POWER STATION RE-EQUIPMENT

ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXXVI. No. 3514 MARCH 30, 1945 9d. WEEKLY

That DIFFERENCE *is in* DETAIL

THE difference between any two watches is intimately a matter of detail. From the design of the case to the smallest screw—each and every detail plays a vital part in expressing the degree of quality established by the finished watch.

The same is true of electrical accessories. We, who strive after perfection in the electrical product have, indeed, a close affinity with the watch maker. As in a watch, so in an accessory—there must be a full complement of parts, each accurately designed and carefully assembled.

We believe that true quality can only be achieved when it is expressed sincerely in every component part. This means, of course, that in accessories one has to look for quality "below the cover"—at those parts of an accessory which the consumer rarely sees.

Here is an example of that difference in detail—the interior of a Crabtree 3-pin Double Pole "Compact" Switch-socket. It embodies no less than 83 separate parts, each one designed so that the working mechanism shall function with that lasting smoothness and efficiency typical of all Crabtree products.

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A · NAME · SYNONYMOUS · WITH · PROGRESS · IN · ACCESSORIES · AND · SWITCHGEAR

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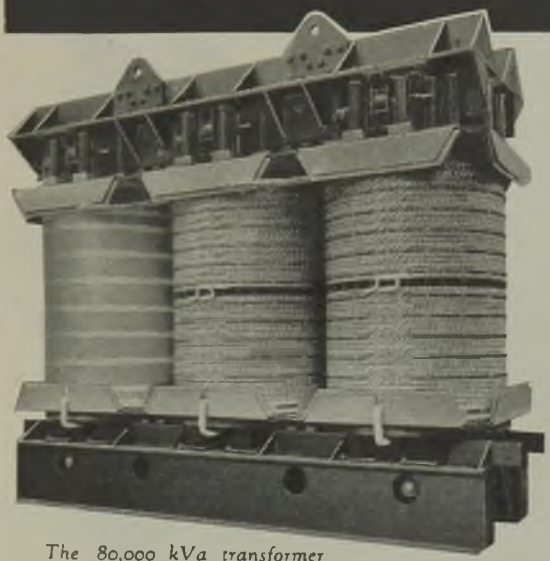
Generator TRANSFORMERS

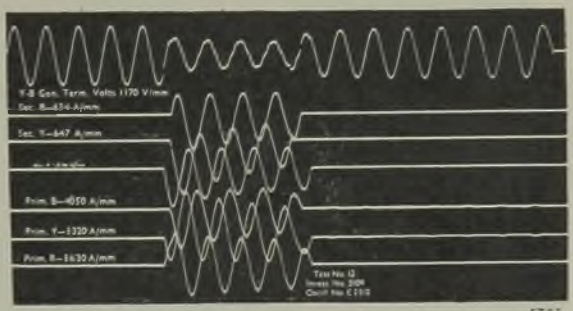


The 80,000 kVa transformer used for the test. The forerunner of 5-80,000 kVa and 2-87,000 kVa 11/66 kV generator transformers for the London Power Company (Battersea Generating Station).

Ferranti Large High Voltage Generator Transformers are designed on facts confirmed by full-scale practical tests.

In 1935 a Ferranti Generator Transformer of 80,000 kVa 66 kV was tested to destruction by a series of 14 full-scale short circuit tests.

A typical oscillogram showing 1,420,000 maximum instantaneous kVa (720,000 kVa symmetrical r.m.s. value.)



LARGE POWER TRANSFORMERS supplied by Ferranti ——

Over 9,000,000 kVa for voltages 33 kV and above
Over 6,000,000 kVa for voltages 66 kv and above

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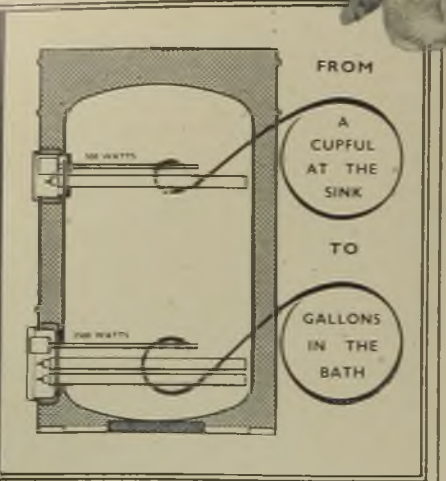
A VOLUME to be issued after the War!

THE Charlton 'TWIN'

DUAL-PURPOSE HEATER



QUESTIONS & ANSWERS. WHAT SIZES WILL BE MANUFACTURED ? Two sizes—15 and 20 gallons. WHAT IS THE LOADING ? There are two heating units (a) 500 watts at the top of the heater and (b) 2500 watts for the lower. IS IT AUTOMATIC ? Yes. Both heating units are thermostatically controlled but a kick switch at the base of the heater allows the 2500 unit to be brought into circuit at will for baths, making 3000 watts in all. IS HOT WATER ALWAYS AVAILABLE ? Yes, for the 500 watt unit is permanently in circuit. WILL THE "TWIN" WORK WITH A SOLID FUEL SYSTEM ? Yes. Connect the cold water inlet of the "TWIN" to the hot water outlet of the solid fuel system—perfectly straightforward.

Ask J. & P. for further particulars of the Charlton "TWIN"

The Charlton "Twin" is a war-time development for post-war use.

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The mark that means that "little more" in quality

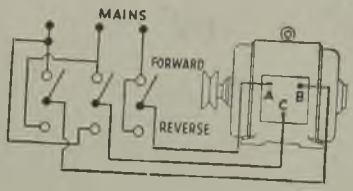
2

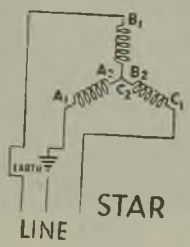
Motor Maintenance Points & Problems

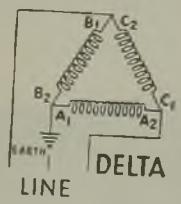
Keep this page, it may prove of service to your Maintenance Engineers

REVERSING THREE-PHASE MOTORS

It is common knowledge that to reverse a three-phase machine it is only necessary to reverse two of the incoming lines. The use of a triple-pole change-over switch enables this to be done frequently, and without damage to the motor, by simply throwing the handle over from one position to the other







RESULT OF AN "EARTH" ON A STAR-DELTA MOTOR

The complaint made regarding this motor was that it had lost its torque in "Star", and only started satisfactorily in the "Delta" or running position, whilst, during running, the starter overloads frequently tripped the starter out of circuit.

The motor was driving a bottle-washing plant, and the fault was found to be due to condensation in the conduit. This had caused one of the wires between line and starter to burn through and earth on to the tubing, although it was clear on the live side.

The result was that in "Star" one line was dead and the motor was attempting to start as a single-phase machine. In "Delta" the equivalent supply to the motor was 400 volts on two phases, and line to earth or 230 volts on the third phase. As the load was more or less constant, the effect was to overload one of the circuits in "Delta" and cause the starter overloads to operate

FLICKERING LIGHTS

Should a fairly large three-phase motor be connected in the works, and the lights commence to flicker, suspect the rotor of the motor. The effect of one phase out of circuit on a three-phase motor on load, is to generate a frequency different from that of the supply, and this can be easily noted by its effect on the lighting system. A fault on a rotor can usually be traced to one of the following—loose rotor lead, faulty rotor contact, dirty slip ring, or poor connection on short circuiting gear.

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Technical Advisers at

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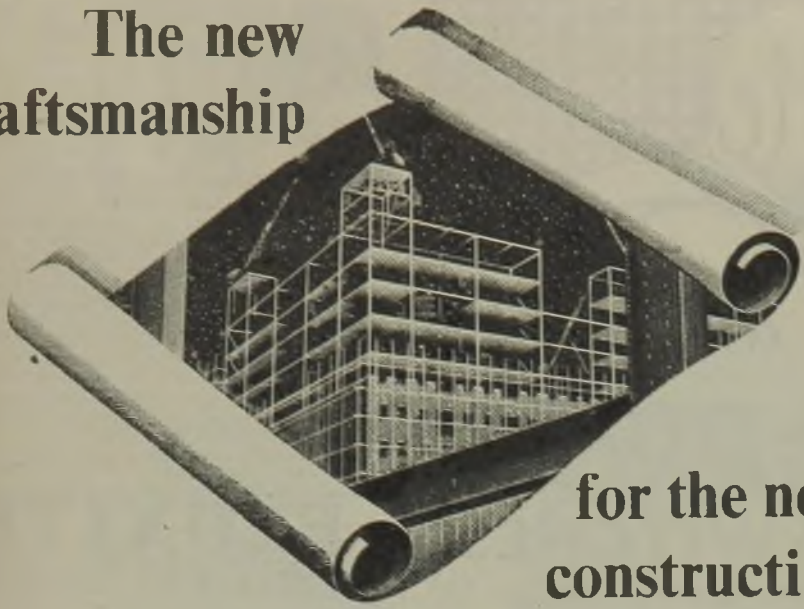

for the new construction

The post-war demand that the building industry and its suppliers will have to face will be for quality in quantities. Only the New Craftsmanship of mass production can provide it. M.E.M. have demonstrated, in the manufacture of Switch and Fuse Gear, how the scientifically organised large-scale production of standardised designs can combine quality, quantity and low prices. With an entirely self-contained factory, organised and equipped along the most efficient lines, M.E.M. will be ready to meet all post-war demands in Switchgear, Fusegear, Motor Starters, and Electric Fires.

M.E.M. "Memette" Switch and Fuse

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SWITCHGEAR

MOTOR STARTERS • FUSEGEAR

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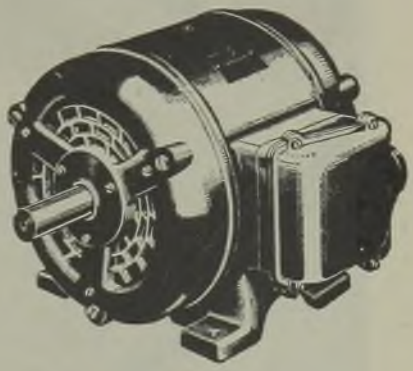
Frequent reversing?

This motor



abolishes trip-gears.

Mechanical reversing devices are expensive, clumsy, noisy and subject to excessive wear. The Parkinson R.V.R. Motor makes them unnecessary. It is capable of reversing up to 40 times a minute without harm. The torque at the moment of reversal is high but the current peak is kept low. This motor greatly simplifies the design of many types of reversing machinery. The R.V.R. is a Parkinson special duty motor. Yet it is in the standard range of over 2,000 types of Parkinson Motors. Almost any combination of mechanical and electrical features can be readily obtained out of this exceptional range. To make sure of the exact motor for the job go straight to the Parkinson A.C. Motor Service.

CROMPTON PARKINSON
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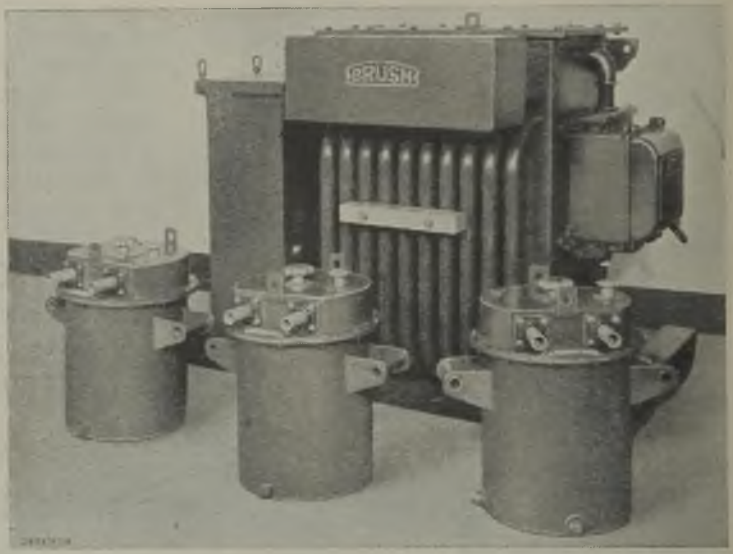
VICTORIA EMBANKMENT, LONDON, W.C.2

BRUSH Welding EQUIPMENT



THIS equipment is constructed for heavy duty to withstand the most arduous service conditions and conform to British Standard Specification 1071-1943.

The illustration shows a Brush 90 kVA Transformer complete with incoming control switch and fuse, and condenser for power factor correction, the whole mounted on skids for ease of movement.

Three of six regulators are shown in the foreground. Each regulator has a capacity of 300 amperes per arc and is fitted with a robustly constructed switch having 36 positions to cover a current range from 35 to 300 amperes. The switch is arranged for positive location in all positions. An indicator plate shows the current ratings.

Brush Welding Equipment is built to cover four standard sizes, details as follows :—

kVA (continuous rating)	OPERATORS
54	**Three** at 300 amps per arc
90	**Six** at 300 amps or 3 at 600 amps per arc
122	**Nine** at 300 amps per arc
153	**Twelve** at 300 amps or 6 at 600 amps per arc

8.17

THE BRUSH ELECTRICAL ENGINEERING CO. LTD. LOUGHBOROUGH ENGLAND

ELECTRICAL REVIEW

March 30, 1945

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Hugh S. Pocock, M.I.E.E.

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

Commercial Editor:
J. H. Cosens

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

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Pressure upon Space

Rising Tempo Accentuates Difficulties

AT the time when the *Electrical Review* met the paper shortage by a reduction to "pocket size" the attention of all branches of the electrical industry was focused on war production. Other things did not count for much when attempts at the invasion of England were still a possibility and the tide was still flowing against us. There was much which we would have liked to publish but national security came first—albeit that term was somewhat stretched by the authorities. Thus our loss of paper was not an unbearable hardship.

But then when America came in and things began to happen to the Germans in Russia there was a rapid increase in activities not entirely connected with war production. More people felt that they were justified in reading and discussing papers on many technical and commercial subjects before institutions and associations. Then the post-war planning era set in and there was a spate of reports and ideas which has not yet abated. Added to this there has been a considerable easing of censorship.

Need for Expansion

We have seen our task of keeping up with all these movements getting more difficult week by week and now squeezing the weekly quart of electrical news, plus original articles, into the pint allowed for each issue has become a serious problem. We want to expand, to introduce many more articles and give greater space to matters which we now have to cut down rather drastically, but until more paper is granted us these improvements will have to be postponed.

Faced with this situation our feelings are not soothed by a suggestion by Mr. G. E. Moore, the president of the Electrical Power Engineers' Association, that the Association's journal should publish more general electrical news "because many members do not read any electrical paper." Already a number of Association organs attempt to do this and we are not adopting a dog-in-the-manger attitude when we deprecate these encroachments upon what we consider to be the field for which the technical and trade Press is very much better equipped by its specialised experience and resources.

Limitation of Functions

Association journals should concentrate upon the affairs of their organisations. They can never be independent journals covering all the interests of the industry however much they might be prepared to expend on building up newspaper organisations.

Considering the more mercenary side, the question of advertisements arises. In the last number of the *Electrical Power Engineer* a member complains that the December issue consisted of twenty pages of reading matter and forty-four of advertisements. The point might be raised with regard to technical and trade papers—but there is a distinct difference. In the first place trade papers are not ashamed to admit that they are only able to provide their readers with the service they do by reason of their advertisement revenue; the

cost of each copy is often far more than is charged for it. Secondly, the advertisers are an important section of the industry which the paper serves and readers, more particularly those overseas, look upon the advertisements as an integral part of their paper. We hold the view that every responsible member of an industry should take one of that industry's newspapers and thus gain a wider knowledge of affairs than he can obtain by reading his Association's paper only.

The value of the technical Press in keeping electrical engineers up to date was stressed by Sir Arthur Fleming at the recent A.S.E.E. luncheon. Associations should not go further into the publishing business than is necessary to record their activities and those of their members. If they do they tend to weaken the position of their independent trade journals and that is ultimately doing their members a serious disservice.

Showing the Flag

MUCH has been heard of late of the loss to national prestige through reticence concerning British achievements in many fields. Since deeds speak louder than words—at any rate to the type of trained intelligence it is most desirable to impress on account of its pervasive influence abroad—it was a good idea of the British Council in conjunction with the I.E.E. South Midland Centre to present a cross-section of electrical activities to American and Dominion engineers now in this country. The Birmingham area was well chosen for the purpose and particulars given on a later page show that the programme was well thought out. Repetition of such arrangements in other parts of the country should prove to be of national benefit.

Housing Prospects

ALL the Government pronouncements upon housing are of interest to the electrical industry, for houses need installations and appliances, distribution services and electricity. The need for houses has been variously estimated at anything up to 4,000,000; the Government's latest White Paper on the subject aims no higher than three-quarters of a million to afford a separate dwelling for every family which desires one; a further half-million to relieve overcrowding and clear slums; and an indefinite number to be provided under a continuous programme to raise the general housing standard. By the end of the second year after the war it is hoped to have 220,000 houses completed and 80,000 in course of erection. The White Paper says that arrangements are being made to ensure, largely by standardisation, that materials and "fitments" will be available as the building work progresses. Makers of these standard articles will be enabled to put them into production without specific orders and will be assured, if necessary by the Government, of a market for their products. This has apparently been done already with regard to cookers.

Associates

A CLASS of I.E.E. membership that is smaller than it should be is that of Associate. Possibly its importance is inadequately recognised because in bygone days there was a tendency to regard it as a somewhat heterogeneous group composed of men often having slight technical qualifications. This view, as the foreword to the *I.E.E. Journal* for February shows, is more than fifteen years out-of-date. Those eligible now are electrical engineers who have achieved positions of responsibility in the industry by virtue of innate practical ability, despite the handicap of limited orthodox academic training. The class should be suitable to many of those referred to in the recent (second) I.E.E. Report on Education as "technicians" and should on that account be expected to show a considerable numerical increase after the war.

Visual Efficiency

THE beneficial influence on health of good lighting and the dependence of the latter on adequate illumination amply justify the investigations of the Industrial Health Research Board into the relationship between illumination and visual efficiency. A second report, No. 87, has now been issued (Stationery Office, 9d. net) in which Mr. H. C. Weston deals with the effect of brightness contrast between an object and its background. The ultimate aim of the series of reports is to establish a scientific basis for a code of illuminating values in offices, schools and homes as well as in factories. In regard to the last-named the joint E.D.A.-E.L.M.A. publication "Modern Factory Lighting" covers the practical application of known scientific principles.

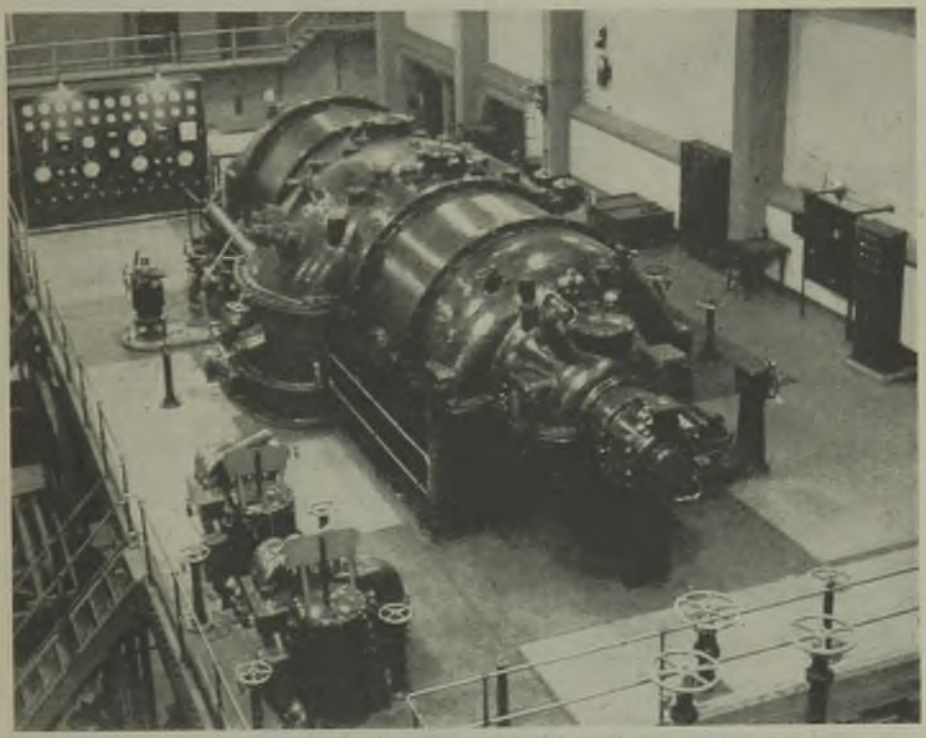
Power Station Re-equipment

A Space Conservation Problem

THE essential problem faced by the West Midlands Joint Electricity Authority in raising the capacity of its Wolverhampton generating station was that of increasing the output value of the floor space already devoted to generating plant, rather than of extending the station in the normal way. The station is in a very congested district, so that it has not been possible to extend the buildings, although a new boiler house has been erected to better advantage after pulling down part of the older building. The re-equipping scheme will ultimately double the station capacity, but the subject of this article is the first stage of the extension which has been completed during the war, embracing a 30,000-kW turbo-alternator, four boilers, each with an evaporative capacity of 120,000-lb. per hour, coal-handling plant, a chimney, a concrete cooling tower and various auxiliaries.

The turbine room is about 226 ft. long by 55 ft. wide, and about 30 ft. of the length is occupied by an unloading bay. The new Brush-Ljungström turbo-alternator set takes up about half of the available plant space, where there were originally three 5,000-kW sets. In the remaining available plant space there are two older 7,500-kW sets which may be replaced ultimately by another 30,000-kW set. In the case of the boilers, four new "La Mont" units, manufactured by John Thompson Water Tube Boilers, Ltd., have replaced six 40,000-lb. per hour boilers.

An essential part of this plant reorganisation scheme has been the selection of the Brush-Ljungström type of turbo-alternator set because of the space-saving afforded by the radial-flow design of the turbine, and of the "La Mont" type of boiler because of a similar saving made possible by the forced-circulation principle. Incidentally, in the

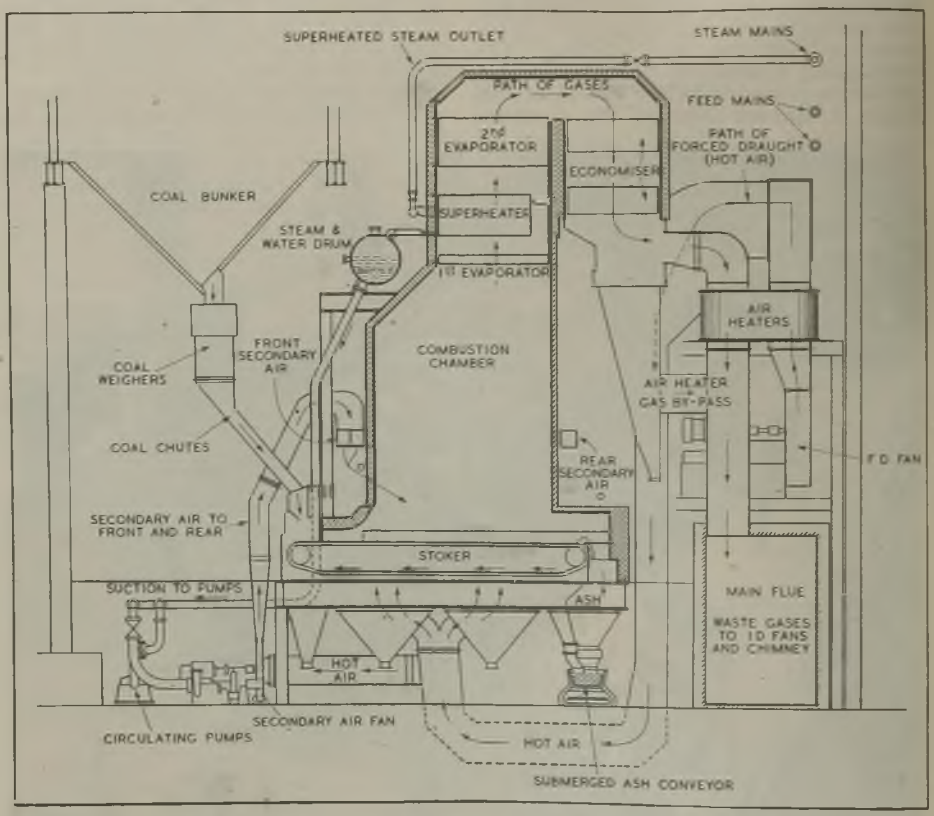


The new 30,000-kW turbo-alternator set takes up about half of the available plant space, where there were originally three 5,000-kW sets

case of the turbo-alternator set, the double-alternator feature has brought the weights to be handled within the capacity of the 40-ton travelling crane which existed for the older plant; moreover, the plant foundations are much simpler than those which would have been necessary for the more orthodox type of turbo-alternator.

While the new plant runs normally in parallel with the older plant in the station, it is so comprehensive in character that for descriptive purposes, at any rate, it can be treated alone as a complete power station. The boilers are suitable for burning coals of a wide range of qualities and calorific values. The fuel is transported from the local collieries to the station by canal in long and narrow barges of 25- to 28-ton capacities. There is wharfage for unloading two barges at a time, as well as for tying up a number of barges in canal basins about the station. The unloading equipment, which is capable of dealing with 360 tons per eight-hour shift, embraces two telphers, constructed by Strachan & Henshaw, Ltd., both of which deliver into a central hopper. Each telpher is fitted with a 2-cu.-yd. grab.

From the central hopper a belt conveyor takes the coal to the boiler bunkers, and *en route* the weight of the fuel is integrated continuously by means of an "Adequate" weigher incorporated in the conveyor system. The coal is also conditioned by water sprays during transit on this belt. There are emergency arrangements for feeding the new boilers from similar coal-handling plant serving the older boilers. The coal is delivered to the hoppers of the chain-grate stokers by means of chutes *via* Avery automatic coal weighers. The ash from combustion is chute fed into a water-trough conveyor system in the basement, from which it is taken to an elevated bunker outside the boiler house, where it is gravity fed to lorries for despatch.



Our notes on the general boiler construction and operation and the gases and water and steam circuits have special reference to this drawing

Engineers will appreciate the typical accompanying lay-out drawing of one of the "La Mont" boilers in preference to a

" word picture," and our notes on the general boiler construction and operation are related to this drawing. Each boiler has one forged steam and water drum, with riveted ends, 22 ft. in overall length and 45 in. in internal diameter. This single-drum feature, together with the forced-circulation principle which we will refer to more conveniently later, enables a given evaporation to be obtained from a smaller space than would be the case with a natural-circulation boiler. Each boiler drum has a steam space of 139 cu. ft.

Coal is transported to the station by canal; the unloading equipment embraces two telphers

The boiler tubes have a maximum length of 150 ft. and are 1·25 in. in internal diameter and of No. 9 gauge thickness. The dimensions of the water wall, economiser and superheater tubes are similar, except that the economiser and superheater tubes are of No. 8 gauge. The heating surfaces of the boiler, superheater, economiser and the water walls and screens are 5,844, 3,385, 6,880 and 4,368 sq. ft. respectively. The superheater is of the " La Mont " integral design. The combustion chamber has an effective volume of 6,060 cu. ft., with a projected radiation surface of 1,563 sq. ft., and the tubes forming the lining are supported on the boiler framing by means of hooks welded on to the tubes and resting on the boiler framework. The tubes are backed with refractory blocks which, in turn, are backed with ample insulating material, the whole being finally finished off with protective steel-panel casing. The heat release is about 27,500 BThU. per cu. ft. per hour, with a calculated gas leaving temperature of about 1,960 deg. F.

The heat cycle of the station is on the normal modern closed principle, steam being bled at a number of points from the turbine and passed through the feed-water heaters, to which we shall refer later in the description of the turbine plant. Make-up is obtained from the town-water supply, and after being treated by " Neckar " lime-soda and base-exchange softening plant it is dealt with by two " Weir " bled-steam evaporators, each capable of evaporating 8,500 lb. of water per hour, with an inlet-water temperature of 50 deg. F.

Four new 120,000-lb. per hour boilers have replaced six 40,000-lb. per hour units

There are two motor-driven feed pumps, each capable of delivering 27,000 gallons of water per hour, as well as one stand-by steam turbine feed pump having a capacity of 35,000 gallons per hour. When operating at m.c.r. the feed water enters the "La Mont" bare-tube type economiser at 315 deg. F. and leaves at 406 deg. F., and the stop valve steam conditions of the boiler are 400 lb. per sq. in. and 850 deg. F. When it is necessary to avoid sluggishness of the water supply to the economiser under low loads, advantage is taken of the forced-circulation equipment of the boiler to circulate the economiser with boiler water.

Tubes forming the lining and the combustion chamber are supported on the boiler framing

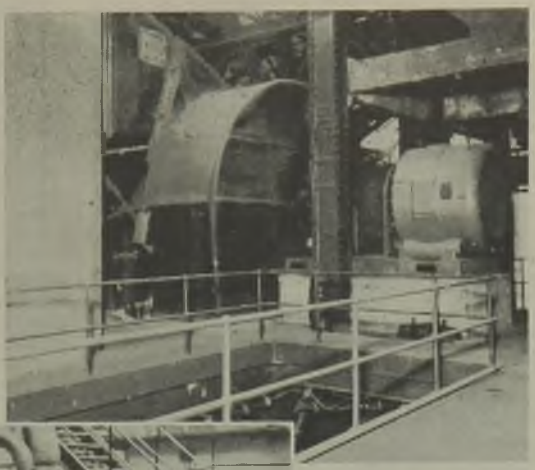
Water is extracted from the steam and water drum by means of the boiler circulating pump and delivered to distributing headers which, in turn, supply water to the combustion chamber wall and boiler evaporator circuits whence the steam and water mixture is collected in the drum.

An important contribution to the high quality of steam generated is the system of baffles in the drum which effectively separates the steam and water from the steaming tubes. Boiler-water circulation is effected by two 50 per cent. duty motor-driven pumps, and one 100 per cent. duty stand-by steam-driven pump for each boiler. Each motor-driven pump is fitted with a differential pressure relay connected between the suction and discharge. The two relays are in series, so that in the event of failure of either of the motor-driven pumps the relay associated with that pump operates, thereby interrupting the circuit to a B.T.H. thrustor which opens the steam valve to start up the turbine pump.

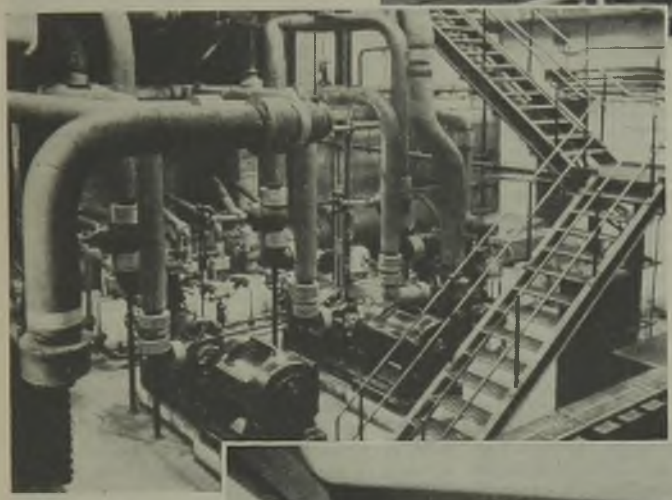
Each boiler has one forged steam and water drum, with riveted ends (left); automatic coal weigher (right)

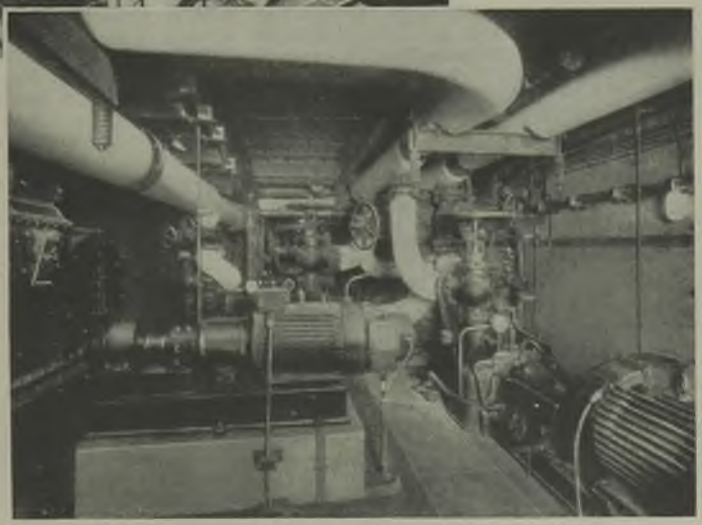
The air heaters are of Howden regenerative type and each boiler unit is equipped with two Howden forced-draught fans and two similar secondary-air fans, the latter enabling controlled supplies of hot air to be admitted over the fires both at the front and the rear of the grates. Two main dampers are provided for each boiler outlet for controlling the induced draught in a main flue common to all four boilers and is produced by three large Davidson fans.

Two induced draught fans only are required for the full duty of the four boilers, the third fan being held in reserve. The speed of all fans is controlled by hydraulic couplings, and the dampers are operated by Tate remote - control units. The following temperature conditions obtain in the gas system of the plant under m.c.r. conditions: gas temperature at boiler exit 711 deg. F., at the economiser exit 443 deg. F., and at air heater exit 360 deg. F.



Induced draught is produced by three fans (two working, one stand-by) in a main flue common to all four boilers; one i.d. fan at base of chimney





Above: Boiler feed pumps in the condenser basement near feed heaters
Right: There are two 50 per cent. duty motor-driven circulating pumps and a 100 per cent. duty stand-by steam-driven pump per boiler

Twenty-one "Lectramek" soot blowers are disposed at all the likely soot-collecting points throughout the gas system of each unit, a feature of this

equipment being the sequence control of the blowers from a central control board. The wiring between the control board and sootblower operating motors is carried out in "Pyrotenax" cable. The new brickwork chimney, which replaces the one demolished with the six older boilers, is 250 ft. high overall and 16 ft. in internal diameter at the base.

The designed gross combustion heat efficiency of each boiler is 83·21 per cent. and the designed overall net efficiency of each boiler, allowing for all auxiliaries, is 81·16 per cent. In the light of the guaranteed efficiency, the following figures relating to the official boiler trials are of interest: gross efficiency on test 83·43 per cent.; equivalent heat absorbed by auxiliaries 1·79 per cent.; net efficiency 81·64 per cent.

The boilers are manually controlled, and as an aid in obtaining the highest possible operating efficiency a comprehensively equipped instrument panel is provided for each of them. These Kent panels are neatly arranged in pairs in "V" formation in the firing aisle, each pair being placed symmetrically on the dividing line of the corresponding pair of boilers.

At the time of its erection the new 33,300-kVA turbo-alternator was believed to be the only set of its type in this size to run at 3,000 RPM. The turbine is designed for stop-valve steam conditions of 375 lb. per sq. in. and 825 deg. F., with a vacuum at the exhaust flange of 28 in. (barometer 30 in.).

Great Reduction in Length

The radial-flow feature of the turbine has resulted in a reduction of the overall length of the set, including the two alternators, one at each end, together with their exciters, from what may have been about 64 ft. with the axial flow design to 44 ft. The turbine is fitted with a lubricating-oil settling tank of 1,200-gal. capacity, and the oil system is complete with a Hopkinson motor-operated centrifugal purifier with a capacity of 206 gallons per hour. The turbine is bled at three stages for feed-water heating, and in addition to the bled-steam feed-water heaters there are a gland heater and a drainage heater for the same purpose. These heaters were designed to give a temperature under full-load conditions of 315 deg. F. at the inlet to the economiser. The feed pumps are situated in the condenser basement near the feed heaters. Steam bled from the turbine is provided for the two evaporators which are also situated in the condenser basement. De-aeration of the evaporate takes place in the condenser, and the guaranteed oxygen content of the water delivered by the extraction pumps does not exceed 0·05 c.c. per litre, which is continuously recorded by a Cambridge oxygen recorder.

The condenser is of the dual-section type, and each section can be operated independently. The total cooling area of the complete condenser is 37,100 sq. ft. Two Drysdale extraction pumps serve the condenser, and each is capable of dealing with the full load condensate, plus the evaporated water from the evaporators. The condenser cooling water is delivered by two Drysdale circulating-water pumps which have a combined capacity of 27,400 g.p.m., or a cooling-tower delivery of 1·64 million gal. per hour.

A comprehensive range of Kent turbine control and measuring instruments are mounted on a cubicle-type panel near the governor-equipment end of the turbine, on an elevated operating platform, and the instruments include "Multilec" water-purity recorder and indicating and integrating steam-flow meters. The net heat consumption of the turbine at the m.e.r., including the feed heating and allowing for auxiliaries, but excluding evaporators, is 11,650 BThU per kWh sent out. On this basis the efficiency of the set is 29·24 per cent. This figure, when combined with the boiler efficiency, results in a thermal efficiency per kWh sent out of 23·87 per cent.

The new Yorkshire Hennebique hyperbolic concrete cooling tower is 200 ft. high, 140 ft. in diameter at the base, 82 ft. at the top and 72 ft. at the throat. Its performance is based on a recooled water temperature of 80 deg. F., with an atmospheric temperature of 62·4 deg. F. The make-up water for the cooling tower is taken from the canal adjacent to the station and treated with "Calgon" for the purpose of preventing scale formation in the condenser.

Each of the 16,650-kVA alternators (one at each end of the set) generates at 6·6 kV and is totally enclosed for the closed-air system of ventilation, together with its slip-rings and exciter. The alternator cooling air passes through Heenan & Froude water-cooled air coolers which have a total surface of 3,120 sq. ft. The new Ferguson, Pailin switchgear for the alternator is in line with the existing equipment for the older plant, and the new plant includes Ellison auxiliary switchboards.

We are indebted to Mr. H. F. Carpenter clerk and manager, West Midlands J.E.A., and to Mr. L. F. Jeffrey, chief engineer, for their permission to visit the station, and to Mr. O. H. Hosking, chief assistant engineer, for his help in obtaining information and photographs.

Canadian Power Production

The Dominion Bureau of Statistics reports that the output of central electric stations in 1944 reached a new high mark of 40,465·7 million kWh, as against 40,377·6 million kWh in 1943. The increase occurred wholly in the first half of the year.

PERSONAL and SOCIAL

News of Men and Women of the Industry

AMONG appointments of new Junior Ministers approved by the King last week were: Secretary, Department of Overseas Trade, **Mr. G. S. Summers, M.P.**; Joint Parliamentary Secretary, Ministry of Supply, **Mr. J. A. de Rothschild, D.C.M., M.P.**; and Parliamentary Secretary, Ministry of Town and Country Planning, **Mr. Arthur Jenkins, M.P.**

Mr. F. Newey has been appointed chairman of the British Electrical Development Association and **Mr. H. J. Randall**, vice-chairman for the year 1945–46. The constitution of the Council for the ensuing year is as follows:—

Mr. F. Newey

Appointed by:—Central Electricity Board: Messrs. H. F. Carpenter, A. J. Fippard, F. Nicholls, H. J. Randall, C. D. Tate, and G. A. Vowles. Incorporated Municipal Electrical Association: Messrs. R. Birt, J. Eccles, E. E. Hoadley, Councillor J. Selwyn Jones, and Mr. F. Newey. Power Company Members: Capt. J. M. Donaldson and Brig.-Gen. R. F. Legge. London Electricity Supply Association: Mr. Clarence Parker. Provincial Electric Supply Association: Sir John Dalton. Conference of Joint Electricity Authorities: Alderman H. Leese.

Nominated by Area Committees:—Central England, Mr. F. H. Pooles (deputy, Mr. R. H. Rawlls); Mid East England, Mr. A. G. Connell (Mr. A. Kelso); Northern Counties, Mr. S. L. Ellis (Mr. T. E. Darnell); Northern Ireland, Mr. R. A. Boston (Mr. W. J. Girvan); N. W. England and N. Wales, Mr. W. H. Metcalfe (Mr. G. A. Robertson); Scottish, Mr. A. E. Roots (Mr. H. L. Holme); S.E. and E. England (Greater London), Mr. J. R. Jones (Mr. F. W. Purse); (Eastern), Mr. A. Wade (Mr. G. P. Dixon); (Southern), Mr. H. Dixon (Mr. S. J. C. Ellis); S.W. England and S. Wales (Northern), Mr. C. L. Townsend (Mr. Edward Jones); and (Southern), Mr. A. E. Baker (Mr. R. W. Steel).

Mr. E. Player, technical director of Burnid Industries, Ltd., has been appointed joint managing director of that company and also of the Birmingham Aluminium Casting (1903) Co., Ltd., a subsidiary. Mr. Player will act with **Mr. Cyril C. Mankelay**, who continues as chairman and joint managing director of both companies.

Mr. E. H. Taylor, boiler house superintendent at the Ironbridge power station of the West Midlands Joint Electricity Authority, has been appointed power station superintendent at the Bradford Electricity Department's Valley Road power station. **Mr. S. P. Innes**, who is already with the Bradford undertaking, being promoted to assistant power station superintendent. **Mr. R. W. Blythe**, chief charge engineer at the Valley Road power station, has been appointed substation engineer to the Barking Corporation Electricity Department.

Mr. James Irlam, chief constructional engineer at the Portishead power station, has been appointed to the position of deputy city electrical engineer of Bristol at a temporary capacity at a salary commencing at £1,074, rising to £1,126. The City Electricity Committee also recommends the appointment in a temporary capacity of **Mr. E. C. Willis** as secretary and sales manager to co-ordinate five departments, his salary being £1,000 rising to £1,200.

Mr. Irlam, who is forty-six, was appointed constructional draughtsman in 1926 and was promoted to chief constructional draughtsman the following year, becoming engineer in charge of the constructional department and drawing office at the Portishead power station in 1932.

Mr. Willis is fifty-one and has been with the undertaking since 1919. It will be remembered that Mr. A. J. Newman, chief engineer and general manager of Bristol Electricity Department, retired last December and that Mr. L. A. D. Pedler, his deputy, who is himself proposing to retire in June, succeeded him in a temporary capacity pending reorganisation of the Department.

Mr. H. V. J. Harris, who has been appointed manager and engineer of the Hull Corporation Telephone Department, was born in 1905 at Frome, Somerset. He received his education at Bournemouth Secondary School and joined the Post Office Engineering Department at Bournemouth in 1925. He was appointed assistant traffic superintendent in the Southampton district in 1927. Ten years later he became traffic superintendent (Class II) in the Newcastle-on-Tyne telephone area and at the outbreak of war was seconded to the Communications Branch of the Home Office and Ministry of Home Security and attached to the headquarters of the London Civil Defence Region. In 1940 he was appointed communications adviser for the Northern and North Eastern C.D. Regions, and in 1942 he became regional communications officer (Grade I) Northern C.D. Region. For his civil defence work he was awarded the M.B.E. In October last year he returned to the G.P.O. as traffic superintendent (Class I) at Liverpool.

Mr. H. V. J. Harris

The Hull Corporation telephone undertaking embraces ten automatic and four manual exchanges serving a radius of about six miles from the centre of the city.

Mr. Harris's predecessor, **Mr. T. Holme**, who was manager of the system for forty-one years, was paid high tribute last week. A resolution of appreciation of his services is to be engrossed on vellum and presented to him.

The St. Pancras Finance and General Purposes Committee recommends that **Mr. W. H. Matthews,** commercial assistant, shall be appointed chief commercial assistant at a basic salary of £650 per annum, on a temporary basis. Mr. Matthews will succeed **Mr. J. E. Coode** who recently retired; he has been with the St. Pancras undertaking for twenty-six years.

Bedford Corporation Electricity Committee recommends the appointment of **Mr. F. G. Whitmore** as charge engineer at a salary of £420 per annum.

Mr. E. C. Mills, A.M.I.Mech.E., A.M.I.Mar.E., late of Holman Bros., Ltd., Camborne, now an associate of C. W. Glover & Partners, consulting engineers and architects, is also consulting engineer to Tubes & Fittings (Wholesale), Ltd., Bristol.

Mr. A. T. Haywood, who for a number of years has been manager of the Birmingham branch of Electrical Components, Ltd., has been appointed sales manager. **Mr. A. Baillie** (Leicester branch manager) and **Mr. G. H. Wells** (radio manager) have been appointed assistant sales managers.

Following a decision of the Industrial Court, Stirling Corporation Electricity Committee recommends the appointment of **Mr. Alexander Blewitt** as mains superintendent without charge of substations.

Mr. H. Emptage, lighting superintendent at Margate, who reaches retiring age in May, is to be re-engaged at his present salary.

Mr. H. F. Knell, who has been area manager and engineer to the Kent Electric Power Co., Ltd., since 1938, has been co-opted to the Chatham Borough Council.

Mr. W. S. Verrells has resigned from the chairmanship and joint managing directorship of E. K. Cole, Ltd. He is succeeded by **Mr. A. G. Allen,** D.S.O., M.C., who is already on the board and now becomes chairman.

Mr. J. F. Peaker, for seventeen years assistant manager and mains superintendent of Chesterfield Corporation Electricity Department, is retiring on April 15th. Mr. Peaker, who received his early training with Sheffield Corporation Electricity Department, was later employed in the undertakings of Sheffield (Tramways Department), Blackpool, Ealing, St. Marylebone, Mansfield and Mexborough. Consequent upon Mr. Peaker's retirement, **Mr. F. C. Gill,** A.M.I.E.E., has been appointed assistant manager and mains superintendent and **Mr. W. J. Jefferson,** A.M.I.E.E., has been promoted from distribution assistant to technical assistant (distribution). **Mr. E. V. Allsopp** becomes assistant mains superintendent and **Mr. S. Cooper** junior distribution assistant.

Mr. H. D. MacLaren, who, as we have reported, is succeeding Sir James Pringle as Director of Electrical Engineering at the Admiralty on April 1st, was born at Forglen, Banffshire, in 1898, and was educated at Fordyce Academy, Banffshire, and at Edinburgh University, gaining the B.Sc. degree in applied science. Subsequently he was a student apprentice with the B.T.H. Co. and went to the American General Electric Co., Schenectady, for two years on a B.T.H. Fellowship. Upon his return in 1935 he joined the B.T.H. staff but in the following year became assistant electrical engineer at Chatham Dockyard. From 1931 to 1933 he occupied a similar position in Ceylon and was then appointed electrical engineer in the Dockyard Department of the Admiralty. From 1937 to 1940 he was superintending electrical engineer at the Singapore Naval Base. Upon his return in 1940 he took up the position of assistant director of electrical engineering which he now holds.

During the last war Mr. MacLaren served in the R.N.V.R., R.N.A.S. and R.A.F. and was awarded the D.F.C. and the French Croix de Guerre (with palms).

Mr. H. B. S. Franks, A.M.I.Mech.E., A.M.I.E.E., is returning to Hull Corporation Electricity Department on April 1st, after three years' war service with the Air Ministry Directorate-General of Works, as assistant mechanical and electrical engineer. Mr. Franks obtained leave of absence from the Hull Corporation to go to the Air Ministry in March, 1942, and he has been responsible for Air Ministry mechanical and electrical engineering work in London, York, and for the last twelve months in Scotland.

Mr. T. Carmichael has been elected a director of the Yorktown (Camberley) and District Gas & Electricity Co., Ltd.

Obituary

Mr. E. A. Hounsell.—We regret to report the death of Mr. Ernest Alfred Hounsell, A.M.I.E.E., A.M.I.Mech.E., which occurred at his home at Hove on Tuesday last week. He was joint London manager for the Brush Electrical Engineering Co., Ltd., with whom he had been for over twenty-four years. Mr. Hounsell served an apprenticeship at the Lancashire Dynamo Works, Old Trafford, and then joined the Brush Company as an estimating engineer, ultimately going to the company's London office. He had borne his ill-health with great fortitude; he was working on March 19th and passed away in his sleep early the following morning. Many to whom he was a good friend will greatly miss him.

The late Mr. E. A. Hounsell

Mr. G. G. Thomson.—We are sorry to hear from Lieut.-Col. D. C. Thomson, engineer and manager, Walton and Weybridge U.D.C., that his brother, Mr. Gordon G. Thomson, of the Hong Kong Electric Supply Co., was killed in the Internment Camp at Hong Kong on January 16th, as a result of an Allied air raid. He had been a prisoner since December, 1941, and leaves a widow and two children, who are returning to England from Australia.

Mr. A. Clifford.—The death occurred recently of Mr. Arthur Clifford, who retired in 1939 from the position of deputy city electrical engineer of Nottingham, which he had held for seventeen years. He joined the Nottingham undertaking in 1899 as mains superintendent. He was seventy years of age.

CORRESPONDENCE

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

Training Apprentices

IF we are to put right the state of things complained of by Mr. Atherton in your issue of March 2nd, we must give more training on the practical side of electrical work and not so much on the academic. Boys come into the industry expecting that a National Certificate will cut out training with the "hammer and chisel." Many parents are amazed that the training of their clever sons has to begin by hard manual work, as they believe a knowledge of the theory of electricity to be a substitute for actually making or installing plant.

Both my sons have spent two years in a foundry. My managing director in those days said, "Why put them in the foundry; they can go into the drawing office." But they started at the right end. Now they are studying electrical and mechanical engineering. When that is completed they will do the electrical installation side under my tuition.

I was sent, fortunately, at the age of fourteen, into the foundry as my first stage in electrical engineering, and this took my mind away from the "collar and tie" drawing office notion, much to my subsequent financial advantage.

In electrical engineering we need more men like the late Mr. Howard Marryat, who "fathered" his apprentices and trained them practically and theoretically and turned out reliable men. When the electrical trade as a whole takes a similar interest in apprentices and spends more time on the practical side of that training than on National Certificate ideas, we shall have craftsmen with pride in the way their jobs are done.

Chard. JAMES SCOTT.

Joint Electrical Showrooms

THE indictment of the British electrical industry by Mr. Sadler (your issue dated March 16th), as run by private enterprise, is of considerable interest to one who for some years now has been of the opinion that in standardisation of design under common ownership and control lies the salvation of the industry.

Mr. Sadler himself stresses the point that a joint showroom would have to hold "a tremendously varied stock to cater for the whims of each individual contractor" and "this would lead to the keeping of a colossal number of spares for the servicing of the appliances sold." Quite; but suppose the consumer or customer is given a little thought for a moment. The thing to do surely is to produce an appliance which embodies all the best features and none of the snags of the "tremendously varied" designs at present on the market. This would effect a very real saving in manufacturing costs, and in marketing, and would give the consumer a lower-priced, efficient and interchangeable article. I submit that this is what the consumer wants.

Such a revolution in policy could only be carried through by common ownership and control of the industry. The industry will, at some time or another, have to face fierce competition from overseas, and now is the time to get its house in order.

Coventry. C. DOUGLAS-GREEN.

Steel-Cored Copper Conductor

IN the article entitled "System Maintenance" in your issue dated March 9th, I was incorrectly reported as having said that the company with which I am associated had found that wrapping the steel core of a steel-cored copper conductor with bitumenised tape had only increased the life of the conductor from seven to nine years. I should be grateful if you would correct this report, which may be misleading, as this undertaking has never used any steel-cored copper conductor with the core wrapped with a bitumenised tape.

What I actually said at the recent meeting of the Transmission Section of the Institution of Electrical Engineers was that this undertaking had found that coating the central steel strand of a low-steel-ratio 0·04 sq. in. steel-cored copper conductor with bitumen (not tape) only increased the life from approximately seven years to approximately nine years.

I further stated that I did not think that putting bitumenised tape round the steel core would help much, except possibly in the larger-sized conductors with two layers of copper wires.

Grantham. N. F. MARSH,
Engineer and Manager,
Mid-Lincolnshire Electric Supply Co., Ltd.

Standard Voltage

REFERRING to the article by Capt. J. M. Donaldson in your issue of February 23rd, the reason for adopting 220 V as standard at one time was probably that the arc lamp was used for lighting in large units.

An open-type DC arc lamp requires about 40 V for its operation, but if operated from a 40-V supply system it would take an initial current equal to thirty or more times the

normal. By raising the voltage to 55 and connecting a resistance in series, the initial current can be reduced to between three and four times the normal, so that for series operation the supply voltage should be a multiple of 55.

Similarly with the enclosed type of DC arc lamp, which requires about 80 V, by raising the supply voltage to 110 and absorbing the excess in a series resistance, the heavy initial current is again reduced to between three and four times normal. Hence four open or two enclosed arc lamps could be operated in series from a 220-V supply.

But why has the factor 55 been continued right through to the grid voltage?

Birmingham. B. J. VINE.

Universal Domestic Tariff

WITH reference to Mr. Crowsley's letter in your issue of March 16th, I must thank him for introducing the word "logic." I would ask him if it is logical (*a*) to expect a consumer with *five types* of heavy loading to use only 480 kWh per quarter; (*b*) to make statements (such as his second paragraph) which do not mean anything unless accompanied by a lot of qualifications; (*c*) to be surprised at a new and original tariff just because it differs from his experience of previous tariffs (admitted by the leading authorities to be unsuitable for use on a universal basis); and (*d*) to expect consumers to install five types of heavy load without a little encouragement which can be given without financial loss to the undertaking.

I do not claim for one moment that my proposed tariff is perfect since perfection cannot be achieved, owing to the numerous points of view involved. Consequently, I do not claim a complete absence of anomalous situations. The question which Mr. Crowsley ought to tackle is not the possibility of a few anomalies occurring, but whether the tariff does or does not fulfil the criteria laid down in the original article. If he can show where the tariff fails to satisfy these, then I should much appreciate his letters. I endeavoured to be constructive: if Mr. Crowsley can devise a better universal tariff I am willing to scrap mine.

Logic indicates that a universal domestic tariff is becoming increasingly necessary, but it also indicates that a universal tariff must contain the seeds of anomalous individual cases for the same reasons as apply to all existing tariffs. Nevertheless, logic demands that the trifling anomalies must be overlooked in the face of the important needs and therefore I trust that if Mr. Crowsley writes again he will view this tariff problem from a national, rather than a narrow parochial point of view.

Wolverhampton. J. L. FERNS.

Transport Co-ordination

THE commemorative address delivered by SIR CYRIL HURCOMB (chairman of the Electricity Commissioners) in London on March 22nd as part of the celebration of the twenty-fifth anniversary of the first public meeting of the Institute of Transport, reviewed the co-ordination of transport in Great Britain during the ten years since he delivered his presidential address to that Institute.

Brief reference to the wartime combination of the Ministries of Transport and Shipping, with a prediction that having been joined together they would not again be put asunder, was followed by reasons for the wartime control of railways. Sir Cyril then turned to internal co-ordination of public passenger and goods transport by road, indicating how the scheme of organisation had been elaborated as part of the war economy to ease the administrative load.

Bare mention of inland waterways led on to an outline of steps taken towards greater internal co-ordination of coastwise shipping, harbours and docks; with a note on the distribution of road mileage among various highway authorities. In the absence of the normal criterion of cost, allocation of traffic during the war in a way that had to differ from ordinary commercial transactions had not been an easy task. Government control policy aimed at the stabilisation of prices.

Sir Cyril was hardly yet able to judge how far wartime experiments and detailed arrangements devised temporarily to satisfy exceptional circumstances would provide anything of permanent value to the real economic co-ordination of transport. But the habit of co-operation in times of stress, added to the knowledge and experience gained, would surely contribute to fairer prospects of greater agreement on both principles and methods.

Sweden's Railways

THE electrification of the Swedish State Railways has saved seven million metric tons of coal during the war, and 2,000 new locomotives would have been required in order to maintain by steam operation the present practically unrestricted traffic. This information was recently given by Th. Thelander, head of the Electro-technical Department of the State Railways, in connection with the thirtieth anniversary of the completion of the first electric line in the country. The anniversary coincided with the inauguration of the newly-electrified section between Ostersund and Jerpen in the North-Swedish province of Jemland, which later this year will be extended up to the Norwegian border.

The Swedish State Railways are at present operating about 11,650 km. of the country's 17,000 km. railway system. Over 4,600 km. of the State lines have already been electrified and further sections are under construction, although the shortage of materials, especially copper, has hampered activities. In 1915 the energy consumption amounted to 8 million kWh and in 1940 it had risen to 667 million kWh. For 1945 the consumption is estimated at 915 million kWh Of the total traffic capacity of the State Railways 86 per cent. is at present handled on electrified lines.

Welding Repairs

Development of New Processes

By C. W. Brett

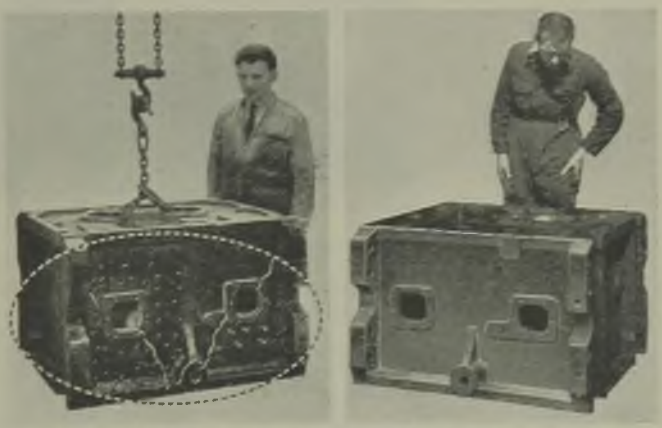
RESEARCH has enabled remarkable feats of repair and maintenance by welding to be carried out, not merely as a wartime expedient but with a permanence that equals the life of the machine concerned. Welding work regarded as virtually impossible a few years ago is now commonplace. Great thicknesses of metal can be handled successfully. The need for pre-heating cast and malleable iron has been overcome. Metals as dissimilar as steel and aluminium can be reliably welded together, changes in technique have materially reduced the time occupied by operators and whilst the same degree of skill and experience is demanded the cost of the work is lower.

With the use of X-ray apparatus no flaw, however minute, can remain hidden—a factor of inestimable value in the case of pressure vessels and steel structures. Photographic film is now available for practically all purposes whilst portable equipment can be used for testing site welding. A deficiency at any point can now be cut out and re-welded. Inspection photographs of two welds, one behind the other, if taken straight through, would show inconclusive results, as one weld would appear on top of the other. Exposure can, however, be made in an oblique direction to show both welds separately. The X-ray testing of welds is not restricted to ferrous metals

Whilst a large proportion of repair work consists of reuniting fractured components, many items are simply worn or corroded. In such cases weld metal is selected of a type and quality from which better service can be expected than by a more expensive renewal of the original item. Moreover delays are avoided, as normally twenty-four hours suffice even when some machining is involved.

In welding copper some of the problems involved are due to the high heat conductivity and comparatively low melting point of the metal. In other words there must be surplus heat to counteract the loss due to rapid conductivity. On the other hand temperatures must not be too high, because of the gases given off by copper when molten. This metal absorbs carbon monoxide and hydrogen readily but these gases are given off again when the metal commences to solidify. Should they be trapped, the weld will be porous. Furthermore, the tendency to rapid oxidation of copper when hot needs to be controlled, otherwise its mechanical characteristics can be affected detrimentally. An additional obstacle is the high co-efficient of expansion and contraction. These difficulties have, however, been overcome and the welding of copper is now a subject of British Standards. Success is largely due to the introduction of "deoxidised" copper welding rods. The carbon arc, as distinct from the metallic-arc welding process, is frequently the best for welding copper. Bronze, brass and the copper-silicon-manganese alloys can be welded by a similar technique.

Only within comparatively recent times has it become possible to weld aluminium to ferrous metals or to weld magnesium alloys. In both cases primary progress was due to the development of a suitable flux, but more recently in welding magnesium alloys the need for flux has been eliminated. The arc is surrounded by a field of helium or argon and the tungsten electrode is non-consumable, as in spot welding. These results are all the more remarkable in view of the inflammable nature of magnesium.



Diesel-engine cylinder heads with cracked water jackets, repaired by welding

The great extension of welding in ship construction is partly due to the introduction of new technique. A series of layers gives a

better result than one heavy deposit, because each layer normalises the preceding one. Where this high standard is not essential, welding can be done in about a quarter of the time, or even less, by the use of a large electrode, a heavy deposit of metal and very high amperage. Several of these new welding processes are practically automatic and labour can rapidly be trained to operate them.

A new process that is now being watched very closely by all concerned with quantity production entails the use of a refrigerating medium, such as calcium chloride brine at 0 deg. F., instead of water for cooling the electrodes of spot-welding machines.

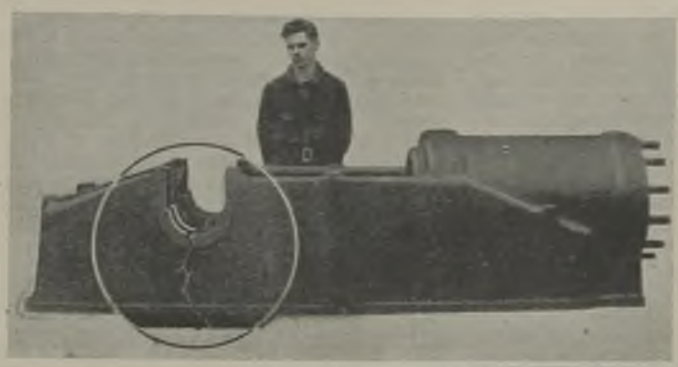
Spot welding has largely taken the place of riveting in the construction of aeroplane components. It is highly successful with aluminium, but interruption in production occurs because of the necessity for constantly cleaning the copper electrodes. Closer control of electrode temperature by means of refrigeration greatly reduces this weakness.

Automatic or semi-automatic welding machines are also being used for reconditioning work, such as the building up of worn tracks of railway wheels.

The kind of repairs to electrical machines often needed is exemplified by an AC motor the frame of which had broken away from the feet as a result of an attempt to lift the motor without unbolting it from the foundation. Repairs were completed within forty-eight hours without disturbing the windings.

Presses of a type frequently used for the production of electrical goods often suffer through mistakes of the operator. In repairing the damage the opportunity is sometimes taken to strengthen the press so that it can undertake heavier work. An extension of this idea is the application of welding to modifications of plant. Fabricated steel plate takes the place of castings and is far less costly if only one or a few off are required, as it avoids the cost of patterns. It will not, however, supersede foundry production on a basis of cost when there is reasonable repetition, although welding implies weight reduction.

Another example of quick repair work is provided by an 80-HP single-cylinder horizontal oil engine which, being used for charging a battery, could not be permitted out of use for a long period. Its base, weighing 2 tons, developed a crack running from the main-bearing housing down the side of the casting through metal varying from 1 in. to 3½ in. in thickness. The accuracy possible with welding is exemplified in the dependable reuniting of broken crankshafts.



Damaged bedplate of a 80-HP horizontal oil engine which was expeditiously restored to service

Not long ago the cylinder heads of a Diesel engine were cracked. Each head weighed 2 tons and in this instance the damage was in the jackets. Attempts at repair by patching failed, but welding was entirely successful. Sometimes fracture occurs between the valve seats, in which event it is generally unsatisfactory to weld after preparing the fault by veeing. The proper procedure is to remove all metal that, in view of high temperatures and heavy stress, has become denaturised and to replace it with new material, thus making the repair permanent. If cracks occur at points inaccessible to the operator, a portion of the jacket can be removed and invisibly replaced when the primary repair is completed.

Contractors as Retailers

Grasping Post-War Opportunities

By C. J. B. Barlow, M.I.E.E.
(Warrington Electrical Co., Ltd.)

AFTER the war the demand for domestic electrical appliances will be unprecedented. The manufacturers will require to produce quantities greater than ever before to cater for that demand and we must first realise that this great output is actually going to be sold to the public. Will the electrical contractor go out for that business in a far more energetic manner than ever before? I firmly believe he will because he is realising the possibilities of such business. More electrical contractors will open new retail shops and those who already have them will set about greatly improving them and making them more attractive. These establishments should, of course, be in the main shopping centres wherever possible.

A Big Market

Where is this business to come from? Thousands of homes are wanting to buy electric kettles, irons, radiators, refrigerators and lots of other electrical apparatus. Those of us who already have retail establishments know this only too well. But we must get right at the front with good premises, adequate displays, and good and clean stock. The average housewife, and many husbands, too, will have had a hard time with little help in their homes and they are at present looking for ideas and are anxiously awaiting the time when they can improve their home conditions by the purchase of more electrical equipment. Then there are the many thousands of new houses and new homes which will be started. However well equipped these are in the first instance by the builders, there are certainly very many other electrical appliances which they will want and will buy. It is a big market.

The Electrical Contractors' Association has formed the National Committee for Retail Trade, of which I am a member. It is realised that the public will prefer to buy their electrical apparatus where they can get technical advice, and the electrical contractor-retailer is in a far better position to give this than any other type of retailer. There will be a great deal of competition. In my opinion the electrical contractor in the past has let this competition get too far ahead and has given it undue weight, to his own detriment. But this is going to be altered and I do not think that I am mistaken in feeling that the manufacturers will give us their blessing and afford us adequate support. I feel that if we fulfil our duty to the public, and I emphasise our *duty*, then the public will give us their support because we are obviously the most suitable avenue for the marketing and selling of electrical equipment through our numbers and our training. In addition to domestic electrical equipment there are other sections which should be considered, such as the industrial appliances, including electric tools, etc. There are, of course, certain aspects of unfair competition at present existing which will have to be altered, to, I think, the advantage of all concerned, including the public.

There are many electrical contractors who are in the front rank of electrical engineers, and have considered retailing or shopkeeping a little beneath their dignity. There is, however, a new outlook to-day, and the public is going to be much better served by these electrical engineers who will give their attention to the retailing of electrical equipment. This will have an influence on the general public attitude towards our industry.

In pre-war days many electrical contractors opened good and sometimes very elaborate electricity showrooms. These, I think, could seldom be made to pay if considered as separate departments with their correct overhead charges. The knowledge we now have teaches us that we must largely forget or drastically alter most of these premises. A retail shop with a good counter trade can be a money-making proposition after this war: a shop where one can buy almost everything from a torch battery to a refrigerator. A showroom may often be combined with it with advantage, but the first consideration is the retail shop into which the public will not hesitate to enter for the many modest purchases they so very often make.

Joint Showrooms

Individual effort is to be encouraged. But where individual effort is not strong enough to open up in a main shopping centre, it is strongly advisable to consider a joint showroom, and I see no reason why a number of these in various towns should not be successful. There are many snags, but none that I know of which could not and would not be overcome by men of goodwill and ability. The contractors in at least one town are going ahead with such a scheme and they are most enthusiastic about it.

Service in maintenance and in repairs, in particular, is a matter in which manufacturers ought to take considerable interest. It is of primary importance to the public. The new post-war retailer will have to give very special attention to this. The work must be carried

out by competent, trained employees, it must be prompt, and it must be done to give general satisfaction.

I have not touched on hire-purchase or radio retailing, both of which are matters which can be of material assistance when properly organised. There are other aspects in regard to this retailing such as joint advertising, approved apparatus, distinguishing signs for shops, etc., all of which will have consideration in the post-war era. Every electrical contractor and particularly those in the Association will have to give these matters very careful thought and attention.

Securing Economic Balance

The British Commonwealth and the World

AT a meeting of the Royal Empire Society on March 21st, Sir George Nelson, M.I.E.E., president of the Federation of British Industries, gave an address on "The British Commonwealth in Relation to the Great Economic Units of the World." In the course of this he said that the first major problem was to establish plans for the prevention of aggression. Assuming that these steps would be taken he wished to draw attention to the major future economic problems on which stability of employment for the peoples of the Empire must depend.

A predominant problem was that associated with the development of great economic units in the world. While this development could be of great service to the necessary expansionist policy, it had its dangers if these units were not properly balanced. Sir George referred to the United States, which was the greatest producing unit of the world and was able to manufacture many articles cheaper than they could be produced in the British Commonwealth, in spite of high wages, because this production was based on a great home consumption. Then there was Russia, with great natural resources but needing considerably increased transport and power and industrial development to raise its standard of living. Being rightly determined to proceed rapidly with this development Russia would in due course become a very formidable economic unit because here again production would be based on a great home demand.

With regard to the rest of Europe, embracing a population of over 400,000,000, if there were to be happiness and economic stability it seemed that it would be necessary to organise economic zones. Eventually China would become a further great economic union of states with a potential home demand which would enable economic producing units to be established.

Co-ordinated Plan Needed

He suggested that the competition from these great units would be a great danger to the stability of employment and the standard of living of the countries of the British Commonwealth unless some co-ordinated plan was embarked upon. Conditions in Great Britain were such that if it attempted to live on an internal economy it could not sustain a population of more than 20,000,000. Similarly each country of the British Commonwealth, except India, had a relatively small population. India, however, had a huge population of 350,000,000, with great resources, but its industrial development had not yet been undertaken sufficiently. How much surer would the future peace of the world be if, while each part retained its own Government, the economic development of the British Empire was co-ordinated in such a way as to make it an economic unit similar to the others to which he had referred. Sir George said that within its boundaries were all the resources of population, food and minerals, and being spread all over the world it had great strategic strength.

This country could claim to have shown the world the advantages of scientific and technical development and the world, including Empire countries, had followed our precedent by developing their own industries and distributing goods according to their own needs. We in this country must not underrate the effect of these aims of the Dominions on our own economy, but there were no grounds for pessimism if we carefully studied the subject with the determination to use such resources as we possessed to our own and to the Dominions' mutual advantage.

Double Taxation

One matter that had discouraged manufacturers to establish works overseas had been the fact that they were subject to double taxation. Representations had been made to the Chancellor of the Exchequer who he hoped would be able to secure a satisfactory response from the countries concerned.

Sir George said that he sincerely hoped that the day would arrive when the countries of the Empire would get together to work out a solution of this economic co-ordination on which the destiny of the Empire and the good of the world would ultimately depend. He concluded with a reference to the structure and work of the Federation of British Industries.

Future Power Position

SPEAKING at a lunch held by the I.E.E. Scottish Centre in Glasgow on March 17th, MR. T. G. N. HALDANE, vice-president of the Institution, said there was going to be a very great demand on the electricity supply industry in the post-war era. During the war years we had been unable to replace power plant, and there had been very little building of new stations, yet we were now at a point where enormously increased quantities of electricity would be required. During the past winter the load had to be cut by several hundred thousand kilowatts and it was likely that next winter the situation might be more difficult. Mr. Haldane said he hoped the water power of Scotland was going to play a considerable part in helping to extricate the industry from these serious difficulties, but there seemed to be a certain section of opinion in Scotland which was not very favourable to utilising these water power resources.

COMMERCE and INDUSTRY

London Electricians' Wages. Export Market Study.

War Damage Insurance

THE Board of Trade announces that all policies under the Business Scheme (War Damage Act, 1943) which are in force on March 31st will be extended until June 30th without further payment of premium or further action on the part of policy holders. For new or additional insurance under the Scheme the rate of premium for the three months April 1st to June 30th will be 1s. 8d. per cent. with a minimum premium of 5s.

Scottish Hydro-Electric Rating

The Scottish Grand Committee of the House of Commons has passed the Hydro-Electric Undertakings (Valuation for Rating) (Scotland) Bill. No substantial amendments were made to the Bill. An attempt by Commander Galbraith and Mr. Erskine Hill to secure the inclusion of the works of the British Aluminium Co. in the operation of the measure was unsuccessful. Mr. T. Johnston (Secretary of State for Scotland) said that the principle of the Bill was to pass on the benefit to consumers; it would be impossible for the company to pass it on to the consumers of aluminium.

Plugs and Sockets

In Post-War Building Study No. 11 the Study Committee (Electrical Installations) recommended the adoption of a standard 3-kW 230-V plug and socket. The matter is now under consideration by the appropriate Code of Practice Committee and in this connection Major R. Amberton of Dorman & Smith, Ltd., sends us a copy of an analysis of the subject which he has addressed to members of the Committee. This traces the past history of the plug and socket question and quotes reference to it in the above-mentioned Study, and the Housing Manual. It also sets out a number of considerations including interchangeability, wiring and fusing, the case against "uprating," safety, the views of the electricity supply industry and electrical contractors, what the housewife wants and an "epilogue" summing up the case in favour of the standard plug and socket.

Contracting Industry Wages

We are informed by Mr. L. C. Penwill, director and secretary of the Electrical Contractors' Association, that the National Joint Industrial Council for the Electrical Contracting Industry at its meeting on March 13th, decided that there should be an increase of ¾d. per hour on the basic Grade "A" (London) rate. This increase, which comes into operation on the third pay day in April for the pay period covered by that pay day, has the effect of increasing the Grade "A" (London) stabilised rate (as defined in the Wages (War Adjustment) Agreement of November 24th, 1939, to 1s. 11¼d. per hour. To this rate the appropriate cost of living (war) addition must be added.

The amount of the present cost of living (war) addition is applicable up to and including the second pay day in April. A declaration as to the hourly rate as from the third pay day in April will be circulated as soon as the appropriate Ministry of Labour return is available.

The above increase correspondingly alters the wage rates of Categories II and III (labour under 21) and a new schedule is circulated.

The following publications have been issued by the National Federated Electrical Association, Africa House, Kingsway, W.C.2:—

(1) A 44-page booklet, dated January, 1944, entitled "Industrial Agreements and National Working Rules" inclusive of the amendment slips mentioned below (1s. per copy). (2) Amendment slips (Reference "A" to "G" inclusive), bringing the contents of (1) up-to-date to May, 1944 (6d. per set). (3) Amendment slips (Reference "H" to "O" inclusive) which, together with (2) bring these booklets up-to-date to October, 1944 (6d. per set). The publications are available to any bona fide inquirers and the charges indicated include postage. Applications must be accompanied by the appropriate remittance.

Exports to India

The Government of India has issued a general open licence (No. VII) which enables Indian concerns to import a wide range of goods from the United Kingdom without securing a special import licence. Two of the items in the list are electrical household appliances and radio receiving instruments and parts.

This action, which has been rendered possible by an improvement in the shipping situation, will, it is hoped, enable United Kingdom firms to increase their trade with India as goods become available.

Export Market Research

Electrical concerns are prominent in the list of British industrial undertakings which have combined to form the British Export Trade Research Organisation. These include the General Electric Co., Ltd., the Automatic Telephone & Electric Co., Ltd., British Insulated Cables, Ltd., the Marconi Company, Tube Investments, Ltd., Cable & Wireless, Ltd., and the Pressed Steel Co., Ltd. Among the members of the "formation committee" are Mr. L. C. Gamage (G.E.C.), and Mr. F. C. Burstall (Automatic Telephone & Electric); the chairman is Mr. Ivor Cooper (Lever & Unilever).

The organisation's work will primarily be the study of overseas markets for which purpose it will employ field staffs and marketing investigators. The subjects covered will include consumers' tastes and requirements; the special characteristics of each market—economic, commercial and social; methods of marketing, including publicity and advertising; transport and distribution; trade customs; financial and insurance facilities; and Governmental regulations affecting trade.

The information will be collected and collated by the organisation's head office and disseminated in the form of publications or on

special inquiry and it is intended that special investigations shall be carried out for members.

A company is to be formed, limited by guarantee, to operate on a non-profit-making basis. The founder members have undertaken to subscribe £500 a year for three years after which they will become ordinary members, the yearly subscription for whom is £100. Mr. Leslie Gamage said last week that it was the duty of leading industrial concerns to assist the new organisation, for the benefit of British industry as a whole, by becoming founder members.

Dr. Dalton at Switchgear Works

Dr. Hugh Dalton, President of the Board of Trade, recently visited the works at Treforest of South Wales Switchgear, Ltd. During his visit he closed what is claimed to be the first 11-kV, 150-MVA spring-operated breaker made in Wales. The accompanying picture shows a group in the factory during the visit, including Sir George Usher, chairman of the company and managing director of International Combustion, Ltd., on the left, Dr. Dalton; Mr. E. Brunning, Factory and Storage Control Officer for Wales; Sir Gerald Bruce, Lord Lieutenant of Glamorgan; Mr. A. J. Nicholas, general manager of the company; and Mr. R. J. Humphreys, Regional Controller for Wales, Ministry of Labour. In the photograph Dr. Dalton is looking at a chart showing the progress of the company during the last three years, during which the number of employees has increased ten-fold.

[Group including Dr. Hugh Dalton and Sir George Usher at South Wales Switchgear works

Allocation of Factories

Referring to the Board of Trade allocation of Government factories for peacetime production (*Electrical Review*, March 23rd, p. 427), Brookhirst Switchgear, Ltd., say that in their case the statement refers to the small factory adjacent to their main switchgear works, at present engaged upon special stores. The main works will be fully engaged upon the production of switchgear for war purposes until war demands are fulfilled.

Shellac Importation

It has been decided to resume the importation of shellac on private account into the United Kingdom. Accordingly the Ministry of Supply will cease to buy shellac in India on public account as from March 31st, and thereafter private traders may purchase in India for shipment to this country subject to the Government of India Lac Export Control Order, 1944. Applications for import licences should be made to the Import Licensing Department, Board of Trade, 1/6, Tavistock Square, London, W.C.1. The existing arrangements for the distribution of Ministry of Supply stocks through the Shellac Distributing Agency, Ltd., will remain unchanged for the time being.

Training Young Engineers

Referring to the series of articles upon the education and training of engineers which we published a few months ago, the Stanton Ironworks Co., Ltd., mentions a training scheme which it inaugurated in 1918. Under this scheme junior employees have been assisted in continuing their education after joining the company. Both boys and girls have attended technical and commercial courses and where they have shown particular ability they have been released for part-time day instruction. The company has met the cost of the classes, travelling expenses and examination fees. Textbooks, instruments and stationery have been provided at half cost and a large sum of money has been distributed as prizes for good reports and examination successes.

The company has recently decided to develop this scheme and has sent us a copy of a booklet which it has prepared describing a number of works courses available to boys and girls in its employment. These include a pre-trade apprenticeship course for boys under 16; a trade apprenticeship course; learnership, occupational and general training courses open to entrants under 21 years of age; a special apprenticeship course; and a university entrance course. In addition to these, there are two special courses for employees wishing to take up laboratory, analytical, research or metallurgical work; courses of training for office employees; for salesmen and sales department staff; and three special courses for girls. The brochure contains a number of illustrations of various departments of the works.

Engineers' Wages and Conditions

At a meeting between representatives of employers and trade unions in the engineering industry the employers replied to the claim of the unions for higher wages, a forty-hour working week after the war, payment for statutory holidays and twelve days' annual holiday with pay. Sir Alexander Ramsay said that the employers were satisfied that the country was already so heavily committed to its people and their security that no other substantial risks should be taken until these obligations had been fulfilled. We could not endanger our future prospects by adding to our industrial

liabilities. On behalf of the Engineering Joint Trades Movement, Mr. J. Tanner (A.E.U.) said that the wages dispute would be reported to the Ministry of Labour for reference to the National Arbitration Tribunal. The Joint Movement would review the claims with regard to working hours and holidays. He said that it was a very serious matter that the engineering worker should have to depend so much for a decent standard of life on overtime earnings. The average district minimum rate, exclusive of overtime and other extra payments, was £4 11s. 6d. for skilled workers and £3 15s. 6d. for unskilled.

Electrical Visitors

For the benefit of the American and Dominion forces in this country a course in electrical engineering was organised by the British Council and the I.E.E. South Midland Centre at the University of Birmingham from March 13th to 17th. Lectures on supply matters were given by Mr. F. W. Lawton, city electrical engineer, Birmingham, and his deputy Mr. D. Sayers, on post office communications by Mr. W. H. Brent, and on works installations by Mr. F. C. Platt, chief power engineer of Guest, Keen & Nettlefolds, Ltd. Works visits were arranged to the G.E.C., Ltd., at Witton, Hams Hall power station, a telephone exchange and I.C.I. Metals, Ltd. Varied social activities completed a very full programme.

Trade Publications

British Insulated Cables, Ltd., Prescot, Lancs.—Descriptive list N.S.G.10 on earthing. This refers to a number of publications on the subject and contains data on soil resistivity, resistance of electrodes, effect of time-delay protective devices, voltage gradients and choice of electrodes. It also illustrates and describes the company's earthing conductors, earth rods, plates and pipes.

Allen West & Co., Ltd., 32, Old Queen Street, London, S.W.1.—Leaflet No. 1724/E/1, containing a reprint of an A.S.E.E. paper by Mr. S. H. Harding, on "A Comparison of Starting Methods for Three-phase Squirrel-cage Motors."

Applications for these publications should be made on business letter-headings.

TRADE MARKS

THE following applications have been made for trade marks. Objections may be entered within a month from March 21st :—

FEDERAL. No. 631,262, Class 9. Radio transmitters and receivers, and parts thereof not included in other classes; electronic valves, current rectifiers, battery chargers, electronic amplifiers, piezo-electric crystals, battery eliminators, antennæ and switches; telephonic and telegraphic apparatus, and parts thereof not included in other classes; cables and conductors.—Federal Telephone & Radio Cpn., 591, Broad Street, Newark, New Jersey. Address for service: c/o E. B. Robinson, Connaught House, Aldwych, London, W.C.2.

GREMLIN. No. 632,062, Class 9. Electrical apparatus and instruments not included in other classes.—David Langlands, Grovelands, Orchard Grove, Orpington, Kent.

Forthcoming Events

Tuesday, April 3rd.—*Manchester.*—Engineers' Club, 6 p.m. I.E.E. North-Western Centre Installations Group. "Organisation of Industrial Electrical Maintenance," by J. C. B. Nicol.

Birmingham.—James Watt Institute. Electro-depositors' Technical Society (Midlands Centre). "Plant Layout," by Dr. S. Wernick.

Birmingham.—Birmingham Electric Club. "Automatic Control Devices," by A. M. Craig.

Wednesday, April 4th.—*London.*—Institution of Electrical Engineers, 5.30 p.m. I.E.E. Radio Section and the Television Society. "Studio Technique in Television," by D. C. Birkinshaw, M.B.E., and D. R. Campbell.

Birmingham.—James Watt Institute, 6.30 p.m. Junior Institution of Engineers (Midland Section). "Modern Underground Electric Traction," by N. R. Holbrook.

Thursday, April 5th.—*London.*—Institution of Electrical Engineers, 5.30 p.m. "The Place of Radiant, Dielectric and Eddy-Current Heating in the Process Heating Field," by L. J. C. Connell, O. W. Humphreys and J. L. Rycroft.

Friday, April 6th.—*London.*—Institution of Electrical Engineers, 5.30 p.m. Measurements Section. Discussion on "Are Engineers Losing their Sense of Proportion on the Accuracy of Industrial Measurements?" to be opened by H. D. Hawkes.

London.—39, Victoria Street, S.W.1, 6.30 p.m. Junior Institution of Engineers. "Quality Control," by Dr. B. P. Dudding, M.B.E., assisted by W. J. Jennett.

Glasgow.—University (Natural Philosophy Department), 7.30 p.m. Institute of Physics (Scottish Branch). "Theoretical Interpretation of Alloy Structures," by Dr. W. Hume-Rothery. Meeting open to visitors.

Nottingham.—Corporation Gas Showrooms, 5.30 p.m. Illuminating Engineering Society (Nottingham Centre). "Lighting in Hazardous Situations," by S. W. Richards.

Bristol.—Radiant House, Colston Street. Illuminating Engineering Society. "Stage Lighting," by Gillespie Williams.

Saturday, April 7th.—*London.*—Bonnington Hotel, W.C.2, 2.30 p.m. Institution of Factory Managers. London Branch meeting.

Leeds.—Y.M.C.A., Albion Place, 4 p.m. The Engineer Surveyors' Association. "Turbo-electric Drives in Mills" (illustrated), by F. R. Mason.

Bristol.—At 3 p.m. I.E.E. Bristol Students' Section. Students' Lecture, "The Cathode-ray Tube and its Applications," by Dr. W. Wilson.

Monday, April 9th.—*Newcastle-on-Tyne.*—Royal Station Hotel. I.E.E. North-Eastern Centre. Annual general meeting followed by informal conversazione.

Bristol.—I.E.E. Western Centre. "A Survey of the Problems of Post-war Television," by B. J. Edwards.

Tuesday, April 10th.—*Glasgow.*—Royal Technical College, George Street, 6.15 p.m. I.E.E. Scottish Centre. Informal paper on "Plastics for the Engineer," by Dr. P. D. Ritchie and W. A. Kirkwood.

Saturday, April 21st.—*London.*—Connaught Rooms, W.C.2, 1 for 1.30 p.m. Junior Institution of Engineers. Annual luncheon.

Views on the News

Reflections on Current Topics

MR. C. A. Cameron Brown, who has just been appointed by Edmundsons to superintend their extensive rural development programme, has spent many years at what was at first a rather uphill job. But there has been a change in recent years in the farmers' attitude towards electricity. In fact they have probably gone too far and expect electricity to do everything for next to nothing. It will be part of Mr. Cameron Brown's work, not exactly to disillusion them, but at least to bring them down to earth—and farmers, above all people, should appreciate this. I see that Mr. C. B. was speaking at an I.E.E. meeting at Chester last week when he paid a well-deserved compliment to that city as a pioneer of rural electrification, under the guidance of Mr. S. E. Britton, who was also present at the meeting. Mr. Britton said that of the eighty-nine parishes in the city's area of supply thirty-three were "100 per cent. electrified." They now had 5,247 rural consumers and supplied 950 agricultural holdings.

* * *

Apart from the anticipated rise in the status of the refrigerator to the position of being an essential part of the house of the future, a considerable expansion in the "frosted food" idea can safely be forecast after the war. Introduced a few years before the war, this system provides for the rapid freezing of foodstuffs to a temperature of 40 deg. F. and then distributed in refrigerated vans to special containers in retailers' shops. Foods thus treated can be kept indefinitely and it is quite possible to have, say, strawberries at Christmas barely indistinguishable from fresh. So far in this country fruit and vegetables have been the only items marketed on a commercial scale, but in the U.S.A., I believe, upwards of a hundred different foodstuffs have been successfully dealt with, including some complicated dishes requiring a considerable amount of time and trouble to prepare. This opens up a promising new outlook for the housewife.

* * *

When manufacturers come to change over from war to peacetime production they will not find that the break in their normal manufacture has been entirely to their disadvantage. Besides giving them an opportunity to discontinue out-of-date lines and to concentrate on new designs, their wartime experiences will have taught them a great deal, particularly in the matter of mass production. There is now a complete change in the attitude regarding tooling-up. To-day wideawake manufacturers do not try to save money on tooling-up but consider how much can be usefully spent on it, and it has been proved beyond doubt that a little extra time and attention given to tooling-up and arranging layouts pays handsome dividends.

* * *

The Romans (at least the wealthier ones) guarded themselves against the British climate rather more effectively than we British do. They introduced the hypocaust or under-floor heating system in their villas: there is a good example at St. Albans (Verulamium). Thus, Mr. L. H. Keay, the Liverpool city architect and director of housing, is not an innovator when he proposes to install under-floor ducts in his Corporation bungalows through which electric fans will drive heated air from a coal-fire grate. But it's a pity it has to be a coal fire.

* * *

There seems to be a general impression that there is novelty in the Severn Barrage idea, but this is dispelled in a recent issue of *Everybody's*. According to the author of an article on tidal power, in the Shannon Scheme "huge turbo-generators do indeed seize the racing Atlantic waves, translating them into electric current to provide power for nearly the whole of Eire." A picture of the Ardnacrusha control room is said to show "the heart of a mighty scheme to regulate for the benefit of mankind the tremendous power released by the tides of the earth." The Irish were always great leg-pullers; have they been at it again?

* * *

Ever since I read in the March *A.E.I. News* that the girls in the Main Progress Office of the B.T.H. Works, Rugby, had organised a beetle drive in aid of the Red Cross Prisoners of War Fund I have been wondering. Were the beetles made to race—rather slow unless flying varieties were used—or were they caught, crushed and counted? But apart from coleoptera, there is a heavy mallet of the same name. Did those girls . . . ? I give it up.

* * *

I rather like the story published in the *Manchester Guardian* one day last week. A customer who was in a hurry was told by a manufacturer that delivery was delayed by shortage of labour and Government priorities. In exasperation the customer asked for his order to be cancelled at once, only to be told that it was impossible to cancel the order at once—it would have to take its turn.—

REFLECTOR.

A Vital Service

Functions of the Technical and Trade Press

THE Council of the Trade and Technical Press, which represents over 200 journals covering every branch of industry in Great Britain, has produced a booklet setting out the part which the technical and trade Press must play in helping to secure maximum industrial efficiency and in making British industry's achievements and abilities known to the world.

While trade and technical papers give current news of their industries and of matters which have an influence upon those industries, they do more than this. They deal with scientific progress and improvements in design, materials, equipment and production methods. They cover the whole field of information required by manufacturers, by their suppliers and by those whom they supply. Each copy of a technical journal has many readers so that its actual circulation is not a true measure of its influence.

Post-War Home and Export Trade

In post-war trade it will be essential for manufacturers to be acquainted, at the earliest moment, and regularly, with all relevant data regarding new design and production methods, especially if they are embarking upon new lines. Thus it is vital that technical journals should be able to obtain and publish all the information required. In export trade the technical Press will play an even more important part. To the reader abroad these journals mirror the whole of the progress in this country of scientific research and developments in production methods and he is thus enabled to judge whether Great Britain is able to meet his requirements. For this reason the publishers of technical journals should be in a position (which they are not at present, unfortunately) to produce publications which in content and appearance compare favourably with those of any other country.

Trade journals are directed to the distributor and may be as important to him as transport for they enable him to select and acquire the goods which he wishes to obtain for his customers. During the war the trade Press has rendered indispensable service by acting as interpreter and intermediary between the Government and individual distributors. Without such assistance, rationing, price regulation, zoning and purchase tax, to take but four examples, could not have operated without serious risk of breakdown.

As regards home trade, war exigencies have caused the virtual disappearance of sales organisations and so, as supply begins to meet demand, the trade journal will become increasingly essential to the manufacturer as a means of communication with his distributor, and to the distributor as a means of knowing and judging what the manufacturer has to offer. As with technical journals, the trade Press has an important function to perform in overseas markets in the building up of British export trade.

The Press and the Government

The booklet stresses the importance of British technical and trade journals as media for advertisements—as a means of preparing the ground for the sale of British goods. It is hoped that the Government will take a more active interest in the expansion of British trade but it is stressed that Government-produced propaganda cannot be so effective as the work of the technical and trade Press.

At the present time this Press is in an unenviable position. Its basic paper ration for over three years has been only about one-fifth of its pre-war consumption and paper quality has deteriorated. In the United States, on the other hand, some widely-distributed trade journals have actually increased in size.

The Council says that the technical and trade Press asks the Government for additional paper of a quality which will stand comparison with that used by foreign journals, as a means of meeting the demands of those who need the journals, at home and overseas; the early release of skilled paper makers, printers and block makers, as well as experienced technical and trade key men to supplement overworked editorial staffs and re-establish contact with industry; high priority for the provision of new and up-to-date printing machinery; the release of full information about British wartime discoveries and inventions; and close collaboration with the Government at home and its commercial representatives abroad which has long existed in other countries.

Those conducting trade and technical journals, says the Council, are fully alive to their responsibilities and are determined to make the British technical and trade Press the best in the world.

Radio Set Accident.—A verdict of accidental death was passed at an inquest at Swansea recently upon David J. Williams. It was stated in evidence that the deceased was found holding a flex which had just been disconnected from a radio set. He had apparently plugged it into a socket and had hold of the ends while the power was switched on.

Lead Cable Sheaths

Securing Improved Structure

By C. J. Beaver, M.I.E.E.

IT is more than forty years since the writer came to the conclusion, from practical experience, that a large portion of the defects which occurred in lead cable sheaths was due to non-union of succeeding charges in the lead press container. This non-union is caused by the slight film of oxide on the surface of the expressed charge, due in turn to its temporary exposure to atmosphere under elevated temperature conditions. The cleavage surface thus formed between the charges becomes distributed over a certain length of the pipe, causing laminations (usually traceable in a cross section of the pipe as tongues) which may sometimes break through to the surface of the pipe.

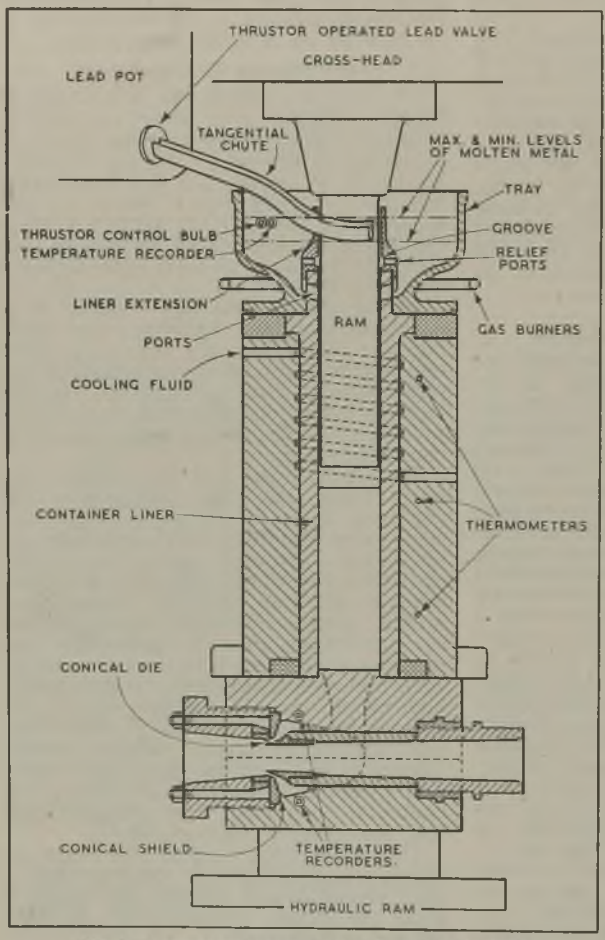


Fig. 1.—Lead press incorporating Farmer principle

The writer's method of dealing with this part of the problem was to melt the surface of the finished charge so that the succeeding charge, poured into the container at a suitable temperature, would amalgamate with the preceding one, the oxide film becoming dispersed in the mass of metal. This superficial melting of the lead surface was accomplished by the use of a circular oxygen-coal gas burner, which was lowered into the container for a definite short space of time, the new charge of molten lead being immediately poured.

The method, though relatively very successful, could not attain perfection for two general reasons:—(1) It could not *prevent* the formation of an oxide film on the surface of the expressed charge, but could only disseminate it in the new charge; (2) the operation was always more or less subject to the "human element."

In an article by the present writer which appeared in the *Electrical Review* of June 1st, 1934, a brief description was given of a design of lead press in which these shortcomings were obviated. This design was based on British Patent No. 394,427, granted to C. S. Farmer in 1933, and subsequently acquired by W. T. Glover & Co., Ltd.

The present-day development of the primary design effectively deals with points (1) and (2) above referred to. With regard to (1), the sealing of the container by a reservoir or tray of the molten metal precludes oxidation, this condition being secured by the original Farmer invention. With regard to (2), the sequence of operations is automatic in regard to feeding the container with metal and this—and other improvements—has been developed by the writer and his associates (British Patents Nos. 434,041 and 561,829, etc.)

An ordinary vertical lead press, to which the Farmer principle of design is applied, is represented diagrammatically in Fig. 1. In detail the container has a liner which extends up into the tray under the surface of the molten lead, and at this upper end there are several ports. When the ram reaches these ports on the upward stroke the molten lead in the tray flows through them into the container, in which a vacuum exists due to the withdrawal of the ram in conjunction with the sealing of the container by the molten lead. When the container is filled the ram is lowered again to cover the ports in preparation for the next downward extrusion stroke.

In order to make the sealing between the top end of the container and the ram effective, sufficient lead or lead alloy is provided within the tray to maintain a minimum head above the end of the container liner to prevent air from obtaining ingress into the container, even when the charge has passed into the latter.

An additional precaution is necessary to prevent the oxide which accumulates on the surface of the molten lead in the tray from entering the container with the charge of molten lead. Normally this oxide cannot obtain entry into the container *via* the ports, but because the ram has to pass through the oxide-covered surface of the metal in the tray, there is a possibility that oxide might adhere to the ram and be carried down into the clearance between the latter and the container liner. The end of the container liner in the tray is therefore extended a very short distance beyond the maximum level of the molten metal within the tray, the bore being a close fit, of the order of a few mils, on the ram tip. The extension piece has a circumferential groove machined on the inside at the lower end and this groove communicates with the molten metal in the tray by virtue of several ports drilled radially through the extension piece. The lower level of the metal in the tray is such that under no circumstances are these ports exposed to the atmosphere or to the surface of the molten metal in the tray.

When the charge of metal has entered the container, a cooling fluid, generally hot water, is passed round the upper end of the container liner in order to solidify the metal so that it can be pressed and extruded. During the extrusion or pressing operation, a certain amount of plastic metal is pressed past both sets of ports into the clearance space between the extension piece and the ram. Any tendency for oxidation to occur within this space is thus rendered harmless by the continuous upward displacement of the molten metal.

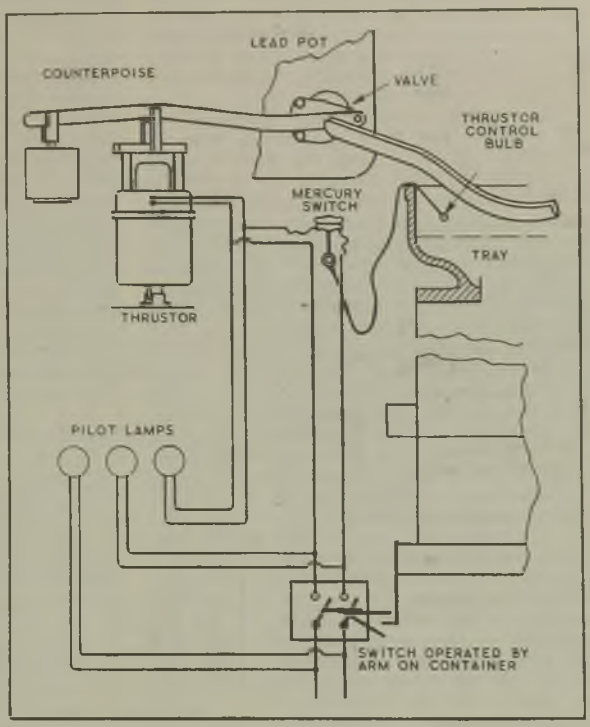


Fig. 2.—Scheme of automatic control of level of molten lead

Fig. 2 shows the automatic arrangements made for the control of the level of the molten metal in the tray. The maximum level is limited by means of a vapour-pressure bulb control placed in the tray. When this bulb is uncovered, as during the filling of the container, it cools, and then operates, by means of an electrical thrustor, the valve of a lead pot feeding the tray with molten lead. Cut-off occurs when the bulb is again covered by the hot metal. The lower level of the metal is, of course, one container charge below the maximum level.

In order to avoid the risk of air being driven into the molten metal within the tray and then lodging in the ports of the container liner or extension and being subsequently swept into the container, the lead or lead alloy is fed from the lead pot into the tray by means of a long U-shaped cross-section trough, which is shaped and suspended

so that the metal enters the tray tangentially to the surface of the molten metal therein, thus avoiding any risk of air or oxide being driven down into the metal. The temperature of the metal in the tray is recorded continuously by means of a temperature recorder and is controlled by regulating the gas burners on the underneath side of the tray.

The surface of the molten metal within the tray is kept in a reasonable state of cleanliness by skimming the surface after every two or three charges. It should be emphasised that the accumulation of oxide within the tray would not necessarily involve the risk of oxide entering the container, but the surface must be reasonably clear of oxide so that the bulbs of the controller operating the valve of the lead pot and of the temperature recorder shall operate under constant conditions.

The various steps in the cycle of operations are automatically signalled to the press operator by means of coloured lamps. The temperature of the container is recorded by means of thermometers embedded in its wall at suitable intervals.

Any recognised type of die block may be used for the press. In order to obtain a satisfactory sheath thickness, the temperature of the die block must be recorded as near as possible to the lead stream and in order to do this the die blocks are drilled as close to the die chambers as safety will permit. Within ½ in. of the lead passages temperatures of the order of 400 to 450 deg. F. are obtained, whereas temperatures recorded in the die blocks at a distance of 3 or 4 in. from the lead chambers are of the order of 350 to 400 deg. F. These readings show that the temperature of the lead is actually higher than the former value, and also that the former value gives a more faithful record in all respects of the actual lead temperature than the latter. Another point which is very important in connection with the control of the extrusion process concerns the pressure of the lead within the die block and container for producing featureless lead pipe or sheaths.

On a bridge type of block where the lead stream passes over a bridge in the upper part of the block and then re-unites to form the top half of the pipe, it is important that the physical conditions shall be such as to ensure that the two streams re-unite satisfactorily so that no weak weld or seam exists in the extruded pipe. There are three factors entering into this question, *viz.*:—(*a*) the temperature of the metal, (*b*) the time of reunion of the divided metal stream before leaving the press in the form of pipe and (*c*) the pressure which is exerted on the weld. It has been found that (*c*) the pressure is by far the predominant factor in ensuring sound welds.

High lead pressures are obtained with normal cable cores and dies when extruding small pipes which have, of course, correspondingly small radial thicknesses of wall, and thus the lead pressures for pipes up to 1-in. diameter are sufficient to produce featureless pipe. On large pipes, however, these pressures are not sufficient for the purpose and therefore in order to increase them to a sufficient amount the die is provided with an internal conical surface so that a restricted passage for the flow of lead is obtained between this surface and the external conica surface of the core. The length of the restricted passage is adjusted for the size of pipe being extruded to give the requisite pressure.

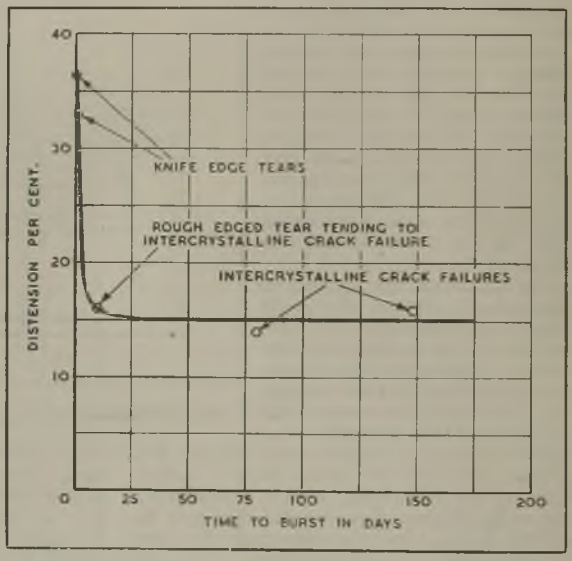


Fig. 3.—Bursting tests on E-alloy pipes at 15 to 25 deg. C.

With regard to (*a*), another precaution is taken relating to the cooling of the container when the new charge has entered. At the point where the cooling water enters the cooling coils, a local area of low temperature exists within the metal at the end of the electrically timed cooling period. In the case of small pipes the complete charge of metal takes a good deal of time for extrusion and this locally cooled metal attains substantially the same temperature as the rest of the metal by the time it reaches the die block. In the case of large pipes, however, where the

extrusion time is short, a waiting period of several minutes is necessary before extrusion commences, to ensure that this locally cooled portion of metal is reheated by conduction from the rest of the metal.

A research form of test which has been adopted for demonstrating the quality of extruded pipe consists in subjecting a 1,000-yd. length of pipe to an internal pressure such that the hoop stress in the pure lead pipe is approximately 1,000 lb. per sq. in. and somewhat higher for harder alloys. Under these conditions, depending upon the ambient temperatures, the pipes will burst in a period of days. When examined the bursts in such pipe should be of the nature of knife-edged tears showing no sign of oxide, air or other occlusions or any structural defect. For such tests the minimum distension measured ⅛ in. from each end of the tear should be at least 5 per cent. for pure lead and at least 10 per cent. for E alloy (Pb 99·4 per cent., Sm 0·4 per cent., Sb 0·2 per cent.).

In Fig. 3 is shown the relation between the amount of distension and the time taken to produce the burst for E alloy pipes. The distension value is higher when the burst is produced relatively quickly, but there is no indication, even under very slow rates of distension, that the total distension at the burst will be less than 10 per cent. In very slow tests the openings take the nature of intercrystalline fractures, but there is no indication of any imperfection in the structure of the pipe. The distension values given in the above correspond to pipe with a circumferential variation of, say, 5 per cent. of the radial wall thickness. If the variation of wall thickness is greater than this there will be a tendency for selective circumferential distension to occur at the thinnest part of the wall, and in consequence a burst may occur at this point before the remainder of the circumference of the pipe has been fully distended. This emphasises that the amount of distension obtained on a perfectly sound pipe depends to the extent shown on its uniformity of wall. The main criterion of quality is the character of the tear.

Attention has been focused in recent years on the necessity for producing sound lead sheaths, by the introduction of super-voltage cables designed to operate with gas under a high pressure, either within the dielectric or superimposed on the dielectric. The gas pressure retaining sheaths for these cables, which may be made either with pure lead or lead alloy, are reinforced with metallic tapes to withstand the gas-pressure load, but it is essential that the structure of the sheaths shall be such that when the sheaths have been strained to an extent sufficient to transfer this load to the reinforcing tapes, the sheath shall still be perfectly gastight.

The type of lead press described in this article has been used over a period of several years for extruding pressure-retaining sheaths for the gas-filled type of cable, and such cables have been in commercial use under an internal gas pressure of 200 lb. per sq. in. for seven years without incident.

Derby Engineer's Report

Effect of Loan Repayment Policy

FROM 98·9 million in 1938-39 the number of kWh sold by the Derby Electricity Department has risen to 158·3 million in the year ended March 31st, 1944. This is shown in the latest annual report of the chief engineer and general manager (Mr. F. H. Poole). Last year's increase in domestic heating and cooking and general lighting sales exceeded 6 million kWh (8·7 per cent.), but a decline in industrial power sales reduced the overall growth to 4½ million kWh (2·9 per cent.).

Net revenue from electricity sold advanced by £9,604 to £595,609. In spite of soaring coal prices, representing an additional annual cost of £81,000 over pre-war, and an increase of £28,000 per annum in salaries and wages, the average price per kWh sold was the lowest on record (0·903d.) and there was a net profit of £9,463 on the year's working. This was brought about mainly by increased efficiency of generation and the Electricity Committee's policy of accelerating the repayment of loans on the early years of the war. Total income last year amounted to £633,115 (against £627,027 in 1942-43) and working expenses were £456,559 (£428,535), with capital charges and special expenditure at £167,093 (£188,519).

The installed capacity of the generating station was increased from 37,500 to 67,500 kW in 1940-41. With an overall generated thermal efficiency of 23·6 per cent. it ranks second in the Central England Area. This has been attained, the report says, in spite of the fact that the station is operating at a much lower pressure and temperature than the majority of stations in the Area. The availability factor of the plant is not exceeded by any other station in the Area. Owing to the adaptability of powdered fuel firing no reduction of output due to inferior fuel was experienced although the quality varied considerably.

Record New Zealand Output

DURING the year 1943-44 the total quantity of electricity generated in New Zealand reached a new record at 2,170 million kWh, an increase of nearly 134 million kWh over the previous year. Generation by Government hydro-electric plants increased from 1,754 million kWh in 1942-43 to 1,859 million kWh in 1943-44. From the new set at Waikaremoana (started in December, 1943) full benefit will not be derived until the completion of new high-voltage transmission lines. Net capital outlay during the year was £1,740,000 compared with £443,500 in 1942-43 and £2,150,000 in 1941-42.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Clip-on Ammeter

A CLIP-ON ammeter having seven ranges, all self-contained, has been introduced by FERRANTI, LTD., Hollinwood, Lancs. It is being supplied as an addition to the well-known dual range models, but is of more "streamlined" pattern.

The "7-range" clip-on cable ammeter

The selector switch, by means of which any one of the seven ranges of 10, 25, 50, 100, 250, 500 or 1,000 A can be used, is operated by the thumb of the hand holding the instrument and it is not necessary to remove the ammeter from the conductor being tested.

The core is fully insulated and has a 2½ in. square aperture to accommodate cables up to that diameter. At the end of the handle there is a slot through which a leather strap can be passed for hanging on a linesman's belt.

The indicating portion consists of a 2½-in. dial moving-coil rectifier type instrument fitted with a toughened glass to stand the rough treatment that these instruments often receive.

The clearly marked scale ensures easy readings from 5 up to 1,000 A and lower readings can be obtained when it is possible to wind two or more turns of the conductor through the core.

The accuracy of the ammeter is within 3 per cent. of full scale on all ranges and the instrument can safely be used on bare conductors up to 600 V without risk of shock or short circuit. All metal parts, except the actual magnetic contact surfaces are protected by insulating material.

Putty Router

The building trade is likely to benefit from the availability of a labour-saving tool for quickly removing old putty from the window frames of war-damaged buildings before reglazing. The new device, which has recently been employed in the Croydon area with the approval of the Ministry of Works, has been jointly contrived by MR. G. SCRATCHLEY, a retired builder, and MR. W. J. BILTON, mechanical engineer, 28, Cross Road, East Croydon, Surrey. It is a simple accessory to a lightweight hand drill of the ordinary electric kind, such as the ¼-in. Wolf type EG2C, which is fitted in the usual way with an appropriately shaped cutter. Over the latter is slipped the special attachment which enables the tool to maintain its position correctly relative to the window sash. Adjustment to rebate dimensions is effected by the simple turning of a knurled pin for height and a slight twist of a helical slotted sleeve for depth.

The two-handed tool is guided along the window frame and the tungsten steel cutter (⅝ in.) shaves off the old putty as fast as the light machine (5 lb. total weight) can be pushed along, not missing the "sprigs," which are cut or thrown out as readily as the putty itself.

Bilton-Scratchley putty remover showing its use together with a lightweight hand drill

An additional grooving cutter is now being designed for cleaning out the deeply slotted "meeting rail." Thus much time and effort can be saved with the incidental advantage that frail sash members can be prepared for glazing without risk of damage by hammering and tracking.

Institution of Chemical Engineers

THE twenty-third annual corporate meeting of the Institution of Chemical Engineers is to be held at the Connaught Rooms, London, W.C.2, on April 13th, commencing at 11 a.m. with the business session, with the presidential address by Mr. F. A. Greene at noon. At a luncheon at 1 p.m. the principal speaker will be Sir Stafford Cripps. At 3 p.m. a paper by Messrs. H. W. Cremer and R. L. Fitt will be read.

Electric Light Fittings

Past Year's Activities

IN his report for 1944 the chairman of the Electric Light Fittings Association (Mr. A. E. Iliffe) says that the improving war situation has enabled the Association to broaden its activities. Assistance has been given to local authorities in the conversion of street lighting to the higher standard now permitted. The Government Departments concerned continue to consult E.L.F.A. on all subjects of interest to the lighting fittings industry and assistance has been given by the director and staff, in collaboration with the Council, in arranging and operating the supplies of the necessary materials.

As a measure for imparting "new blood" to the Council a proportion of the members will in future retire annually and remain ineligible for re-election for a year. A number of post-war reconstruction matters have been considered and the Association is collaborating with B.E.A.M.A. on the subject of the disposal of surplus Government electrical plant. Advice has been given on lighting fittings in post-war houses. Reference is made to the removal of restrictions on decorative and commercial fittings which, however, will still be scarce for the time being.

Fair Trading Code

It has been decided to form a Decorative and Commercial Section, leaving industrial fittings to be dealt with by an Industrial Fittings Section. Under the latter section considerable work has been done by the Fluorescent Fittings Committee towards defining fair trading conditions for the sale of these fittings. The subject of fair trading for industrial fittings generally has also been considered and a complete Fair Trading Code has been drafted. It is hoped to extend the operation of this Code to non-members. In this, E.L.F.A. is collaborating with the Electrical Wholesalers' Federation. Work is already in hand towards establishing a code for the future sale of street lighting equipment, Through the close collaboration existing with the Ministry of Home Security, E.L.F.A. members have been greatly assisted in obtaining the necessary raw material authorisations enabling them to turn their production capacity to street lighting fittings wherever possible without interfering with war work.

The Decorative and Commercial Fittings Section is devoting its attention to future trading policy with a view to keeping prices low, consistent with good design, efficient production and reasonable distribution costs.

The annual report of the Technical Committee, which was set up in 1943 under the chairmanship of Dr. S. English, states that E.L.F.A. representatives have been appointed to the various B.S.I. committees, etc. The Committee has expressed the view that bayonet-type caps are undesirable on 200-W lamps, owing to heating effects, and this finding has been referred to E.L.M.A. for comments. As it has been found that street lighting is seriously affected by variations in the position of the filament gap the Street Lighting Sub-Committee has been asked to study the possibility of a change of lamp cap. Representatives from the research laboratories of the B.T.H. Co. and G.E.C. are meeting a panel of the Committee to discuss the question of mirror glassware. Meetings have been arranged with the Zinc Alloy Die Casters' Association as it is evident that zinc alloy die castings have a considerable field of application to lighting fittings. Methods of measurement of cut-off with various types of lamps have been considered.

Street Lighting Specification

At a meeting with representatives of E.L.M.A. it was decided that a Code of Practice for street lighting was necessary and could be more quickly produced than a specification. It was recommended that after the production of a Code of Practice the B.S.I. should be asked to prepare a separate specification for the performance of lanterns. At a later B.S.I. meeting, however, the weight of opinion was in favour of the issue of a specification. With the easement of street lighting restrictions recommendations were framed for the most practical and economical means of obtaining the higher intensities. Recommendations by sub-committees are being re-drafted by the Technical Committee and are to be circulated for members' comments. The Committee has decided that in future data sheets of general interest will be periodically submitted to the Executive Committee for circulation to all members.

Post-war Housing Ideas

A FEATURE of a successful electrical exhibition in connection with post-war housing recently held by the Gloucester Corporation Electricity Department was an "Ideas Competition," a Ferranti fire being offered for the best idea in connection with kitchens. The presentation of the prize was made on the last day of the exhibition by the chairman of the Electricity Committee, Councillor W. E. Clift, in the presence of Emil Braathen, chief engineer and general manager of the undertaking.

ELECTRICITY SUPPLY

Dover Undertaking's Finances. Restrictions in Eire.

Barton-upon-Irwell.—TIME EXTENSION.—The Electricity Commissioners have extended by three years the period of thirty-five years after which the Swinton and Pendlebury Corporation and the Kearsley U.D.C. (as successors to the Barton-upon-Irwell U.D.C.) may acquire from the Lancashire Electric Power Co. those portions of the undertaking authorised by the Barton-upon-Irwell Electric Lighting Order, 1906, situated within their jurisdiction.

Bedford.—LOAN FOR DEVELOPMENT.—The Electricity Committee is seeking sanction to borrow £137,666 for developments and recommends the appointment of Merz & McLellan to supervise the major works.

Dover. — UNDERTAKING'S FINANCES. — The current year's working of the Electricity Department is expected to show a profit of £7,817 against the £120 that was estimated last year. For 1945-46 the net profit is estimated at £3,951. The borough electrical engineer (Mr. R. G. Widgery) pointed out at the last meeting of the Electricity Committee that with the increased coal charges the price paid per kWh to the C.E.B. was 0·59d., which was 0·09d. more than the undertaking charged consumers under the two-part tariff. That was covered to a certain extent by the standing charge, but the margin was getting very close. The Committee agreed, on his recommendation, not to make any alteration in charges.

JUBILEE.—To celebrate the undertaking's jubilee a luncheon is to be held in the Connaught Hall on April 19th.

Hollingbourn (Kent).—TEMPORARY HOUSES.—The Rural District Council has asked that half of the 40 temporary houses allocated to the district shall be all-electric.

Hull.—TARIFF ADJUSTMENT.—Application is being made by the Electricity Committee for consent to adjust the actual kWh charge of all tariffs where coal clauses are not operating. The general manager has assured the Committee that the increase would not affect consumers using less than 360 kWh per quarter.

Morpeth (Northumberland). — ALL ELECTRIC HOUSES.—Fifty temporary houses to be built by the Town Council are to be "all electric."

Musselburgh. — REDUCED CHARGES. — The Musselburgh & District Electric Light & Traction Co. has informed the Town Council that, as from the next meter readings, the running charge of the domestic two-part tariff will be reduced from 1d. to ¾d. after the first 200 kWh consumed. The average cost of electric cooking will then be about 3¼d. a day instead of 4¼d. The Council decided recently to have all-electric cooking, heating and lighting in houses at Stoneybank.

Scarborough.—MAINTENANCE OF DOMESTIC EQUIPMENT.—The Housing Committee is asking the Electricity Department to consider the question of maintaining the electrical equipment proposed to be installed in temporary houses and to state the best terms that can be offered for this service.

Scotland.—LOCH SLOY DISCUSSION.—As a result of discussions held in London last week, a satisfactory basis for the settlement of differences between the North of Scotland Hydro-Electric Board and the Dumbartonshire County Council was reached.

Overseas

Canada.—BRITISH COLUMBIA COMMISSION.—Plans for rural electrification in British Columbia will be based on similar lines to the Ontario system, with necessary regional modifications, it was indicated in a Bill presented to the Provincial Legislature. The Bill provides for formation of a commission of three entrusted with administration and management of power systems. The commission will have power to acquire, construct and operate works for the generation, supply and distribution of power: may expropriate real and personal property, including power plants, projects and sites: and may supply power in bulk to municipalities or directly to consumers. Municipalities will be exempt from expropriation.

Eire.—RATIONING AGAIN.—Restrictions on the use of electricity have been reimposed by the Electricity Supply Board as from March 26th. They are based on the 1941 consumption as shown on the ration cards issued in 1943. For cooking alone 100 per cent. is allowed, but there is a cut of 50 per cent. for water heating and of 25 per cent. for all other purposes other than motive power, industrial process heating, traction and public lighting. The penalty for non-compliance is disconnection of supply. The Electricity Supply Board says that the position will continue to be difficult this summer and appeals to users who are not affected by the restrictions to exercise the utmost economy.

RADIO and TELEPHONY

China.—BETTER TELEGRAPH SERVICE.—Cable & Wireless, Ltd., announces that a direct wireless circuit is now available between London and Chungking for all classes of telegraphic traffic. To supplement this direct circuit at certain times of the day, traffic between Britain and China is automatically relayed *via* Colombo.

United States.—CO-ORDINATION OF COMMUNICATIONS.—Mr. Paul Porter, chairman of the U.S. Federal Communications Commission, told the Senate Commerce Committee last week that unification of the country's international communications was a basic necessity. He was supporting in principle a plan of Mr. James Forrestal, Secretary of the Navy, for a merger of all American communications operating abroad.—*Reuter.*

TRANSPORT

Newcastle-on-Tyne.—TROLLEY-BUS PLANS.—The City Council has decided to promote a Parliamentary Bill to introduce trolley-buses on a further 16 routes. The scheme is expected to involve a capital expenditure of £825,100; this includes £570,000 for new trolley-buses and £215,000 for electrical equipment.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

North-Eastern Electric Supply Co., Ltd.—Mr. R. P. Sloan, C.B.E. (chairman), speaking at the annual meeting on March 22nd, referred to the maintenance of the dividend and said that during the war they had concentrated all their attention on meeting the heavy demand for power for war industries and domestic development had been practically at a standstill. Much publicity had been given to their proposals to erect a new power station near Durham. While they were not without concern for the preservation of amenities, they had to fulfil their legal obligations to consumers. It was considered necessary to have the additional plant available for the winter of 1948 but the time taken up by inquiries had resulted in the loss of a whole year. It was particularly unfortunate that at a time when new power plant was so greatly needed electricity supply authorities should be hampered in this way.

In common with other authorities the company was making headway with the planning of the future, including schemes, which were now advanced, for the further electrification of rural areas.

County of London Electric Supply Co., Ltd.—In the course of his speech at the annual meeting last week the chairman, Sir Robert Renwick, Bt., reviewed the accounts for 1944 (summarised in our last issue) and then dealt with the engineering aspects of the company's business. He said that during the war the capacity at Barking had been extended by the addition of another 75,000-kW set and four boilers, bringing the total capacity to 537,500 kW. The principal difficulties in operation had arisen from labour and coal. On account of the first it had been difficult to keep up their high standard of maintenance. As regards coal, the annual requirements at Barking exceeded a million tons a year, mainly seaborne. Before the war Barking could be coaled by some 270 ships a year but the present shipping position had made it necessary to deliver the coal in 407 ships of various sizes and suitability. In a reference to the alarming increase in the price of coal, Sir Robert said he wondered if the trouble in the mining industry had been due to politics; if it had been it was a warning to many other industries threatened with political interference.

There had been no material reinforcement of their transmission and distribution system during the war period; work had been confined to connections for essential war supplies and to maintenance and repairs. He paid a tribute to the resourcefulness and courage of the company's engineering personnel. There had been times when a number of their men were performing standby duties and accordingly arrangements were made to undertake work for the Ministry of Aircraft Production and other Ministries at cost.

Turning to matters of general interest, Sir Robert said that the electricity supply industry had to make available to other industries electric drive without which full productivity was not likely to mature. With regard to proposals that the industry should be nationalised, it was always forgotten that it had a background of vast technical and other professional experience among both the directorates and staff. Some people thought apparently that all this experience would pass over to the Government at salaries and fees consistent with Treasury regulations. It would be a very unwise Government which decided on any major interference for no other reason than that of political expediency. On the question of future rates for supply, Sir Robert said that these must depend largely on the cost of fuel, plant and materials. The only means of reducing the present excessive costs was by greater productivity in every branch of industry. Their associated and subsidiary companies had had varying fortunes throughout the war. They were now looking forward to greatly improved conditions in the near future. Sir Robert concluded with a reference to the benefits derived from mutual aid schemes and praise for the company's staff.

The Bournemouth & Poole Electricity Supply Co., Ltd. reports revenue for 1944 amounting to £765,197, as against £664,990 for the previous year, and expenses totalling £529,482 (£449,994), leaving £235,715 (£214,996). The ordinary dividend is maintained at 12½ per cent. and £6,957 (£7,944) is carried forward.

The Richmond (Surrey) Electric Light & Power Co., Ltd., records revenue for 1944 amounting to £119,637 (£112,604) and expenditure £82,730 (£77,127), leaving £36,917 (£35,477). The ordinary dividend is maintained at 6 per cent. leaving £868 (£1,355) to be carried forward.

The West Kent Electric Co., Ltd., records a revenue for 1944 of £738,807 (£674,191), less expenditure £583,494 (£521,088), leaving £155,313 (£153,103). An ordinary dividend of 8 per cent. (same) is to be paid leaving £39,072 (£37,509) to be carried forward.

The South Metropolitan Electric Light & Power Co., Ltd., shows a revenue for 1944 of £1,103,534 (£1,039,165) and expenditure totalling £767,635 (£722,993), leaving £335,899 (£316,172), plus £25,000 (nil) transferred from taxation reserve. The ordinary dividend is again fixed at 7 per cent., leaving £38,047 (£35,625) to be carried forward.

The Metropolitan Electric Supply Co., Ltd., held its annual meeting on March 28th when Major H. Richardson, M.C. (chairman and managing director) referred to the company's increased output. He said that between 1938 and 1944 the energy sold to domestic and business consumers increased from 116 to 176 million kWh—51 per cent., in spite of the stoppage of all development work. Energy sold to industrial consumers rose from 131 to 308 million kWh, or over 136 per cent., and that sold in bulk to other undertakers in the Western area increased from 135 to 188 million kWh, or 39 per cent. The total sold for all purposes in the Western area rose from 384 to 672 million kWh —75 per cent. The gross revenue had increased from £1,707,000 to £3,023,000 (78 per cent.).

and the surplus on trading from £431,000 to £681,000 (58 per cent.). They had been able to make adequate allocations to depreciation reserve and maintain the ordinary dividend at 8 per cent.

Since 1939 the capital expenditure of the company and its subsidiaries, amounting to just over £12,000,000, had been restricted to essential supplies; they had therefore great leeway to make up. They had plans for extensions costing nearly £5,000,000 to be carried out over a five-year period. The prospects for the electricity supply industry must depend on the country's trading prosperity which (in turn) would depend upon the amount of freedom the industry was allowed in order to exert initiative and invention in the development of trade. There was still much discussion regarding nationalisation and the appropriate Ministry was giving consideration to future regulation of electricity supply. The Power Companies' Association had submitted constructive views upon the question of electricity supply in which it was urged that large comprehensive and efficiently operated areas should not be split up. On the contrary it was proposed that the less efficient concerns should be absorbed by the larger efficient local authorities and companies. While codification of existing legislation, with further enactments providing a healthy and helpful regulation, was desirable, excessive interference would stifle initiative and result in a serious weakening of our national efficiency.

The Scottish Power Co., Ltd.—The company's accounts for 1944 show that the trading profits of the undertakings which it owns and operates amounted to £1,052,435 against £1,082,103 in the preceding year. After providing for taxation, including E.P.T., on the earnings of the operating companies there is a balance of £552,955 (£535,509), from which £245,368 (£202,465) is appropriated for depreciation, renewals and reserves, or carried forward, leaving £307,587 (£333,044) as the revenue, less income tax, available to the Scottish Power Co. Restoring the income tax deducted, the gross revenue amounts to £575,175 (£626,088). The holding company's revenue, including miscellaneous receipts and £15,000 brought in, and after payment of expenses and interest of loans, totalled £566,704 (£603,753), from which £278,347 (£315,753) has been provided for taxation and £22,750 for general reserve (against £25,000 for contingencies). The final ordinary dividend is 5 per cent., making 8 per cent. for the year (same), and £17,607 is carried forward.

The Kent Electric Power Co.'s total receipts for 1944 amounted to £1,960,853 (£1,782,565), the net revenue being £453,080 (£454,139). After providing for debenture and loan interest £108,258 (£119,006), sinking fund £3,396 (£28,297), depreciation £188,552 (£181,275), contingencies £30,000 (£45,000), taxation £20,000 (same) and general reserve £55,000 (nil), a final dividend of 5 per cent. again makes the total distribution 8 per cent. and £155,886 (£150,012) is carried forward.

The Lancashire United Transport & Power Co., Ltd., reports a net profit for 1944 of £175,461 (£163,801), plus £30,697 (£36,361) from investments. After providing £115,854 (£126,355) for taxation, £3,501 (£3,334) for debenture redemption and nil (£1,669) for general reserve, an amalgamated dividend of 6 per cent. is to be paid, again making 10 per cent., leaving £13,158 (nil) to be carried forward.

The British Thomson-Houston Co., Ltd.—Speaking at the annual general meeting last Friday Mr. H. N. Sporborg, chairman, stated that active steps had been taken to retrain and rehabilitate employees returning from the Forces. There was ample evidence of the demand for the company's products and there could be no question of the potential capacity of the electrical industry to meet this demand and contribute substantially towards the great national need for increased exports. Overseas purchasers, however, had made it clear that, both as regards technical performance and price, their products must be competitive with those offered by foreign manufacturers, and it remained to be seen whether under existing conditions this test could be met. Their products could compete in efficiency with those obtainable in any foreign country, but in regard to price their position was less favourable.

British Mechanical Productions, Ltd., which is one of the Philco group, reports a net profit of £13,380 for the year ended July 31st, as compared with £9,184 for the previous year. These figures were reached after providing £22,500 and £18,200 respectively for taxation. General reserve receives £5,000 (£2,315) and contingency reserve £2,300 (£2,700). After paying a final dividend of 7 per cent. (again making 10 per cent.) the carry-forward is £2,033 (£2,203). The report announces that a considerable interest has been acquired in General Accessories, Ltd., of Bristol. This will necessitate an increase in capital and shareholders may expect to hear about it within the next few months as part of the general scheme for refinancing the Philco group.

Lancashire Dynamo & Crypto, Ltd., reports a net profit for 1944 of £134,313 (against £127,255), after meeting all charges, including E.P.T. and income tax. To this is added £190,180 (£169,603) brought in. As already reported, the final dividend is again 10 per cent., making 15 per cent. for the year (same), together with a bonus of 7½ per cent., as last year. The staff pension fund receives £3,000 (against £3,000 to the pension fund and a special allocation of £10,000 to superannuation fund), and £100,000 (nil) is set aside for special reserve for post-war contingencies. The carry-forward is £127,707.

The India Rubber, Gutta Percha & Telegraph Works Co., Ltd., reports a net trading profit of £175,096, against £169,333, and after meeting depreciation, debenture interest, income tax, etc., there is a net balance of £44,484 (£31,904). As already reported, 6 per cent. is paid on the preferred ordinary, plus 2 per cent. additional, and 6 per cent. on the ordinary, plus 3 per cent. additional. The balance carried forward is £129,384 against £207,487.

Broom & Wade, Ltd.—Provisional consent has been secured for the issue of 132,000 new ordinary 5s. shares at 18s. 9d. in the proportion of 22 for each 100 ordinary shares held. The new shares will not rank for the interim dividend usually declared in May.

S. Smith & Sons (England), Ltd., have again declared an interim dividend of 7 per cent. on the preferred ordinary shares.

Associated Electrical Industries, Ltd., has extended to April 18th the period within which holders of B.T.H. cumulative preference shares can accept the offer of A.E.I. cumulative preference shares for their holdings.

The Greengate & Irwell Rubber Co., Ltd., from a profit of £85,551 (against £79,562) is paying a final dividend of 7 $\frac{11}{16}$ per cent. on the ordinary shares, making 15$\frac{3}{8}$ per cent. (as for 1943). The deferred dividend is again 25 per cent.

The National Gas & Oil Engine Co., Ltd., records a net profit, after taxation, of £45,569 for 1944, as against £47,263 for the previous year. The ordinary dividend is maintained at 5 per cent. and £35,113 (£32,544) is carried forward.

London Associated Electricity Undertakings, Ltd., has announced a dividend of 4 per cent. on the ordinary stock for 1944, the same as for the preceding year. The net profit was £238,211 (against £244,423).

The Salisbury Electric Light & Supply Co., Ltd., is paying a final dividend of 6 per cent. (same), again making 10 per cent.

The Swanage Gas & Electricity Co. reports a profit of £580 for 1944 (against £1,235). No ordinary dividend is being paid.

The Oriental Telephone & Electric Co., Ltd., announces a dividend of 4 per cent., as last year. The profit rose from £19,431 to £24,482.

The Nigerian Electricity Supply Co., Ltd., is again paying an interim dividend of 3 per cent., less tax at 5s. 2d. in the £.

New Companies

John Hunter & Co. (Electrical Engineers), Ltd.—Private company. Registered March 17th. Capital, £5,000. Objects: To acquire the business of an electrical engineer and contractor carried on by S. A. MacLeish at 22, Rodney Street, Liverpool, as John Hunter & Co. Directors: S. A. MacLeish (governing director) and K. L. MacLeish. Registered office: 22, Rodney Street, Liverpool, 1.

D. K. Manufacturing Co., Ltd.—Private company. Registered March 10th. Capital, £100. Objects: To carry on the business of manufacturers of, and dealers in, electrical and other lamps, stoves, radiators, refrigerators, domestic appliances, wireless goods, etc. First directors: Zoltan Desham, 13, Valentine Road, Ilford, and three others. Registered office: 66, Chandos Place, W.C.2.

Mirex, Ltd.—Private company. Registered March 14th. Capital, £100. Objects: To carry on the business of manufacturers of, and dealers in, wireless and television instruments, and accessories, radio-gramophones, electrical apparatus, etc. Subscribers: E. A. Slatford, 20, Ranmoor Gardens, Harrow, and L. J. Preece, 78, Woodfield Way, N.11. Registered office: 63, Coleman Street, E.C.2.

Bentric Industries, Ltd.—Private company. Registered March 3rd. Capital, £1,000. Objects: To carry on the business of mechanical, electrical, heating, air conditioning and general engineers, etc. Directors: R. S. Antrobus and Mrs. Esme F. Antrobus, both of 60, Meadway, N.14. Registered office: 60, Meadway, N.14.

Badger & Rowan, Ltd.—Private company. Registered March 17th. Capital, £2,000. Objects: To carry on the business of electricians, electrical and radio engineers, etc. Directors: H. R. Badger, 25, Empire Road, Sheffield, 7, and C. R. Rowan, 38, Aizlewood Road, Sheffield, 8. Registered office: 676, Chesterfield Road, Sheffield, 8.

Companies' Returns

Mortgages and Charges

South Western Electrical Engineering Co., Ltd.—Debenture dated February 12th, 1945, to secure £2,000, charged on the company's undertaking and property, present and future, including uncalled capital. Holders: Thomas Photographic Co., Ltd.

A. C. Ford, Ltd.—Particulars filed of debentures not exceeding £1,000 authorised February 12th, 1945, charged on the company's property, present and future, including uncalled capital, the amount of the present issue being £400.

Waghorn Electrical Contractors, Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated March 1st, 1945, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Bylock Electric, Ltd.—Satisfaction in full on September 5th, 1944, of mortgage dated November 5th, 1937, and registered November 6th, 1937. (Notice filed March 12th, 1945.)

Grant Switchgear, Ltd.—Assignment on February 20th, of proceeds of contracts, to secure all moneys due or to become due from the company to Midland Bank, Ltd.

Mechanical & Electrical Engineering Co. (Sheffield), Ltd.—Satisfaction in full on December 30th, 1944, of mortgage dated August 8th and registered August 30th, 1941, securing not more than £1,000. (Notice filed March 3rd.)

Electric Supplies (Bloxwich), Ltd.—Satisfaction in full on February 13th, 1945, of mortgage dated August 15th, 1938, and registered August 24th, 1938, securing £2,331 15s. 3d.

Receiver Released

Leader Way, Ltd.—Gerald Haring, Queen's College Chambers, Paradise Street, Birmingham, ceased to act as receiver and manager on December 31st.

Liquidations

Curtis Lighting Co. of Great Britain, Ltd.—Meeting April 16th at Crown House, Aldwych, London, W.C.2, to receive an account of the winding-up by the liquidators, Mr. W. C. Bush and Mr. H. T. Neale.

Kye Electrical, Ltd.—Meeting April 17th at Electra House, Victoria Embankment, W.C.2, to receive an account of the winding-up by the liquidator, Mr. H. P. Goodall.

Bankruptcies

R. T. H. Brimfield, electrical contractor, trading as Richfield Electrical Components, 73-78 High Holborn, London, W.C.1.—First dividend of 11½d. in the £ payable March 30th at Bankruptcy Buildings, Carey Street, W.C.2.

STOCKS AND SHARES

TUESDAY EVENING.

STOCK EXCHANGE markets show a fair amount of vitality, the near approach of the Easter holidays having no conspicuously unfavourable effect upon the volume of business. Investments stocks and shares remain in persistent demand. It is announced that a large amount of Australian 5 per cent. stock is to be repaid on July 1st next, holders being given the option of receiving the cash or, in some cases, converting into a new 3¼ per cent. issue. Some of the money realised by this operation is certain to find its way into the industrial market. In fact, evidence of this being so has been already furnished. Activity in E. K. Cole and other radio shares is something of a feature. Home Railway stocks remain out of favour. Cable and Wireless ordinary has risen 3½ points.

Home Electricity

Inquiry for the ordinary shares of Home electricity supply companies has spread during the past few days to those of the lesser-known undertakings. These have been in demand for purely investment purposes, and, as with the bigger brethren, the shares are difficult to buy because of the tenacity with which holders retain their interest. As an example, Mid-Cheshire £1 ordinary may be cited at 42s. ex the dividend payable next month. The company has been paying annual dividends of 8 per cent. for some years past, and the yield at the present price is no more than £3 16s. 3d. This, however, compares with £3 13s. 6d. the yield on Edmundsons ordinary at 32s. 6d. Northamptons at 51s. 6d. ex dividend, give £3 17s. 6d. and Lancashire Electric ordinary pay £3 18s. 3d. Shares of which there is a fairly good supply available are London Associated Electric ordinary. Some 5,000 came on offer at 26s. 6d. to yield £3 0s. 3d. on the basis of the 4 per cent. dividend. Since a month ago, the ordinary shares of thirteen Home electricity supply companies have risen 6d. or 1s. Against these, there are three falls in this group.

Chairmen's Speeches

Chairmen at the recent annual general meetings of shareholders in the Home electricity supply companies have had pleasant tasks in their recital of progress during the war years. Sir Robert Renwick, at the County of London meeting, spoke of a policy of expansion which would have astonished even his father, the late Sir Harry Renwick, the enthusiastic apostle of electrical progress, whose slogan was the "Golden Age of Electricity." His son admitted that he was aware of the obstacles which lay ahead of industry in the post-war years, labour, materials, costs, etc., all being likely to contribute their quota to the difficulties. These difficulties, however, do not daunt the County of London directors from an ambitious policy marked out for post-war development. Every chairman has stressed the importance of individual enterprise as an essential necessity for sustaining the life of national industry with a vigour that no official interference would be likely to improve upon.

A Month's Fluctuations

The comparison of the prices given in to-day's lists is made with those of a month ago. Intermediately, the principal changes have been noted in the text of each weekly article. By observing the net fluctuations over a month, it is, perhaps, possible to gain a more just perception of market trends than a single week's comparison can afford.

The principal rise of the month in the accompanying price-lists is the 22s. 6d. gained by De la Rue ordinary shares. This has lifted the price to 11⅛, and discounts some of the optimism current in regard to the promising prospects that the company indubitably possesses. Another share to show improvement is International Combustion, a rise of 7s. 6d. taking the price to 7⅞. On the month, Ransome and Marles are 3s. 9d. up at 91s. 3d.; Hopkinsons at £4 and Vactrics at a guinea are similar gainers. Automatic Telephones have put on 3s. at 67s. 9d.; Westinghouse Brake 2s. 9d. at 78s. 9d.; Lancashire Dynamo 2s. 6d. at 5¼. Numbers of smaller advances have occurred, deemed to be due in the majority of cases to the post-war prospects of the various companies.

Radio Revival

Revival of attention to radio shares is something of a feature. E. K. Cole stood out prominently with a jump to 42s. 6d. after being down to 38s. 6d. The rise tempted sales, and the price went back to 41s. 3d. Philco gave way to 13s. 9d. but rallied to 15s. upon a statement from the company forecasting the early declaration of two years' dividend, and announcing that the capital is to be increased, with the Treasury's sanction. E.M.I. shares have fallen to 34s. 3d. and Pye deferred to 32s. 6d.

Conversion Successes

The process of stock conversion is still continuing, and in most cases with noticeable success. The North Metropolitan Power Station 5 per cent. second debenture 1963, has been converted to the extent of 80 per cent. into the company's 3¼ per cent. stock at 99. Of this stock there was £658,799

(*Continued on page* 480)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend Previous	Dividend Last	Middle Price Mar. 27	Month's Rise or Fall	Yield p.c. £	s.	d.
Home Electricity Ordinary							
Bournemouth and Poole	12½	12½	64/–	+1/–	3	18	1
British Power and Light	7	7	33/6	..	4	3	10
City of London ..	5½	6	31/–	+1/–	3	17	5
Clyde Valley ..	8	8	42/6	..	3	15	3
County of London	8	8	45/–	..	3	11	1
Edmundsons ..	6	6	32/–	..	3	15	0
Elec. Dis. Yorkshire	9	9	46/6	+6d.	3	17	3
Elec. Fin. and Securities ..	12½	13½	61/6	+6d.	4	7	6
Elec. Supply Corporation ..	10	10	51/–	..	3	18	6
Lancs. Light and Power ..	7½	7½	38/–	..	3	19	0
Llanelly Elec. ..	6	6	29/6	+6d.	4	1	4
Lond. Assoc. Electric	3	4	26/6	..	3	0	6
London Electric	6	6	31/–	..	3	17	5
Metropolitan E.S.	8	8	44/6	..	3	12	0
Midland Counties	8	8	42/–	+6d.	3	16	2
Mid. Elec. Power	9	9	45/–	+6d.	4	0	0
Newcastle Elec.	7	7	32/6	+6d.	4	6	2
North Eastern Elec.	7	7	35/6	+6d.	3	19	0
Northampton ..	10	10	51/–	+6d.	3	18	4
Northmet Power	7	7	42/6	−6d.	3	5	9
Richmond Elec.	6	6	26/6	−6d.	4	10	7
Scottish Power ..	8	8	41/6	+6d.	3	17	0
Southern Areas	5	5	23/6	+6d.	4	5	0
South London ..	7	7	30/–	−1/–	4	13	4
West Devon ..	5	5	25/–	..	4	0	0
West Glos. ..	4½	3½	25/6	+6d.	2	15	0
Yorkshire Elec...	8	8	45/6	+1/6	3	10	4
Public Boards							
Central Electricity:							
1955–75 ..	5	5	115	−1	4	7	0
1951–73 ..	4½	4½	107	..	4	4	0
1963–93 ..	3½	3½	105½	+½	3	6	4
1974–94 ..	3¼	3¼	102	..	3	3	9
London Elec. Trans.	2½	2½	98½	+½	2	10	9
London & Home Counties 1955–75	4½	4½	111	..	4	1	1
Lond. Pass. Trans. Bd.							
A	4½	4½	122½	..	3	13	6
B	5	5	123½	..	4	1	0
C	3¼	3	66½	..	4	10	3
West Midlands J.E.A. 1948–68	5	5	106½	..	4	14	0
Overseas Electricity Companies							
Atlas Elec. ..	Nil	Nil	7/3	+1/–	—		
Calcutta Elec. ..	6*	6*	51/6	+4/–	2	6	6
Cawnpore Elec...	10	7	42/6	+6d.	3	5	9
East African Power	7	7	36/6	+6d.	3	16	9
Jerusalem Elec...	7	5	28/–	..	3	11	5
Kalgoorlie (10/–)	5	5	10/6	..	4	15	3
Madras Elec. ..	Nil	4	34/6	+3/–	2	6	4
Montreal Power	1½	1½	23	−½	—		
Nigerian Elec. ..	8	10	37/6	..	5	6	8
Palestine Elec. "A"	5*	5*	39/6	+1/–	2	10	8
Perak Hydro-elec.	6	7	13/–	..	—		
Tokyo Elec. 6%	6	6	23½	..	—		
Victoria Falls Power	15	15	50/–	..	3	7	7
Whitehall Inv. Pref.	—	6	26/–xd	+6d.	4	12	4

Company	Dividend Previous	Dividend Last	Middle Price Mar. 27	Month's Rise or Fall	Yield p.c. £	s.	d.
Equipment and Manufacturing							
Aron. Elec. Ord.	10	15	62/–	..	4	16	9
Assoc. Brit. Eng.	6	7	53/9	..	2	12	0
Assoc. Elec.:							
Ord.	10	10	58/3	+1/–	3	8	6
Pref.	8	8	41/–	+1/–	3	18	1
Automatic Tel. & El.	12½	12½	67/9	+3/–	3	13	9
Babcock & Wilcox	11	11	53/6	−6d.	4	2	3
British Aluminium	10	10	45/–xd	..	4	9	0
British Insul. Ord.	20	20	115/9	−6d.	3	9	2
British Thermostat (5/–)	18½	18½	20/9	..	4	9	0
British Vac. Cleaner (5/–)	30	30	33/–	..	4	11	0
Brush Ord. (5/–)	8	9	11/–	..	4	1	6
Burco (5/–) ..	15	15	15/9	..	4	15	3
Callender's ..	15	20	117/6	−1/16	3	8	0
Chloride Elec. Storage	15	15	90/–	..	3	6	8
Christy Bros. ..	12½	17½	77/6	..	4	10	2
Cole, E. K. (5/–)	15	20	41/3	..	2	6	0
Consolidated Signal	24	27½	6⅞	..	4	0	0
Cossor, A. C. (5/–)	7½*	10*	32/6	−3d.	1	10	9
Crabtree (10/–) ..	17½	17½	44/–	..	3	19	7
Crompton Parkinson Ord. (5/–) ..	20	22½	34/0	−6d.	3	6	3
De La Rue ..	35	40	11⅛	+1⅛	3	12	0
E.M.I. (10/–) ..	6	8	34/3	−1/16	2	6	9
Elec. Construction	10	12½	62/–	−1/–	4	0	8
Enfield Cable Ord.	12½	12½	65/–	+2/–	3	17	0
English Electric	10	10	56/–	+6d.	3	11	5
Ericsson Tel. (5/–)	22*	20*	54/6	+6d.	1	16	9
Ever Ready (5/–)	40	40	45/–	+1/–	4	9	0
Falk Stadelmann	7½	7½	36/3	+1/6	4	2	9
Ferranti Pref. ..	7	7	33/6	+1/–	4	3	7
G.E.C.:							
Pref.	6½	6½	34/6	..	3	15	4
Ord.	17½	17½	98/–	−6d.	3	11	6
General Cable (5/–)	15	15	19/–	..	3	19	0
Greenwood & Batley	15	15	48/3	..	6	3	0
Hall Telephone (10/–)	12½	12½	30/–	−1/–	4	3	4
Henley's (5/–) ..	20	20	28/–	+1/16	3	11	5
4½% Pref. ..	4½	4½	24/–	..	3	15	0
Hopkinsons ..	15	17½	80/–	+3/16	4	7	6
India Rubber Pref.	5½	5½	24/–	..	4	11	9
Intl. Combustion	30	32½	7⅞	+⅜	4	2	6
Johnson & Phillips	15	15	75/6	−3/–	3	19	6
Lancashire Dynamo	22½	22½	105/–	+½	4	5	10
Laurence, Scott (5/–)	12½	12½	13/9	..	4	11	0
London Elec. Wire	7½	7½	39/–	+1/–	3	17	0
Mather & Platt ..	10	10	55/–	..	3	12	9
Metal Industries (B)	8	8½	50/6	..	3	7	6
Met. Elec. Cable Pref.	5½	5½	21/3	..	5	3	6
Mid. Elec. Mfg. ..	25	25	7⅜xd	+⅛	3	8	1
Murex	20	20	5¼	..	3	19	2
Newman Ind. (2/–)	20	20	7/4½	1½d.	5	8	9
Philco (2/–) ..	—	—	15/–	+6d.	—		
Power Securities	6	6	29/–	−6d.	4	2	9
Pye Deferred (5/–)	25	25	32/6	−1/16	3	17	0
Ransome & Marles	20	20	91/3	+3/16	4	7	9
Revo (10/–) ..	17½	17½	43/6	..	4	0	5
Reyrolle ..	12½	12½	73/9	+1/16	3	7	9

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price Mar. 27	Month's Rise or Fall	Yield p.c. £	s.	d.
Equipment and Manufacturing (*Continued*)							
Siemens Ord. ..	7½	7½	36/6	..	4	2	4
Strand Elec. (5/-)	10	12½	11/-	−6d.	5	13	8
Switchgear & Cowans (5/-) ..	20	20	20/9	..	4	16	7
T.C.C. (10/-) ..	5	7½	26/-	+1/-	2	17	9
T.C. & M. ..	10	10	60/-	+1/-	3	6	8
Telephone Mfg.(5/-)	9	9	12/-	..	3	15	0
Thorn Elec. (5/-)	20	20	29/-	..	3	9	0
Tube Investments	20	22½	5 $\frac{5}{16}$	+ $\frac{1}{16}$	3	19	10
Vactric (5/-) ..	Nil	22½	21/-	+3/9	5	7	2
Veritys (5/-) ..	7½	7½	8/9	−3d.	4	3	4
WalsallConduits(4/-)	55	55	53/-	..	4	3	0
Ward & Goldstone (5/-)	20	20	30/6	..	3	5	8
WestinghouseBrake	14	14	78/9	+2/9	3	11	1
West, Allen (5/-)	7½	7½	8/9	..	4	5	9
Traction and Transport							
Anglo-Arg. Trans.:							
First Pref. (£5)	Nil	Nil	2/6	..		—	
4% Inc. ..	Nil	Nil	7½	+1		—	
Brit. Elec. Traction:							
Def. Ord. ..	45	45	1175	−30	3	16	0
Pref. Ord. ..	8	8	190	..	4	4	3
Bristol Trams ..	10	10	57/-	..	3	10	2
Brazil Traction ..	1¾	2	27¼	+½	7	6	9
Calcutta Trams..	6½	7½	62/6	−4/-	2	8	5
Cape Elec. Trams	5	6	26/-	..	4	12	4
Lancs. Transport	10	10	48/-xd	..	4	3	4
Southern Rly.:							
5% Prefd. ..	5	5	77	+1	6	9	9
5% Pref. ..	5	5	117½	−2	4	5	1
T. Tilling ..	10	10	61/-	..	3	5	7
West Riding ..	10	10	48/-	−1/-	4	3	4
Telegraph and Telephone							
Anglo-Am. Tel.:							
Pref.	6	6	124½	−½	4	16	5
Def.	1½	1½	29½	−½	5	1	8
Anglo-Portuguese	8	8	27/6	..	5	16	4
Cable & Wireless:							
5½% Pref. ..	5½	5½	118	+½	4	10	5
Ord.	4	4	88½	+3½	4	12	0
CanadianMarconi$1	Nil	4cts.	12/-	−6d.		—	
Globe Tel. & Tel.:							
Ord.	8¼*	5*	41/-	..	2	8	2
Pref.	6	6	31/-	..	3	17	5
Great Northern Tel. (£10)	Nil	Nil	28	−1		—	
Inter. Tel. & Tel.	Nil	Nil	32	+2		—	
Marconi-Marine..	7½	7½	35/6	+1/-	4	4	6
Oriental Tel. Ord.	4	4	51/6	+1/6		—	
Telephone Props.	Nil	6	20/-	..	6	0	0
Tele. Rentals (5/-)	10	10	12/6	..	4	0	0

* Dividends are paid free of Income Tax.

Stocks and Shares (*Continued from page* 478)

outstanding, and the company, at the beginning of last month, gave notice of intention to redeem it at 100 on September 1st next. The offer of the Associated Electrical Industries to give ten of its 8 per cent. preference shares for every eleven of the 7 per cent. preference shares of the British Thomson-Houston Co. has been accepted by holders of more than 90 per cent. of the B.T.H. preference proprietors and the acceptance period has been extended. Fractions are being bought by the company on the basis of 30s. per full share. Associated Electrical Industries preference are 1s. higher at 41s.

British Electric Traction

Investment which is prepared to accept a modest return in exchange for good security, will be interested to hear of £10,000 British Electric Traction 8 per cent. non-cumulative preferred ordinary stock as being on offer in the market at 192. Possibly the stock could be obtained a point or two cheaper. At 192, the yield is £4 4s. 3d. per cent. Dividends in July and December. The annual service of the dividend requires £106,101; in the last-published accounts, the amount available to meet it was £572,000. The price of the stock seldom moves and the security is suitable for permanent investment willing to ignore prospects of early capital appreciation. A fall of 30 points has lowered the deferred to 1175. Thomas Tilling hold their previous price of 61s. London Passenger Transport stocks have undergone no change in the last four weeks. Southern Railway 5 per cent. preference—a strict trustee security—is 2 down at 117½.

High Prices Defended

The Minister of Aircraft Production has called for mass production in the making of electrical appliances. Investment regards this suggestion as an underlining of the previous conviction that the outlook for electrical manufacturing and equipment companies is bright enough to justify the high levels which so many prices to-day command.

Alteration of E. K. Cole's Objects

An alteration in the objects of E. K. Cole, Ltd., was confirmed by Mr. Justice Vaisey in the Chancery Division in the High Court last week. Mr. Harold Christie, K.C., for the company, said it was incorporated in 1926 and the business, which then consisted of manufacturing radio components, had expanded very much since that time. It was now sought to alter the company's objects to enable it to develop its business in the post-war period and put beyond doubt certain directions in which it had already expanded its activities. The company was engaged in television and radio work of one sort or another for the Forces. There had been great developments, mostly secret, and the company thought they could be turned to account in the post-war period.

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.

AKT.-GES. Brown, Boveri & Cie.—"Centrifugal compressors." 12743/43. August 10th, 1942. (567946.)

Aktiebolaget Karlstads Mekaniska Werkstad.—"Method of manufacturing parts of water turbines, centrifugal pumps and propellers." 20384/43. November 13th, 1942. (567872.)

R. H. F. Boot.—"Electric arc welding." 14206. August 31st, 1943. (567867.)

W. F. Bowling and Riley & Neate, Ltd.—"Overhead transmission line supports." 10130. June 23rd, 1943. (567852.)

British Thomson-Houston Co., Ltd.—"Condensation pumps." 5626/43. April 8th, 1942. (567884.)

Brookhirst Switchgear, Ltd., C. Morrey and A. R. H. Thorne.—"Rotary electric switches." 8980. June 4th, 1943. (567916.)

Brush Electrical Engineering Co., Ltd., and C. B. M. Dale. — "Valves for internal-combustion engines." 13764. August 24th, 1943. (567948.)

Colvilles, Ltd., and D. Todd.—"Electrical safety apparatus for coke ovens." 14683. September 7th, 1943. (567931.)

General Electric Co., Ltd., and A. G. Bowd.—"Lighting fittings." 1127. January 22nd, 1943. (567837.)

General Electric Co., Ltd., and W. H. Peters.—"Tuning arrangements for wireless receivers." 20844. July 18th, 1939. (567834.)

W. T. Henley's Telegraph Works Co., Ltd., and J. H. Savage.—"Apparatus for the vulcanising and other heat-treatment of electric cables." 15222. September 16th, 1943. (567956.)

Hoover, Ltd.—"Suction cleaners." 14399/43 September 11th, 1942. (567929.)

Igranic Electric Co., Ltd.—"Electric motor drives for printing presses and other machines." 6052/43. April 24th, 1942. (567885.)

G. Liebmann and Cathodeon, Ltd. — "Screening of amplifying valves." 15190. October 29th, 1942. (567971.)

Mullard Radio Valve Co., Ltd., and R. W. Kersey.—"Secondary emission electron multipliers." 14139. August 30th, 1943. (567860.)

Mullard Radio Valve Co., Ltd., and C. L. Richards. — "Moving-coil loudspeakers and microphones." 15156. September 15th, 1943. (567955.)

G. F. N. Oliver.—"Electric hand torches." 15691. September 24th, 1943. (567960.)

W. Partington and Metropolitan-Vickers Electrical Co., Ltd. — "Electric regulating arrangements for alternating current circuits." 10569. June 29th, 1943. (567923.)

Philips Lamps, Ltd. (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). — "Direction-indicating radio-transmitting apparatus." 16647. December 24th, 1941. (567876.) "Devices comprising electric discharge tubes." 6798. April 29th, 1943. (567889.)

Siemens Bros. & Co., Ltd., and D. A. Christian. — "Telephone systems." 17618. October 26th, 1943. (567964.)

Siemens & General Electric Railway Signal Co., Ltd., and H. J. N. Riddle.—"Railway signalling systems." 11631. July 16th, 1943. (567901.)

Standard Telephones & Cables, Ltd., and C. W. Earp.—"Mechanical modulator for radio beacons utilising two tones." 3434. February 23rd. 1940. (567967.)

Standard Telephones & Cables, Ltd., and H. W. Silcock.—"Manufacturing of electric communication cables." 14411. September 3rd, 1943. (567930.)

Standard Telephones & Cables, Ltd., F. H. Bray and L. R. Brown.—"Arrangements for counting electrical impulses." 14180. August 31st, 1943. (567863.) "Telecommunication exchange systems." 14181. August 31st, 1943. (567864.) "Telecommunication exchange systems." 494/45. August 31st, 1943. (Divided out of 567864.) (567874.)

Patent Considerations

MANY matters of immediate interest were dealt with by Mr. W. W. Triggs, M.Sc., B.E., M.I.Mech.E., A.M.I.E.E., in his recent presidential address to the Chartered Institute of Patent Agents. He said his purpose was to examine briefly the character of the so-called patent monopoly, the nature of the attacks being made on it, and some of the immense advantages deriving from the system. A patent was not a "monopoly"; it merely gave the patentee the right for a limited term to exclude others from making, using or selling his invention or discovery. It was a property right and no more a "monopoly" than other property rights.

The attack on the patent system had been associated with the establishment of cartels and trade associations; these were said to be bad and therefore patents were bad. This fallacy was certainly not accepted by clear minded people who were sufficiently altruistic to put the public interest before their own. Mr. Triggs maintained that the attack on the system was wholly illogical or largely based on non-existent abuses, although he did not deny that there had been abuses, particularly in the United States. In this country the Comptroller-General had powers to deprive a patentee of his limited monopoly unless within a relatively short period he showed willingness and ability to give the public adequate and reasonable benefit from his invention.

Turning to the benefits of the system, Mr. Triggs said that the inventor must not only find and disclose a use for his invention but he must also disclose *how* to use it. This created a powerful incentive on the scientist or experimenter to direct any knowledge which he might discover into channels of usefulness and to relate his findings to the everyday life of the people and to make his ideas practical. Another benefit was that the system preserved a written record of progress in all the arts.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

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

Australia. — May 28th. Mackay City Council, N.S.W. 2,500-kW turbo-alternator. Contract 42/45. Plans and spec. (10s. 6d.) from A. E. Axon, consulting engineer, Bank of Australasia Chambers, Brisbane.

July 4th. Victoria State Electricity Commission. 40,000-kVA synchronous condenser, Spec. 44-46/1.

Cleethorpes.—April 23rd. Electricity Department. Switchgear, transformers and cable. (March 23rd.)

Edinburgh.—April 4th. Corporation Electricity Department. Interlocked tile cable covers for the year ending May 28th, 1946.

Keighley.—April 6th. Electricity Department. Four 400-kVA, 6,600/400-V, three-phase transformers. (March 23rd.)

Littleborough.—April 10th. Electricity Department. 500-kVA transformer. (March 23rd.)

Manchester.—April 3rd. Electricity Department. Automatic voltage variation equipment and reactors. Mercury-arc rectifier equipment. DC traction switchgear. (March 9th.)

April 7th. Electricity Committee. Service cut-outs and cables. (March 16th.)

Middlesbrough.—April 20th. Tees-side Railless Traction Board. Two 300-kW mercury-arc rectifiers, etc. (March 9th.)

Wolverhampton.—April 4th. West Midlands Joint Electricity Authority. Transformers. (March 9th.)

Orders Placed

Brighton.—Public Utilities Committee. Accepted. 500-kW mercury vapour rectifier (£2,557).—Hewittic Electric Co.

London.—ISLINGTON.—Electricity Committee. Recommended for twelve months:—Transformers.—Hackbridge; British Electric Transformer Co.; Lindley Thompson. Transformer tanks.—Alfred Allen & Son. Tinned copper wire and fuses.—Lighting, Heating and Traction Supplies Co. Boxes.—Callender's; W. Lucy & Co.; Henley's; Siemens Bros.; Aero Engines. Meters.—Metropolitan - Vickers; Aron Electricity Meter; Sangamo Weston. Lamps, etc.—B.T.H. Co.; Crompton Parkinson; Philips Lamps; G.E.C.; Ensign Lamps. Cable Covers.—Cable Covers, Ltd. Tapes.—L. Andrew & Co. Cables.—Aberdare Cables; Britannic Elec. Cable & Const. Co.; B.I. Cables; Edison Swan Cables; T. C. & M. Co.

Sunderland. — Town Council. Accepted. Electrically-driven creeper track grab crane for the electricity undertaking (£1,639).—Priestman Brothers.

Walsall.—Electricity Committee. Accepted. Cable for three years.—Callender's.

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.

Argyllshire.—Engineering works; J. M. Rollo, engineer, Bonnybridge, Stirlingshire.

Ashington (Northumberland).—Additions to Ashington Hospital (£50,000); board of governors.

New Essoldo Cinema; J. H. Morton & Son, architects, Martins Bank Chambers, Fowler Street, South Shields.

Ashton-under-Lyne.—Six shops, Reyner Lane estate; A. T. Kemp, borough surveyor.

Beswick.—Additions to Mill, Bradford Road, for T. Hope, Ltd.; Jones & Dalrymple, architects, 178, Oxford Road, Manchester, 13.

Bolton.—Extensions for nurses' accommodation at Townleys Hospital (£4,500); C. Herbert, borough engineer.

Brighton.—Extensions, Warren Farm schools (£5,750); borough engineer.

Bury.—Extensions, Bridge Hall Mill; Transparent Paper Co., Ltd.

Chesterfield. — Machine shop; Derbyshire Carriage & Wagon Co., Ltd.

Cumberland.—Police station, Kells; county architect, 4, Alfred Street North, Carlisle.

Dorchester. — Annexe to Dorset County Hospital; county architect, Shire Hall, Dorchester.

Glasgow.—Extensive building work for Royal Infirmary after the war (£250,000); medical superintendent.

Manchester.—School, Heaton Park; G. H. Gawler, chief building superintendent, Education Offices, 140, Deansgate, Manchester, 3.

Factory, 90/92, Oldham Street; J. H. Frisby, Ltd., 24, Lever Street, Manchester, 1.

Middlesbrough.—New electrical installations in nine war-damaged houses; borough engineer.

Newcastle-on-Tyne.—Rebuilding of six houses in flats for the Gateshead Land & Property Co.; Cackett, Burns, Dick & McKellar, architects, 21, Ellison Place, Newcastle-on-Tyne.

Perth.—Extensions, maternity department, Royal Infirmary; medical superintendent.

Rochdale.—School kitchen, Greenhill; S. H. Morgan, borough surveyor.

Stockport. — Foundry, Conway Street, Reddish; Storey Foundry Co., Ltd., Sheffield Street, Heaton Norris, Stockport.

Child welfare centre, Grange Avenue, Reddish; W. F. Gardner, borough surveyor.

Warrington.—Works additions, Rose and Crown Street; T. White & Co., Ltd.

West Riding.—Maternity home, Sandygate House, Wath-on-Dearne (£6,000); A. Booth, acting county architect, County Hall, Wakefield.

York.—Pumping station, Fulford; C. J. Minter, city engineer, Guildhall.


SPECIFY BAKER CONTACTS
WHEN DESIGNING ELECTRICAL EQUIPMENT
BAKER PLATINUM LTD., 52 HIGH HOLBORN, LONDON, W.C.I

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.

EASTER SCHEDULE

CLASSIFIED ADVERTISEMENTS

APRIL 6 issue

has already closed for press.

SITUATIONS VACANT

None of the vacancies for women advertised in these columns relates to a woman between 18 and 41 unless such woman (a) has living with her a child of hers under the age of 14, or (b) is registered under the Blind Persons Acts, or (c) has a Ministry of Labour permit to allow her to obtain employment by individual effort.

THE UNIVERSITY OF SHEFFIELD

Lecturer in Electrical Engineering

THE Council invite applications for appointment as Lecturer in Electrical Engineering. Qualifications in light-current engineering, particularly electronics, will be a recommendation. Salary £570 per annum, with war-time marriage and children allowance. Further particulars may be obtained from the undersigned, with whom applications should be lodged by April 30th.

A. W. CHAPMAN, Registrar.
1694

CHARGE Engineer required for Power Station in India. Experience with large water tube boilers and steam turbines essential. Salary Rupees 800 per month with free quarters and passage. Apply, with copies of testimonials, to—Box 1616, c/o The Electrical Review.

DISTRIBUTION Engineer required by British company operating overseas, 3 years' agreement. Salary (including war bonus) £650 p.a. Passage paid and quarters provided by company. Apply, with full particulars of age, training, experience and present position to—Box 1691, c/o The Electrical Review.

ELECTRICAL and Mechanical Engineer. An important Telephone Cable manufacturing firm, situated in S.E. England, requires the services of an Electrical and Mechanical Engineer for the maintenance of high precision telephone cable manufacturing plant. Applicants should, preferably, hold an engineering degree and should have been engaged in a similar capacity elsewhere. Duties include responsibility for the installation and maintenance of insulating and twisting machines, stranders, drying ovens, lead presses and armouring machines, together with maintenance shops and boiler plant and other ancillary equipment. Salary £600 p.a., or more for specially qualified man. The appointment will be permanent and pensionable. Applicants should write, quoting D.1151XA, to the Ministry of Labour and National Service, Appointments Dept., Central (T. & S.) Register, Room 5/17, Sardinia Street, Kingsway, London, W.C.2, for the necessary forms, which should be returned completed on or before 10th April, 1945. 1701

ELECTRICAL wholesalers require Trade Counter Assistant. Must be conversant with all types of electrical material for installation purposes.—London Electrical Co., 92, Blackfriars Road, S.E.1. 24

ELECTRIC Lamp factory requires Works Chemist for its small but well-equipped laboratory. If possible, some knowledge of fluorescent tubular lamps. Good prospects for the right man. The factory has good foreign connections with large research laboratories. Applications invited to—Box 1650, c/o The Electrical Review.

EXPERIENCED and energetic Representative required by well-known manufacturers of electric light fittings. Accustomed to working by car and stockroom. Good salary, expenses and bonus. Only first-class men need apply, stating age, education and experience to—Box 1590, c/o The Electrical Review.

FULLY Qualified Mechanical Engineer in N.W. area, age 35-45, required by engineering company designing and constructing electricity generating stations and industrial plants. Applicants should have had wide experience in design of steam-raising plant and associated equipment, including alternative methods of firing; practical experience of plant commissioning and operation; capable of controlling technical reports, drawing office work, and erection. Permanent position. Salary not less than £1,500 per annum. Applicants should write, quoting C.2512XA, to the Ministry of Labour and National Service, Appointments Dept., Central (T. & S.) Register, Room 5/17, Sardinia Street, Kingsway, London, W.C.2, for the necessary forms, which should be returned completed on or before 12th April, 1945. 1688

JAMES Scott & Company, Electrical Engineers, of Dunfermline, Edinburgh and Branches, are prepared to consider for post-war development, young Electrical Engineers between the ages of 25 and 40 years, for supervisory positions. Applicants should have technical qualifications equivalent to Institution of Electrcial Engineers' Graduate Examination, and preferably with experience in electrical contracting, especially in erection and design of overhead extra high voltage transmission with wood and steel poles to very latest practice. Good prospects for energetic men. Commencing salary £400 to £650 per annum, depending on technical qualifications and experience. Apply in first instance, giving all particulars and stating salary expected, to—I. Sclar, James Scott & Co., Chapel St., Dunfermline. 1666

MECHANICAL and Electrical Engineer required by the Gold Coast Government Public Works Department for one tour of 12 to 24 months, with prospect of permanency. Salary according to qualifications and experience in the scale from £475 p.a. rising to £840 p.a. Local allowance is payable, and separation allowance for married men, e.g., the rates on salary of £475 are £24, and between £84 and £204 according to number of children. Outfit allowance £60 if initial salary is not more than £600 a year. Free passages and quarters. Candidates must be Corporate Members of either the Institution of Electrical or Mechanical Engineers or hold an engineering degree; and must have a thorough practical knowledge of compression ignition oil engines, producer gas plant and suction gas engines, pumping plant, and A.C. and D.C. electrical generation and distribution. Applicants should write, quoting C.2526A, to the Ministry of Labour and National Service, Appointments Dept., Central (T. & S.) Register, Room 5/17, Sardinia Street, Kingsway, London, W.C.2, for the necessary forms, which should be returned completed on or before 28th April, 1945. 1689

METROPOLITAN Borough of Islington: Charge Engineer required immediately. Previous experience with three and two-phase turbine alternators, water tube boilers, essential. Salary in accordance with Joint Board Scale, Grade 8, Class G. Applications, giving experience and date to start duties, together with copies of three testimonials, to be delivered not later than noon, 10th April, to the Borough Electrical Engineer, 341/343, Holloway Road, London, N.7. 1699

NON-Association electric cable makers require first-class Representative for Midlands territory, preferably resident in the Midlands. Must be fully conversant with selling cables and be able to prove results.—Box 1700, c/o The Electrical Review.

ONE Assistant Switchboard Attendant required to assist on the E.H.T. and L.T. switchboard in a selected station. Experience with rotary converters, motor generators and their control gear essential. Wages and conditions of employment in accordance with N.J.I.C. Schedule (Area 10), present wage £5 14s. 4d. per week of 48 hours (shift work). Apply by letter only, stating age and particulars of experience, and enclosing copies of three recent testimonials, not later than 12 noon on Wednesday, the 18th April, 1945, to Mr. H. F. J. Thompson, M.I.E.E., General Manager and Engineer, Electric House, 204, Lavender Hill, London, S.W.11. 1698

PATENT Agent. Well-established firm requires a Patent Agent of British nationality, preferably specialising in electronics, as Assistant in Patent Department, permanently or for duration of war. Subjects: Control apparatus, electronics. Salary £700-£900 or upwards, according to qualifications and experience. Applicants should write, quoting F.3427XA, to the Ministry of Labour and National Service, Appointments Dept., Central (T. & S.) Register, Room 5/17, Sardinia Street, Kingsway, London, W.C.2, for the necessary forms, which should be returned completed on or before 11th April, 1945. 1687

PROGRESSIVE Company in the London area, intending to specialise in Electrical Measuring Instrument Manufacture as soon as the present restriction on employment is removed, invite applications for the post of Design Research Engineer. Applicants must have wide theoretical and practical experience in development of electrical and electronic apparatus. Excellent opportunity for really first-class man. Write, giving details of experience, salary required, etc., to—Box 1670, c/o The Electrical Review.

SALES Engineer required for preparation of tenders for switchgear. Applicant required to have first-class technical education and preferably to have had drawing office experience. This vacancy offers excellent opportunity to any young man with ambition, as this is the commencement of a sales section of a rapidly developing electrical engineering company.—Box 1643, c/o The Electrical Review.

SALES Representative or Agent required for reputable manufacturers of conduit fittings, lighting fittings and electrical accessories, for Midlands and South-West England areas, wholesale trade only. State experience, age, full particulars of any qualifications, and remuneration desired. —Box 1686, c/o The Electrical Review.

SHIFT Engineers wanted for power station, permanent position. Salary in accordance with Grade 8, Class F, of N.J.B. Schedule. Reply, giving age and technical training and experience, to West Gloucestershire Power Company Limited, 126, London Road, Gloucester, endorsing envelope "Shift Engineer." 6900

TECHNICAL Lighting Assistant required in London by large lamp manufacturers, to prepare lighting schemes for war applications, factories, public lighting, etc. Electrical and lighting experience and technical correspondent essential. Permanent position with post-war prospects for young man free of National Service obligations. Write, stating age, qualifications, experience and salary required, to—Box 1631, c/o The Electrical Review.

APPOINTMENTS FILLED

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

SITUATIONS WANTED

ADVERTISER seeks position of responsibility Electrical Accessories Sales or Office Administration, methodical and efficient controller. Full particulars and salary.—Box 6853, c/o The Electrical Review.

DESIGNER Draughtsman, with over ten years' experience in the design and manufacture of domestic electrical appliances, including thorough knowledge of design as applied to mass production, desires to change position to firm interested in the development and utilisation of domestic electrical products in the post-war period. —Box 6878, c/o The Electrical Review.

ELECTRIC Heating. Sales Engineer (50), experienced space and water heating and cooking, installations and equipment design, wishes to represent manufacturer in London and Southern Counties. Contacts amongst Govt. depts., supply authorities and trade.—Box 6877, c/o The Electrical Review.

HIGHLY qualified diploma Electrical Engineer, M.Sc., 15 years' design and research exp., motors, generators, instruments, own patents and ideas, desires change position. Will take position as Development Engineer with firm interested in development, electrical man. Available now. Write—Box 6896, c/o Electrical Review.

LAMP Works Executive (40), wide technical and administrative experience of modern manufacturing practice, including production and personnel management, seeks change, not necessarily lamp manufacture.—Box 6884, c/o The Electrical Review.

PLASTIC Moulding (Compression) Foreman seeks similar position, 18 years' practical experience, ex. refs., go anywhere, free now.—Box 6895, c/o The Electrical Review.

PROGRESS or Production Control Manager, anything electrical, fully experienced all departments from sales orders to despatch. Will consider assistantship with large concern.—Box 6899, c/o The Electrical Review.

STORES Supervisor seeks position with concern manufacturing light engineering and electrical equipment. Fully experienced in modern stock control methods and stores routine, buying, etc.—Box 6879, c/o The Electrical Review.

SUBMERSIBLE Motor-driven Pumps. Chartered Electrical and Mechanical Engineer, skilled in design and manufacture, wishes contact first-class pump manufacturing concern interested in same.—Box 6882, c/o The Electrical Review.

SUPPLY Authorities. Qualified Electrical Engineer, A.I.E.E. (38), free from Government Service next few months, would appreciate enquiries in any of the following capacities: Generation, distribution, consumers' engineer, sales or development. Sound technical and executive background.—Box 6870, 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.

THREE 6,000-kW TURBO ALTERNATORS FOR SALE

ONE 6,000-kW TURBO ALTERNATOR, comprising Curtis-Impulse type Steam Turbine by Fraser & Chalmers/G.E.C., running at 3,000 r.p.m., for operation on steam at 190/250 lbs. per sq. inch and 600/700 deg. F. total temperature; direct coupled to 6,000-kW M.C.R. Alternator, also by Fraser & Chalmers/G.E.C., designed to give its output at 6,600 volts, 3-phase, 50 cycles, with direct coupled exciter, field suppression switch and resistance. The Turbine exhausts to 2-pass surface condenser by Cole, Marchant & Morley, with 10,000 sq. ft. cooling surface, fitted with 2-stage steam jet air ejection with all necessary inter-cooler, oil coolers, extraction pump, etc.; installed 1927.

Two each 7,500-kVA TURBO ALTERNATORS by English Electric Co. Ltd., each 6,000 kW, .8 p.f., 6,600 volts, 3-phase, 50 cycles, 3,000 r.p.m.; each set complete with condenser and usual accessories; 200 lbs. per sq. inch steam pressure, 600 deg. F. total temperature, with attractive steam consumption; one set manufactured 1928 and the other 1923.

GEORGE COHEN, SONS & CO. LTD.,
Wood Lane, London, W.12, and Stanningley, nr. Leeds.
1682

GEORGE COHEN, SONS & CO. LTD.

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GUARANTEED ELECTRICAL

PLANT.

MOTORS, GENERATORS,

SWITCHGEAR,

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WOOD LANE, LONDON, W.12.
Telephone: Shepherds Bush 2070
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STANNINGLEY, NEAR LEEDS.
Telephone: Pudsey 2241.
Established 1834.

27

A number of self-cont. Petrol Lighting Sets, 3 kW, A.C. or D.C., any voltage, semi-portable, like new, from stock.—The Electroplant Co., Wembley. 1678

REBUILT MOTORS AND GENERATORS

LONG deliveries can often be avoided by purchasing rebuilt secondhand plant. We can redesign or replace surplus plant of any size.

SEND US YOUR ENQUIRIES.

OVER 1,000 RATINGS ACTUALLY IN STOCK HERE.

DYNAMO & MOTOR REPAIRS LTD.,
Wembley Park, Middlesex.
Telephone: Wembley 3121 (4 lines).

Also at Phœnix Works, Belgrave Terrace, Soho Road, Handsworth, Birmingham.
Telephone: Northern 0898.

26

WATER TUBE BOILERS IN STOCK

Two	25,000 lbs.	evaporation,	175 lbs. W.P.
Three	20,000 lbs.	..	175 lbs. ..
One	12,000 lbs.	..	200 lbs. ..
One	12,000 lbs.	..	160 lbs. ..
One	9/10,000 lbs.	..	200 lbs. ..

We install complete, including brickwork. Economisers, Pumps, Piping Valves, Generating Sets and Motors in stock. Please send us your enquiries; we can give immediate delivery.

BURFORD, TAYLOR & CO. LTD.,
Boiler Specialists, Middlesbrough.
Telephone: Middlesbrough 2622.

32

500-v. D.C. EQUIPMENT

2 panels, each comprising 1 double-pole, 4,000-a. direct current Circuit Breaker, calibrated 2,500-4,500 a.

2 panels, each comprising 2 4,000-a. Knife Switches, 0-4,000-a. sector type Ammeter and Shunt, and 1 type D D.C. Metropolitan-Vickers Reverse Current Relay.

2 panels, each comprising 1 type DE Metropolitan-Vickers D.C. Watt-hour Meter and control fuses and shunts.

The above are suitable for control of D.C. Rotary Converter plant, and can be seen any time at the Electricity Works, St. Andrew's Road, Huddersfield.

Offers to be addressed to F. A. Ellis, M.I.E.E., Borough Electrical Engineer, Corporation Electricity Offices, Market Street, Huddersfield. 1696

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A.C. and D.C. Motors, all sizes, large stocks, fully guaranteed.—Milo Engineering Works, Milo Road, East Dulwich, S.E.22 (Forest Hill 4422). 6781

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

ALTERNATING Petrol Sets, 1½ kVA, 230/1/50, direct coupled, enclosed housing, compact, self-contained units, with meters and regulators. Condition as new.—The Electroplant Co., Wembley, Middx. 1677

ALTERNATOR, 500 kVA, 3-p., 50 c., 400/440 v., 750 revs., direct coupled exciter, 2 brgs., on bedplate. —Stewart Thomson & Sons, Fort Road, Seaforth, Liverpool, 21. 58

ALTERNATOR, 600 kVA, 400/3/50, 300 r.p.m., with exciter, for coupling. Like new, bargain.—The Electroplant Co., Wembley. 1679

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FOR sale, in running order, ranging from 2 to 25 h.p., 400 volt, 20 D.C. shunt and compound wound Motors, Veritys and B.T.H., etc., R.O. and ball bearings, complete with switchgear and starters, and in some cases with series and shunt speed regulators. Can be seen on site by appointment. Apply—Box 1581, c/o The Electrical Review.

FOUR identical 150-kW "Weir Sulzer/E.C.C." Diesel-driven Generating Sets, 220 volt D.C.—Stewart Thomson & Sons, Fort Rd., Seaforth, L'pool, 21. 74

GENERATING Sets for sale, 18 kVA, petrol, 400/3/50; 300-amp. petrol-driven Portable Welding Set; 2½-kW, 220-v. D.C. Crude Oil Set.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 1693

INSU-Glass covered Plain or Enamelled Instrument Wires, No. 18 s.w.g., No. 40 s.w.g., stock deliveries. —Saxonia, Roan Works, Greenwich, S.E.10. 29

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

MET.-Vick. and B.T.H., 3-pole, oil-immersed, 11,000-volt and 6,600-volt Oil Switches; also ammeters and kW-meters. Low prices.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 1588

MONOMARK. Permanent London address. Letters re-directed, 5s. p.a. Write—BM/MONO53, W.C.1. 68

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

NAMEPLATES, Engraving, Diesinking, Stencils, Steel Punches.—Stilwell & Sons Ltd., 152, Far Gosford Street, Coventry. 14

NAME Plates for Electrical Engineers. Neatly engraved. Send wording for full size sketch and list (enclose 3d. stamps).—Maile & Son Ltd., Engravers, 367, Euston Road, London, N.W.1. 24

ONE Motor Generator Set, 300 amps., 0/60 volts, with direct coupled exciter, and 400/3/50-cycles slip-ring driving Motor. Complete with oil starting gear and D.C. switchboard.—Newman Industries Ltd., Yate, Bristol. 1673

PHONE 98 Staines. 35-kW Crude Oil Set, 220 vo.; 35-kW Browett Steam Set, 220 vo.; 50-kW Hindley Steam Set, 440/220 vo.; 75-h.p. National Twin Diesel: Three-throw Ramp Pump, 3½" × 6", 700 lbs. w.p.—Harry H. Gardam & Co. Ltd., Staines. 60

PORTABLE Engine-driven Welding Sets, output 75/350 amps., brand new, Government licence to purchase, delivery stock.—Gladiator Welder Sets Ltd., 18, Leicester Road, Sale, Manchester. 69

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

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TWO duplicate 73-kW, 230-volts, Diesel-driven Generating Sets, each consisting of 110-b.h.p. Crossley 4-cylinder, vertical, scavenge pump, cold start, Diesel engine and direct coupled 73-kW, 230-volts compound wound D.C. Generator and Switchboard. New 1933 and 1936. £725 each complete set loaded on site.—Newman Industries Limited, Yate, Bristol. 1614

6½-kW Turbo-Generating Set, 110 volt D.C., £40.—Stewart Thomson & Sons, Fort Road, Seaforth, Liverpool, 21. 55

7½-kW Steam-driven Generating Set, Ashworth Parker vertical engine coupled to L.D.M. compound wound 230-volt generator, £120.—Stewart Thomson & Sons, Fort Road, Seaforth, Liverpool, 21. 54

250-kVA Alternator, 400 volts, 3-phase, 50 cycles, 750 revs., with direct coupled exciter.—Midland Counties Electrical Engineering Co. Ltd., Grice Street, Spon Lane, West Bromwich. 36

500 Electric Motors, Dynamos, Transformers, Converters, etc., etc., at low prices.—S. C. Bilsby, A.M.I.C.E., A.M.I.E.E., Crosswells Road, Langley, near Birmingham. Phone, Broadwell 1359. 21

ARTICLES WANTED

ACCUMULATOR Plates (old) and lead Peroxide; as actual smelters we pay top price. Also old storage batteries, transformers and whole installations purchased.—Elton, Levy & Co. Ltd., 18, St. Thomas Street, S.E.1. Hop 2825-6. 39

AUTOMATIC Lighting Set, 1,500/3,000 w., 110 or 230 v. Price and full particulars to—J. S. Ramsbottom & Co. Ltd., Keighley. 1594

COIL Winding Machines wanted for essential work.—Box 63, c/o The Electrical Review.

DYNAMOS, 110 volts, 200-400 amps; D.C. Motors, ½ h.p. to 10 h.p., 200-500 volts, ball bearings.—W. H. Sugden, Glenny Road, Barking. Rip. 3302. 1526

ENAMELLED Copper Wire wanted. Please state quantity, make, gauge and price.—Box 61, c/o The Electrical Review.

ENGINEERING Technical Books (new or secondhand) wanted in any quantity. Attractive cash offers. Call—Third floor, 356, Oxford Street, W.1, or "Stoneleigh," St. George's Avenue, Weybridge. 62

IMMEDIATELY required for high priority work, two Westinghouse Rectifiers, makers' continuous rating 8 volts, 1,000 amperes each for input 415 volts, 50 cycles, 3-phase, complete with built-in 11-stage on-load tap changing gear. State year.—Box 6897, c/o The Electrical Review.

MERCURY (Quicksilver) wanted. Write for packing instructions. Gold, Silver and Platinum also purchased.—Collingridge & Co. Ltd., Riverside Works, Riverside Road, Watford (Tel. 5963). 20

ONE compound wound D.C. Generator, 3-bearing type, 230 volts, 120 kW, speed 500-750. One 4-wire, 400-volts, 3-phase, 50-cycles Alternator, with direct coupled exciter, 3-bearing machine, 200 kVA, speed 500-600-750, if possible complete with control switchboard.—Box 67, c/o The Electrical Review.

ONE 220-volt, 15-kW, D.C. compound wound Generator, about 720 to 960 r.p.m., less would suit; also one 5-h.p., 700-1,000-r.p.m., series wound Motor for 220 volts D.C., with attraction type controller, in good condition.—Box 1695, c/o The Electrical Review.

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

WANTED, 4 or 5 Inter-Communication Telephones, must be in good order, not less than 4 or 5-way.—Equipment & Engineering Co. Ltd., 2 & 3, Norfolk Street, Strand, W.C.2. 1692

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REPAIRS: Clocks, Electric Clocks, Clockwork Controllers for public lighting, control and time switches, exposure meters and every kind of clockwork appliance repaired and overhauled. Inquiries welcomed.—J. W. & R. E. Hughes (Clockwork Engineers), 58, Victoria Street, London, S.W.1. Phone, Victoria 0134. 66

TRANSFORMERS, single and three-phase. All types up to 10 kVA.—Woden Transformer Co. (Phone, Bilston 41959), Moxley Road, Bilston, Staffs. 11

AGENCIES

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

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REFRIGERATORS. Agency required for sale of Refrigerators in Aberdeen, North of Scotland and Islands (domestic and business), finance and showrooms available in principal shopping centre of Aberdeen (George Street) at May, 1945. Address—"2033," Wm. Porteous & Co., Glasgow. 6898

MISCELLANEOUS

RELAY AUTOMATIC TELEPHONE COMPANY'S BENEVOLENT FUND

NOTICE is hereby given that the Annual General Meeting of the above-named Fund will be held at 24, Southampton Buildings, Chancery Lane, W.C.2, at 1 p.m. on Wednesday, the 4th of April, 1945, to receive the Annual Report and Statement of Accounts for the year ended 31st December, 1944.

L. E. JONES,
Hon. Secretary.
1684

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THE TECHNOLOGICAL INSTITUTE OF GT. BRITAIN,

35, Temple Bar House, London, E.C.4. 77

COMPANY MEETINGS

BRITISH POWER & LIGHT

Increased Sales Revenue

THE Sixteenth Ordinary General Meeting of British Power & Light Corporation Ltd. was held on 22nd March, in London, Mr. George Wansbrough presiding.

The following is an extract from the chairman's statement which was circulated with the accounts:—

The consolidated profit and loss account shows quite clearly the financial result of the year's working. The revenue from the sale of energy has increased by approximately £144,000 to £2,347,780, and cost of energy generated and purchased by £50,000, leaving a gross profit of £1,097,465 against £1,002,795 for the previous year. Against this, provision for taxation at £421,267 shows an increase of approximately £58,400, with the result that the amount available for service of Ordinary capital is £101,873, compared with £88,465.

The demand for electricity in all the areas of our subsidiary companies continues to increase. We sold to consumers rather over 410 million units in 1944 as compared with 145 million units in 1938, an increase of approximately 182%, representing a steady increase of 19% per annum. The greater part of this substantial increase is due to the increase in power demand, and is a measure of our contribution towards the war effort, for during the whole of the period under review domestic users and ordinary business supplies were thoroughly damped down, a fact well appreciated by household users everywhere.

I am glad to be able to report, as last year, that in spite of increases in the costs of energy purchased, of increase in costs of material, wages, etc., none of our subsidiary companies has found it necessary to increase charges. Notwithstanding the increase of 182% in the amount of electricity sold and of increases in the costs of almost everything we bought, the increase in our own operating and management expenses (excluding generation) over those for 1938 has been no more than 25%.

Post-War Development

So far as it is possible your directors have given consideration during recent months to probable post-war development. First there will be arrears to be made good—normal developments which, but for the war, would in many cases have been carried out long ago. This applies more particularly to commercial, farm and domestic supplies. Our future aim is to ensure that a supply of electricity shall be made available in every village and on every farm within our areas of supply without burden on the other consumers. The rate of progress will necessarily depend upon the available supply of labour and material.

In connection with the economic development of supplies in rural areas, there is a point of importance to which we think the attention of the authorities should be directed, namely, the burden of local taxation. The total of rates paid by your operating companies last year was over £110,000 and exceeds by 50% the net dividend paid to the Ordinary stockholders. The rates paid in respect of our distribution system average over 12% on the capital expenditure involved. Such a burden as this on future extensions removes from the category of being self-supporting a very substantial body of developments which on true economic merits are justified and which ought not to be so penalised.

The Government's proposals for dealing with war damage contributions for public utility undertakings have not yet appeared, but your directors have had regard to this contingency in their recommendations as to disposal of available earnings.

Exacting demands continue to be made on our staff, both permanent and temporary. We are consequently compelled to make increased demands on those members of the staff who remain, but efficiency has been maintained at a high level, and all have responded with willing energy to every call made upon them. Your directors feel confident that you will wish to express your warm appreciation of their devoted work.

The report and accounts were adopted.

1683

COMPANY MEETINGS—*Continued*

THE NORTH-EASTERN ELECTRIC SUPPLY CO. LTD.

AT the Annual Meeting of the above company, held at Newcastle-upon-Tyne on the 21st March, a final dividend making 7% on the Ordinary stock was declared for the year ended 31st December, 1944.

In the course of his speech the Chairman (Mr. R. P. Sloan, C.B.E.) said: The gross profit for the year was £2,237,239—an increase, over the corresponding figure in 1943, of £205,729.

The net profit remaining, £261,151, together with the carry forward from the previous year, gives a total of £493,746. This is sufficient to enable us to maintain the same dividends as in recent years and to carry forward to 1945 £234,408 against £232,595 brought in from 1943.

To meet the requirements for increased generating capacity in the North-East, the establishment of a new generating station in the neighbourhood of Durham was planned. Much publicity was given to this proposal and there was considerable criticism from certain circles regarding the effect it might have upon local amenities.

We ourselves are in no way without concern for the preservation of amenities, and in our opinion a suitably designed power station on the site chosen can have no adverse effect on those of Durham City. But we also have certain obligations placed upon us by Parliament as regards the provision of adequate supplies of electrical energy, and it is our duty to meet the requirements of our customers—present and prospective.

In laying down our programme, it was considered necessary to have this additional plant available for use before the winter at the end of 1948—the maximum demand made upon us, and indeed upon all electricity supply undertakings, occurs during the winter months.

On the 5th December our proposal was the subject of two Inquiries, which were held simultaneously by the Electricity Commissioners and by a representative of the Minister of Town and Country Planning.

It will be appreciated that the time involved in making the preliminary arrangements to hold such Inquiries, and subsequently up to the time of receiving the decision on the matter, will result in a corresponding delay in commencing the work of construction, and in the particular circumstances this is a very serious matter to us.

It undoubtedly will prevent the additional capacity being available by the time we had planned, and already has meant the loss of a whole year so far as its being available to assist in meeting winter requirements.

It is perhaps not generally known that the imperative need to concentrate the manufacturing resources of the country on the production of munitions of war has, for the past three years, seriously retarded the expansion of generating resources. There has been no corresponding pause in the expansion of the demands for electricity. The industry is thus faced in the next few years with the double task of making up this leeway and at the same time providing for the further growth of demand which is bound to come.

It is, therefore, a particularly unfortunate time for the introduction of a new public policy—which I may say is hampering other electricity supply authorities as well as ourselves—under which it seems to be taken for granted that any important extension programme must be opposed, and indeed frustrated, if possible, by some body or another, or at all events that it should be made extremely difficult to carry out.

Our position is extremely unsatisfactory, as, whatever the merits or demerits of any other site may ultimately prove to be, we cannot now afford the time to start *de novo* on any new ground.

The time required to prove that a site can meet the many exacting requirements of a modern generating station and to negotiate its purchase, coupled with the possibility —I might almost say probability—of our again having to meet opposition from one quarter or another, rules this out.

I have spoken strongly on this matter because I feel that the occasion demands it, and I would emphasise that, if we are short of plant when it is required, the responsibility for the consequences will rest upon the shoulders of others—not upon this company.

We, in common with other authorities, are making headway with planning for the future, including schemes, which are now advanced, for the further electrification of rural areas. Prior to and during the war years development in the use of electricity by farmers has been appreciable, and it is expected that there will be an accelerated expansion in this direction.

THE COUNTY OF LONDON ELECTRIC SUPPLY COMPANY LTD.

Sir Robert Renwick's Review

THE Fifty-first Ordinary General Meeting of the County of London Electric Supply Co. Ltd. was held on 20th March, in London.

Sir Robert Renwick, Bart., the chairman, in the course of his speech, said: The output for the year 1944 was 2,481 million units as compared with the 1939 figure of 2,243 millions. The output for 1944 was the second highest in the history of the company. The record output was that for 1943 at 2,566 million units.

The gross revenue for the past year at some £7,898,000 shows an increase of 6.3% over 1943 and 38.6% over the year 1939. This present remarkable figure compares with a revenue of just over £3,000,000 in 1934 and £4,000,000 in 1936. On the other hand, our expenditure on revenue account for the year 1944 at £4,956,000 has increased by £1,869,000 since 1939, and is attributable to extra expenditure arising out of war conditions.

We carry to net revenue account for this year a sum of £2,942,000, as compared with £2,609,000 for 1939, an increase of 12½%.

The excellent position has been achieved with only a very moderate increase in our prices to consumers; thus throughout the war years our consumers have been getting cheap electricity, and what is more important, there has been achieved for them a security of supply which, under the circumstances, I claim is remarkable.

The increase in expenditure over the previous year is accounted for in the cost of coal and the purchase of current which also reflects this. The increase in the price of coal per ton since 1939 is no less than 88%.

A final dividend for the year has been declared on the Ordinary stock of 5%, making, with the interim dividend, 8% for the year, leaving £796,941 to be carried forward as compared with £787,759 brought in.

Greater Productivity

As to the future, one thing is abundantly clear to me, that to those two persistent and very virtuous slogans "Full Employment" and "Social Security" there needs to be added even more persistently and even more virtuously a third, namely, "Greater Productivity." Without greater productivity there can be no full employment and the social security which we all want so much.

On this question of greater productivity we in the electricity supply industry are the handmaidens. It is our job to make available to other industries electric drive, without which full productivity is not likely to mature. So much did your company believe in this necessity, that already our programmes of development have been submitted to the authorities and, so far as material is available, work has already been put in hand.

You will be interested to hear that the estimated generation expenditure for this company and our associated companies alone over the next 10 years, which has already been considered by your Board is of the order of £21,000,000.

With regard to transmission and distribution, the estimated expenditure even for the next five years is approximately £12,000,000, and we believe that if this country is to revive and become once again a leader in industrial matters, such a programme is absolutely essential.

These vast sums of money are not going to be found by subsidies from the Government or even by the Central Electricity Board. They are to be found by people like ourselves who have to put such experience and wisdom as we have accumulated into the wise expenditure and operation of these vast resources. It appears, however, that there are ideas in some minds that a prosperous industry such as ours should be nationalised and that the Government, that is, the taxpayer, would find these vast sums of money for development. I have said to you before that your Board is strongly of the opinion that no major operation is necessary, although improvements can be made of what I called a first-aid nature within the industry itself.

The report and accounts were adopted.

Index to Advertisers

(*Continued on page* 82)

Index to Advertisers

(*Continued from page* 76)

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

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