2.—Three slide scales in relative positions

The rule is now complete and all that remains is to make it durable by giving it a coat of clear cellulose varnish, or amyl-acetate in which some celluloid has been dissolved. A cursor can be made of celluloid by dipping it in boiling water and bending it to shape so that it will run in the grooves left for that purpose.

CORRESPONDENCE

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

Prefabricated Houses at Hull

MY attention having been drawn to a broadcast from Hull in relation to use of gas in a specially erected demonstration prefabricated bungalow, I think, justifies the following explanation of the situation.

In the broadcast mention was made of a gas fire and a gas cooker ; this referred only to a bungalow which has just been erected quickly. A few weeks ago a house comprising two rooms and a kitchen downstairs and three bedrooms and a bathroom upstairs was erected under similar circumstances, and this was equipped wholly electrically, including immersion heater, fires and cooker.

When erecting the bungalow, Mr. Tarran decided on the principle of " freedom of choice," and gave the gas companies an opportunity, though a notice appears on the gas equipment, that this may be either gas or electric. My observation to Mr. Tarran, however, was that any installation of gas equipment on erection would, in the great majority of cases in this city, be completely wasted, and I should have the troublesome pleasure of superseding them very quickly when the house became a home.

Hull. D. BELLAMY,
General Manager,
Electricity Dept.

High-Frequency Heating

AS Mr. A. E. L. Jervis rightly points out in his article in the *Electrical Review* of May 26th, the spate of articles on high-frequency heating in the American Press and the dearth of similar articles in the Press of this country may easily give a wrong impression of relative activities on both sides of the Atlantic. In fact, very considerable progress has already been made in this country, and development work in the use of high-frequency heating is continuing at a pace which in the present circumstances is little short of amazing. The list of applications grows daily with naturally a bias towards those materials whose thermal conductivities have so long been one of the troubles with which fabricators or manipulators have had to contend, and for which " the existing ways of electric heating " referred to in your editorial have usually proved to offer little advantage over any other method of applying the heat externally.

Already there are numerous equipments in use in this country. True, a few of them are of American origin, due to the difficulties experienced in recent years in obtaining certain components in short supply over here. This state of affairs was only to be expected when the radio industry could not supply the colossal demands made upon it by the various Services. The situation at present tends to ease slightly, and many equipments now on order will shortly be adding to the nation's capacity for producing more and better articles at lower cost and in less time, while, as components become available, sets of larger kW capacity will be obtainable.

It is desirable, therefore, to draw attention to one particular section of Mr. Jervis' article which may have an unfortunate effect upon those contemplating the adoption of the process. He quotes Mr. J. P. Taylor's paper to the American Society of Mechanical Engineers, and includes in Figs. 5 and 6 curves showing operating and equipment costs. Mr. Taylor's paper does not say exactly what is included in the " equipment " and states that " unfortunately varying applications and engineering costs were necessarily involved." It is, therefore, difficult to be precise on capital costs, but the American prices, from which the curve of Fig. 6 is derived, are far in excess of figures for British equipment, and this in turn must be reflected in the operating costs shown in Fig. 5.

The cost of any installation of given kW capacity must vary with the nature of the electrode and other ancillary equipment, but it would appear that the prices for American high-frequency generators are two or three times those of reputable British manufacturers. It would be a pity, therefore, if prospective users of such apparatus were deterred from investigating the process for their own production by what appear to be abnormally high initial costs quoted in the article.

Watford. WILD-BARFIELD ELECTRIC FURNACES, LTD.,
J. E. ORAM, *Director.*

Guidance for the Public

I HAVE had a fairly intimate knowledge of your journal for over fifty years and up to the time of reading the paragraph under the above heading in your issue of May 26th I was very strongly of the opinion that everything written by you in the *Electrical Review* was based not only on intimate knowledge of the subject but very fair reasoning and I have never had any cause for doubting the correctness of your expressions of opinion, but the view you have expressed and the expressions you use in the concluding paragraph make me doubt whether I am still of that same opinion.

Whilst I have no sympathy with nationalisation or state control of any industry, still,

broadly speaking, I believe that the comments made in the *People* are quite justified and are certainly borne out by my own personal experience. True there are some of these private companies whose charges are open to comment, but there are many whose charges show a "scandalous disparity of charges between one district and another" and, as you will see from the evidence I give you, there is a scandalous disparity of charges between one district and another even of the same company, unless these have since been adjusted.

I am chairman of two manufacturing companies: in the one case we occupied premises in a district for many years where the charges worked out at 3d. for lighting (principally basement) and about 1d. for power. Some few years ago we moved our premises to another part in the same company's supply area, some 300 or 400 yards from the original premises, and, naturally, as the new premises were supplied by the same company, we omitted to confirm the cost of the electricity supply. We are now paying 6d. for lighting (also principally basement) and about 3½d. for power.

At my other company's premises, situated about five miles from these premises, the charge for supply works out at the combined rate of about 1·3d. per unit, which is about one-quarter of the rate we pay at these premises. At my residence, which is situated about half way from each, I pay a combined rate of about 1½d. per unit. I have endeavoured to get the charges for these premises more equitably adjusted but without avail.

Surely this is a very glaring example of "scandalous disparity of charges between one district and another" and rather repudiates your remarks that the *People's* comments "consist largely of this sort of nonsense."

EDWARD L. JOSEPH.

[We did not deny that there were disparities between charges in adjoining areas. It was the politically-biased implication that only company undertakings were responsible for these to which we objected.—Editors, *Electrical Review*.]

Power Station Ownership

RECENT articles in your journal dealing with generation of electricity, with particular reference to the handing over of power stations to the Central Electricity Board, appear to me to omit some factors which are worthy of special consideration. These may be summarised as follows:—

(1) Speaking generally, a large city having its own power station is assured of a more reliable supply of electricity.

(2) The rates value to a city may be affected, since progressive growth of supply necessitates increased power plant.

(3) Electricity departments' staffs and workers would also be subject to review, and this in turn may affect some hundreds of employees in any one undertaking. Little, if any, mention is made of them in reorganisation schemes put forward by various bodies.

(4) Local trading may be seriously affected, for it is inevitable under a scheme of central control that central purchasing would obtain.

(5) During the growth of a city the electricity undertaking (by way of the power station) is developed and generally proves an asset. That this is so is borne out by the fact that smaller stations have not been permitted to extend. Admittedly, there are cases in which the reverse holds good.

(6) Are we present-day engineers going to hand over the work of our predecessors without any thought for their sincere desire to serve the industry and their undertakings? Are we sure that they would have "handed over" without adequate protection?

(7) It has been said that developments in power station plant have been chiefly due to the enterprise and initiative of power companies. This requires some degree of qualification, for present-day high-pressure and pulverised fuel plants were, to my knowledge, primarily the work of two municipalities. Pulverised-fuel boiler plant was, I believe, introduced and fostered by the Derby Corporation Electricity Department, whilst high-pressure boiler and turbo plant (1,100 lb. per sq. in. and 850 deg. F.) was first installed in this country by the Bradford Corporation Electricity Department.

Whatever form of organisation the electricity supply industry takes, it is to be hoped that the change will be evolutionary, as this is essential if it is to be of lasting good to the community.

Bradford. T. H. CARR,
Electrical Engineer and Manager.

Chief Engineers' Salaries

IT is refreshing to read your leaderette regarding the salary offered by the Wimbledon Corporation for a chief electrical engineer to succeed Mr. A. E. McKenzie. In offering a salary in excess of that generally recognised, the Corporation has doubtless only reached this decision in the light of its experience over the past twenty years, during which period the progress of the undertaking has been out-

standing. Such action clearly shows that the Corporation appreciates that it has been a sound investment, not only from the financial point of view but for the benefit of the consumers and the borough as a whole.

Those responsible for determining the policy of the Electricity Department at Wimbledon are obviously sufficiently enlightened to realise there is still ample scope for further development in the future, and mean to secure a chief electrical engineer who has the necessary qualifications and ability to continue the excellent results produced by Mr. McKenzie.

It is a pity that the seventy odd municipal electricity undertakings, who have specifically refused to adopt the properly negotiated agreement made by the National Joint Committee of Local Authorities and Chief Electrical Engineers for the Electricity Supply Industry, do not take advantage of the experience obtained by the Wimbledon Corporation.

London, E.5. E. A. MILLS,
President, Associated Municipal Electrical Engineers.

Plugs and Sockets

A LETTER from Mr. H. Moss appears in your issue of May 26th, in which a new plug and socket, presumably the domestic standard fused plug introduced by me, is adversely criticised. The critic admits not having seen one, so his remarks need not be taken too seriously. Nevertheless, we feel bound to correct positive misstatements.

It is known to all who have studied the matter that the existing B.S.S.546 Plugs & Sockets will not provide what is required for post-war houses, and whoever tries to comply with the requirements will be bound to design something new. We have not put forward "another" universal plug, because none existed before ours appeared.

The pin centres of our plug were decided upon by dielectric requirements and convenience of wiring after careful study and experiment and Mr. Moss may rest assured that nothing was left to chance. It is quite impossible to interchange the live and neutral pins as he suggests. The pins being loose in the plug head can be pushed up and the flex put into the terminal holes in full view. The tails being all the same length, no loose strands are possible with any carelessness short of deliberate sabotage. The "so-called" rubber cord grip has been tested with flexes from 3-A silk covered to 15-A tough rubber covered, so the intermediate sizes are automatically provided for.

The statement that the new plug is not wanted by the trade is quite untrue. We have been inundated with orders from contractors and large users which our existing high priority commitments have so far prevented us from executing.

Mr. Moss refers to our terminal arrangement as having been patented by him in 1919, but adds that the patent having run out, it is free for all to use. We make no comment on this, but are bound to issue a warning that our pending patents were only applied for after a most careful study of existing specifications and published matter and whilst anyone may make use of a lapsed patent, we may say with some confidence that it would be unwise for anyone to assume that our design is not fully covered.

Salford. For DORMAN & SMITH, LTD.,
THOMAS ATHERTON,
Managing Director.

MR. HARRY MOSS, in your issue of May 26th, criticises what he terms "a bastard size of plug" solely upon his own interpretation of illustrated descriptions. He admits that he has not even seen a manufactured sample. To pen such condemnation with so little substantiation is, to say the least, exceedingly premature, and his interpretation is entirely wrong.

Details of a plug of this kind were given in your journal on October 29th, 1943, and February 10th, 1944. Few engineers will agree with his contention that "we have, at present, all that is required." I would direct him to that excellent article on "Socket Outlets" by Mr. Forbes Jackson, which appeared in the *Electrical Review* of January 21st. The following extract aptly expresses the views of many:—"No one can pretend that the present design of plugs and present circuiting methods are entirely satisfactory. We have an opportunity to put this right and to produce a really satisfactory domestic outlet system incorporating experience and materials not available when existing standards were made. . . . If on technical and economic grounds a change is desirable, now is the time to make it, and the desire to use a standard, merely because it is a standard, need not be given too much weight."

The decision to increase substantially the number of socket outlets brought with it the necessity for including a fuse at each plug point and made it essential that all plugs in a house should be interchangeable with one another. This involves a plug of not less than 10-A capacity and preferably somewhat higher. No such plug exists in B.S. 546, except the 15-A which is too large and too high-priced for universal use.

Like Mr. Moss I have no use for a 5-A plug "up-rated" to 10 A; but I am one of the few engineers in the country who has had first-hand experience of the 3-kW 230-V fused plug and socket to which he apparently refers. It is a small neat design. Seven of them are being included in each of the "Poplar" kitchen units with which my name is associated. The utilitarian value

of this new plug is stressed by the fact that it satisfactorily serves the clock circuit of the kitchen unit as well as its highly loaded hotplate circuit. I am able to say from experience that no difficulty has arisen in the wiring and use of these plugs and sockets.

With regard to the possibility of using the wrong size of fuse in these plugs, I understand that they will be of different colours, but in the particular case mentioned above, I am not concerned with this as I am using the maximum size., *viz.*, 13A throughout. The reason for this is that very few domestic appliances are capable of being overloaded. A fault, when it occurs, is almost invariably a short-circuit and a 13-A fuse will open the circuit as well as a 5-A or 2-A.

An electric clock takes under 5 W. A 2-A 230-V fuse blowing at something over 3A represents a fault loading of 700 W or 140 times the full load of the clock, so that a 13-A fuse is every bit as good as a 2 A for this purpose. Similar considerations apply to most other domestic appliances, including standard lamps. If Mr. Moss is worrying about the protection of the flexibles, I would refer him to recent literature on this subject, including the article of Mr. Forbes Jackson, which has done much to dispel many conservative conceptions relating to the loading of flexibles.

Again, the introduction of this type of fused plug does much to reduce the "human-element" factor. When a fuse blows, it is usually the man of the house who rewires it according to the material available (which is usually of doubtful quality) and his very limited knowledge. With this type of plug he has no alternative but to replace with a new fused pin having characteristics exactly similar to those of the discarded fuse.

*Poplar, E.*14. ROBERT ILLINGWORTH,
Borough Electrical Engineer and General Manager.

Electrical Terminology

I AM very glad that Mr. Banner has drawn attention to the importance of avoiding obsolete terms and symbols. With regard to the latter, it would be very much easier to teach the correct symbols if all manufacturers adopted the B.S.I. recommendations; for instance, milliammeters are still being labelled MA, or Ma or even M/A.

The following are additional examples of obsolete symbols and terms still frequently used by teachers: Small ϕ instead of capital Φ for magnetic flux, Kva for kVA, "apparent power" for "volt-amperes," and "pressure" for "voltage." It would be interesting to know if anyone ever uses the term "mass resistivity." I have never seen it except in a City and Guilds examination question! In the Glossary, "conductivity" is not qualified by "volume," so why should "resistivity" not be interpreted in a similar way and the term "mass resistivity" deleted?

Mr. Banner's Table III does not agree with the B.S.I. recommendations. Thus, "crest" and "effective" are given by B.S.I. as alternative terms that may be used for "peak" and "R.M.S." respectively. "Virtual" is a term frequently used by teachers, but it does not appear in either the 1936 or the 1943 editions of the Glossary. Mr. Banner gives obsolete equivalents of "mean," but I can neither find any reference to these in the Glossary nor see any reason why they should be regarded as obsolete. Other terms listed by Mr. Banner as obsolete are not deprecated by the B.S.I.

Undoubtedly, the quickest method of getting the B.S.I. terms and symbols adopted generally is to persuade every teacher to use them and I would suggest that every technical institution should have copies of the publications listed by Mr. Banner. Possibly, the B.S.I. would be prepared to supply copies at a reduced rate to individual teachers.

Technical College, Brighton. EDWARD HUGHES.

Power Point Positions

IN a letter published in your issue of February 11th I suggested that power plugs should be located 30 in. above the carpet rather than a mere 4 in. In the following issue Mr. Alex. Milne said:—"Constructive criticism is always valuable, but personally I cannot regard the remarks of Mr. D. P. Wilson as such."

It was, therefore, refreshing to read in your issue of May 26th that Major Lloyd George, in his address to the E.A.W., stated that he could not understand why plug points could not be placed at a height and position which could be reached without stooping. I feel sure that this constructive criticism, uttered by the Minister of Fuel and Power before such an important gathering, will lead to easier work and maintenance in many post-war homes.

*London, S.W.*14. D. P. WILSON.

Rural Development

IT seems highly important that the belief you state, on page 763, June 2nd issue—that electricity will raise farming efficiency and increase production can be proved—shall be put beyond the stage of belief. How and by whom can this best be accomplished?

In continuation of his opening of the discussion on Post-War Planning at the I.E.E., Mr. Percy E. Rycroft has written me that his experience over a number of years is that many farms have been purchased at relatively low prices because electricity was not available, *i.e.*, if electricity had been available several hundreds of pounds more would have been paid. If this could be put

into definite figures, it would be easier to induce the occupiers to contribute towards the cost of bringing a supply to the farms.

You also ask: "Would the farmer meet the cost if he could be given a long-term loan at a low rate of interest?" And you refer to the loans for distribution systems and the wiring of farms and homes in U.S.A. by the Rural Electrification Administration. How can we induce the addition to the technical and financial returns annually collected of complete information concerning all farms, homes, etc., which are not yet connected?

The Agricultural Holdings Act, 1931, Scotland, provides compensation on termination of tenancy to an outgoing tenant who has paid for electric wiring in farm buildings, house and cottages. Why limit such compensation to Scotland? I have collected information on supplies to 160 farms (light and small power) and to 32 small-holdings all acting under Section 23, Electricity Act, 1909. But we need reliable, precise data.

Herne Bay. THEODORE STEVENS.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE first part of the King's Birthday Honours list published yesterday did not contain the names of any strictly "electrical" people, although some of them are, or have been, connected with the industry in one direction or another. It is hoped that the second part, to be published to-morrow, will include some members of the profession and industry. Yesterday's list contained the names of **Dr. H. S. Houldsworth,** Controller-General of the Ministry of Fuel and Power, and **Mr. E. J. Missenden,** general manager of the Southern Railway, upon whom knighthoods have been conferred. **Mr. J. Chuter Ede,** Parliamentary Secretary to the Board of Education, a former president of E.D.A. and former chairman of the London J.E.A., is made a Privy Counsellor. **Stella, Marchioness of Reading,** a former president of the Electrical Association for Women, and now chairman of the W.V.S., is made a Dame Grand Cross of the Order of the British Empire.

Mr. W. A. Wordley, the retiring president of the Bradford Engineering Society, was given a presentation at the Society's annual dinner on May 19th. The principal guest was **Mr. T. H. Carr,** electrical engineer and manager of the Bradford Electricity Department.

The Governing Council of the British Engineers' Association has appointed **Mr. J. W. Thomas,** B.Sc., LL.B., M.I.E.E., as secretary in succession to **Mr. H. E. Jones,** whose services will continue to be available to the Association.

Mr. Thomas, who is taking up his new duties this month, is well known in the electrical industry as a practising barrister, a former assistant general secretary of the Electrical Power Engineers' Association and editor of that Association's journal, and the author of many articles published in the *Electrical Review* and other technical journals. He received his education and training at the College of Technology and Victoria University, Manchester, and served a student apprenticeship with the Corporation Electricity Department in that city. Subsequently he held positions as junior engineer in the undertaking, engineer with the Metropolitan-Vickers Electrical Co. and lecturer at the Birmingham Technical College before becoming assistant general secretary of the E.P.E.A. Mr. Thomas has taken an active part in the affairs of the Institution of Electrical Engineers, having served as a member of the Council as well as being a former hon. secretary and past-chairman of the North-Western Centre.

We report on another page of this issue the establishment of a United Nations Standards Co-ordinating Committee with offices in London and New York. The London office will be in the experienced hands of **Mr. C. le Maistre,** who has retired from the position of chairman of the Executive Committee of the British Standards Institution.

Mr. C. le Maistre

Mr. le Maistre was born in Jersey in 1874 and was educated at the Brighton Technical College and the Central Technical College, South Kensington. After an apprenticeship at the Thames Iron Works he was engaged in consulting work and he joined the Engineering Standards Committee in 1902. Later the Committee became the British Engineering Standards Association and Mr. le Maistre was its director for twenty-five years until 1941 when he was appointed chairman of the Executive Committee of the British Standards Institution (a title which had supplanted the familiar B.E.S.A.—although many people still cling to the old initials), being succeeded as director by Mr. P. Good, C.B.E. Mr. le Maistre has also been general secretary of the International Electrotechnical Commission since its inception in 1906.

Mr. le Maistre is a member of the Institution of Electrical Engineers, an associate member of the Institution of Civil Engineers, a member of the American I.E.E. and an hon. member of the Royal Dutch Institution of Engineers. His work was recognised in 1920 by the award of the C.B.E. He is also a knight commander of the Swedish Order of Vasa (second class).

Mr. H. Payne, district representative of the South Wales Electric Power Co. for Pontypool, Blaenavon and Usk, has been elected president of the Rotary Club of Pontypool.

At a recent meeting of the executive directors of the Brush Electrical Engineering Co., Ltd., **Mr. Alan P. Good,** managing director, presented annuity bonds to five long-service employees.

The recipients were Messrs. S. Price, electrical test department (39 years); T. Unsworth, foreman, fabricating shop (43 years); W. Ashborn, general stores (37 years); E. A. Minton, foreman, transformer shop (47 years) and E. R. Watson, chief, electrical test department (52 years).

Sir Felix J. C. Pole has been appointed a director of the Power Securities Corporation, Ltd., to fill the vacancy caused by the death of Mr. William C. Lusk.

Mr. D. C. Brook has been appointed a director of Balfour, Beatty & Co., Ltd.

The following staff changes are announced by the British Thomson-Houston Co., Ltd.:—**Mr. W. J. Belsey,** after forty-two years' service with the company, has retired from the managership of the Marine Department at Rugby, but has been retained in a consulting capacity; **Mr. W. S. Steel** has been appointed manager. Owing to ill-health, **Mr. P. F. Lloyd** has relinquished the managership of the London Export Department, and has been succeeded by **Mr. J. N. MacDonald.** Mr. Lloyd will continue to assist Mr. MacDonald. **Mr. C. E. Webb** has become Birmingham manager in succession to the late **Mr. O. S. Nichols,** while **Mr. H. Hall** has been appointed manager for the Sheffield District. **Mr. G. W. Edgley** has succeeded **Mr. F. Penny** as manager at Leeds, the latter having recently retired after forty-three years' service.

Mr. L. Goodall, engineering assistant, is recommended by the Stoke-on-Trent Electricity Committee for the appointment of distribution engineer at a salary on the District Joint Board scale. The matter of the appointment of a technical assistant has been referred to the Staffing Sub-Committee, which has been asked to consider the qualifications of members of the staff for the position.

Mr. E. Stephenson

On May 30th a presentation from his fellow employees was made to **Mr. E. Stephenson** on his retirement after thirty-seven years' service with the Stepney electricity undertaking. Mr. Stephenson was for many years a prominent trade union official and well known throughout the electricity supply industry for the part which he played in negotiations and the settlement of disputes in the London area.

Mr. W. P. Lilwall, borough electrical engineer of Fleetwood, has been unanimously elected president of the Incorporated Municipal Electrical Association for 1944-45. The Council has placed on record its appreciation of the services rendered by **Mr. F. Newey** during his two-year presidency. **Alderman W. Walker** has been elected vice-president; he is the first local authority representative to occupy that position.

Alderman Sir Percival Bower and **Mr. F. Forrest** retired from the Council during the year and their places were taken by **Councillor F. Kenyon** (Oldham) and **Mr. J. Eccles** (Liverpool).

Mr. P. J. Robinson and **Mr. F. Forrest** have been elected honorary members of the Association.

Accrington Corporation General Purposes Committee is to consider a recommendation of the Electricity Committee to increase the salary of the borough electrical engineer, **Mr. A. Goward,** to £1,000.

Mr. F. V. Thompson, formerly secretary of Imperial Smelting Corporation, Ltd., has been appointed secretary of British Insulated Cables, Ltd., with **Mr. R. Macmillan** as chief accountant.

Mr. W. Sears and **Mr. C. G.** and **Mrs. Catherine Vaughan** have withdrawn their directorships of Claybury Electrical Supplies, Ltd., a new company the formation of which was announced in our issue of April 28th (page 611).

In referring to the advertisement of the position of deputy chief engineer at Manchester last week, we inadvertently gave the salary as £1,200. It should have been £1,400.

Obituary

Lieut. O. Kirby Johnson.—We learn with great regret from Mr. H. L. Kirby Johnson, of the Martindale Electric Co., Ltd., that his son, Lieut. Oliver Kirby Johnson, R.E., was killed in action in Italy on May 20th. Lieut. Kirby Johnson, who was only twenty-one years old, was educated at the King's School, Canterbury, and Corpus Christi College, Cambridge.

Mr. S. Farmer.—We regret to announce the sudden death on May 29th at the age of forty-one of Mr. Stephen (" Mick ") Farmer, Birmingham manager of Foster Transformers & Switchgear, Ltd., since 1932.

Dr. H. M. Berry.—The death occurred on June 3rd, at the age of sixty-five, of Dr. H. Martin Berry, a leading radiologist. At one period of his career he was carrying out radiology at eighteen hospitals.

Lieut.-Col. H. W. S. Outram, C.B.E., Director-General of Aeronautical Inspection, Ministry of Aircraft Production, who died on May 31st at the age of 56 was an associate member of the Institution of Electrical Engineers.

Mr. H. C. Felser.—The recent death is reported in the *Journal des Télécommunications* of Mr. H. C. Felser, for many years the inspector-general of the telegraph and telephone service in Holland.

Sir Colin Fraser.—The death occurred in Australia in March of Sir Colin Fraser, the prominent mining engineer and industrialist. He was connected with a number of Australian concerns, including the Electrolytic Zinc Co. and the Western N.S.W. Electric Power Co. of both of which he was chairman.

Mr. O. S. Nichols.—The colleagues of the late Mr. O. S. Nichols, M.C., manager of the Birmingham branch of the B.T.H. Co., collected a sum of £38, given in lieu of flowers, and sent it to the Electrical Industries Benevolent Association. This sets a good example and one which we are sure would have had the approval of the man in whose memory the money was contributed.

Will.—Mr. **James Rowan,** former general secretary of the Electrical Trades Union and member of T.U.C. General Council, left £3,882.

International Standards

Co-ordinating Committee Established

From a Correspondent

ELECTRICAL engineers have been internationally minded from the start of the industry. They were brought up on international units, and there has been a continuous exchange of views between those working in this field in the different countries. This international outlook is probably due to the excitement and sense of adventure created by the development of electricity; invention or discovery leading to wider and wider applications followed its use as a means of communication, which, from the very earliest time, was conceived as *overseas* communication. Against this background, the International Electrotechnical Commission was established for the purpose of developing international standards for the rating of electrical machinery.

Electrical engineers were also interested, in some measure, in the work of the International Standards Association which, in effect, was a federation of the national standards organisations in the different countries. It is fairly obvious that the work of the International Standards Association can hardly be resumed on a full international basis until several years have elapsed after the conclusion of the war.

It is therefore of significance that, as reported in the *Electrical Review* of May 26th, the national standards bodies of the United Nations have agreed to establish a United Nations Standards Co-ordinating Committee, as a temporary measure, to provide a centre for the immediate co-ordination of standards in the field of communications of all kinds, both transport and telecommunication, and the development of standards in connection with the transfer across borders of raw materials and partly or wholly finished articles. These standards will provide agreed methods of expressing and testing the properties of materials, appliances, symbols, terms and definitions and will include dimensional standardisation to secure interchangeability where the replacement of parts is an important consideration.

London and New York Offices

The United Nations Standards Co-ordinating Committee has set up offices in London and New York with the object of promoting the maximum possible co-ordination and unification of standards necessary for the war effort and the immediate post-war period. The promulgation of the standards will be the responsibility of the national standards organisations. Membership of the Committee will be open to representatives of the national standards organisations of the United Nations. Approval of the scheme has been received from the standards bodies of Australia, Canada, South Africa and the United States, and the London office has been opened at 19-21, Palace Street, S.W.1.

Mr. C. le Maistre, C.B.E., who has been general secretary of the International Electrotechnical Commission since its formation in 1906, having retired from the British Standards Institution, has agreed to place his unique international experience at the disposal of this United Nations Standards Co-ordinating Committee and will have charge of the London office. The Committee therefore starts off under the most favourable circumstances, and it may be anticipated that its operations will bring about a greater measure of co-ordination in the post-war international field, where there was formerly a tendency for international bodies to be created without sufficient reason.

Drying Foodstuffs

Determination of Moisture Content

AN accurate method of gauging the amount of water removed from fruits, vegetables and meats during dehydration has been described in *Science* by Messrs. G. Botuyoucos and H. A. Cardinell (Michigan Agricultural Experiment Station, East Lancing, U.S.A.). It is based on the fact that temperature falls during the evaporation of water. Thus at the beginning when the material contains its maximum water content, evaporation lowers its temperature far below that of the drying chamber; it then increases progressively as drying proceeds until finally both temperatures approach each other closely. At that stage the material will have reached a satisfactory degree of dryness.

Two thermometers are needed; the bulb of one of them is bare, simply hanging within the chamber, while the bulb of the other should be placed in one of the loaded drying trays and surrounded by some of the material to be dried, being kept in place by a small bag of cheesecloth. The bag should be held round the bulb by rubber bands, which tend to exert pressure continuously. The area and amount of material enclosed in the bag should be definite and constant, and related to the amount and thickness of the layers of material on the drying trays.

The thermometers used are of the electrical (liquid) resistor type and claimed to be 30,000 times more sensitive than the metallic variety. Their bulbs are made of glass, being 25 mm. long and 8 mm. in diameter, while they range from 2,500,000 ohms at 32 deg. F. to 25,000 ohms at 185 deg. F. The resistance values are indicated by a special Wheatstone bridge circuit outside the drying chamber, the connecting leads being ordinary " flex " and they may be of any length.

COMMERCE and INDUSTRY

Patent Evidence Sought. A.E.U. Plans.

I.M.E.A. Meeting

THE Council of the Incorporated Municipal Electrical Association decided at its meeting on June 1st that in view of possible transport difficulties the annual general meeting, which was to be held on June 22nd, should be postponed until a more suitable date. The annual report is being sent to members and a summary will appear in our next issue.

Second-hand Lighting Fittings

The Board of Trade draws attention to the fact that supplies of second-hand lighting fittings and re-covered lampshades are subject to the quota restrictions imposed by the Limitation of Supplies (Miscellaneous) (No. 22) Order, 1944 (S.R. & O. 1944, No. 60) on persons registered in Class 9b. Moreover, the re-covering of lampshades is considered to be a process of manufacture, and accordingly an authorised unregistered manufacturer must include the value of shades re-covered and supplied by him in his permitted total of £100 per month. An unregistered person who was not on December 1st, 1941, carrying on a business of supplying controlled goods of Class 9b manufactured by him may not supply shades re-covered by him.

A.E.U. Expansion

Since the beginning of the war the membership of the Amalgamated Engineering Union has grown from about 369,000 to 916,000, including over 141,000 women. The Union was a combination of ten separate engineering trade unions, the largest of which was the Amalgamated Society of Engineers, established in 1920. Preparations are being made for the celebration of the Union's silver jubilee next year and an endeavour is being made to raise the membership to a million. As a contribution to this negotiations are being made to take in nine other unions with a membership of 250,000.

Toolmakers' Library

A technical library has recently been established for the benefit of members by the Gauge and Tool Makers' Association at Standbrook House, Old Bond Street, London, W.1. The list of books now available on loan will be added to as circumstances and opportunity permit, while directories, works of reference, trade journals and other periodicals can also be consulted.

Cable Makers' Wages

It should have been made clear in the note under this heading in our last issue (p. 781) that the adjustment of base rates applied only to male pieceworkers.

Australian Refrigerator Service Order

In order to conserve manpower the Australian Minister of State for War Organisation has made the Refrigerator Service Order which provides for the licensing of refrigerator service men and prohibits anybody from working in this capacity without a licence. From the wording of the Order it seems that the licensing authorities to be established will see that no area is served by more men than necessary. Licences may be granted in respect of particular areas beyond which the holder must not operate.

Bristol Engineering Directory

A classified index of trades in Bristol and an alphabetical list of manufacturers and suppliers are among the many useful features of the 1944 edition of the Bristol Engineering Directory, a well-produced 84-page publication now available from the Bristol Engineering Manufacturers' Association, 104, Filton Avenue, Bristol, price 9d., post free.

New Cambridge Professorship

The Council of the Senate of Cambridge University recommends the establishment of a professorship of electrical engineering under the Faculty of Engineering and the acceptance of an offer of the Institution of Electrical Engineers to provide endowment for a period of years.

Help on Farms

A. Reyrolle & Co., Ltd., have announced that a week's leave of absence, in addition to the usual annual holiday, will be granted to those employees wishing to help farmers with the harvesting later in the year.

Patent Law Reform

Evidence is now being heard by the committee set up by the Board of Trade under the chairmanship of Mr. Kenneth Swan, K.C., to report whether, and if so what, changes are desirable in the Patents and Designs Acts and in Patent Office practice and Court procedure.

In the first stage the Committee will confine its attention to the questions of legal proceedings under the Acts, including the constitution of the appropriate tribunals, the provisions of the Acts for the prevention of abuse of monopoly rights and the possible reduction of cost and expedition of settlement of legal proceedings.

Representations or evidence should, for the time being, be confined to these matters. Those desiring to submit proposals and evidence should communicate with the joint secretaries to the Patents Committee, 1944, Patent Office, 25, Southampton Buildings, London, W.C.2.

Rolling Mill Lighting

An interesting example of virtually shadowless lighting has recently been carried out in a large rolling mill. The original installation consisted of 1,000-W gas-filled lamps in dispersive type reflectors suspended at truss level, 26 ft. 6 in., and these have been superseded by "Sieray" 80-W fluorescent tubes in reflector fittings. The aim was to install the new lighting without any substantial alteration to the cable runs.

The mill is permanently blacked-out and operates day and night almost continuously. Furthermore, as there are three travelling cranes extensively used on all shifts, new installation work would have seriously inter-

fered with production. It was therefore decided to install the fluorescent tubes in suitable reflector fittings mounted in rows of ten fittings on alternate roof trusses along the whole length of the mill. The existing cable system was extended to serve the additional lighting points without the necessity for work in the roof, this extension being carried out from the travelling cranes.

A total of 250 tubes was installed in this section of the mills, representing a saving of 9·5 kW and the effect is not dissimilar to that produced by good natural roof lighting with the additional advantage that it is not subject to change with the time of day or night. The way in which even the insides of rolls of sheet metal are illuminated is very striking. The illumina on intensity averages 6 ft.-candles throughout the mill.

Fluorescent lighting in a blacked-out rolling mill

Accessibility for maintenance offered some difficulty. It was therefore decided that every tube point should be connected through a socket and plug. It is now possible to isolate from a crane any particular tube quickly, until such time as a crane may be available to rectify any trouble or for replacement. The lighting lay-out was carried out by the mill's engineering department in conjunction with the Lighting Service Department of Siemens Electric Lamps & Supplies, Ltd. The installation work was carried out by Rashleigh Phipps & Co., Ltd.

Commercial Travellers

The half-yearly court of governors of the Commercial Travellers' Benevolent Institution will be held at the London offices, 4b, Frederick's Place, Old Jewry, London, E.C.2, on Saturday, June 24th.

Welding in Reinforced Concrete Structures

No. 8 of the Ministry of Works Post-war Building Studies (H.M. Stationery Office, price 6d.) deals with reinforced concrete structures. The committee responsible, which was convened by the Institute of Structural Engineers and had as its chairman Dr. Oscar Faber, points out that welding by gas or electricity has now reached such a stage of development that it should be permitted under suitable conditions and with suitable safeguards. No special precautions in regard to stress are needed, it is stated, for tack or positional welding (employed between rods crossing more or less at right angles so as to fix them in position), but for butt welding (between the ends of rods in line whereby stress is transferred across the section) it is recommended that this should only, at present, be allowed for mild steel. In the case of rods of mild steel which have their strength increased by cold working, butt welding may be permitted, but the stress at the weld should be limited to that appropriate to mild steel, and the additional strength obtained by cold working should be ignored at and near the weld. The committee also recommends that the passage of all pipes, ducts, etc., should, wherever possible, be indicated on plans available before final reinforced concrete details are prepared and actual construction commenced, so that provision for these could be made and wasteful cutting avoided.

Installation Agreement Claim

Judge Trevor Hunter at the Ilford County Court last week confirmed the judgment previously given by the Registrar in favour o the Ilford Corporation in a claim against Mr. R. Dalziel for 32s. which the Corporation contended was due under an installation hiring agreement. The case originally came before the Registrar, Mr. Adam Partington, in February, and in April he gave reserved judgment in favour of the Corporation (*Electrical Review*, April 28th). The defendant then applied for a re-hearing before the Judge.

His Honour, giving judgment, held that the wording on the metal plate was sufficient; the label was affixed to a conspicuous part of the fittings and apparatus and in his view the installation remained the property of the Ilford Corporation.

Society of Instrument Technology

A body with this title has been formed for those interested in the design, manufacture, use and maintenance of scientific instruments. Its objects are:—The advancement of instrument technology by the dissemination and co-ordination of information relating to the design, application and maintenance of instruments. The provision of opportunities for discussion, particularly between designers and manufacturers on the one side, and users on the other. The provision of opportunities for discussion and collaboration between the Society and other associations. The encouragement of technical education dealing with

instrument research, design, manufacture or use. Research into problems relating to instrument technology and standardisation of instruments and accessories. The determination of a commonly acceptable terminology and the enhancing of the status of those employed in the industry. The president is Sir G. P. Thomson, M.A., F.R.S. and the hon. secretary, Mr. L. B. Lambert, 55, Tudor Gardens, London, W.3.

Home Guard Rifle Competition

The results of the third annual competition organised by the Society of Miniature Rifle Clubs, and open to all Home Guard platoons in the country, were recently announced. The winning team is one composed entirely of employees of Everett, Edgcumbe & Co., Ltd., and is from the works platoon. The same platoon were runners-up in the competition last year, and this year, as winners, they have made a score of 982 out of a possible 1,000. As last year, the number of teams entered for the competition was over 2,500.

Electricity Supply Administrative Association

Since the inauguration of the Electricity Supply Administrative Association last year its constitution has undergone a change. Membership was confined originally to the Greater London area, but now the chief administrative assistant of any electricity supply undertaking in the country is eligible for membership. This decision has met with a remarkable response in the north-western area and a branch will be opened there shortly. Amongst the present membership of eighty-four some of the large provincial supply undertakings, including several companies, are prominent. Throughout the winter regular well-attended meetings were held in London and matters discussed included wartime trading, minimum charges, standardisation of accounts and costing, war damage claims and P.A.Y.E.

Prefocus Lamps

Publication is announced of a specification (B.S. 1164-1944) for prefocus lamp caps and holders. It sets out the principal dimensions of medium and large sizes of both components, together with details of appropriate gauges. The new document may be obtained from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. post free.

Fatalities

Two-pin Adaptor Fitted to Drill.—At an inquest at Lowton, Lancs, last week, on a man who was killed while using an electric hand drill, it was stated that he removed a three-pin plug and attached a two-pin lamp adaptor and that the unconnected earth wire was the cause of his death. A verdict of "Death from misadventure" was returned. The coroner said that "people should realise that the three-pin plug was a safety device and a two-pin adaptor should not be fitted in its place."

Perspiration Blamed.—A verdict of "Accidental death" was returned at an inquest on June 2nd on Harry Finch (28), who received a fatal electric shock while repairing a ram at the Lancashire Foundry coke ovens. Mr. W. French, foreman electrician, said that on inspection he found the levelling switch had been opened up for examination and repair, but there was no evidence that Finch had had a tool in his hand. The only explanation he could give was that the man perspired freely and his hands were moist when he touched the controller. He was satisfied that even without the intervention of a metal tool, the perspiration would be sufficient to cause a shock.

Soldier Killed by Electric Iron.—A verdict of "Death by Misadventure," was returned at an inquest held at Eastleigh, Hants, recently on Rifleman Oliver James Weightman, who received a fatal electric shock. It was stated that at the time of the accident he was pressing his uniform with an electric iron the element of which was poorly insulated. He was wearing hobnailed boots and was standing on a wet cement floor.

Houses Without Coal Fires

Stoke Newington Borough Council has asked its Housing Committee to consider the erection of a number of houses on the Hawkesley Road site with no provision for coal fires, thus making them an experimental type of all-electric house. It is thought that this innovation would be welcomed by many people.

Valve Equivalents

The Mullard Wireless Service Co., Ltd., Century House, Shaftesbury Avenue, W.C.2, has produced for the trade a second edition of its list of wartime equivalents for the replacement of the company's valves. Details are given of any necessary circuit adjustments.

Change of Address

Batwin Electric Motors, Ltd., have moved their offices to 302, Malden Road, New Malden, Surrey (telephone: Malden 3160; telegraphic address: Phasomota, New Malden). The works and stores remain at Rear 74, Church Road, Barnes, London, S.W.13.

Changes of Names

The Ensign Arc Welding Co., Ltd., has changed its name to the Ensign Arc Welding & Engineering Co., Ltd.

The Handy Battery Co., Ltd., has changed its name to the Flare Co., Ltd.

INFORMATION DEPARTMENT

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

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

MAXIVEE miniature tumbler switch.

NOSEPARKA vacuum cleaner.

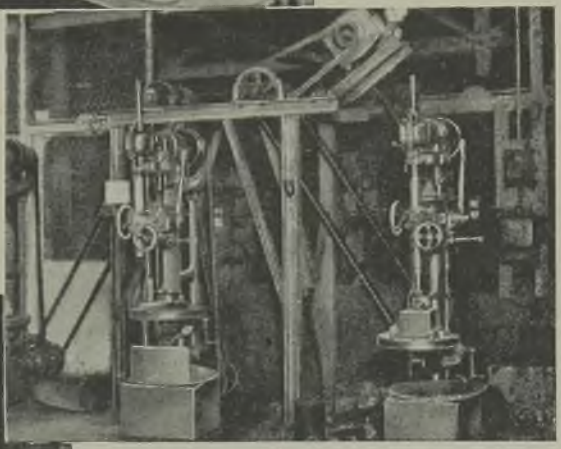
Making Farm Implements

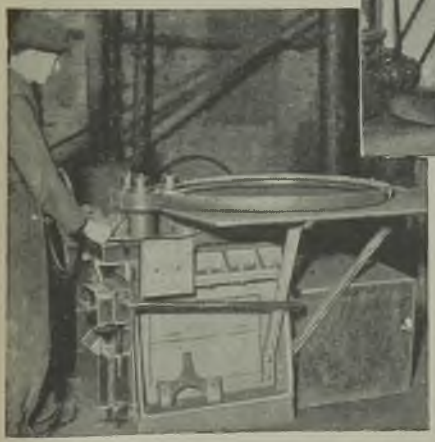
Advantages of All-Electric Drive Demonstrated

AT the agricultural machinery factory of W. N. Nicholson & Sons, Ltd., at Newark, where the plant has been completely electrified during the course of the past twelve years, an excellent opportunity is provided not only of seeing how the use of electric drives can speed up production, but also how the electric motors have been selected and installed to give the best and most economical results. With the up-to-date facilities now provided, the firm, which is a very old-established one, dating from 1825, is producing farm implements which at present include haymaking machinery, cultivators and fertiliser distributors, and plant for the processing of edible foodstuffs for man and beast.

With the 40-HP synchronous motor (above) the factory has averaged nearly unity power-factor over a period of twelve years

Although individual motors are found in a few cases, the fact that seldom, if ever, do the machines in any one group operate simultaneously at full load has encouraged the use of group drives with line shafts and belting. In some cases, as, for example, for a 5-HP, 945-RPM unit driving a group of three drilling machines, the motor has been mounted above the driven machinery and balanced in such a way that its weight is utilised to give correct tension on the "V" belts. These grouping arrangements, besides making it possible to have fewer and (as all the machines are not used at the same time) smaller motors installed, also help to achieve a reasonably good load factor.





Above: A 5-HP motor, driving three drilling machines, balanced so that its weight is utilised to give correct tension on the "V" belts. Left: Eleven reversals a minute are required for the motor driving this tyre-bending machine

Another instance of efforts made to secure maximum efficiency of operation is to be found in connection with the main machine shop

drive. Here a 40-HP synchronous motor has been installed to drive a line shaft, and this corrects the total factory load. The company is rightly proud of its performance since over a period of twelve years the factory power-factor has averaged 0·94 to 0·98. To obtain this very satisfactory result hardly any adjustments are made on the motor field regulator, despite the fact that the synchronous motor itself drives an intermittent load and that the load of the rest of the factory is also intermittent.

Two examples of the way in which the use of electricity has accelerated production are particularly interesting. They both concern the making of wheels. Equipped with a 4-HP, 930-RPM reversible squirrel-cage motor fitted with a special high-resistance rotor, a new tyre-bending machine enables no fewer than thirty-five metal tyres to be bent in forty minutes. When this machine is in operation under the worst conditions the motor reverses eleven times a minute. Similarly electric welding sets, of which seven sets are employed (Quasi-Arc and Holmes, mostly portable), have reduced to a fraction the time taken to assemble the wheels.

Electric welding saves much time in assembly work

Diverse Applications

Among the other apparatus for which electrical operation is employed are cupola blowers, mixers, grinders, compressors for presses, paint sprayers, wood working machinery and a coke mill. Altogether there are about thirty motors ranging from 1 to 40 HP, practically all manufactured by Lancashire Dynamo & Crypto, Ltd., the average load being about 160 kVA and the maximum load about 180 kVA. To facilitate maintenance and repairs an endeavour has been made to standardise on as few different sizes of motor as possible, units of 5 and 10 HP being the most popular. Generally on the larger machines Erskine Heap oil-immersed starters are employed, while English Electric and Erskine Heap air-break star-delta starters control the smaller units.

The metalclad switchboard serving the synchronous motor, drills, foundry, boiler house, lathes, rake and wood shops is of "Metrovick" construction while for the welding, paint shop, lighting, canteen, etc., there is a Foster heavy industrial switchboard with cartridge type fuses. The lighting, provided by Holophane units (all installed without flexible cables to reduce maintenance), is grouped for control purposes, most of the switches being located in the power house.

We should like to thank Mr. Clive Nicholson, managing director of the company, for permission to inspect the works, and also Mr. B. G. Boullen, Nottingham manager of Lancashire Dynamo & Crypto, Ltd., for providing some of the technical information concerning the plant.

E.C.A. and the National Register

IN the paper which he read recently before the Association of Supervising Electrical Engineers Mr. L. C. Penwill, director and secretary of the Electrical Contractors' Association, said that the 1,399 contractors on the National Register of Electrical Installation Contractors were largely members of his Association. He claimed that without their support the Register would cease to exist.

The position is treated more fully in the June *Electrical Contractor*. It is stated that the membership of the E.C.A. is about 1,480; of this number 750 (*i.e.* 51 per cent.) are on the Register and 730 are not. These 750 represent 56 per cent. of the total number of registered contractors, but it is claimed that they include the "vast majority of the largest electrical contractors in the United Kingdom" who supported the Register out of loyalty to the E.C.A. and because the Association regarded the voluntary system as a first step towards compulsory registration.

As regards the Electrical Contractors' Association of Scotland, it is pointed out that only about a hundred of a total membership of 350 (or 28 per cent.) are on the Register. Thus 46 per cent. of the combined membership of the two Associations are registered and together these represent 63 per cent. of the Register's strength.

At a meeting of the E.C.A. Council a member expressed the opinion that the National Register was now a stumbling block to compulsion.

Dust Precipitation

Electrostatic Plant at a South African Power Station

THE use of electrostatic precipitators for minimising emissions from power-house chimneys is dealt with in a paper submitted by Messrs. C. DAWSON and F. A. HANLON to the Natal Branch of the South African Institution of Certificated Engineers. They explain that the Congella generating station at Durban is conveniently situated for obtaining water for condensing purposes and is near to the load centre. When first built it was fairly remote from, but is now rapidly becoming centralised among, industrial as well as residential buildings.

The electrostatic precipitators have cost some 25 per cent. of the amount spent on the boiler, instruments and draught plant which they serve, and a considerable improvement is expected from the unit fired boilers being installed. The precipitators require DC at up to 80,000 V and probably more space than the other types, but they are highly efficient and do not cause any appreciable loss of boiler draught. If the percentage of ash in the coal used at Congella were reduced at the pit mouth from the present 15 or 16 to 5 or 6 per cent., the number of railway trucks saved for haulage purposes per annum would be about 500, and the railage saved £12,000.

Construction of Apparatus

Two of the boilers installed at Congella are pulverised coal fired with a normal rating of 100,000 lb. of steam per hr. The gases pass through an air heater and then directly to the precipitator, from which they are drawn by the induced draught fan and discharged to the chimney. Incidentally, the erosion of the fan, which is serious when it has to deal with a large percentage of ash from a pulverised coal-fired boiler, is practically eliminated by this arrangement. The precipitator is approximately 26 ft. by 21 ft. in plan, and contains 420 hexagonal tubes 12 ft. long, the whole assembly in appearance resembling a huge honeycomb. Down the centre of each tube a wire electrode is suspended from a frame of channels and angles which, in turn, are supported by large high-voltage insulators. On the lower ends of the electrodes are hung tension weights, in addition to which another grid is suspended by the corner electrodes of each section and so arranged as to form spacers for centralising the electrodes in the tubes.

It is necessary to vibrate the tubes and centre electrodes to remove the dust adhering to them, which is accomplished by the simple method of pivoted weights suspended from arms on a slowly rotating shaft, which causes the weights to be dropped once per revolution at selected positions, thus imparting a hammer blow sufficient to dislodge the dust, which then falls into receiving hoppers forming the bottom portion of the precipitator. From the hoppers the dust is led to a chamber in which it is wetted and sluiced out for pumping,

The mechanical rectifier is installed at Congella. On the control panel are mounted the usual breaker and instruments and an auto transformer with 22 tappings brought out to a switch whereby the input to the single-phase transformer can be varied from 300 to 600 V approximately. It is of the usual design with 100 to 1 ratio and a capacity of 40 kVA.

Safety Measures

To ensure safety in operation all high-voltage plant is screened and mechanical interlocks are provided to ensure the correct operation of links and the earthing of the apparatus before entrance may be obtained.

Combustion chambers cooled by water tubes are installed at Congella. The practical and economic fineness of grinding and high percentage of CO_2 permissible with such a boiler result in increased efficiency, but, at the same time, there is an increase in the percentage of unburnt carbon which escapes to the chimney, averaging about 20–30 per cent. of the ash passing through the boiler. The precipitator has, therefore, to deal with two substances which is an important factor in the actual operating efficiency of the extraction plant. The efficiency of a dust extractor is expressed as a simple proportion of the dust removed to total dust, and is guaranteed as a percentage. For the Congella precipitators the guarantee was 95·5 per cent. efficiency with 165,000 lb. of gas per hour at 270 to 300 deg. F., representing a boiler output of 100,000 lb. per hr.

The authors cite a typical example of an actual test indicating an efficiency of 97·6 per cent. and practically no discharge can be seen at the chimney top.

The life of the enclosed conveyors operating in the abrasive dust was very short and maintenance was excessive. They were, therefore, removed and gravity chutes substituted. Choking was overcome by re-positioning the sprays and sealing the outlet as well as was practically possible.

Far in excess of all other involuntary stoppages combined have been those occasioned by broken centre electrodes. Operation of the boiler without the precipitator is undesirable and is only permitted when no alternative is practicable. Steps have been taken to reduce these breakages.

ELECTRICITY SUPPLY

Bradford's £1,000,000 Plan.

Bradford.—POST-WAR PLAN.—A five-year post-war plan prepared by Mr. T. H. Carr, the city electrical engineer and manager, has been approved by the Bradford Corporation Electricity Committee. Estimated to cost £1,000,000, the scheme provides for the addition and replacement of switchgear and cables, a new mains department to replace an obsolete building, and the purchase of consumers' electrical apparatus and appliances to cover the requirements for post-war as well as existing houses and premises.

Dudley.—NEW SUBSTATION.—The Corporation has sold a site in Foxglove Road to the Midland Electric Corporation for Power Distribution, Ltd., for the erection of a transformer station.

Guildford.—LIGHTING IN SUMMER.—The town clerk reported to the Highways Committee that in view of the advantages of retaining a certain amount of street lighting from dusk to dawn during the summer, and the fact that its discontinuance would only result in a saving of the equivalent of about two tons of coal for the whole period, he had applied for permission to maintain such lighting. The Ministry of Fuel and Power stated that there was no objection to the maintenance of the reduced street lighting.

Hull.—REDUCING POWER STATION FUMES.—The Corporation Sanitary Committee has arranged for the medical officer of health to consult with the Electricity Committee regarding the proposed boiler plant extensions at the Sculcoates power station, in connection with a suggestion that the scheme should incorporate plant for lessening the emission of sulphur and other noxious fumes.

Ilford.—SUPPLY TO RESTAURANT.—The Parks Committee reports that Mr. Hartfield, who hires the pavilion in Valentines Park, proposes to install additional electrical equipment at the restaurant owing to staff shortage. This will necessitate an additional cable at an estimated cost of £100, and the Committee recommends that half the cost shall be paid by Mr. Hartfield.

Jarrow-on-Tyne.—SCHOOL LIGHTING.—The Education Committee has agreed to a modified scheme suggested by the Board of Education for installing electric lighting in the ground floor rooms at Croft Terrace School.

London. — HOUSE INSTALLATIONS. — Westminster City Council Housing Committee, which is requisitioning and improving 100 houses, proposes that some shall be all-electric, with others all-gas except for lighting.

Londonderry. — AMALGAMATION OPPOSED.—The Mayor, speaking at the annual meeting of the local Chamber of Commerce, stated that the Ulster Government was proposing to amalgamate all the electricity systems of Northern Ireland. It was decided to write to the Londonderry Corporation pledging support to any steps which would be taken to fight this proposal.

Tynemouth.—LOANS.—The Town Council is applying to the Electricity Commissioners for sanction to borrow £4,000 for mains and services, £2,000 for substation equipment and £1,500 for substation buildings.

Fume Suppression at Hull.

York.—MODEL KITCHEN.—At a meeting of the Housing Committee it was reported that the Estates Committee had given permission for the erection of a model kitchen in the Guildhall for six weeks and that the Electricity Committee had promised to give all possible assistance in the scheme.

SUPPLY TO FARM.—The Electricity Committee is seeking sanction to borrow £960 for supplying electricity to Low Gaterley Farm, Castle Howard.

Overseas

Argentina.—BUENOS AIRES SERVICES.—Electric power services throughout the province of Buenos Aires have been officially declared "public services" under the direct financial control of the provincial Minister of Public Works in accordance with the authorisation accorded by the National Government on May 30th.—*Reuter.*

Brazil.—MINISTER TO STUDY U.S. METHODS.—Sr. Apolonio Sales, the Brazilian Minister for Agriculture, has left by plane for the U.S.A. where he will study new agricultural methods, especially in the use of hydro-electric power. The Brazilian Government intends to adopt the methods employed in the exploitation of the Tennessee Valley for the development of the Rio Sao Francisco.—*Reuter's Trade Service.*

France. — ELECTRICITY FROM THE SEA. — It is reported that Granville, on the French Atlantic coast, has submitted to the French Ministry of National Economy a plan for the establishment of a power station which will be operated by the ebb and flow of the tide. The cost is estimated at between 20 and 30 million francs.

RURAL ELECTRIFICATION.—According to *La Vie Industrielle* France now occupies third place in Europe for rural electricity supplies. Out of 38,000 country districts only 1,100 are not electrified, it is stated.

TRANSPORT

Lancashire.—RAILWAY ELECTRIFICATION.—During recent discussions of post-war proposals affecting railways by the Technical Committee of the North and Mid-Lancashire Town Planning Advisory Authority, Accrington delegates have urged that electrification should be continued from Bury to Colne and *via* Blackburn to Preston.

Newcastle-on-Tyne. — NEW TROLLEY-BUS SERVICE.—The City Council's latest trolley-bus route from Whickham View along Elswick Road to Westgate Road and into Clayton Street, a distance of 2¼ miles, will be inaugurated on June 11th and will replace the trams at present operating on that route.

United States.—RADIO ON RAILWAYS.—The Baltimore and Ohio Railway is reported to be experimenting with the use of radio between stations and among staff on trains and yard operators.—*Reuter.*

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Siemens Bros. & Co., Ltd.—The directors' report for 1943 records a trading profit of £482,933, as compared with £460,168 for 1942. After providing for depreciation, etc., and adding £83,000 from taxation reserve not now required, there is a net profit of £314,452 (against £252,140). As already reported, the ordinary dividend is maintained at 7½ per cent., and a balance of £488,712 (against £413,010) is carried forward.

In his statement circulated with the report the chairman (Lord Queenborough) says that as in previous war years the company's efforts have been devoted to meeting Service requirements and the output has substantially increased. Special provision has been made for wartime depreciation of plant and machinery, and the war contingencies reserve still stands at £830,000. In view of the probable calls upon cash resources when the war ends the increased balance, after paying the same dividend, is carried forward.

Rheostatic Co., Ltd.—The report for 1943 shows a profit of £8,784 (as compared with £8,071 in 1942), after making provision for depreciation, managing director's remuneration, and taxation. With £4,055 brought forward there is £12,839 available from which preference dividends and an interim ordinary dividend of 4 per cent. have been paid, leaving £9,939. A sum of £3,000 has been transferred to general reserve and it is proposed to pay a final ordinary dividend of 8 per cent.; this will leave a balance to be carried forward of £4,139.

The chairman, Mr. L. Satchwell, in a statement circulated with the report and accounts, says that the company continues to be very fully engaged and its standard products are vital in the national interest, including fuel economy. The pension scheme which he mentioned last year has now been inaugurated and, judging by its reception, the employees welcome the security provided and the contribution towards the cost made by the company.

Enfield Rolling Mills, Ltd.—In the course of his statement presented at the annual meeting on June 2nd the Earl of Verulam (chairman) said that the apparent reduction in profits was due to the fact that one of the subsidiary companies had made substantial provision for income tax in its own accounts following the settlement of an operating contract with the Ministry of Supply.

So long as E.P.T. continued there could be no material alteration in the profit of the company. As it had such a poor "standard" it was impossible to make any large additions to liquid resources. The directors felt, however, that they were justified in recommending a dividend of 5 per cent.

Kerry's (Great Britain), Ltd. (formerly the East London Rubber Co., Ltd.) is again paying a dividend of 10 per cent. on the ordinary stock for the year ended February 28th last. The net profit was £127,577 (against £136,432). A sum of £90,500 (£95,000) has been transferred to taxation reserve and £6,000 (same) to staff pension scheme; there is this year no allocation to deferred repairs reserve (against £17,500). The balance carried forward is £42,714 as compared with £28,804 brought in.

Simms Motor Units, Ltd., reports profits amounting to £149,910 for 1943, as compared with £95,268 for the previous year. Taxes absorb £137,750 (£85,500), while preference dividends take £3,750. A first and final dividend of 10 per cent. is again to be paid on the ordinary capital, and £18,316 (£18,503) is carried forward. During the year £90,680 of the £100,000 debenture stock was converted into ordinary shares.

The Lightfoot Refrigeration Co., Ltd., last year made a gross profit of £98,882, as against £76,471 in 1942. After providing for depreciation, debenture service, etc., the net profit is £35,745 (£54,732). This reduces the debit carried forward from £62,162 to £26,417. The report states that negotiations are proceeding satisfactorily for the disposal of the company's ice and cold storage business in Calcutta.

Meters, Ltd., records a net profit, after providing for taxation, of £30,623 for the year ended March 31st last, as compared with £23,870 for the previous year. Reserve for taxation receives £10,000 (£15,000) and reserve for deferred repairs £5,000 (nil). A final dividend of 6 per cent. again makes 10 per cent. for the year and £10,558 (£8,539) is carried forward.

The Calcutta Electric Supply Corporation, Ltd., is paying a final dividend of 3 per cent., free of tax, again making 6 per cent., tax free, for the year. It is proposed to distribute among the more responsible members of the staff in India a sum which will not exceed the equivalent of 2 per cent. of the Indian net profit.

The Electrical Finance & Securities Co., Ltd., is to pay a final dividend of 6 per cent. (same) and a bonus of 3½ per cent. (2½ per cent.), making 13½ per cent. (12½ per cent.) for the year. The net profit is £68,184 as against £62,093.

Parkinson & Cowan, Ltd., announce a net profit of £52,324 for 1943 (against £48,423). In view, however, of post-war rehabilitation requirements, the directors have decided to again restrict the ordinary dividend to 5 per cent.

The British Columbia Power Corporation is paying a dividend of 40 cents. on the "A" no par value shares for the quarter to June 30th. In the corresponding quarter of last year the distribution was 50 cents.

The Bridgwater & District Electric Supply & Traction Co., Ltd., is again paying a dividend of 6 per cent. for the past year.

Ransomes & Rapier, Ltd., report a net profit of £25,187 for 1943 (against £26,008). The ordinary dividend is unchanged at 6 per cent., free of tax.

R. A. Lister & Co., Ltd., are maintaining their interim dividend at 5 per cent.

The National Electric Construction Co., Ltd., is paying a first and final dividend of 10 per cent.

The London Electric Wire Co. & Smiths, Ltd., announce the payment of a final dividend of 5½ per cent. for the past year, again making 7½ per cent. An interim dividend of 2 per cent. in respect of the current year has also been declared.

Johnson Matthey & Co., Ltd., have declared a final dividend of 7 per cent., maintaining the distribution for the past year at 10 per cent.

Walsall Conduits, Ltd., is maintaining the year's dividend at 55 per cent. with a final payment of 35 per cent.

Dictograph Telephones, Ltd., has declared an interim dividend of 4 per cent. (same).

New Companies

Palace Electrical Co., Ltd.—Private company. Registered May 25th. Capital, £1,000. Objects: To acquire the business of an electrical contractor, etc., carried on by Edward J. Camp at 231, St. George's Way, S.E.15, and 32, Chiltern Street, W.1, as the Palace Neon & Electrical Co., Ltd. The subscribers are C. F. Turner and A. W. Knott, both of 32, Chiltern Street, W.1. Directors: E. J. Camp, B. J. Piper and C. F. Turner. Secretary: A. W. Knott.

East Durham Electricals, Ltd.—Private company. Registered May 25th. Capital, £500. Objects: To carry on the business of electrical contractors, engineers, etc. Directors: J. Forster, Woodmans Cottage, Wingate, Co. Durham; W. Hornby, 460, Back New Road, Wingate; and T. Knox, 14, Middle Street, Blackhall, West Hartlepool. Registered office: Middle Street, Blackhall, West Hartlepool.

Shorts (Lifts), Ltd.—Private company. Registered May 25th. Capital, £10,000. Objects: To acquire the business of a lift manufacturer and engineer carried on by Reuben W. Short at Sentinel Works, Bradford, and to carry on the business of mechanical, electrical and general engineers, manufacturers of, and dealers in, elevators, hoists, and material handling and labour-saving plant, etc. J. R. Phillips, 3, Tarn Villas, Ilkley, Yorks, is the first director. Registered office: Lloyds Bank Chambers, Hustlergate, Bradford.

Companies' Returns

Increases of Capital

Langley Electrical Repairs, Ltd.—The nominal capital has been increased by the addition of £500 in £1 ordinary shares beyond the registered capital of £500.

Brown & Williams, Ltd.—The nominal capital has been increased by the addition of £2,000 in £1 ordinary shares, beyond the registered capital of £2,000.

Mortgages and Charges

Hilbert & Whitwam, Ltd.—Assignment on May 15th, of proceeds of contracts, to secure all moneys due or to become due from the company to Martins Bank, Ltd.

Celestion, Ltd.—Satisfaction in full on February 21st of charge dated August 2nd, 1939, and registered August 9th, 1939, securing £6,000.

Electrical & Refrigeration Services, Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated May 5th, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Companies Struck Off the Register

The following companies have been struck off the Register and have been dissolved: Corona Lamp Works, Ltd.; Douglas Electric Lighting Co., Ltd.; Electro Chemical Processes, Ltd.; Goldhawk Electric Co., Ltd.; Radio Components, Ltd.; and Terry's Wireless (1938), Ltd.

Liquidations

Princely Battery Co., Ltd., 99/103, Fonthill Road, N.4.—The first meetings of creditors and shareholders under the compulsory liquidation of this company were held on June 1st, at Bankruptcy Buildings, Carey Street, W.C. Mr. H. P. Naunton, Official Receiver, reported that the company was formed in April, 1941, to carry on business as manufacturers of, and dealers in, electrical batteries and accumulators. The issued capital was £95. The only director, Shri Paul Chandra Jaina, had carried on business as a merchant of electric batteries for some time before the formation of the company and the majority of his purchases had been made from the Victor Battery Co., Ltd. He had stated that he found difficulty in trading as an individual and formed this company. In September, 1943, Mr. Jaina purchased for £15,000 the undertaking of the Victor Battery Co., and it was arranged that that company should supply batteries at a special discount of 25 per cent. until the purchase debt had been satisfied. The failure of the company was attributed to the Victor Co.'s inability to carry out that arrangement. The liquidation was left in the hands of the Official Receiver.

Bankruptcies

Michael Skulnick, battery manufacturer, Wellesley Court, Maida Vale.—The first meeting of creditors was held on May 31st, at Bankruptcy Buildings, Carey Street, W.C. The debtor started business as Hydrolax Manufacturing Co. in 1938 and commenced to manufacture batteries in December, 1940, at Stanhope Street, N.W. He sold the business to a company in July, 1943, for £1,200, making a profit of £400. He attributes his failure to the adverse result of an action in which he had to pay the costs. The only proof of debt tendered was for £219 by the petitioning creditor and the debtor returned no assets. A resolution was passed for Mr. Percy Phillips, accountant, to act as trustee under the proceedings.

G. T. Miller, engineer, 4, Harewood Close, Northolt, Middlesex, lately carrying on business as radio dealer under the style of Odeon Radio at 335, Northolt Road, South Harrow, and 10, New Parade, Hayes, Middlesex.—Last day for receiving proofs June 17th. Trustee, Lord Latham, 185-188, High Holborn, London, W.C.1.

F. Taylor, electrical and general contractor, carrying on business at 4, Mercer Court and 46, Fenwick Street, Liverpool and residing at 46, Beverley Grove, Blackpool.—Receiving order made May 24th. Public examination July 25th at the Court House, Hunter Street, Liverpool.

STOCKS AND SHARES

TUESDAY EVENING.

CHAIRMEN at many companies' annual meetings are warning their fellow shareholders that vital war developments now at hand may have a temporary effect upon profits. This caution may be considered, perhaps, as being ultra-conservative; at any rate, it makes no difference to the strength of prices in the Stock Exchange markets. Industrial shares exhibit pronounced firmness, and there is no disposition discernible of anxiety, or nervousness. Investment looks well beyond the range of immediate prospects. Satisfied as to the final outcome of the invasion, people are content to take the longer view, and to employ money in Stock Exchange securities rather than allow it to lie idle during the period of suspense.

Home Railways

The Government is again being approached with proposals for revision of the agreement made between the Treasury and the railway companies soon after the outbreak of war. The effect upon prices has been beneficial. Southern Railway stocks are better; the London Passenger Transport prior-charge issues have improved. The expectation of the Government's consenting to re-open the question of the bargain, is illustrative of the optimism of those who are pressing for better terms to be given to the companies.

Callender's Cable

Callender's Cable & Construction Co. is repeating the distribution of dividend and bonus which was declared in respect of 1942. The year ends with December, and a final dividend of 10 per cent., plus a bonus of 5 per cent., making altogether 20 per cent., will be paid next month. The company's dividends were 20 per cent. in 1936 and in 1937. In the four following years the bonus was omitted and the dividend made 15 per cent. The bonus was restored last year. The price of the shares is $\frac{1}{16}$ better at $5\frac{3}{8}$, the highest reached for more than a decade. During the bad times of 1940 Callender's fell to 46s. 3d., the lowest touched for many years, from which there was a recovery to 78s. two years later. The issued capital of £1,923,916 is divided into preference and ordinary shares, the latter being £1,123,916 and the balance being divided equally between $6\frac{1}{2}$ per cent. preference and $7\frac{1}{2}$ per cent. " B " preference.

W. T. Henley's

W. T. Henley's Telegraph Works Co. is also paying dividend and bonus to make 20 per cent. for the year. This has come to be so usual that the 5 per cent. declared as bonus might well be included in the dividend announcement. In the Stock Exchange the description of a distribution as being a bonus is taken to hint at the possibility of its not being maintained. Henley's are likely to go on paying at least 20 per cent. for years to come, and the respect in which the investment is held can be judged by the modesty of the yield, £3 15s. per cent., which the shares afford at the present price of 26s. 9d. The sum of £50,000 is set aside for war contingencies, and provision is made for special depreciation and obsolescence.

Electrical Finance & Securities

For years past the Electrical Finance & Securities Co. has paid an annual dividend on its ordinary shares of $12\frac{1}{2}$ per cent. This has now been raised to $13\frac{1}{2}$ per cent. and the price of the shares rose 1s. to 56s. on the announcement. The company (through subsidiaries) supplies electricity to various districts of the United Kingdom, including Colne Valley, Northwood Electric Light, Lothians Electric Power and Boston & District Electric Supply. It has an authorised and issued share capital of £525,000, of which £375,000 is in ordinary shares of £1 each, the balance being in 7 per cent. cumulative preferences. There is also a debenture issue. Several issues of ordinary shares have been made to ordinary shareholders, the last, at 30s., in November, 1938.

Radio Shares

Electric & Musical 10s. shares stand out as a feature of strength with a rise of 3s. to 34s. E. K. Cole are 2s. up at 32s. 6d. Cossors touched 26s. before reverting to their previous level of 25s. 6d. Pye deferred have a modest rise of 3d., to 28s. The return of summer weather and the preparations for the " Second Front," with the distractions which result from these, are said to have caused a marked falling off in attendances at cinemas. Personal experience—for what that may be worth—does not confirm this. The jump in the price of E.M.I. shares came as a surprise, and the reason for the buying which caused it was awaited with lively interest.

Further Rises

Following upon the rises scored last week in the equipment and manufacturing section, Telegraph Construction & Maintenance shares are a florin higher at 55s. Hopes are entertained of a possible increase in the 10 per cent. dividend. General Electrics advanced $\frac{1}{16}$ to 95s. for a similar reason, though conservatism suggests that the dividend due next month will again be $17\frac{1}{2}$ per cent. It is thought that the new chairman will bow to the often-expressed wish that the dividend might be declared, and paid, half yearly, instead of once a year as at present. Automatic Telephones at 66s. have shed 1s. of their recent gain. Walsall Conduits are 1s. up, the dividend of

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ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend Previous	Dividend Last	Middle Price June 6	Rise or Fall	Yield £ s. d.
Home Electricity Companies					
Bournemouth and Poole	12½	12½	60/6	..	4 2 8
British Power and Light	7	7	33/-	..	4 4 10
City of London	7	5½	28/-	..	3 18 7
Clyde Valley	8	8	41/6	..	3 17 0
County of London	8	8	41/-	..	3 18 0
Edmundsons:					
7% Pref.	7	7	34/6	..	4 1 4
Ord.	6	6	29/-xd	+4d.	4 2 9
Elec.Dis.Yorkshire	9	9	45/6	..	3 19 6
Elec. Fin. and Securities	12½	13½	56/-	+1/-	4 16 5
Elec. Supply Corporation	10	10	46/6	..	4 6 0
Isle of Thanet	Nil	Nil	18/-	..	—
Lancs. Light and Power	7½	7½	36/-	..	4 3 4
Llanelly Elec.	6	6	26/-	..	4 12 4
Lond.Assoc.Electric	3	4	23/6	..	3 8 1
London Electric	6	6	28/-	..	4 5 9
LondonPowerRed. Deb.	5	5	104½	..	4 14 7
Metropolitan E.S.	8	8	40/-	..	4 0 0
Midland Counties	8	8	40/6	..	3 19 0
Mid. Elec. Power	9	9	44/-	..	4 1 9
Newcastle Elec...	7	7	30/6	..	4 12 0
North Eastern Elec.:					
Ordinary	7	7	33/6	..	4 3 7
7% Pref.	7	7	35/-	..	4 0 0
Northampton	10	10	48/-	..	4 3 4
Notting Hill 6% Pref. (£10)	6	Nil	11	..	—
Northmet Power:					
Ordinary	7	7	39/-	..	3 11 9
6% Pref.	6	6	30/6	..	3 18 8
Richmond Elec.	6	6	25/6	..	4 14 1
Scottish Power	8	8	40/-	..	4 0 0
Southern Areas	5	5	23/-	..	4 7 0
South London	7	7	28/-	..	5 0 0
West Devon	5	5	23/6	..	4 5 1
West Glos.	4½	3½	24/6	..	2 17 4
Yorkshire Elec...	8	8	43/-	..	3 14 5
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	7/6	+9d.	—
Calcutta Elec.	6*	6*	38/-	..	3 3 2
Cawnpore Elec...	10	10	35/-	..	5 14 3
East African Power	7	7	33/-	..	4 4 10
Jerusalem Elec...	7	5	28/6	..	3 10 2
Kalgoorlie (10/-)	5	5	10/-	..	5 0 0
Madras Elec.	4*	Nil	23/-	..	—
Montreal Power	1½	1½	23½	--½	6 7 8
PalestineElec."A"	4*	5*	41/-	..	2 8 9
Perak Hydro-elec.	6	7	10/-	..	—
ShawiniganPower	83cts.	90cts.	15½	..	—
Tokyo Elec. 6%	6	6	15	..	—
VictoriaFallsPower	15	15	4½	..	3 12 7
WhitehallInv.Pref.	—	6	24/-	..	5 0 0

Company	Dividend Previous	Dividend Last	Middle Price June 6	Rise or Fall	Yield £ s. d.
Public Boards					
Central Electricity:					
1955–60 (Civil Defence)	3	3	100	..	3 0 0
1955–75	5	5	115	..	4 7 0
1951–73	4½	4½	107xd	+1¼	4 4 1
1963–93	3½	3½	103½	..	3 7 8
1974–94	3½	3½	100	..	3 5 0
London Elec.Trans. Ltd.	2½	2½	97	..	2 11 3
London & Home Counties1955–75	4½	4½	113	..	3 19 8
Lond.Pass.Trans.:					
A	4½	4½	121½xd	..	3 14 1
B	5	5	121½xd	+1	4 2 4
C	3	3½	72	..	4 10 3
WestMidlandsJ.E.A. 1948–68	5	5	108½	..	4 12 4
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	120½	..	4 19 7
Def.	1½	1½	31	..	4 16 9
Anglo-Portuguese	8	8	26/-	..	6 3 1
Cable & Wireless:					
5½ Pref.	5½	5½	114	+½	4 16 6
Ord.	4	4	83	+½	4 16 7
CanadianMarconi$1	Nil	4cts.	9/3	..	—
Globe Tel. & Tel.:					
Ord.	8½*	5*	39/6	..	2 10 8
Pref.	6	6	30/-	..	4 0 0
GreatNorthernTel. (£10)	Nil	Nil	21½	..	—
Inter. Tel. & Tel.	Nil	Nil	16	..	—
Marconi-Marine	7½	7½	33/6	-6d.	4 9 7
Oriental Tel. Ord.	16	10	46/6	..	—
Telephone Props.	6	Nil	17/-	..	—
Tele.Rentals (5/-)	10	10	12/-	..	4 3 4
Traction and Transport					
Anglo-Arg.Trans.:					
First Pref. (£5)	Nil	Nil	2/6	..	—
4% Inc.	Nil	Nil	6	..	—
Brit.Elec.Traction:					
Def. Ord.	45	45	1205	+20	3 14 8
Pref. Ord.	8	8	175	..	4 11 5
Bristol Trams	10	10	56/6	..	3 10 10
Brazil Traction	$1	$1⅛	27½	+1	6 7 3
Calcutta Trams	5½	6½	40/6	+1/-	3 4 3
Cape Elec. Trams	5	6	26/-	..	4 12 4
Lancs. Transport	10	10	45/6	..	4 8 0
Mexican Light:					
1st Bonds	5	5	103½	..	4 16 7
Rio 5% Bonds	5	5	105½	..	4 14 9
Southern Rly.:					
5% Prefd.	5	5	80	+1	6 5 0
5% Pref.	5	5	113½	+1	4 4 3
T. Tilling	10	10	59/6	..	3 7 3
West Riding	10	10	44/6	..	4 10 0

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price June 6	Rise or Fall	Yield p.c.
Equipment and Manufacturing					
			£ s. d.		
Aron.Elec.Ord. ..	10	15	60/–	..	5 0 0
Assoc. Elec. :					
Ord.	10	10	54/–	+1/	3 14 3
Pref.	8	8	39/6	..	4 1 0
AutomaticTel.&Tel.	12½	12½	66/–	–1/–	3 15 9
Babcock & Wilcox	11	11	50/6	..	4 7 3
British Aluminium	10	10	47/6	..	4 4 1
British Insul.Ord.	20	20	5½	+⅛	3 12 9
British Thermostat (5/–)	18½	18½	21/–	..	4 8 1
British Vac. Cleaner (5/–)	15	30	30/–	..	5 0 0
Brush Ord. (5/–)	8	9	9/–	..	5 0 0
Burco (5/–) ..	15	17½	16/–	+6d.	5 9 5
Callender's ..	15	20	5⅜	+⅛	3 14 8
ChlorideElec.Storage	15	15	82/6	..	3 12 10
Cole, E. K. (5/–)	10	15	32/6	+2/–	2 6 2
ConsolidatedSignal	24	27½	6½	..	4 4 6
Cossor, A. C. (5/–)	7½*	10*	25/6	..	1 19 6
Crabtree (10/–) ..	17½	17½	38/9	+9d.	4 10 1
Crompton Parkinson Ord. (5/–) ..	20	22½	30/6	..	3 14 9
E.M.I. (10/–) ..	6	8	34/–	+3/–	2 7 1
Elec. Construction	10	12½	52/–	..	4 16 2
Enfield Cable Ord.	12½	12½	56/6	..	4 8 6
English Electric	10	10	52/–	+6d.	3 17 0
EnsignLamps (5/–)	25	15	21/3	..	3 10 8
Ericsson Tel. (5/–)	22*	20*	56/3	..	1 15 7
Ever Ready (5/–)	40	40	43/3	+6d.	4 12 7
Falk Stadelmann	7½	7½	33/6	..	4 9 7
Ferranti Pref. ..	7	7	30/–	..	4 13 4
G.E.C. :					
Pref.	6½	6½	34/–xd	+6d.	3 16 6
Ord.	17½	17½	95/–	+⅛	3 13 9
General Cable (5/–)	15	15	15/–	..	5 0 0
Greenwood&Batley	15	15	43/3	+9d.	6 18 10
HallTelephone(10/–)	12½	12½	28/6	..	4 7 9
Henley's (5/–) ..	20	20	26/9	..	3 14 9
4½% Pref. ..	4½	4½	24/–	..	3 15 0
Hopkinsons ..	15	17½	65/–xd	..	5 7 8
India Rubber Pref.	5½	5½	23/6	..	4 13 9
Intl. Combustion	30	30	6¾	..	4 12 4
Johnson & Phillips	15	15	74/–	..	4 1 1
LancashireDynamo	22½	22½	97/–	..	4 12 9
Laurence,Scott(5/–)	12½	12½	13/–	..	4 16 2
London Elec. Wire	7½	7½	39/–	..	3 17 0
Mather & Platt ..	10	10	52/6	+6d.	3 16 4
Metal Industries(B)	5	8	48/6	..	3 6 1
Met.Elec.CablePref.	5½	5½	21/3	..	5 3 6
Murex	20	20	105/9	..	3 15 6
Pye Deferred (5/–)	25	25	28/–	+3d.	4 9 3
Revo (10/–) ..	17½	17½	42/6	..	4 2 4
Reyrolle ..	12½	12½	70/6	..	3 11 5
Siemens Ord. ..	7½	7½	33/–xd	+3d.	4 11 0
Strand Elec. (5/–)	7½	10	7/9	..	6 9 0
Switchgear & Cowans (5/–) ..	20	20	18/6	..	5 8 1
T.C.C. (10/–) ..	5	7½	22/6	..	3 6 8
T.C. & M. ..	10	10	55/–	+2/–	3 12 0
TelephoneMfg.(5/–)	9	9	11/9	+3d.	3 16 8
Thorn Elec. (5/–)	20	20	25/–	..	4 0 0
Tube Investments	20	20	97/–	..	4 2 4
Vactric (5/–) ..	Nil	Nil	14/6	..	—
Veritys (5/–) ..	7½	7½	7/9	+3d.	4 16 9
WalsallConduits(4/–)	55	55	49/6	+1/–	4 8 7
Ward & Goldstone (5/–)	20	20	27/3	+6d.	3 13 6
WestinghouseBrake	12½	14	75/–	..	3 14 9
West, Allen (5/–)	7⅛	7⅛	7/3	..	5 3 5

* Dividends are paid free of Income Tax.

Stocks and Shares (*Continued from page* 825)

35 per cent. again making 55 per cent. for the year. Ward & Goldstone at 27s. 3d. are 6d. better. Rises of 3d. to 1s. are general in this section. British Electric Traction deferred has once more topped £1,200. At to-day's middle price, the yield is barely 3¾ per cent. on the money. Thomas Tillings change hands frequently at 60s. A spurt of a dollar lifted Brazilian Tractions to 27½. Both classes of Cable & Wireless stock benefited to the extent of 10s. from the genial influence of investment buying. Marconi Marines reacted to 33s. 6d. Globe Telegraph & Trust ordinary and preference hold their prices firmly at 39s. 6d. and 30s. respectively.

War Work and Profits

It is an everyday experience to find industrial companies reporting increased turnover —sometimes considerable—accompanied by lower net profits. Taxation is sometimes the reason, but it can also happen that a company's normal business is temporarily suspended, or curtailed, through a change-over to war work. In such a case, the profit provided by the Government is generally less than the company would earn in normal circumstances. Therefore, expansion of turnover by no means implies an increase of profits, although it may be noted that dividend distributions are, as a rule, maintained.

Reserves for Obsolescence

Obsolence is a matter of serious concern at the present time to the directors of many industrial companies, especially those, of course, which are concerned with heavy machinery. Appeal has been made to the Government for consideration in such cases as those where obsolescence will be an inevitable consequence of war operations. To what extent relief, if any, will be afforded is a matter that, so far, cannot be estimated. The need for building-up reserves to meet obsolescence is an important factor in governing the policy of distribution of profits, and shaping dividend policy. Where companies are abundantly supplied with liquid reserves and assets, the matter is one which causes little anxiety to directors. The capitalist—large or small—of to-day will make careful inquiry into the financial position of companies in whose shares he contemplates placing his money for permanent investment.

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.

W. G. ALLEN & SONS (TIPTON), LTD., and A. Weddell.—" Electric air heaters and diffusers for ceiling use." 17795. December 15th, 1942. (561386.)

C. M. C. Armstrong.—" Boiler feed and like regulators." 16093. November 13th, 1942. (561404.)

G. Arrowsmith and Hick, Hargreaves & Co., Ltd.—" De-aerators for boiler feed water or water for other plant." Cognate applications 11300/42 and 14777/42. August 12th, 1942. (561366.)

Automatic Telephone & Electric Co., Ltd., C. Gillings and P. E. A. Cowley.—" Telecommunication systems." 16128. November 14th, 1942. (561405.)

British Thomson-Houston Co., Ltd.—" Cooling means for laminated cored inductive electrical apparatus." 17529/42. December 12th, 1941. (561384.) " Electric meters." 1054/43. January 23rd, 1942. (561421.)

British Thomson-Houston Co., Ltd. (General Electric Co.). — " Magneto-electric machines." 12095. August 27th, 1942. (561367.)

British Thomson-Houston Co., Ltd., and T. W. Wilcox.—" Contacts for electric circuit-breakers." 11239. August 11th, 1942. (561394.)

Chloride Electrical Storage Co., Ltd. (C. D. Galloway).—" Electric accumulators." 1314. January 26th, 1943. (561442.)

English Electric Co., Ltd., R. W. Humm and A. Plowman.—" Electric hot-plate." 16380. November 19th, 1942. (561481.) " Electric hot-plate and heat responsive switch therefor." 21114/43. November 19th, 1942. Divided out of 561481. (561488.)

G. S. Farlam, R. A. Bourne and L. B. Burgess.—" Resistance for the control of electrical machinery." 16225. November 17th, 1942. (561476.)

Foster Transformers & Switchgear, Ltd., and R. G. Lowe.—" Contacts for electrical switches, fuses, fuse switches, cut-outs, circuit-breakers and the like." 16183. November 16th, 1942. (561406.)

C. O. Griffith.—" Turbines." 18242. December 23rd, 1942. (561435.)

W. T. Henley's Telegraph Works Co., Ltd., H. W. Breeze and W. L. Dalton.—" Electric fuse devices." Cognate applications. 16492/42 and 2843/43. November 21st, 1942. (561484.)

R. E. Jennings and Foster Transformers & Switchgear, Ltd. — " Electrical regulating apparatus." 15367. November 2nd, 1942. (561467.)

T. B. Jones.—" Electrically heated pads." 18547. December 30th, 1942. (561436.)

Marconi's Wireless Telegraph Co., Ltd.—" Machines for making lock seamed sleeves." 12902/42. December 14th, 1940. (561397.)

" Electric frequency changing systems such as are employed in superheterodyne radio receivers." 6702/42. May 17th, 1941. (561459.)

Marconi's Wireless Telegraph Co., Ltd. (T. L. Gottier).—" Frequency modulation systems." 15379/41. December 21st, 1943. Convention date not granted. (561331.)

Marconi's Wireless Telegraph Co., Ltd. (Radio Corporation of America).—" Apparatus for viewing television images." 15906. November 11th, 1942. (561347.)

Revo Electric Co., Ltd., and F. H. Reeves.—" Electric lighting fittings." 16358. November 19th, 1942. (561355.) " Fluorescent tubular discharge lamp fittings." 15443. November 3rd, 1942. (561469.) " Fluorescent tubular discharge lamp fittings." Cognate applications 15444/42 and 8202/43. November 3rd, 1942. (561470.)

G. F. Shotter.—" Electrical contact means." 15433. November 2nd, 1942. (561468.)

Siemens Bros. & Co., Ltd., A. Rosen and G. W. Arcus.—" Stabilisation of a direct current voltage." 18568. December 31st, 1942. (561389.)

Standard Oil Development Co.—" Electrical apparatus for the detection and indication of gases." 1450/43. November 19th, 1941. (561444.)

Standard Telephones & Cables, Ltd.—" Telephone systems." 7983/43. April 23rd, 1941. (561364.)

Standard Telephones & Cables, Ltd. (Western Electric Co., Inc.).—" Gain regulating circuits for signal transmission systems." 16077. November 13th, 1942. (561382.)

A. H. Stevens (Electronic Laboratories, Inc.).—" Electrical systems for converting direct current into alternating current." 6875. May 20th, 1942. (561332.)

Western Electric Co., Ltd.—" Heat-treating apparatus." 126/43. January 10th, 1942. (561408.)

H. Ziebolz.—" Electric relay systems for the automatic control of variable conditions." 16484/42. December 30th, 1941. (561434.)

TRADE MARK APPLICATIONS

THE following applications have been received for British trade marks. Objections may be received within a month from May 31st.

ALCHO-RE. No. 627,967, Class 1. Fluxes for soldering and brazing. Fry's Metal Foundries, Ltd., Tandem Works, Christchurch Road, Merton Abbey, London, S.W.19.

SKY-LINE. No. 624,096, Class 9. Cases for electric pocket lamps; electric batteries, flat irons, apparatus (not included in other classes) for domestic and household purposes, etc. Also No. 624,098, Class 11. Electric domestic and household apparatus for lighting, cooking and refrigerating; ventilators, electric lamps, lamps for cycles, torches. Platers & Stampers, Ltd., Colne Road, Burnley, Lancs.

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.

Dundee.—June 14th. Electricity Department. Cables. (See this issue.)

June 19th. Corporation Emergency Committee. Inspection lamps complete with cables. Particulars from the A.R.P. Equipment Officer, Friarfield House, Barrack Street.

Dunfermline.—June 19th. Town Council. Various works, including electrical, at 20 additional houses at Brucefield Housing Scheme. Schedules, etc., from C. R. Douglas & Son, 15, East Port.

Manchester.—Electricity Department. June 23rd. 33-kV and auxiliary pilot and telephone cables. (See this issue.)

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

Orders Placed

Hull.—Electricity Committee. Accepted. Reactors for power station (£7,800).—Metropolitan-Vickers. Telephones Committee. Accepted. Insulators (£300).—Bullers.

Manchester.—Health Committee. Accepted. Refrigerators for three wards at Baguley sanatorium.—British Automatic Refrigerators. Town Hall Committee. Accepted. Loudspeaker equipment.—G.E.C. Electricity Committee. Accepted 33-kV feeder protection gear.—A. Reyrolle & Co. AC motors.—Laurence, Scott & Electromotors; Electric Construction Co; B.T.H. Meters. — Ferranti; Metropolitan-Vickers. Kettles.—Premier Electric Heaters. Cable for period ending June 30th, 1945.—Scottish Cables; Britannic Electric Cable & Construction Co.; Lancashire Cables; Aberdare Cables; Connollys (Blackley); W. T. Glover & Co.; Standard Telephones & Cables; Mersey Cable Works; L. Andrew & Co.; Duratube & Wire; and Aeralite. House-service cut-outs (twelve months' requirements).—Parmiter, Hope & Sugden; Siemens Electric Lamps & Supplies.

York.—Electricity Committee. Recommended. Secondary air equipment for boiler (£2,160).—John Thompson Water Tube Boilers.

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.

Angus.—Four-roomed houses; county architect, Forfar.

Argyll.—Conversion of building into maternity hospital; Mid Argyll Medical Officer, County Council, Lochgilphead.

Backworth (Northumberland).—Miners' canteen; R. Burke, Singleton House, Newcastle-on-Tyne.

Bingley.—Youth centre and canteen for Youth Council; Rev. R. H. Place, Holy Trinity Vicarage, Bingley.

Birmingham.—Water filtration works; city engineer.

Brighouse.—Alterations and additions to works, River Street; J. Blakeborough & Sons, Ltd., Woodhouse Works.

Castleton.—Extensions; Dunlop Cotton Mills, Ltd.

Dunfermline.—Extension to maternity hospital (£10,000); burgh surveyor.

Enfield.—Factory additions for Cosmos Manufacturing Co., Millmarsh Lane; J. Stanley Beard & Bennett.

Factory additions, Southbury Road; F. C. Dean.

Extensions, Strayfield Works, Strayfield Road; E. W. Palmer.

Council offices, Fir Tree House site (£6,000); U.D.C. surveyor.

Glasgow.—Switch house and transformer house, Craighall Road; Brownlee & Co., Ltd.

Additions, Lennox Castle Emergency Hospital (£1,500); city engineer.

Milk depot, Possil Road; Scottish Farmers Dairy Co., Ltd.

Reconstruction, 274-280 Shields Road; J. Milligan.

Rebuilding, 8-12, Stockwell Street; Soho Trust, Ltd.

Tenements, Barrowfield; housing director.

Guildford.—Works reconstruction, Walnut Tree Close; Billing & Sons. Ltd.

Halifax.—Houses, Ovenden and Siddal; D. T. Lloyd Jones, borough surveyor, Town Hall, Halifax.

Hebburn-on-Tyne.—Canteen, St. Aloysius School; J. Dibble, surveyor, U.D.C. offices, Hebburn.

Hereford. — Works additions, Nicholson & Scriven, architects.

Hyde.—Additions, Garden Street, for Newton Mill, Ltd., cotton spinners.

Ilford.—Works additions, Roden Street; Ilford, Ltd.

Houses, Chadville Gardens and Beech Grove; Holland Bros.

Laboratory for Howard & Sons, Ltd.; Hammond & Miles, Ltd.

Church school and hall, Vista Drive; Canon Palmer.

Isle of Ely.—Extensions, Sessions House; county architect.

Jarrow.—Three temporary shops at Simonside (£1,048); borough engineer.

Dining hall, Valley View School; J. S. Weir, borough engineer, Town Hall.

Lanarkshire.—Canteen (£1,000), Castlehill Colliery, Carluke; manager.

London.—WESTMINSTER.—Repairs to Training College, Horseferry Road (£1,037); city engineer.

DEPTFORD.—Canteen, Shere Road; J. Stone & Co., Ltd.

Macclesfield.—Parish hall; Rev. A. Clarke, Christ Church Vicarage, Macclesfield.

Manchester.—Workshop; Ladybarn Timber Co., 188, Ladybarn Road, Fallowfield.

Mansfield.—Office extensions, Union Street; Stokes Castings, Ltd.

March.—Houses, Wisbech Road; F. J. Martin & Son.

Middlesbrough.—Kitchens at eleven schools; borough education architect.

Newton Heath.—Works additions; G. Grenfield Baines, architect, 12-24, Guildhall Street, Preston.

North Riding.—School dining centre, Ampleforth; J. R. White, county architect, County Hall, Northallerton.

North Shields.—Factory, Chirton; Clay & Co., Nottingham.

Northumberland.—School kitchens: Allenheads School, N. Glendinning, builder, Allendale; Glanton School, Johnson Bros., builders, Glanton; Shankhouse School, Cramlington Co-operative Society, builders, Cramlington.

Preston.—Additional nurses' home for Sharoe Green Hospital; J. Foster, borough surveyor, Town Hall.

Rawtenstall.—Canteen extension, Rossendale Works, Waterfoot; Lambert, Howarth & Sons, Ltd.

Canteen, Booth Road, Waterfoot; Sir H. W. Trickett, Ltd.

Canteen, Hall Car Mill; Greenbridge, Ltd.

Smethwick.—Alterations, North Works, Halfords Lane; Henry Hope & Sons, Ltd.

Southgate. — Alterations, Brockley House, North Circular Road, for Metal Box Co.; F. C. & D. W. Dabbs.

South Pelaw (Co. Durham).—Miners' hostel; Cackett, Burns Dick, & McKellar, Ellison Place, Newcastle-on-Tyne.

South Shields.—Rebuilding Laygate Lane Infants' School; Howard Hill, Winchester Street.

Staffordshire.—Maternity accommodation, County Institution, Wordsley; E. M. Coombs, county architect, County Offices, Stafford.

Stockton-on-Tees.—Three school kitchens and three dining-rooms; borough architect.

Tettenhall.—Houses, Long Lane, Tettenhall Wood; F. W. Mason, surveyor, Town Hall, Tettenhall, Staffs.

Tynemouth.—Two school kitchens; borough engineer.

Walsall.—Buildings (£15,000), for Grigg & Brettel, Ltd.; H. W. Shipley, architect, Langtoft, Gorway Road, Walsall.

West Hartlepool.—Additional office accommodation for the Borough Treasurer's Department; borough engineer.

Wolverhampton.—School canteens at Low Hill and Fordhouses; W. M. Law, borough engineer, Town Hall.

York.—Additions, Wigginton Road; J. & E. Sturge, Ltd.

Extensions to orthopædic hospitals at Thorp Arch and Kirbymoorside; secretary, Yorkshire Association for the Care of Cripples, 20, Park Row, Leeds, 1.

Pump house at Mental Hospital (£1,740); William Birch & Sons, Ltd.

Forthcoming Events

Tuesday, June 13th.—*London.*—Lighting Service Bureau, Savoy Hill, W.C.2, 6.15 p.m. Association of Supervising Electrical Engineers Three winning papers in branch papers competition.

London.—At Institution of Mechanical Engineers, Storey's Gate, S.W.1, 2.30 p.m. Opening of two-day session of Institute of Marine Engineers at which a series of papers on "The Engining of Post-War Cargo Vessels" is to be presented.

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

Thursday, June 15th.—*Manchester.*—At the Engineers' Club, Albert Square. Women's Engineering Society (Manchester Branch). Discussion on "Household Equipment—the Engineer's Point of View," with introductory talk by Mrs. Crispin on "Electrical Household Equipment."

Saturday, June 17th.—*London.*—Bonnington Hotel, Southampton Row, W.C.1, 2.45 p.m. Institution of Factory Managers, South Eastern (London) Branch. Discussion on "Current and Future Problems in Factory Management."

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

London.—At Institution of Mechanical Engineers, Storey's Gate, S.W.1, 7.15 p.m. Association of Austrian Engineers, Chemists and Scientific Workers in Great Britain. "Planning and Education for Technical Research," by Prof. P. Gross.

Rural Housing

THE importance of the maximum extension to rural areas of electricity, gas, water and sewage disposal services is stressed in the third report of the Rural Housing Sub-Committee of the Central Housing Advisory Committee appointed by the Minister of Health (Stationery Office, price 1s.).

Full agreement is expressed with the Scott Committee as to the need for providing these services. The Sub-Committee is of the opinion that Rural District Councils should not discourage the placing of small industrial units in their areas so long as they are properly controlled by planning, and should be prepared to deal effectively with the problem of housing which results from such industrial development. In the long run, it says, the admixture of industry with agriculture will improve the rural housing services. Among general objectives to be aimed at are a planned programme to bring rural housing conditions up to the highest possible level in a given period of years, and a financial basis for new house building in rural areas which will make it possible to give the agricultural worker as good a house as the worker in other industries.

F

The series of "R.E.A.L." advertisements, one of which is reproduced below, has created considerable interest and has evoked comments from many sources both at home and abroad.

In response to many requests we are therefore reproducing the series one by one with the English translation shown in each case.

PRAGUE

Yet another European City infested by the powers of darkness and suppressed by brute force.

But your day will come, Prague, when liberation will again place you amongst the cities of the free and independent —when your labours will be devoted to peaceful products and your glimmering lights will again shine a welcome to your visitors.

Issued by Rowlands Electrical Accessories Ltd.
R.E.A.L. Works, BIRMINGHAM 18

The same supplies –

–safe in the same containers

—but standing up to very different conditions!

Medway Corrugated Cases are to-day doing a vital war job. Hundreds of thousands of tons of essential supplies are being delivered safely in this form of packing. And the sound reputation they achieved in the days of peace has been enhanced by the way they are standing up to the greater hazards of wartime transport. For safety—Medway—every time!

MEDWAY
CORRUGATED CASES

The Medway Corrugated Paper Co. Ltd., Larkfield, Nr. Maidstone, Kent.
London Sales Office: Blackfriars House, New Bridge Street, London, E.C.4

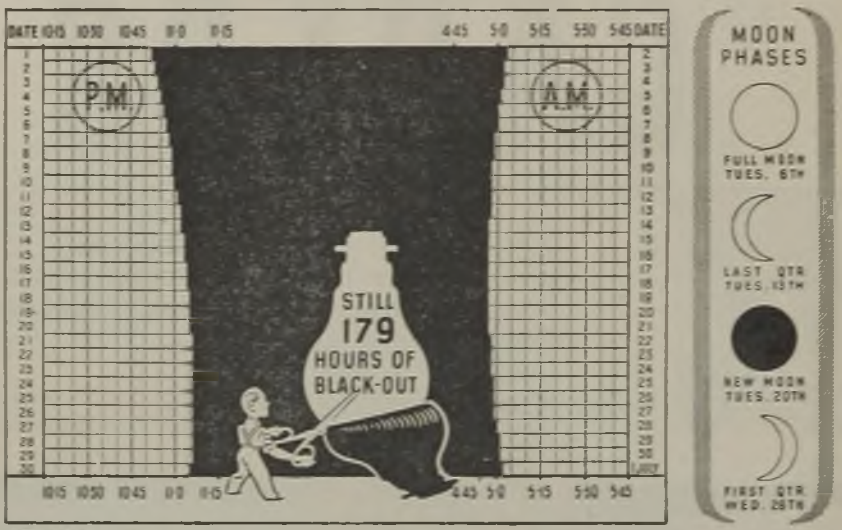
E.R.

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

Before June is out . . . .

BLACK-OUT CHART FOR JUNE



★Times shown are those for the London area.

Reproduced from the Nautical Almanac by permission of the Controller of H.M. Stationery Office.

Before June is out the hours of black-out lengthen. The longest day has gone. Ahead, once again, is the problem of how to bring daylight seeing conditions into the blacked-out factory.

Only the best of good lighting is good enough for making certain that output is maintained, for good lighting exhilarates and sustains the workers.

Choose carefully and wisely the lamps you use. Osram is a worth-while choice.

Osram

A G.E.C. PRODUCT

THE WONDERFUL LAMP

Made by The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2

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.

CITY AND ROYAL BURGH OF DUNDEE

Electricity Department

THE CORPORATION invites Tenders for the Supply and Delivery of MULTICORE AND SINGLE LOW TENSION, PAPER INSULATED, PLAIN LEAD-COVERED CABLE.

SPECIFICATIONS, quantities, etc., may be obtained on application to the undersigned.

TENDERS (sealed in envelopes provided) to be lodged with the TOWN CLERK, CITY CHAMBERS, DUNDEE, not later than WEDNESDAY, 14th June, 1944.

THE CORPORATION does not bind itself to accept the lowest or any Tender.

P. PHILIP, M.I.E.E.,
City Electrical Engineer.

Dudhope Crescent Road,
Dundee.
29th May, 1944. 223

CITY OF MANCHESTER

THE Electricity Committee invites tenders for the supply, delivery and laying of:—

33,000-volt and Auxiliary Pilot and Telephone Cables (Specification No. 801).

Specification, etc., from Mr. H. C. Lamb, Chief Engineer and Manager, Electricity Department, Town Hall, Manchester, 2, on payment of a fee of one guinea, which amount will be refunded on receipt of a bona-fide tender.

Tenders to be delivered by 10 o'clock a.m. on Friday, 23rd June, 1944.

R. H. ADCOCK,
Town Clerk.

Town Hall,
Manchester, 2.
27th May, 1944. 220

SITUATIONS VACANT

THE YORKSHIRE ELECTRIC POWER COMPANY

Shift Charge Engineer
Switchboard Attendant

APPLICATIONS are invited for the positions of Shift Charge Engineer and Switchboard Attendant at a new 60,000-kW generating station.

Candidates should apply, stating age, training, experience and present position, to—GM/GH, The Yorkshire Electric Power Company, Bramhope, near Leeds. 231

HEAD Foreman required to take charge of the assembly of small Electrical Apparatus (Telephone, etc.). Must have had experience in the mass production of this class of work, be capable of controlling female labour, and a good disciplinarian. Salary £400 per annum, plus annual bonus. Excellent post-war prospects. Midlands. Write, stating experience, positions held, age, etc.—Box 5944, c/o The Electrical Review.

SUNDERLAND EDUCATION COMMITTEE

The Technical College

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

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

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

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

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

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

W. THOMPSON,
Director of Education.

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

BOROUGH OF WIMBLEDON

Appointment of Borough Electrical Engineer

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

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

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

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

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

Canvassing, either directly or indirectly, will disqualify.

EDWIN M. NEAVE,
Town Clerk.

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

APPRENTICE CONTROLLER

LARGE Engineering Works in the North of England requires an Apprentice Controller whose experience and ability would enable him to deal with the problems of an expanding organisation in all that pertains to the selection, training and well-being of apprentices. Effective guidance in the transition to post-war conditions and outlook will be of particular importance. Apply, giving details of age, experience and background, to—Box 208, c/o The Electrical Review.

COUNTY BOROUGH OF SOUTHEND-ON-SEA EDUCATION COMMITTEE

The Municipal College, Victoria Circus

APPLICATIONS are invited for the post of Lecturer in Electrical Engineering, mainly for teaching senior day and evening students.

Industrial and teaching experience desirable. Duties to commence as from 1st September, 1944. The salary will be in accordance with the Provincial Burnham Technical Scale.

Full details of the post, together with form of application, can be obtained from the undersigned, upon receipt of a stamped and addressed foolscap envelope.

Applications should be returned to the Principal at the College at once.

H. BOYES WATSON,
Chief Education Officer.

Education Office,
Warrior Square,
Southend-on-Sea.
27th May, 1944. 218

PERSONNEL CONTROLLER

LARGE Engineering Works in the North of England requires a Personnel Controller whose experience and ability would enable him to deal with the problems of an expanding organisation in all that pertains to the control and well-being of all grades of personnel. Effective guidance in the transition to post-war conditions and outlook will be of particular importance. Apply, giving details of age, experience and background, to—Box 209, c/o The Electrical Review.

CHIEF Tester required immediately by Electric Wire and Cable manufacturers working on Government contracts. Give fullest details of qualifications and salary required. Information treated in strictest confidence. Apply—Box 237, c/o The Electrical Review.

ELECTRICAL Technical Assistant. Location: County Borough of Warrington. Salary in accordance with Grade 5, Class G, of the N.J.B. Schedule, commencing at £508 p.a. (including cost of living bonus). Applicants should have experience of operation and maintenance of a modern selected generating station and underground and overhead high and low tension distribution system, with modern substation equipment. Some sales development and commercial experience will be an advantage. Corporate member of the I.E.E. preferred, and successful candidate will be required to pass a medical examination and contribute to Council's superannuation scheme. Applicants should write, quoting D862XA, 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 28th June, 1944, with copies of not more than three testimonials. 229

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

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

FULLY experienced Production Manager required for division (employing 1,000) of important Radio Communication manufacturers. Must be conversant with and capable of working within functional management structure. Winding and machine shop control experience essential. Excellent prospects to man with the right experience and outlook. Write full details, please, to—Box 222, c/o The Electrical Review.

OVERSEAS Employment. Cable Jointer required for the Electrical Branch of the Nigerian Government Public Works Department for one tour of 12 to 24 months, with possible permanency. Salary £400, rising to £560 a year. Outfit allowance £25. Separation allowance for married men is £160 on salary of £400. Free quarters and passages. Candidates must have had sound experience of high and low tension jointing of paper insulated cables. Experience in the erection of overhead low tension electric lines is desirable. Written applications (no interviews), giving details of age, National and Armed Forces Registration numbers, training, experience, and name of present employers, should be sent to The Secretary, Overseas Manpower Committee (Ref. 1420), Ministry of Labour and National Service, Alexandra House, Kingsway, London, W.C.2. Applications will not be formally acknowledged. 230

REQUIRED for Plastic Manufacturers in the Wembley area, a Toolmaker-Designer, to take complete control of tool and moulding shops. Write—Box 236, c/o The Electrical Review.

STOREKEEPER, used to handling small component parts in electrical switchgear factory, able to check raw materials, finished parts and keep accurate records. Write, stating age, salary and experience.—Box 217, c/o The Electrical Review.

SUBSTATION Attendant required for Static Substation over 5,000 kW, near King's Lynn, D.J.I.C., No. 8 area, zone B. Modern house available. Apply, giving particulars of experience and age, to—The East Anglian Electric Supply Co. Ltd., Finborough Hall, Stowmarket, Suffolk. 219

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.

BOX 4961—Sales Executive.

SITUATIONS WANTED

CHEMIST, recently discharged Forces, seeks situation in power station, 9 years' chemical experience, 5 in power stations. At present engaged in non-essential chemical work.—Box 5936, c/o The Electrical Review.

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

ELECTRICAL Contracting Supervisor desires change or would be interested in partnership in good class business with good post-war prospects.—Box 5937, c/o The Electrical Review.

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

ELECTRICAL Engineer (38) desires progressive position, experienced maintenance, construction and administrative work, with specialised knowledge of illumination and radio.—Box 5938, c/o The Electrical Review.

ELECTRICAL Engineer (48) seeks senior position in charge of works maintenance staff and electrical plant. Lengthy and varied experience, preparation of specifications, plant lay out, installation and maintenance. Disengaged. Minimum salary £600 p.a.—Box 5946, c/o The Electrical Review.

ELECTRICAL Fitter (age 48), wide experience maintenance, erecting, installation, machinery, switchgear, plant, service work on mechanical-electrical apparatus, first-class work.—Box 5935, c/o The Electrical Review.

ELECTRICAL Supervisor on installation, age 36, free. Experience, switchgear, drafting, planning and organizing labour. Diploma, electrical engineering—power and lighting.—Box 5949, c/o The Electrical Review.

ENGINEER (29), A.M.I.E.E., C. & G. Final Radio, desires change, 10 yrs.' exp. radio, electrical equipment, component, design, development, production. War, post-war position, England or overseas.—Box 5932, c/o The Electrical Review.

ESTIMATING Engineer desires change. Technical education, apprentice, 28 years shops, D.O. and estimating. Experience on good class mechanical and elect. apparatus, automatic machinery, commercial products, jigs and tools. Present post, chief estimator, 10 years, well familiar with initial designs, production methods and costs, estimating government and commercial contracts. Executive post desired, N.W. Lond., Watford or near. Salary £600 p.a.—Box 5947, c/o The Electrical Review.

GENTLEMAN, 44, seeks post as stores manager, head storekeeper or similar. Two years' experience head storekeeper and clerk with electrical contractors on marine work. Change required with view to post-war permanency. —Box 5942, c/o The Electrical Review.

GRAD. I.E.E., Triple Finalist of City and Guilds, P.M.G. (32), experienced installation, maintenance, lecturing, aircraft, etc. Immediate release, travel anywhere. Any offer given consideration.—Box 5940, c/o The Electrical Review.

SWITCHGEAR Engineer, age 32, seeks change. A.M.I.E.E., A.M.C.T., A.I.I.A., experienced in design, contracts, costs, sales and administration, exempt military service. Permanent executive position desired. —Box 5943, c/o The Electrical Review.

WINDING Shop Foreman, thorough experience in winding, assembling and testing of fractional to 100-h.p. machines., production work or repairs, desires progressive position.—Box 5939, c/o The Electrical Review.

YOUTH, 18½, slight physical disability, seeks situation in electrical concern where he could thoroughly learn the trade. Willing assist office. Commercial training, shorthand, typing, calculating machine operator.—Box 5941, c/o The Electrical Review.

FOR SALE

Traders buying and selling hereunder must observe the Restriction of Resale Order, S. R. & O. 1942 No. 958.

TWO 50-kVA. Diesel-driven Alternator Sets, each comprised of 75-h.p., vertical, 4-cylinder, water-cooled Diesel engine, 1,500 r.p.m., direct coupled to 50-kVA B.T.H. alternator, 400 volt, 3-phase, 50 cycles, 1,500 r.p.m., complete with switchboard, engine arranged for electric starting and complete with fuel and cooling tanks, etc. New 1939.

Two 60-kW. Diesel-driven Generating Sets, each comprised of vertical, 6-cylinder, water-cooled A.E.C. Diesel engine, 1,650 r.p.m., direct coupled to 60-kW CROMPTON PARKINSON, 250-volt D.C., compound wound Generator, 1,650 r.p.m., with regulator, engines arranged for electric starting and complete with all accessories. New 1938.

20-kW Diesel Generating Set, comprised of 30-h.p., vertical, 3-cylinder, water-cooled NATIONAL Type D Diesel engine, 1,100 r.p.m., direct coupled to 20-kW, 230-volt D.C. compound wound generator with shunt regulator, engine arranged for hand or compressed starting and complete with accessories. New 1939.

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