# ELECTRICAL TIMES

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## Sir Archibald Page Resigns

On Friday morning the Minister of Fuel and Power announced, as we forecast last week, the resignation of Sir Archibald Page from the chairmanship of the Central Electricity Board. Mr. Harold Hobson has been appointed to succeed him. Sir Archibald's reason for resigning is indifferent health, from which he has been suffering for some little time, a circumstance that is not surprising. During five years of war he has occupied the key position in the industry, electricity supply, on which all other vital industries depend; his responsibilities have been unique. There is, of course, no question of a complete breakdown in health. After a period of relaxation and rest Sir Archibald will, we hope, both for his own sake and for the sake of the supply industry, be his old self again. His wisdom and experience may yet render further invaluable service to national electricity supply in the confused future that lies ahead, either in an official or unofficial advisory capacity.

## New C.E.B. Appointments

Hearty congratulations to Mr. Harold Hobson on his new appointment. He was the natural choice and brings to his new responsibilities talents of the highest order. As manager of the C.E.B., Mr. Hobson has earned for himself something of a reputation as a negotiator. If we mistake not, he is already finding scope for his abilities in that direction. Congratulations also to Sir Johnstone Wright, who becomes general manager of the Board, and to Mr. J. Hacking who, from being deputy, takes over the responsibilities of chief engineer. We wish them all success.

## E.T. and the I.M.E.A.

The interest of THE ELECTRICAL TIMES in the Incorporated Municipal Electrical Association is not limited to the normal relationship of a trade paper to an important association in the industry both serve; in a sense it is paternal also. The older members know that *Lightning*, now the "E.T.," did much to forward the objects of this Association in the early days. Younger members may not know, while others may have forgotten, that the Association's First Annual Convention was vigorously promoted by the late W. L. Madgen, our then manager, and that all the arrangements for the first Convention in 1896 were organised in our offices. We mention these things as our excuse, if, indeed, any be needed, for offering advice to members of the I.M.E.A. on a matter that some might consider exclusively a domestic matter of the Association.

## Politics and the I.M.E.A.

At the moment there is unfortunate dissension in the ranks of the I.M.E.A., not wholly due to but brought to a head by the issue of future ownership of generating stations. There seems to be a possibility that an irreconcilable split may develop, not only on that matter but on other differences also. In other words, if things get worse there may be secession by important groups. The root trouble as we see it is a clash of political opinions. We submit that politics are foreign to the affairs of an Association such as the I.M.E.A., and should be eschewed by all; they should not be allowed to intrude in any way. If members adopted this principle, differences of opinion on technical and other matters might still remain, but they would not be acerbated by irrelevant factors. There is no suggestion that anyone should surrender one iota of his political convictions, whatever they may be, but, and we say this with emphasis, neither the I.M.E.A. nor any other Association representative of industry is the proper arena in which to champion and force political plans.

## Position of the M.O.F.

Consider the matter from the standpoint of the Minister of Fuel and Power, who is ultimately responsible for any scheme of future reorganisation of the supply industry. He has been provided with a series of reports, the multiplicity of which

derives mainly from different political approaches rather than differences of industrial and technical opinion. We hazard the opinion that, being a professional politician, he will pay little heed to sectional politics from within the supply industry, or divided political views in any Association. There is no need, therefore, to get agitated on such matters.

## Destiny of the I.M.E.A.

It is an open secret, like the resignation of Sir Archibald Page we indicated last week, that Major Lloyd George is holding a series of meetings just now with the various groups that have submitted to him reports on electricity supply reorganisation. What is his purpose, to seek advice on political aspects of the problem or on technical and administrative matters? The latter, obviously. This, then, is our proffered advice to members of the I.M.E.A., particularly those whose convictions are so strong as to threaten disruption within the Association. Do nothing hasty for the present, wait and see what manner of scheme the Minister will ultimately bring forth. Whatever it is, one thing is certain. There will be need always for a strong municipal electrical association within the industry. This should naturally be the I.M.E.A., but the Association must remain united and strong to fulfil its high destiny.

## United Nations' Standards

The B.S.I. announcement, that a United Nations Standards Co-ordinating Committee, representative of the respective National Standards Organisations, is to be established, with offices in London and New York, is welcome. It means that for the remainder of the war, and the early post-war period, there will be close international collaboration in the co-ordination and unification of standards for certain purposes, an overdue development that should be productive of much good. But we hope and believe that the new liaison will be permanent, and our confidence that this will be so is strengthened by the fact that Mr. C. le Maistre, who has just retired from the B.S.I., will have charge of the London office. He has unrivalled experience of standardisation matters, and has been general secretary of the International Electrotechnical Commission since its formation in 1906. The new Committee will be concerned with the immediate co-ordination of standards in the field of communications of all kinds, both transport and telecommunication, and the development of standards for use in connection with the transfer across borders of raw materials and partly or wholly finished articles. These standards will provide agreed methods of expressing and testing properties of materials, appliances, symbols, terms and definitions, and will include dimensional standardisation to secure interchangeability where replacement of parts is an important consideration.

## Refrigerator Maintenance

On the authority of Mr. Felix Rogers, secretary of the Domestic Electric Refrigerator Association, the *News Chronicle* recently informed its readers that the Government does not consider repairs of domestic refrigerators as essential work; no allocation of labour, materials or petrol is made for this purpose. That is so, and no one will quarrel with the ruling that war requirements must take complete priority over civilian needs. We do suggest, however, that when labour and materials can be spared from munitions production—and there are indications that that time may soon arrive if it is not already with us—then the claims of refrigerator maintenance should be given prompt attention. Electric refrigerators save food, and against labour expended on repairs and maintenance there is a direct counter saving in economising shipping and transport.

## Future of Radio Engineering

The British Institution of Radio Engineers has added its contribution to post-war planning with the publication of a report, Part I, on Post-War Development in Radio Engineering. Part II, dealing with the personnel required and their necessary education and training, is in preparation. The document, reviewed on page 729, is interesting and informative up to a point, the scope for development in the four main fields of radio engineering—education and entertainment, communications, navigation and radar, and industrial electronics—being aptly summarised. But, unfortunately, little is or can be said, for security reasons, about the potential peace-time applications of

radiolocation technique, which are immensely important and deeply interesting. Within the limits of what is said, however, there is forecast general television, with transatlantic television as a more distant prospect; great expansion of trunk and international telephone communication by radio equipment, supplementary to cables; sea, air and land travel freed largely from the limitations and dangers imposed by fog and cloud; and increased industrial efficiency based on the widespread adoption of electronic control and other devices.

## Priority in Development

The B.I.R.A. report is the first of its kind to reach us since publication of the Government White Paper on Employment Policy, which constitutes a touchstone by which future industrial policies and developments must be judged. The Government has undertaken the responsibility of ensuring substantially full employment at all times, and has indicated in general terms the means that will be applied to secure that end. For instance, particularly in the early post-war years, through directive controls, licensing, and a system of priorities in the use of labour and materials, it is intended that industrial developments shall be co-ordinated to fulfilment of the full-employment ideal. How will this affect the order of priority of the various developments outlined in the B.I.R.A. report? Expansion of exports being an immediate and vital necessity, it may be expected that those developments that tend to expand overseas markets and create new demands will be given maximum encouragement. But will home broadcasting, home television and increased telephone facilities be regarded as of quite the same urgency? And where will industrial electronics come in the priorities list? The ultimate advantage in increased production efficiency will be great, but not necessarily so the immediate effects. Obviously there are a lot of headaches in store for our planners of the future.

## Wales and Electricity Supply

Mr. Hugh Quigley has contributed two recent articles to the *Western Mail*, issues June 9 and 12, in which he discusses the electrical sections of the Rees Committee report on Welsh Reconstruction, and makes certain comments and suggestions. The views expressed are so much at variance with the general trend of electrical development to-day, that we should probably not have drawn attention to them but for one fact. The writer is billed as "Chief Statistical Officer, Central Electricity Board, 1931-43," which may tend to give undue weight to some of his strictures on the course of electricity supply development in recent years. This applies also to some of the flamboyant statements made. For instance, Mr. Quigley, as an able statistician, must know that, contrary to what he avers, it is not safe to say that "no hydro-electric scheme in Britain, for at least 20 years, will be capable of erection at a capital low enough to bring the resultant cost of electricity down to a competitive level with electricity from a coal-fired station." In common with generating station engineers as a body we should very much like to know for certain what the price of coal will be three or five years hence, let alone twenty.

## A Welsh Electrical Board?

Mr. Quigley is not satisfied with the proposal of the Rees Committee, that there should be a Welsh Electrical Development Board, which, as we see it, might fit in as a regional element in a national scheme. He would prefer a Welsh Electrical Board, completely responsible for the generation and distribution of electricity in Wales and independent of the Grid. He considers it would be better not to attach new industries to coal areas, which is generally considered desirable, but that any new industries should be evolved out of the coal industry itself. Again, he points out that the possibility of using existing colliery power stations and interconnected systems for an extensive new industrial development based on electricity, extending such stations to supply electro-chemical or metallurgical plants as an alternative or additional to new stations has still to be explored. This last suggestion deserves consideration, but not, we would suggest, as a means to Welsh electrical autonomy, but as an integral part of, and complementary to, the general national supply system. Taken as a whole, Mr. Quigley's suggestions give the impression that he is preaching Welsh nationalism; we thought he was a Scotsman. **METEOR**

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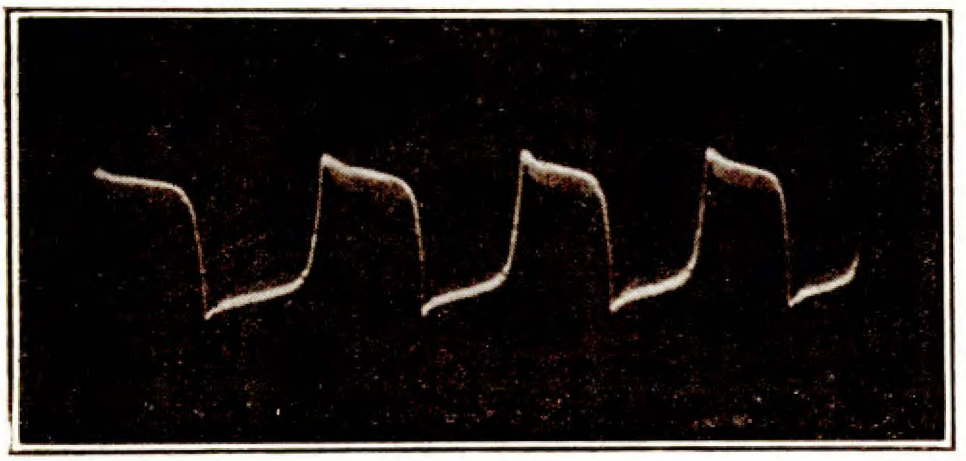
# SUPPRESSION OF RADIO INTERFERENCE FROM MAINS VOLTAGE FLUORESCENT LAMPS

By J. N. Aldington,* B Sc., F.Inst.P., F.I C., F.I.E.S.

THE making or breaking of an electrical circuit will, under certain conditions, give rise to audible effects in an adjacent radio receiver. Such effects are, in general, of short duration and occur as a crackling noise or sharp click, according to the nature and condition of the switch used for controlling the electrical circuit. When the change in circuit condition is clean cut, a single spark at make or break may result in the production of radio frequency oscillations covering a wide band, but of only short duration. On the other hand, a defective switch or one of slower action may produce a train of irregular sparks, and consequently a more sustained and characteristic crackling noise from the radio speaker. Such transient phenomena are, however, generally ignored, as they only occur at infrequent intervals in domestic premises, where the vast majority of radio receivers are installed. In some cases electrical apparatus is used in the home which, by its very nature, is liable to cause prolonged radio interference, as, for example, certain vacuum cleaners and the like ; but in general it can be arranged that the period of use of such apparatus does not coincide with normal listening hours. In other cases electrical equipment required for continuous domestic service, such as a refrigerator, may be fitted by the makers with a suitable mains filter circuit or with effective screening to prevent any objectionable disturbance of radio receiving sets installed on the same premises or adjacent to the apparatus. It is to equipment of the latter type that reference will be made in the present article and to some interesting results obtained with mains voltage fluorescent lamps.

Up to the present time the use of electric discharge lamps for the lighting of domestic premises has been limited in this country to a few experimental installations. With the return of peace, however, it is to be expected that there will be a big demand for fluorescent lighting in the home. As is now well understood, this latest vehicle of light production, with its unrivalled possibilities of colour control and its high luminous efficiency, has only been withheld from use in the domestic lighting field by the exigencies of paramount war-time industrial lighting problems, to the solution of which it has contributed so notably. When circumstances permit the application of fluorescent lamps in the home, it is to be expected that many of them will be installed in close proximity to radio receivers, and it is, therefore, interesting to consider the possibilities of inter-action between these two pieces of apparatus and the magnitude of any effects which might be produced thereby.

Experience has shown that the background noise which may result from the presence of a fluorescent lamp adjacent to a radio receiver is of a low order, and that the suppressor condenser normally fitted as a component of the lamp circuit gear gives, in general, adequate control. There are, however, certain features regarding the suppression or elimination of possible causes of interference which are not without intrinsic interest and which will be dealt with below.



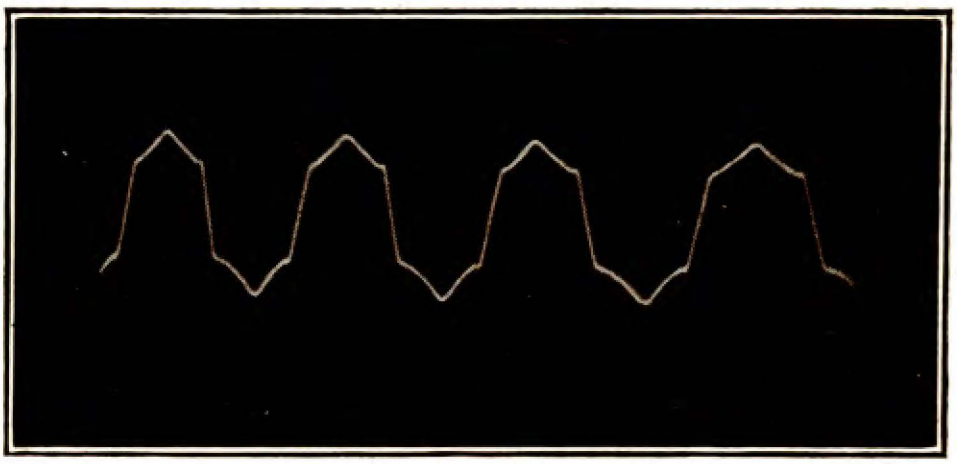
**Voltage Characteristics of 80 Watt Fluorescent Tube during Normal Operation.**

**Source of Radio Oscillations from Electric Discharge Lamps.**—Most electric discharge lamps are designed for operation on alternating current supply mains, and this is generally true of fluorescent lamps. When a fluorescent lamp is operating on the standard British periodicity of 50 cycles per second, the arc discharge will be ignited and extinguished 100 times per second, as indicated by the oscillogram of lamp voltage shown in Fig. 1. It will be seen that in each half-cycle, when the voltage impressed across the tube

* Siemens Electric Lamps & Supplies Ltd.

electrodes reaches the point marked (A), the tube ignites, and thereafter a slight fall in voltage occurs, followed by a substantially flat-topped voltage wave for the remaining period of the half-cycle. In this repeating process of ignition and extinction is to be found the source of those low energy radio frequency oscillations which emanate from fluorescent lamps. After the tube has ignited, and during the period before the voltage falls to zero in each half-cycle, there may occur a train of rapid fluctuations of low amplitude, due to effects taking place at the emissive surface of the lamp electrodes.

While the above remarks appertain to the normal running condition of the lamp, there is another interesting condition of relatively short duration which obtains during the lamp starting cycle. In general, the lamp control gear is arranged to cause preheating of the electrodes for one or two seconds before the starting surge is impressed across them. During this preheating period the electrodes are prepared for the acceptance of the normal running current by the establishment of the requisite electrode temperature and of a localised discharge across the terminals of each electrode. This preliminary discharge has the voltage wave form shown in Fig. 2, and it may be a source of radio oscillations for a short period of time, during which it is sustained prior to the opening of the starter switch and ignition of the lamp.



**Voltage Characteristics of 80 Watt Fluorescent Tube during Preheating of Electrodes.**

When, therefore, a fluorescent lamp is operated adjacent to a radio receiver, a signal may be heard over a wide frequency range. This is particularly true if the radio suppressor condenser normally fitted as part of the lamp circuit equipment shown diagrammatically in Fig. 3, is disconnected.

In one set of experiments carried out to determine the magnitude of possible effects, a signal of low audibility could be heard at a wavelength of 10 metres and over one or two other sharply defined zones up to 50 metres. It was just audible in the 200 to 350 metre band and audible over the whole range from 350 to 1,400 metres, but it could hardly be distinguished at longer wavelengths. The effects were noticeable only when the receiver was not tuned to a broadcast programme or during the silent periods of a programme. It is to be understood that the wavelength range over which the parasitic radiation produced an audible effect in these experiments might presumably be modified under different conditions. In common with other cases, where interference is caused by electrical apparatus adjacent to a radio receiver, it is considered that each of three main factors may contribute to the audible manifestation of interference currents generated by a fluorescent lamp, these are :—

(1) Direct radiation from the lamp itself with which it is closely connected.

(2) Radiation from the wiring connecting the lighting point.

(3) Feed-back into the lighting mains of interference currents, which may therefore, after rectification in the receiver, reach the loud speaker via the power unit.

It will be appreciated that only factors (1) and (2) can contribute to background noise in a battery-driven receiver, as the radiation from these causes is picked up by the aerial system of the radio.

## SUPPRESSION OF RADIO INTERFERENCE

(1) **Direct Radiation from the Lamp.**—It has been found that radiation due to this cause is very feeble and is generally unnoticeable at a distance of a few feet from the lamp. Experiments were carried out with a standard type of mains-operated radio receiver and with a typical battery-driven set with built-in aerial. The two receivers were mounted side by side and a 30 W fluorescent lamp was arranged so that it could be operated at various distances from them. The lamp was operated on control gear connected as shown in the circuit diagram of Fig. 3 with the suppressor condenser in circuit. The receivers were both adjusted to give normal signal strength output and were then tuned to 500 metres. A record was taken of the distance between lamp and receiver at which interference was just audible to an observer listening close to

each of the receivers in turn. The flexible lead connecting the lamp was arranged to be always more remote from the receivers than the lamp itself. The results are shown below.

| Distance at which audible effect was noticeable | |
|---|---|
| Mains Receiver | Battery Receiver |
| 5 ft. | 2 ft. |

Among the causes contributing to the difference between these two results is the difference in the aerial system, which in the case of the battery set was a loop built into the receiver, and in the case of the mains receiver consisted of a short length of insulated wire. In both cases, however, the background noise was inaudible when the receivers were tuned to the nearest broadcast wavelength to 500 metres.

From the above results it is apparent that

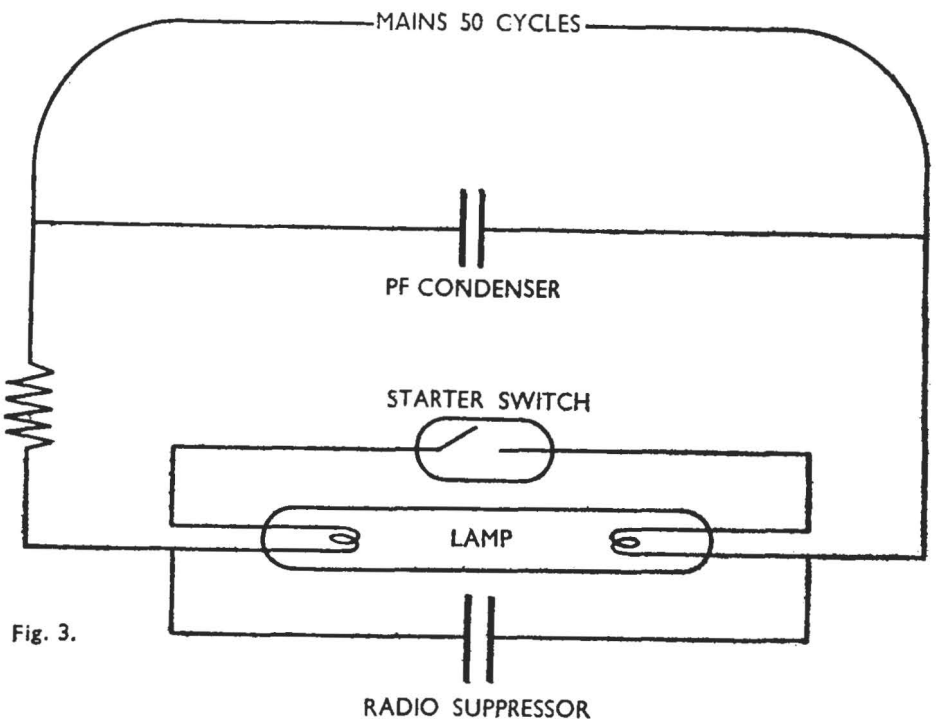



Fig. 3.

ere is small likelihood of direct radiation m a fluorescent lamp producing a disbing effect from a radio receiver in the ne room unless the lamp is mounted very sely to the radio, and even then the rmally fitted suppressor condenser is ierally found adequate. The actual disices given in the above example will uire modification in the case of lamps of ferent wattage, but the quoted values icate the order of magnitude of the cts which might be expected. The itive positions of the fluorescent lamp and receiver sometimes have an influence on magnitude of the interference currents, a reduction may result from modifying orientation of the major axis of the lamp he receiver. For example, with a battery-en set with built-in aerial, if it is necessary nount the lamp very close to the receiver, it may be found preferable to adopt arrangement (*a*), Fig. 4, rather than arrangement (*b*). A similar effect may be found by modifying the relative positions of a fluorescent lamp and a mains-driven radio.

From the above comments it will be clear that the direct radiation from the lamp is very feeble and that in general correct positioning of the lamp and receiver will be adequate to prevent noticeable effects.

The use of wire mesh earthed screens which are recommended for the suppression of strong direct radiation from certain electrical appliances will, therefore, not in general be necessary in the case of fluorescent lamps. In special circumstances, however, this method could be applied with ease to the metal reflectors used in many cases with fluorescent lamps.

(2) **Radiation from the Wiring Connecting the Lighting Point.**—It is difficult to separate the effects produced by direct radiation from a fluorescent lamp from those produced by the field from the wires and circuit components directly connected to the lamp. The wiring and associated equipment may radiate a small amount of power which can be picked up by the aerial system of a radio receiver, if this is mounted in close proximity to it. Experiments have shown that the field from the conductors becomes very attenuated a few feet from the lamp. The remarks made in the last section in regard to the distance separating the lamp and the aerial system of the receiver are applicable also to the wiring and circuit components of the lamp. In general, however, if the cables connecting the lamp are in properly earthed and bonded steel tubing or lead-covered cable, and the control gear is mounted in an earthed metal container, it is unlikely that interference due to radiation from the wiring will be encountered.

There is a further point of interest respecting the relation of the lamp to the control gear. Whilst in many cases the radio suppressor condenser will be located with the choke and starter switch close to the lamp, in others it may be separated from the lamp by some feet of wiring. In order that radiation should be reduced to a minimum, the length of the leads from the lamp to the suppressor condenser should be kept as

short as possible, even if this entails mounting the suppressor condenser separately to the choke coil, It will be appreciated that these considerations need only apply if there is a definite interference problem which requires solution.

In general it can be said that attention to the earthing system of the radio receiver will often of itself do much to eliminate or reduce background noise, either from adjacent lamps or wiring or from other sources of parasitic radiation.

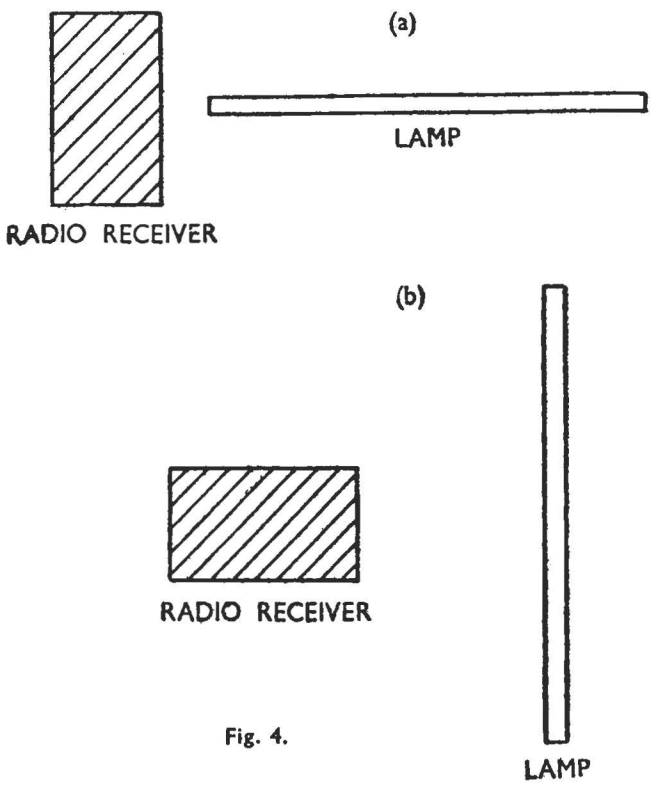



Fig. 4.

**(3) Feed-back into the Supply Mains.**—Interference from this source is unlikely to be encountered to any extent in domestic premises if the radio set is operated from a power circuit and the lamps from separate lighting circuits. Even if this is not the case, the length of the cable separating the lighting point and the radio receiver may be adequate to attenuate any interference current propagated along it to such an extent that a negligible audible response is produced.

If, however, there is evidence of mains-borne interference currents they may be diverted or restricted by the use of a mains filter either at the set itself or at the terminals of the lamp or group of lamps. A simple arrangement of condensers such as that illustrated in Fig. 5, will normally be found effective for this purpose. The three condensers may be mounted in a convenient and compact unit which should be located as near to the lamp as possible, so that besides reducing feed-back into the mains supplying the radio, the length of wiring which might directly radiate is reduced to a minimum. In the case of a large lighting installation it will probably be found sufficient to fit the suppressor unit to the mains terminals feeding the receiver, although the use of such units to deal with a group of adjacent lamps may be found desirable in special circumstances where very sensitive receivers are installed. Other types of mains filters can, of course, be used for the same purpose, and much interesting information will be found in the publications mentioned in the bibliography.

In conclusion, there is one general point worthy of mention. The magnitude of the interference currents produced by fluorescent lamps is generally of a sufficiently low order to be adequately suppressed by the condenser fitted for this and other purposes. The development of interference from an established installation may, therefore, denote the necessity for re-lamping a lighting point. It has been found that the same factors which make this necessary from the point of view of lamp flicker at the end of life may increase the parasitic radiation from the lamp; in which case lamp renewal will effectively restore the original condition of a trouble-free installation.

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B.S.S. 905—"Anti-Interference Characteristics and Performance of Radio Receiving Equipment."

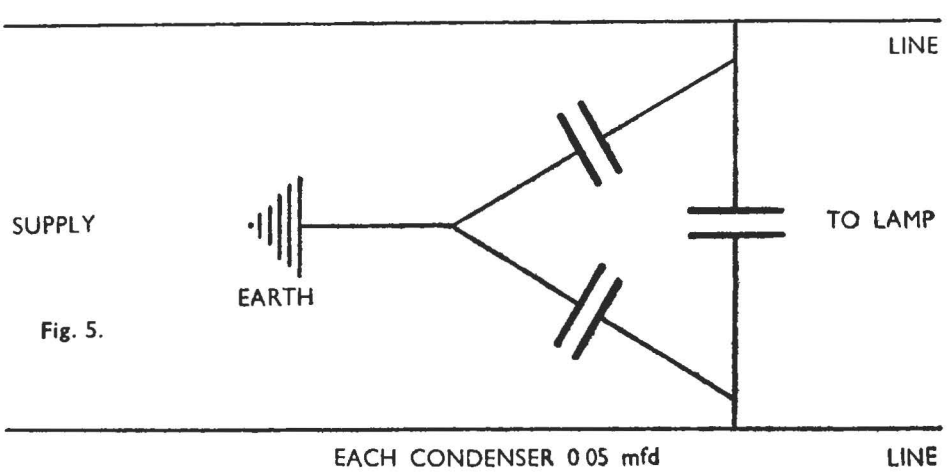



Fig. 5.

## KOLAR GOLD MINES POWER

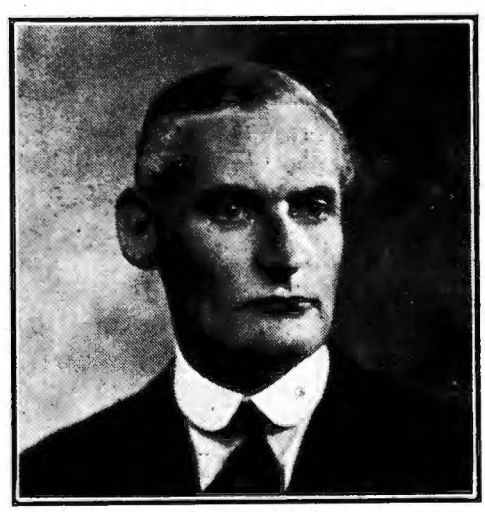
It has been announced by the managers, John Taylor & Sons, of the four gold mines of the Kolar field, India, that mining operations and output will be affected at the Mysore, Champion Reef, Ooregum and Nundydroog mines following serious interruption of the supply of electric power to the Kolar goldfield. The interruption has been caused by lightning damage to the Government generating plant.

# CHANGES AT THE C.E.B.

AS METEOR hinted in his editorial notes last week, changes are being made in the personnel of the Central Electricity Board. It is regrettable that the cause is due to the recent ill-health of the Chairman of the Board; we hope that in the quieter period of retirement, **Sir Archibald Page** will be fully restored to the health and vigour with which we have, over a long period of years, associated him. He has been devoted to his job of making the Grid the success which it has so thoroughly proved in the trials and tribulations to which this country has been exposed since those early days of September, 1939. We gather that he will be at hand to place his experience and advice at the disposal of the Board when such aid may be useful. The bare bones of biographical notes have a way of becoming colourless; one must know the personality to appreciate him. Well, we count ourselves fortunate in having experienced the charm of Sir Archibald Page's company on innumerable occasions; in all the offices he has held his sympathy, tact and good-fellowship have gained him affection, even from the few who disagreed with him in details; he is a great disarmer of criticism, and again an outstanding figure as an electrical engineer. We shall, with all others who have contact with the Central Electricity Board, miss him very much; but he, and we, are glad he leaves such a fine team to carry on the work. The story of his association with the Board commences with the inception of the body in 1927; he was the Board's first general manager, ably assisting Sir Andrew Duncan, a brother Scot, in the none too easy task of setting up and organising the Board. The details, great and small, of the British Grid system are to him an open book. His qualifications for appointment to the general managership of the Board were, of course, outstanding. He was one of the first to be appointed a member of the Electricity Commission, when that body was constituted in 1920, and as a commissioner he served for nearly five years. Our early recollection of him goes back to 1905, when, until nearly the end of the last war, he was deputy city electrical engineer of Glasgow. He then became general manager of the Clyde Valley Electric Power Co. until he joined, as stated, the Electricity Commission. In the interim between leaving the Electricity Commission and joining the C.E.B., he was director and general manager of the County of London Electric Supply Co. Alloa, Scotland, claims him as a son; he was born there in 1875. He was knighted in 1930. And he is a past-president and an hon. member of the Institution of Electrical Engineers. Last year the I.E.E. Council recognised his worth also by the twenty-first award of the Faraday Medal.

Sir Archibald Page.

**Mr. Harold Hobson.**—It will be no great surprise that Mr. Harold Hobson has been chosen to succeed Sir Archibald Page as chairman of the Central Electricity Board; his experience well qualifies him for the post. He joined the Board some 16 years ago as commercial manager, and in January, 1935, became general manager. He is 53 years of age and the son of a well-known economist, Mr. J. A. Hobson. He took his B.Sc. at King's College, London. His first entry into the field of electrical engineering was with Messrs. Merz & McLellan, the consultants, in Middlesbrough and Darlington, whence he came to the London office in 1919 to take charge on the firm's behalf of the construction of the first section of the Barking power station. Completing that work he became joint manager of the County of London Electric Supply Co. In the three years that followed he negotiated a large number of bulk supply and large power contracts, experience which stood him in good stead when he joined the C.E.B. in March, 1928. As commercial manager of the C.E.B. he was responsible for the preparation of the Grid tariff, the basis of the Board's trading operations. It is a feather in his cap that the negotiations, intricate and difficult as the supply industry knows them to have been,



Mr. Harold Hobson.

have resulted in such smooth working between the Board and authorised undertakers, especially the selected-station owners. Mr. Hobson is a member of the Institutions of Electrical and Civil Engineers; also a past-president of the A.S.E.E.

**Sir Johnstone Wright.**—Mr. Hobson is followed as general manager of the Board by Sir Johnstone Wright, a Perthshire man, born at Dunning in 1883. He is an electrical engineer with a wide and intimate knowledge of electricity supply, though his earlier training was with commercial engineering. Technical education he gained at Glasgow Technical College, and this was followed by five years' practical experience with Duncan Stewart & Co., of Glasgow, passing through all the principal departments and offices. Thereafter he joined the British Electric Plant Co., of Alloa, and he had the job of running the station which supplied the works and bulk supply for the town. He went to Oban as chief assistant engineer and at the end of 1906 joined the staff of the Cleveland & Durham Electric Power Co., Middlesbrough. He spent thirteen years with the Power Companies on the North-East Coast, and when the Newcastle Co. took over the Cleveland Power Co. he was appointed engineer and superintendent of the nine power stations with which these companies were associated. He left the Newcastle Co. in the summer of 1919 and went to Bradford Corporation Electricity Undertaking as chief assistant engineer, becoming deputy city electrical engineer a year later. In June, 1922, Belfast appointed him as its city electrical engineer, a position at that time calculated to bring grey hairs to the head of any supply engineer. The way in which Sir (then Mr.) Johnstone Wright tackled the job and converted an overwhelming liability into a fine asset, is an epic of power station engineering. No wonder the Belfast Electricity Committee, when he left in 1927, had a special resolution of regret on its minutes. In addition to the construction of the Harbour Power Station and the laying of h.t. network throughout the city, Sir Johnstone was responsible for the preparation of a comprehensive scheme for electricity supply throughout Northern Ireland—the foundation on which was built the Northern Ireland Electricity Board. He is a past-president of the Institution of Electrical Engineers and was knighted in the New Year Honours List of 1943.

Sir Johnstone Wright.

**Mr. J. Hacking.**—Mr. J. Hacking, who is now promoted to be chief engineer, has been deputy chief engineer to the Board since Easter, 1934. A Lancashire man, born at Burnley, in 1888, he was technically educated at Leeds University and at Armstrong College, Newcastle-on-Tyne; he served an apprenticeship with makers of electric motors in Leeds. In 1908 he joined the staff of the Newcastle-on-Tyne Electric Supply Co., and remained part of the time in the operation and part in the construction department, until, in 1913, he went into employment with Messrs. Merz & McLellan. In that connection he proceeded to the Argentine as assistant engineer on the Buenos Aires (Central Argentine) railway electrification job, and also to South Africa and India on similar work. He was thus employed until he joined the C.E.B. organisation, but prior to 1934 he had supervised the construction of the Grid in the Mid-East England and North-Easd England areas, for which Messrs. Merz & McLellan were the consultants. He should make an excellent third member of a strong "Grid" team.

Mr. J. Hacking.

## SCIENCE AND INDUSTRY

Four meetings sponsored by the Manchester Chamber of Commerce were held in March and April last in collaboration with the Department of Scientific and Industrial Research. The meetings were each addressed by scientists who are in close touch with industry. The views they expressed are the considered judgment of those well qualified to say how best Britain may maintain its important position in the industrial world and keep up its standard of living, which it can only do by being a bit ahead of its competitors in the technical field. Speakers were Lord Riverdale, chairman of the Department of Scientific and Industrial Research; Dr. A. P. Fleming, of the Metropolitan-Vickers Electrical Co.; Dr. Andrew McCance, of Colvilles, Ltd., Glasgow; and Sir Edward Appleton, also of the D.S.I.R. The full report of the meetings is published by the Chamber, at 1s. 6d. per copy, post free

# ACIDITY IN TRANSFORMER OIL

By A. Latham,* M.I.E.E.

IN September, 1943, the B.E.I.R.A. published a very useful memorandum dealing with the Care and Treatment of Transformer Oil to reduce acidity. The writer is surprised that oil manufacturers or refiners have not given more publicity to the matter. There is little doubt that many undertakings are tackling the problem, each working in its own way, and the time seems opportune for the collection of data and information by some independent or central authority. An opinion has been expressed that the oil which seems prone to acidity is mainly that supplied between the early nineteen twenties and mid nineteen thirties; the older oil which was usually of a dark brown colour, and the later oil of lighter hue, does not appear to be so affected. It would be interesting to know if this opinion is confirmed by others.

It would be interesting also to have a reasoned opinion as to why the oil in certain cases develops a high acidity value. Is the acid an inherent property of the oil when supplied and brought into evidence by continual heating and cooling, or is the acidity produced by some product in the insulation or varnish, or some peculiarity in the composition of the tank or laminations? Alternatively, can the acid be absorbed from the air through the breathing of the transformer?

At a recent meeting an engineer stated that, out of number of similar transformers from the same manufacturer, and supplied at the same time, two were installed in a certain substation and the oil developed very high acidity value, whereas none of the remaining transformers were affected. The operating conditions of the two particular transformers were in no way different to the others. An examination showed that neither the lids nor the insides of the two transformers showed any sign of corrosion.

It is appreciated that high acidity is responsible for corrosion trouble under the lid and at the top of the transformer, but it would be interesting to know whether there is any knowledge of an electrical failure due to high acidity, apart, of course, from flakes of rust or metal dropping from the lid and causing a fault on the terminals or connections. If corrosion of the metal work above the oil level is not in evidence to what value should the acidity reach before a failure can be anticipated assuming the transformer is free from sludge? B.S. No. 148-1933 states that the acid value per gramme of oil shall not exceed 0·2 mg KOH/g. The E.R.A. memorandum recommends that if the acid value exceeds 0·5 mg KOH/g, then reconditioning treatment is desirable, and that care should be taken to ensure that the acid value does not rise above 1·5 mg KOH/g. Transformers in service are functioning satisfactorily with acid values as high as 8·0 or 9·0, and it is probable that even these figures are being exceeded.

The problem before us is which is the wisest course to adopt? We appear to have a choice of three solutions :—

(*a*) To remove the high acidity oil, wash down the windings as far as practicable and refill with new oil and discard the old oil.

(*b*) To recondition the high acidity oil with activated alumina.

(*c*) To leave alone, watch for corrosion and remedy if possible, and await results —if any.

With regard to (*a*), what can be done with the discarded oil except to burn it, which seems a terrible waste? It must not be allowed to contaminate other oil drums, and must be treated as an "Isolationist." It is difficult to find anyone who is prepared to take it, and even then its salvage value is negligible.

Alternative (*b*) seems at first sight to be a very attractive proposition, though labour costs in connection with reconditioning the oil are found to be as much, if not more, than the cost of new oil. Oil having an initial value of 3·65 mg KOH/g was reduced on test to 2·35 mg KOH/g. The weight of activated alumina used was about 8·75% that of the oil. It is apparent, therefore, that to reduce the acidity to below 1·0 mg KOH a considerable amount of activated alumina is necessary, probably something like 20% of the weight of the oil. The E.R.A. memorandum states that with acid values of 2·0 mg KOH/g or higher, reconditioning treatment is rarely practicable, and the oil has generally to be discarded. There are probably large numbers of transformers in operation with values considerably in excess of 2·0 mg KOH/g and the replacement of oil in these transformers is a matter which requires careful consideration. We have tested various methods of removing oil from the used alumina. Burning off by fire or "cooking" on hot plates turns the alumina to a dark brown appearance which discolours the oil if reused. Soaking and washing in paraffin and afterwards drying in warm air is only partially successful. The reactivation of the alumina by the forcing of very

* Chief Engineer and Manager, Mansfield Corporation Electricity Department.

hot air and driving off the oil smoke is not very easy of accomplishment. A high air temperature in the region of 500° to 600° C. is desirable and the process seems a lengthy one. It is possible that we have not yet acquired the necessary skill in reactivating, but unless some reasonably simple and cheap method can be evolved it is doubtful if the means justify the end. Typical tests on samples of oil having an initial value of 2·05 mg KOH/g and using a 25% weight of alumina were as follows :—

| | mg KOH/g |
|---|---|
| New alumina .. .. .. | 0·896 |
| Previously used alumina— | |
| Paraffin washed and dried .. | 1·664 |
| Burnt off by firing .. .. | 1·664 |
| Dried by forcing hot air .. | 1·28 |

The writer is inclined to alternative (*c*) unless evidence is shown of damage to the transformer metal, in which case the oil might be changed (having washed down the windings and core as much as possible) and activated alumina placed in bags on the top of the windings to counteract any tendency toward an increase in acidity due to the oil which remained in the cores and laminations.

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"Acidity in Transformer Oils." THE ELECTRICAL TIMES, p. 151, February 11, 1943.

# COMPANIES' MEMO TO MINISTRY OF FUEL

IF the Municipal Selected-Station Owners do not like the ownership proposals, it has no heartier welcome from the Provincial Electric Supply Association, the London Electricity Supply Association and the Power Companies' Group. These also have sent in to the Ministry of Fuel and Power a commentary of which following is a summary.

Companies and municipalities have gone along side by side since the early days, they have each contributed, helped by healthy emulation, to develop an increasingly cheap and efficient electrical service.

That their views differ as to the better form of control is but natural. The municipalities are more tied up with local politics and must in general favour municipal ownership—the I.M.E.A. must obviously have similar views. So agreement between company and municipal owners as to ideal ownership may not be expected; nevertheless, both sides are anxious to give the most efficient service to consumers and to reach maximum agreement, which last was the reason for excluding from the Joint Memorandum detailed arguments as to ownership. The companies would have wished that the Joint Memorandum alone should have been submitted to the Minister of Fuel and Power; but the I.M.E.A. chose to send in a separate document suggesting transfer of generating stations to the C.E.B., and the companies think they should submit their views on this very controversial matter. The Ministry is asked to consider a number of facts and points. The companies were pioneers of electricity supply here—municipalities as a whole were at first very shy. While municipalities occupy a position in the forefront to-day, companies still have a vital place in the industry, and, they maintain, to let the two sides develop as suggested in the Joint Memorandum will achieve more success than any drastic reorgan[illegible] The companies (except London and places elsewhere) serve comparat[illegible]y sparsely populated areas, whereas the municipal electricity undertakings in general operate the thickly populated areas, easy to develop and less costly to supply. So the price per unit sold by companies may sometimes be higher than that charged by municipalities—though not always. Comparison of charges, however, may be unfair for the reasons given. Company undertakings can secure continuity of policy and control such as does not always obtain with municipal undertakings.

With few exceptions amalgamation of undertakings cannot be achieved without the special consent of Parliament, but some companies have been able to arrange for grouping or joint working of their undertakings to achieve greater efficiency.

Any drastic alteration in the Electric Supply Industry is a major political issue and Parliament must consider it in relation to other branches of the Nation's industrial life. The clamour for unnecessary changes typical of the present time is too political and has too little regard to efficient service to the public. Violent changes are apt to have unfortunate results.

The companies urge the Ministry to adopt the proposals of the Joint Memorandum as likely to benefit the Industry and the consumer.

As to the ownership proposals of the I.M.E.A. the companies, like the selected-station owners, lay this at the door of disparity in bulk supply charges—a more general uniformity would cause disappearance of much of the present dissatisfaction. It is submitted that the problem could be solved without making revolutionary changes in ownership of generating stations.

# TURBINE OPERATING RECORDS IN U.S.

By Vernon Walker, A.M.I.E.E.

OWING to war conditions the Prime Movers Committee of the Edison Electric Institute has not been able to issue its usual annual reports on turbine operation and outage. Until recently the last to be published was issued in 1941, covering 1939; a summary was given in THE ELECTRICAL TIMES of October 16, 1941. Recently a report has come to hand for the years 1940 and 1941, and this is of particular interest as it indicates what has been accomplished by way of increased service hours, and corresponding increase in output per unit of capacity, to accommodate the war-time demands for increased electrical energy in a country turning out war materials on a mass production basis.

**Steam Pressure under 1,000 lb./sq. in.**—Table 1 herewith gives a summary of the operation and outage of machines having a capacity of 20,000 kW and above, with an average rating of 39,000 kW for 1940 and 40,000 kW for 1941, using steam under 1,000 lb. per sq. in. and covering 354 machines in 1940 and 366 machines in 1941. The energy generated by these machines during 1940, was 62,132,755,437 units and during 1941, 69,500,526,000. The service demand availability factor (ratio, service hours to demand hours) was 95·9% for 1940 against 96·69% for 1941. The plant load factor (ratio kW generated to product of unit rating and service hours) shows an increase from 70·40% in 1940 to 72·98% in 1941. The unit operating factor (ratio, service hours to period hours) was 66·34% for 1940 and 70·33% for 1941, and the unit capacity factors (ratio, kW generated to product of unit rating and period hours) were 49·78% and 54·42% respectively. All these figures indicate a trend towards maximum loading and service hours, the latter having increased by 166,561 hours in 1941.

TABLE 1.—SUMMARY OF OPERATING RECORDS

| | Totals | | Per Cent. of Period Hours | |
|---|---|---|---|---|
| | 1941 | 1940 | 1941 | 1940 |
| Number of units reviewed | 366 | 354 | — | — |
| Rated capacity kW | 14,809,300 | 13,791,900 | — | — |
| Kilowatt-hr. generated | 69,500,525,000 | 62,132,735,437 | — | — |
| Period hours reviewed | 3,187,270 | 3,126,730 | 100·00 | 100·00 |
| Demand hours | 2,323,880 | 2,245,380 | 72·91 | 71·91 |
| Service hours | 2,244,610 | 2,078,049 | 70·42 | 66·46 |
| Idle hours | 942,650 | 1,048,679 | 29·58 | 33·54 |
| Outage hours | 196,670 | 238,236 | 6·14 | 7·62 |
| Outage hours due to turbines | 118,570 | 138,630 | 3·72 | 4·43 |
| Outage hours due to generators | 27,050 | 29,150 | 0·85 | 0·94 |
| Outage hours due to condensers | 36,260 | 46,091 | 1·14 | 1·47 |
| Outage hours due to other causes | 13,790 | 24,365 | 0·43 | 0·78 |
| Reserve hours | 746,990 | 810,443 | 23·44 | 25·92 |
| Average idle periods per turbine | 105 | 112 | — | — |

The total outage in 1941 dropped from 7·62% in 1940 to the record figure of 6·41% in 1941, which correspond to 673 hours and 535 hours per machine. There was a total decrease of 42,566 outage hours in 1941, turbine outage accounting for 20,060 hours, miscellaneous causes 10,575 hours, condensers 9,831 hours, with generators accounting for the balance of 2,100 hours. In the year 1941 the maximum possible unit operation factor (ratio of sum of service hours and reserve hours to period hours) reached a record figure, 93·86%.

Table 2 gives an analysis of the causes of turbine outage of the machines operating nnder 1,000 lb. per sq. in. steam pressure and reveals "Miscellaneous Items" to be the chief cause of outage in both 1940 and 1941, with "Blading" taking second place. Reported outage due to "Vibration" in 1941, increased 390% above that for the previous year, viz., from 0·63 to 3·11%.

Generator outage has been largely caused by rotor trouble with an increase in the number of machines affected in 1941 compared with 1940 (38 against 24). There has also been a decided increase in stator winding trouble, 30 machines being affected in 1941 against 13 in 1940.

Comparing condenser outage, cleaning accounts for nearly 50% of the total outage, tube leakage 15%, followed by retubing and circulating pumps.

**Steam Pressure above 1,000 lb./sq. in.**—The operating results of units using steam at above 1,000 lb. per sq. in. have also been recorded, and include 32 machines in 1940 and 40 machines in 1941. The units generated by these machines during 1940 totalled 5,189,360,470, and during 1941, 7,834,803,000. The unit operating factor increased from

(*Continued on page* 729)

# BUSINESS ANNOUNCEMENTS

**Official Notices ; Tenders Invited ; Situations Vacant and Wanted ; Etc.***

## APPOINTMENTS VACANT

### City of Carlisle

APPOINTMENT OF CITY ELECTRICAL ENGINEER AND MANAGER

Applications are invited from qualified Engineers who are experienced in the management and administration of an Electricity Undertaking.

The Salary will be in accordance with the Agreement made by the National Joint Committee of Local Authorities and Chief Electrical Engineers, dated 9th July, 1941.

The present Salary according to the scale is approximately £1,800 per annum, subject to the provisions of Clause 10 of the Agreement, i.e., the commencing salary will be 85% of this amount.

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

Application forms with conditions of the appointment may be obtained from, and must be returned to, the Undersigned by noon on 12th July, 1944.

Canvassing directly or indirectly will disqualify.

FREDK. G. WEBSTER,
Town Clerk.

16th June, 1944.

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A Temporary ELECTRICAL INSPECTOR OF FACTORIES is required in the North-West of England by the Factory Department of the Ministry of Labour and National Service.

Salary between £450 and £650 p.a., according to qualifications.

Applicants should have had experience of electrical manufacturing installation work, or electrical supply. Qualifications equivalent to A.M.I.E.E. preferred.

Applicants should write, quoting D.798A, to the Ministry of Labour and National Service, Room 432, Alexandra House, Kingsway, London, W.C.2, for the necessary forms, which should be returned completed on or before 5th July, 1944.

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PATENT AGENT.—Well-established firm requires Patent Agent, preferably specialising in electronics, as assistant in Patent Department, permanently or for duration of war. Subjects: mechanism, control apparatus, electronics. Salary: £600-£700 or upwards, according to qualifications and experience. Applicants should write, quoting F.2592XA, to the Ministry of Labour and National Service, Room 432, Alexandra House, Kingsway, London, W.C.2, for the necessary forms, which should be returned completed on or before 5th July, 1944.

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### County Borough of Carlisle

ELECTRICITY UNDERTAKING

Applications are invited for the position of SWITCHBOARD ATTENDANT at Willow Holme Power Station.

Applicants should be technically qualified and have had practical experience in the operation of modern Power Station Switchgear.

Salary and conditions of service will be in accordance with the N.J.B. Agreement, Class G, Grade 9a (present salary £297 per annum).

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

Applications giving age, details of training and experience to be sent to the undersigned in sealed envelope endorsed "Switchboard Attendant" not later than Monday, 10th July, 1944.

C. W. SALT,
City Electrical Engineer.

Electricity House,
Castle Street,
Carlisle.

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### Heywood Corporation

ELECTRICITY DEPARTMENT

APPOINTMENT OF ROTARY SUB-STATION ATTENDANT

Applications are invited for the position of Rotary Sub-Station Attendant for shift duty in the Corporation Electricity Works. Applicants should have sound experience in the control of high and low pressure switchboards, and in the operation of rotary converting plant.

Conditions of service and rates of pay are in accordance with District Council No. 3, N.W. Area, Capacity in K.Ws. 1001/2000. The position is *not* subject to superannuation.

Applications giving age, details of experience, and enclosing copies of recent testi-

* For Subscription, Official and Prepaid Advertisement Rates, see page 728.

**APPOINTMENTS VACANT**—*Continued*

monials, to be delivered to the undersigned on or before Friday, June 30th, 1944, and endorsed " R.S.A."

H. C. DAY,
Borough Electrical Engineer.

## Stretford and District Electricity Board

APPOINTMENT OF JUNIOR SHIFT ENGINEER

Applications for the above position are invited from suitably qualified engineers with modern generating experience.

*Terms of Appointment*: N.J.B. Schedule and conditions, Class "G," Grade 9. Successful candidates will be required to pass a medical examination and contribute to the Board's Superannuation Fund.

Applications detailing age, training, and experience, with copies of not more than three recent testimonials and endorsed " Junior Engineer," should be delivered to the undersigned on or before Monday, July 10th next.

C. TREWAVAS,
Clerk to the Board.

Town Hall,
Stretford.
22nd June, 1944.

## Shipley Urban District Council

ELECTRICITY DEPARTMENT

APPOINTMENT OF ROTARY SUB-STATION ATTENDANTS

Two vacancies for Rotary Substation Attendants for shift duties in the above Undertaking occur due to retirements.

Conditions of service and rates of pay (at present £5 8s. 0d. per week) are in accordance with 2,001-4,000 kW Grade, Section A, D.J.I.C., No. 2 Area. The positions will be superannuated, subject to six months' satisfactory service, and the passing of a medical examination.

Applicants with good experience in the control of high and low pressure switchboards and the operation of rotary converting plant should send details of experience, present employment, age and copies of recent testimonials to the undersigned by not later than Friday, 7th July, 1944.

NIGEL L. DUNCAN,
Engineer and Manager.

Electricity Works,
Dockfield,
Shipley, Yorkshire.
17th June, 1944.

RELIEF SHIFT ENGINEER wanted for power station in Scotland. Commencing salary £306, including war bonus, subject to deduction for superannuation. Applications in writing, giving full particulars of age, training, experience, present appointment and position under the National Service Acts, to be accompanied by copies of three recent testimonials, and sent not later than 8th July, to Box No. 8281, THE ELECTRICAL TIMES.

Wholesale Distributing Agents for well-known makes of Cables and Flexibles, Electric Lamps, Plastic Light Fittings, etc., require PART-TIME REPRESENTATIVES in London and Home Counties.—Apply, stating experience and area covered, Box No. 8279, THE ELECTRICAL TIMES.

LAMP SALES REPRESENTATIVE for Manchester and District. Permanent progressive post with salary, expenses and commission. Previous experience of lamp market and man with connection preferred, but not essential.—Write, giving age and full particulars of experience to Mr. E. C. Green, E. K. Cole, Ltd., 55 Whitworth Street, Manchester.

**WORK WANTED**

STURDY REWINDS. Transformers and Coils, all sizes to 5 K.V.A. Special department for Radio Transformers.—STURDY ELECTRIC CO., LTD., Dipton, Newcastle-upon-Tyne.

PLASTIC MOULDING. Capacity available.—BENDIX & HERBERT, LTD., 270, Neville Road, London, E.7.

ARMATURE WINDING AND REWINDING. We are specialists in small motor winding and repairs, particularly electric tools. Prompt attention and guaranteed work.—SOUTHERN IGNITION CO., LTD., 190 Thornton Road, Croydon. Phone: THOrnton Heath 4276 (3 lines).

MEASURING INSTRUMENT REPAIRS. All makes of meters and instruments skilfully repaired by experts. Prompt service for essential purposes.—RUNBAKEN ELECTRICAL REPAIRS, Meter Dept. (S 52), Manchester. 1.

VACUUM CLEANER armatures and field coils rewound. Quick service.—ANDERSON'S, " The New Inn " Yard, St. Aldate's, Oxford.

PLASTIC MOULDING, stamping, finishing and assembling of electrical accessories.—Esco (RUBBER), Ltd., 78/80 Stamford Hill, London, N.16.

ELECTRIC CLOCKS REPAIRED. Trade prices.—MERSON, electric clock manufacturer, 44 Maxwell Drive, Glasgow.

ARMATURE, Rotor and Stator rewinds and repairs; fractional to 60 H.P. Prompt deliveries.—T. A. BOXALL & Co., Horley, Surrey. Phone 654.

## WANTED

SCRAP COPPER, Lead, Cable, Old Machinery and Plant, and any description of ferrous and non-ferrous metals and residues purchased for cash.—W. & H. COOPER, LTD., Brady Street, Bethnal Green, E.1. 'Phone: Bishopsgate 7288-9.

Wanted, ROTARY CONVERTERS, any size.—UNIVERSAL, 221 City Road, London, E.C.1.

MERCURY (QUICKSILVER) wanted. Write for packing instructions. Gold, Silver and Platinum also purchased.—COLLINGRIDGE & Co., LTD., Riverside Works, Riverside Road, Watford. (Tel. 5963.)

SCRAP ACCUMULATOR PLATES and Sediment wanted, any quantities. Also Storage Batteries purchased and dismantled. 'Phone or write ELTON LEVY Co., LTD., 18 St. Thomas Street, London Bridge. 'Phone: HOP 2825-6.

Wanted, large quantity of 4 in. outside dia. TUBES from the dismantling of old Babcock Water-Tube Boilers. Best prices paid. Prepared to purchase Babcock & Wilcox Water-Tube Boilers for dismantling. —Apply, giving full details, to: MIDLAND IRON & HARDWARE Co., Cradley Heath.

Two only 10-Button, 11 Lines INTERCOM TELEPHONE SETS, complete.—GORDON WRIGHT, 186 High Street, Barnet. Phone: Barnet 2142.

## SALE BY TENDER

### City of Bradford

MOTOR GENERATORS FOR DISPOSAL

The Electricity Committee of the Bradford Corporation invite tenders for the purchase and removal of—

TWO 500 kW SYNCHRONOUS MOTOR GENERATOR SETS, D.C., 470/570 volts, A.C. 6,600/6,500 volts, 3-phase, 50 cycles; together with associated Switchgear, etc.

The Sets are arranged for D.C. starting, are in good working order, and, by appointment, can be seen in operation at the Valley Power Station.

Form of Tender and further particulars may be had on application to Mr. T. H. Carr, A.M.Inst.C.E., M.I.Mech.E., M.I.E.E., Electrical Engineer and Manager, 27 Bolton Road, Bradford, to whom all enquiries respecting the Sets should be addressed.

Tenders, on the forms provided, must be delivered to the undersigned not later than 10 a.m. on Wednesday, the 5th July, 1944, and no tender will be received unless enclosed in a plain, sealed envelope bearing the words "Tender for purchase, etc., of Motor Generator Sets," but not bearing any mark or name indicating the sender.

The highest or any tender will not necessarily be accepted.

N. L. FLEMING,
Town Clerk.

Town Hall, Bradford.
20th June, 1944.

## FOR SALE

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

### Metropolitan Borough of Hackney

ELECTRICITY DEPARTMENT

The Borough Council invite offers for the purchase of the Machinery described hereunder:—

One 1,500 kW. MOTOR CONVERTER, D.C. volts 500/550, A.C. 6000/6200 volts, 3-phase, 50 period. D.C. machine in good order. A.C. Machine both Stator and Rotor Coils damaged.

Can be viewed on application to the Borough Electrical Engineer, 18/24, Lower Clapton Road, E.5. Tele.: AMHerst 2361.

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

Heavy-duty ARC-WELDING PLANTS, 200 amps. Price £31 10s. complete. Also Spot Welders, £36 15s.—JOHN E. T. STEEL, Clyde Mills, Bingley. 'Phone 1066.

Motorised ½ in. BENCH DRILLING MACHINE, 13 speeds, £11 11s.—JOHN E. T. STEEL, Clyde Mills, Bingley. 'Phone 1066.

BELT GRINDERS or Sanders 4 in. wide Belt, £5 5s.; 6 in. wide Belt, £10 10s.—JOHN E. T. STEEL, Clyde Mills, Bingley. 'Phone 1066.

Self Priming ELECTRIC Pumps, 300 g.h.p., £11 11s.—JOHN E. T. STEEL, Clyde Mills, Bingley. 'Phone 1066.

FOR SALE. 1,000 K.W. TURBO-ALTERNATOR SET, made by Metropolitan-Vickers in 1920; 3-phase, 50 period, 400 volts. Steam pressure 200 lb.; Jet Condenser.—Apply, PATONS & BALDWINS, LTD., Halifax, Yorks.

## BUSINESS NOTICE

**B.E.A.M.A. Price Adjustment.**—For purposes of calculating variations in—(*a*) "Rates of Pay"—the rate of pay for adult male labour at June 17 shall be deemed to be 90s. 6d.; (*b*) "Costs of Material"—the Index figure for Intermediate Products last published by the Board of Trade on June 17, is 176·2 and is the figure for May, 1944.

**TO THE READER.**—If you do not file your copies, why not pass them on to one of your electrical friends in the Services?


# ELECTRICAL TIMES

Registered at the G.P.O. as a Newspaper.

**SUBSCRIPTION RATES**
(payable in advance)

Home and Abroad (except Canada), £1 15s. 0d. per annum. Canada £1 12s. 10d. Pro rata for shorter periods. Subscriptions can begin at any time.

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**Official Notices**: Tenders Invited; Plant for Sale; Legal; Patents; Sale by Tender; Educational; and Miscellaneous, 1/6 per line (as printed, average 6 words to line, 9 lines to inch).

**Prepaid Advertisements** (set solid). Agencies; Partnerships; Second-hand Goods; etc., 3d. per word.

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**CLOSING TIME** for receipt is 10 a.m. **WEDNESDAYS**

**COMMUNICATIONS AND REMITTANCES**

These should be addressed to THE ELECTRICAL TIMES, Sardinia House, Sardinia Street, Kingsway, W.C.2. Tel: HOL 6016. Tele: "Equivolt, Estrand, London."

** Where applicants for posts advertised under box Numbers do not wish their letters to be forwarded to any specific advertiser (such as their own employer) and notify us to that effect, secrecy will be observed by us and the applications destroyed in this office. Applicants applying for positions should not send original testimonials.*


## CONTENTS



*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.*

(*Continued from page* 724)

84·24 to 85·3% and the unit capacity factor from 64·47% to 66·17%.

The total outage expressed as a percentage of the period hours was 9·09% in 1940, and 8·79% in 1941; turbine outage being 4·77% and 5·30% respectively. Generator outage amounted to 2·55% and 1·77% of the period hours reviewed.

The eight additional units operating at pressures in excess of 1,000 lb. per sq. in. increased the reported high pressure capacity by 342,790 rated kilowatts over the year 1940, and the kilowatt-hours generated by more than 2½ billion.

Of the total units generated during 1941 by the whole of the machines reported, 36·14% was generated by 137 machines having a working steam pressure between 300-500 lb. per sq. in. and 29·67% by 169 machines with an operating pressure up to 300 lb. per sq. in. These figures appear to be influenced by the number of topping units installed.

TABLE 2. ANALYSIS OF TURBINE OUTAGE HOURS

| | Total hours | | Per Cent. of Total | | No. of machines affected | | Outage hours per machine affected | |
|---|---|---|---|---|---|---|---|---|
| | 1941 | 1940 | 1941 | 1940 | 1941 | 1940 | 1941 | 1940 |
| Steam casings .. .. | 1,086 | 1,424 | 0·92 | 1·02 | 47 | 51 | 23 | 28 |
| Governors .. .. | 1,489 | 2,281 | 1·26 | 1·65 | 95 | 87 | 16 | 26 |
| Control gear .. .. | 2,420 | 2,971 | 2·04 | 2·14 | 129 | 171 | 19 | 17 |
| Shaft packing .. .. | 2,520 | 2,100 | 2·13 | 1·52 | 44 | 203 | 57 | 10 |
| Nozzles and diaphragms | 385 | 2,734 | 0·32 | 1·97 | 7 | 13 | 55 | 210 |
| Shaft .. .. .. | 2,903 | 210 | 2·45 | 0·15 | 14 | 8 | 207 | 26 |
| Wheels or spindles .. | 1,711 | 8,908 | 1·44 | 6·43 | 12 | 20 | 143 | 445 |
| Blades .. .. .. | 6,059 | 10,749 | 5·11 | 7·75 | 36 | 37 | 168 | 291 |
| Vibration.. .. .. | 3,687 | 879 | 3·11 | 0·63 | 26 | 38 | 142 | 26 |
| Bearings .. .. .. | 1,164 | 1,153 | 0·98 | 0·83 | 47 | 51 | 25 | 23 |
| Lubricating systems .. | 2,130 | 2,053 | 1·90 | 1·48 | 122 | 118 | 17 | 17 |
| Cleaning oil systems .. | 1,716 | 2,233 | 1·45 | 1·61 | 92 | 99 | 19 | 23 |
| Annual inspection .. | 84,901 | 89,568 | 71·60 | 64·68 | 183 | 201 | 464 | 446 |
| Miscellaneous .. .. | 6,396 | 11,267 | 5·39 | 8·13 | 115 | 107 | 56 | 105 |
| Total all items .. .. | 118,567 | 138,630 | 100·00 | 100·00 | — | — | — | — |

# POST-WAR RADIO ENGINEERING

LAST February we noted that the British Institution of Radio Engineers was, like other bodies looking ahead to the post-war period and its developments. It recommended the formation of a British Radio Research Institute and submitted the proposal to the Government and to the Radio Industry. It has now issued Part I of "Post-War Development of Radio Engineering," which calls attention to the special problems of electronics, applied to industry and for entertainment. The various subjects are sectionalised. Thus education and entertainment; introduction of a frequency modulation service on ultra h.f. in this country as in the U.S.A., is suggested. To enable post-war receiving sets to be planned a statement of National policy by the Government should early be made. There should be wide opportunity for expansion of radio set export after the war; interlinked powerful broadcasting stations should be installed in Asia and Africa. Mass production methods must be improved, and overseas needs catered for in components. Great Britain established a lead in television prior to the war—this position must be regained and a policy to that end decided on immediately. The radio band width to be of the same order as pre-war, viz., 4 Mc/s approx., and better use made of it by making use of vestigial side-band transmission and to increasing the number of lines to that which is optimum for the increase dmodulation band-width. Television services should quickly be extended to the provinces. Developments in stereoscopy and colour will require provision of an alternative television service to cinemas. There should be co-operative research methods in television. There seems no reason why, in the near future, channels of communication between various points on the earth's surface should not be multiplied, and it should soon be possible to overcome "fading" effects. The statement says that there should be no difficulty in applying radio to supplement cable communication. Nowadays, apart from radio communication facilities, ships must have radio navigation and direction gear; war-time develgpments in "Radar" must strongly influence this field.

Existing strict control of transmission must be maintained, with international agreement and individual Government control. The time may come when many services can be transmitted in the same wave band. This must affect Government control and international agreement. The memorandum says that standardisation, while desirable for apparatus in final stage of development should certainly not be introduced into the more exploratory regions.

NOTES ON WIRING

# LUXURY AND AUSTERITY

WHEN one sits back and thinks, it is surprising how the thesis has been generally accepted that, immediately the war is over, every individual, and every industry will be far, far better off. By better off I do not mean a simple comparison with existing war conditions, but a comparison with the more or less comfortable, if admittedly imperfect, pre-war conditions. It is difficult to imagine exactly what warrant there is for this optimistic attitude. We shall certainly not be less heavily taxed than before the war. Most of us, it is true, will have war savings to draw upon, but these very war savings represent in the aggregate a very burdensome tax on the exchequer, and therefore on the taxpayer, for interest has to be paid upon them. To attract these war savings, the financial policy of the Government has succeeded in reducing the yield to be expected from other investments in stocks and shares, that is to say their market value is higher, but the fortunate possessors of industrial and other investments are only richer on paper, for the cost of living cannot indefinitely be kept down by Government subsidy as it is at present. If we have not actually lost the greater part of our export trade, it is in any event in long abeyance. True, many countries will need our exports almost in unlimited quantities, but most of them will be as impoverished as ourselves; gold and sterling are merely tokens, and the actual payment will be in those goods or materials which we shall have to import ourselves.

Yet, so far, most of the post-war planning has been in the nature of luxury planning. Everybody is to have a better home, everybody is to have more to eat, there is to be no unemployment, higher wages, and every individual will be able to do less work and have more easy leisure. And, so far, the only fundamental proposal to pay for all this is to squeeze out the middleman (with greater restrictions on private enterprise) and to substitute a Government control which may well be even more costly.

No, if, as I have said, we can find the time to sit back and think, taking our thoughts right away from the ideals of a post-war Utopia, we should realise that most of us will have to face a long period of austerity before we can revert to luxurious living. This applies to the electrical industry, as well as to others. The initial building of houses will be largely in the hands of the Government and local authorities. They will have to charge rents in proportion to the cost of the houses and at the same time within the ability of the tenants to pay them. It goes without saying that all houses will be electrically lighted, but the method of lighting and of wiring will have to be economical to keep down the cost. Moreover, if we are too lavish with our proposals for the other electrical equipment, we shall inevitably be by-passed. A simple example may be taken to illustrate this. It has been recognised that it is inconvenient for the housewife to have to stoop to put things into and to take things out of an electric oven. So the ideal design is to hoist it up on legs and to put the boiling plates and grills on to one side of it. But this will entail more floor space, will necessitate a larger kitchen and will increase the size and cost of the building. So, if we insist on standardising this pattern of cooker with the laudable object of saving some of the less active post-war housewives from an occasional pain in the back, the chances are that the economical housing expert will immediately become antipathetic to electric cooking. With the privately-built houses, particularly those undertaken by speculative builders, and the numerous houses to be reconditioned, the same considerations of cost will apply. Economy will, I think, be the prime consideration, rather than the ideas of post-war luxury prevailing at the moment. Occupiers will not ask for indirect lighting, nor for ornate fittings. While socket-outlet points and wiring should not be based on absolute minimum requirements, neither need they cater for the hypothetical maximum requirements of a few enthusiasts. A socket-outlet should certainly be provided in every room, but there should be no need to have a ring main wandering round the wall of every house to enable an additional socket-outlet to be put in whenever the lady of the house decided upon a re-arrangement of her furniture. A refrigerator should be a necessity nowadays, and at all events an auxiliary water-heater. But the very small water-heaters proposed in some quarters are totally inadequate, and where a decently-sized one to provide all the water-heating in the summer months cannot be afforded, it would be better to omit it altogether, than to bring electric water heating into disrepute. The same applies to the crude and uneconomical practice still largely prevailing of puttiig an immersion heater into the main hotwater tank and heating the whole pipe system of the house unnecessarily.

When we come to other buildings than purely residential, such as schools, public buildings, offices and shops, we shall, I feel sure, revert, at any rate for a few more years,

to an economical rather than a luxurious electrical lay-out. I am aware that many architects wave aside the cost of the electrical installation, saying that it is at most only 5 or 6% of the cost of the whole building, but, when the subject comes up for tender, other views have to prevail.

Let us by all means cherish the idea of an all-electric equipment, but if we ask for too much at the outset we may only too frequently be defeating our own object. Convenience, coupled with economy, should be the pass-word which will supply the bread and butter to the wiring industry. After the war the idle rich class will be but a very small minority. Their requirements should never be of sufficient importance to dictate a standard. We shall have to build up our industry again on the needs of the middle-classes, and it will be more profitable to start with some degree of austerity and work upwards, rather than to presuppose a non-existent desire for luxury and then work downwards.

**MEGOHM**

## ELECTRICAL PLANT PROBLEMS

# TESTING OLD CABLES BEFORE RE-LAYING

**Question 1398.**—*We have some old* 11 *kV paper-insulated cable which has been drawn out of a duct. How far is the power factor of the cable a measure of its possible future life? Can you suggest approximate limiting values for the power factor, i.e., when it would be uneconomic to relay. Any hints on testing or the suggestion of any other criterion of cable life would be appreciated.*—G. D. D.

The measurement of the power factor of the insulation as a means of assessing the condition of the cable is useful only by comparison with previously recorded values for the same cable, or for cables of the same age and type. In this way, deterioration of the insulation will be indicated by an increase in the power factor. In the absence of some basis for comparison, such as the initial power factor, an isolated measurement conveys little and may well be misleading. This may be seen from the fact that the power factor for certain types of cable manufactured just before the war was 0·003, compared with values of 0·008 for similar cables made ten years previously, and 0·03 for much older cables.

It is suggested in the present case that direct-current pressure-tests should be applied separately to the individual lengths. As no joints or terminations will be included, the test can be rigorous—say 100 kV between cores and from cores to earth (60 kV from cores to earth if the cable was designed for earthed neutral working), for 15 minutes. If the cable withstands this test, and provided there is no considerable discrepancy between the leakage currents observed, the condition of the insulation is likely to be satisfactory. If, however, one of the lengths fails, it will be necessary to make a detailed examination of the cable papers at the point of failure in order to determine the type of breakdown. The result of this examination will show whether failure was due to an isolated cause, such as the entry of moisture due to a defect in the sheath, or to a general deterioration of the insulation which might well apply to the remainder of the cable. The same remarks would apply where the leakage current for any one length exceeded greatly the values observed for the remaining lengths, in which case continuation of the test should lead to breakdown, thus enabling an examination of the defective portion to be made.

As a further test, it would be useful to examine samples of the insulation, taken for convenience from the ends of each length. This examination should be similar in type to those mentioned above, except that the purpose is to determine the condition of the papers at random points, and not to ascertain the cause of a known failure. The technique, due to Dr. Robinson, will be found described in the Appendix to his paper entitled "The Breakdown Mechanism of Impregnated Paper Cables" (*Journal I.E.E.*, 1935, Vol. 77, page 102). In general, the older cables (installed, for example, about 1904) are, in the writer's experience, remarkably free from breakdown due to the "internal" type of failure. Such trouble as has occurred was usually caused by sheath defects, due to electrolytic or chemical corrosion.—J. G. P.

**Charge Engineers' Notes.**—In the article "Fault Localising with Slide Wire Bridge," the formula for $x$ contained the figure of 1500, but from the previous working it was obvious that this should have been 500. The correct formula is therefore—

$$x = L \times \frac{500 - n_2}{1000 - (n_1 + n_2)}$$

## PARLIAMENTARY

**Severn Barrage.**—On June 13, **Mr. J. Griffiths** asked the Minister of Fuel and Power what progress had been made by the committee of experts considering the proposed Severn Barrage. than terms of reference and the names of the members serving on the Committee. **Major Lloyd George** referred to replies given previously and had nothing to add to the reply to Mr. E. Smith on May 2.

COSTS AND COMMENTS

# THE MANLY (N.S.W.) REPORT FOR 1942

**Manly (N.S.W.) Electric Supply Undertaking.**—The report refers to the year ended December 31, 1942. It may be considered by the reader that it is somewhat late in the day to present these figures, but he must bear in mind that, even in normal times, due to the distance, there was always a considerable time-lag. No doubt the report for 1943 has already been published, but if the previous year be taken as a precedent, it will still be some months before we receive it. War-time restrictions and the fact that at one part of the year a considerable number of people left Manly and returned later, has had a serious effect on the year's working. For the first time in its history the units sold show a decrease—close upon 900,000—and in place of a surplus of £1,239, there was a deficit of £6,518, the first since 1930. During the year there were 116 new consumers, and among the installations connected were 27 ranges, 15 off-peak load hot-water systems, and 11 wash boilers, all these figures being very much lower than those for some years past. No additional street lights were installed and brownout conditions were continued, but in the later part of the year the restrictions were partly lifted by allowing the removal of screens from lights which were not visible from the sea.

Stocks of electrical appliances for the showroom have not been obtainable, so that activities in this regard have gradually ceased ; public demonstrations of cooking by electricity and the advertising of electrical appliances have also been discontinued for the time being. There is a demand by the public for repairs to electrical appliances, and this service will be continued as long as is possible, particularly as consumers to-day are restricted in their choice by the fewer firms carrying out repairs.

As might be expected, there are increases in the working costs all along the line, the final result being an advance of 0·14d. to a total of 1·41d. per unit.

It cannot be said that the undertaking has had a good year, but there is every hope that the next will show an improvement, as during the latter part of the year under review, the tendency was for sales to increase, and this continued up to May, 1943, the date of the report. **CHESTERFIELD JUNIOR**

*Manly (N.S.W.) Electric Supply Undertaking*

TECHNICAL RECORDS

| Year ended December | Number of Units Sold | | | | | Max. Load in kW | Load Factor % |
|---|---|---|---|---|---|---|---|
| | Private | Public | Traction | Bulk | Total | | |
| 1941 .. | 9,228,928 | 535,776 | nil | nil | 9,764,704 | — | — |
| 1942 .. | 8,647,832 | 217,242 | nil | nil | 8,865,074 | — | — |

FINANCIAL RESULTS

| Year ended December | Gross Profit | Per cent. to average Capital | Interest on Loans less Credits | Interest on Over-draft | Loan Repay-ment | Depreciation | Surplus+ Deficit— |
|---|---|---|---|---|---|---|---|
| | £ | % | £ | £ | £ | £ | £ |
| 1941 .. | 18,468 | 6·41 | 2,243 | nil | 4,560 | 10,426 | 1,239+ |
| 1942 .. | 10,204 | 3·38 | 2,131 | nil | 4,798 | 9,793 | 6,518— |

ANALYSIS OF WORKING COSTS

| Account | 1941 | Per unit | 1942 | Per unit | Increase + Decrease— |
|---|---|---|---|---|---|
| | £ | d. | £ | d. | d. |
| 1. Energy purchased .. .. .. | 31,455 | ·77 | 30,015 | ·81 | ·04+ |
| 2. Distribution .. .. .. | 8,644 | ·21 | 9,399 | ·25 | ·04+ |
| 3. Rent, rates and taxes .. } | 11,558 | ·29 | 12,727 | ·35 | ·06+ |
| 4. Management expenses .. } | | | | | |
| Total working costs .. | £51,657 | 1·27 | £52,141 | 1·41 | ·14+ |
| 5. Interest and loan repayment .. | 7,000 | ·17 | 7,054 | ·19 | ·02+ |
| Total costs .. .. | £58,657 | 1·44 | £59,195 | 1·60 | ·16+ |

# THE BUYERS' COLUMN

### Petrol-Electric Mobile Cranes

The advantage of electrical control combined with freedom from the need for a supply of electricity are provided for cranes by a petrol-electric drive. A series of cranes of this type is made by Steel Engineering Products, Ltd., London Crane Works, Derby. The power unit of the smaller sizes, 3 and 5 tons, is a petrol engine direct coupled to a generator under throttle control. A 6 h.p. motor is provided for travelling and a similar size for the hoist and derrick, while for slewing there is a separate 1 h.p. motor. There are separate reversing switches for all motions, and the speed of hoisting derricks, or slewing, is controlled by a foot-acceleration pedal. When this pedal is released, electromagnetic brakes are automatically applied. In the largest models, capable of lifting 5 tons at 9 ft. radius, travelling is by direct drive from the power unit. For the hoist and derrick, separate 6 h.p. 900 r.p.m. motors are fitted with a 1 h.p. motor for slewing, all supplied from a 0/250 V shunt generator.

### Overhead Line Fuse-Switch

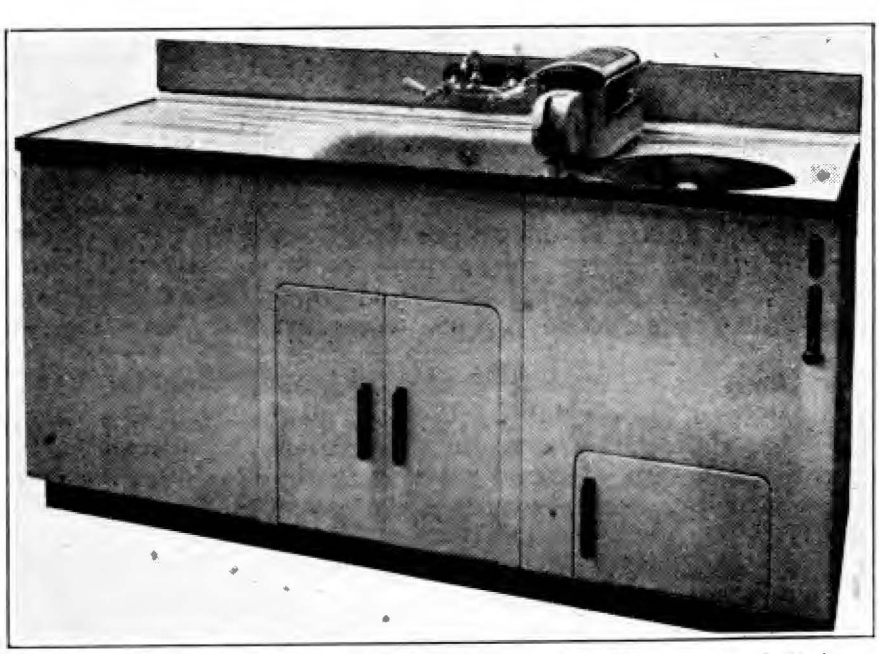
The type D fuse switch made by Johnson & Phillips, Ltd., Charlton, S.E.7, needs little introduction to readers, for it has already been described, and is now widely used on overhead lines. Last year we published details of a repeater switch that had been added to the range to provide automatic reclosure of the circuit after a fault. Now a new catalogue has been issued dealing with this range of equipment. The fuse-switch provides that once the element is blown, even by a small current, the circuit is effectively cleared and an unmistakable indication is given that the fuse has operated. Three types of fuse elements are available having time-current characteristics to suit the particular requirements of the circuit to be protected. In this catalogue the characteristic curves of the various ratings and types are shown. The addition of curves which include an allowance for arcing time permit the ratings for co-ordination of fuses on a network to be quickly determined.

# KITCHEN UNIT AND WASHER

IN place of individual kitchen fitments and appliances the trend of post-war development will undoubtedly be towards combined kitchen units. By this means, although the units may appear large, a more economical use of the space available is achieved. The accompanying illustration shows a prototype of a unit combining a sink, water-heater and washer that has been developed by the Hotpoint Electric Appliance Co., Ltd., in association with Hurton's Appliances, Ltd.

On the right of the unit is the electric washer. This is of the standard Hotpoint design, with a power-operated wringer and the emergency roller release bars. This wringer is shown in position ready for use. When not required, the wringer is lifted out and stowed in the cupboard beneath the washer. A table top cover is then placed over the washer to provide a table for culinary operations. On the left-hand side is the draining-board, with its sloping grooves. Below is a 20-gallon water-heater. This is equipped with two immersion heaters. One of these, intended to heat the whole of the water, is placed in the bottom of the tank and rated at 2½ kW. It is under manual control and is intended for supplying bath water, etc. Near the top of the tank is a second heater of 500 W under thermostatic control. This provides that 5-7 gallons of hot water on the top of the tank is always available for kitchen and small domestic uses. The tank is plumbed to the main hot water system, and special provision will be made for an extension fitting for filling buckets at floor level.

In the centre of the unit is a sink, and the whole top is made of one pressing, which by the use of instantaneous release fixing, can be easily lifted to give access to the interior of the unit. The whole unit will be finished in vitreous enamel in a choice of colours.



**Combined Electric Water Heater, Washer Wringer and Sink.**

# LETTERS TO THE EDITOR

*We cannot be responsible for the opinions and expressions of our Correspondents*

## Future of Battery Traction

SIR,—I should like to comment upon the article, "Future of Battery Traction," June 1, by Mr. Ridley. Battery and body developments are undoubtedly going to influence the future prospects of electrics, nevertheless, it is on the drive that I wish to focus attention.

Mr. Ridley spikes the objection to wheel motors — unsprung weight — by quoting American petrol engine developments. This, to me, does not seems to point the way. I.C. engines are favoured by virtue of their ability to reduce their power/weight ratio in accordance with metallurgical development; this is not so in the case of electric motor design, at least, not at anything like similar rates. Further, is it not true to say that slow speed motors must always rank lowly in P/W ratio by comparison with I.C. engines, especially in the small h.p. in which we are interested. There seems to me to be many other objections to the proposal, not the least the thought of these fairly heavy wheels rolling at 40/50 m.p.h., with our light plastic carriage attached.

I wish to put to Mr. Ridley the following proposition. Briefly—couple an electric motor to an oil pump with adjustable capacity. The type I have in mind is the Keelavite. Connect the inlet and outlet ports of the pump to a Keelavite oil motor, and couple the oil motor in turn through a suitable gear ratio to the differential; either rear or front axle. The electric motor can then be selected for the highest electrical characteristics. Speed, up to 2,000 r.p.m.; series or shunt wound. Also, I believe, it could be used regeneratively.

The vehicle would be operated as follows. The motor would be switched on and would be running before load is taken up. The controls should be greatly cheapened and lightened. To start the vehicle, the capacity of the oil pump is opened gradually, the electric motor speed remaining constant. The capacity adjustment offers an adjustable gear ratio to suit the torque necessary or speed required.

If the oil motor capacity was made greater than that of the oil pump, then, by opening this up to its maximum on down grades, regeneration might be effected simply. Alternatively, simple overdrive is possible by reducing the capacity of the oil motor on the level, or slight down grades, or unfavourable wind conditions.

These ideas may appear to introduce complications for the driver, but designers should find it possible to group the requirements into one foot pedal. Maybe I am missing obvious objections, but the possibilities appear to me to be attractive.

June 15. H. A. LAMBERT.
39 Gladeside, Shirley, Croydon, Surrey.

## Compulsory Registration

SIR,—I fail to understand how Compulsory Registration is the direct highway into the quagmire of complexity, as visualised by METEOR in your issue June 8. Indeed, just the opposite; it is an effective method of preventing slipshod work by mushroom firms, who have no reputation to preserve, as carried out during the building boom and since.

I have read with interest the articles of METEOR and *Megohm*, also various letters in the correspondence pages. Why the opposition to control of managements and operatives? Have not systems of control operated abroad with success for a considerable period?

After all, one does not trust one's body to an unqualified doctor, then why trust electrical installations to unqualified contractors and operatives? Electrical energy provided at suitable places, in an efficient and safe manner, can be a good servant to mankind. Also some restriction will have to be placed on the sale of accessories, which, in the hands of the unskilled, can become dangerous.

June 12. W. J. MANN.
32 Penderry Rise, Catford, S.E.6.

## Another New Plug

SIR,—While we still have more sizes of plugs than are necessary, we have during the last ten years or so obtained some sensible degree of standardisation, which the public do appreciate. Now we are faced with another suggested universal plug (fortunately not yet available), 2 to 13 A, of a bastard size and different in every respect to all existing standard plugs. (See THE ELECTRICAL TIMES, February 10.)

In connection with the new plug there are several pertinent questions I would like to ask.

Are ring mains going to be adopted?

Have the I.E.E., the Insurance Companies, and all supply authorities approved of this new suggestion?

Does the suggested new socket fill the gap, even if ring mains are approved, as it is made for surface wiring?

Is it intended to run all conduits or triple cable round the skirting boards of new houses to enable this suggested new socket to be fitted?

How could the new socket be fitted to an installation of sunk wiring?

Does the rubber bush form a satisfactory cord grip?

Is the plug top big enough to take a triple 15 A flex ?

The thing is wrong, and I do sincerely hope the trade will have nothing at all to do with the introduction of new designs of non-standard socket-plugs.

June 11. HARRY MOSS.
116 Horton Grange Road, Bradford.

### Automobile Batteries

SIR,—With reference to Mr. J. Coxon's letter in your issue of May 25, surely British manufacturers have nothing to learn from their American friends about the high-rate performance of automobile batteries at low temperatures. In point of fact, I would suggest that the boot is on the other leg.

There is no difficulty in supplying batteries in this country which have a performance appreciably exceeding the American figures quoted by Mr. Coxon. It is also worth noting that for many years before the war at least one British firm had adopted, as a standard feature, certain manufacturing processes to enable batteries to maintain their low temperature performance when operated for prolonged periods in a cold climate.

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June 17. C. P. LOCKTON, M.Sc.Tech., A.M.I.E.E.
250 Brooklands Road, Baguley, Cheshire.

# PERSONAL

**Lord Portal,** Minister of Works, was the guest of honour at a private dinner of leading members of the electrical industry at the Savoy Hotel, on June 8. Mr. Clarence Parker presided, and others present included Sir George Bailey, Mr. H. R. Beard, Mr. R. Birt, Mr. W. K. Brasher, Mr. V. W. Dale, Sir John Dalton, Captain J. M. Donaldson, Miss C. Haslett, Mr. E. E. Hoadley, Mr. Harold Hobson, Mr. P. V. Hunter, Sir John Kennedy, Alderman H. Leese, Sir George Nelson, Mr. F. Newey, Sir Harry Railing, Mr. H. J. Randall, Mr. O. A. Sherrard, Mr. H. N. Sporborg, and Mr. V. Watlington.

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**Mr. John G. Glassco** is due to retire next September after 32 years as general manager of the City of Winnipeg Hydro-Electric System. In his annual report Mr. Glassco notes that the result of his life's work has

# LETTERS TO THE EDITOR

*We cannot be responsible for the opinions and expressions of our Correspondents*

## Future of Battery Traction

SIR,—I should like to comment upon the article, "Future of Battery Traction," June 1, by Mr. Ridley. Battery and body developments are undoubtedly going to influence the future prospects of electrics, nevertheless, it is on the drive that I wish to focus attention.

Mr. Ridley spikes the objection to wheel motors — unsprung weight — by quoting American petrol engine developments. This, to me, does not seems to point the way. I.C. engines are favoured by virtue of their ability to reduce their power/weight ratio in accordance with metallurgical development; this is not so in the case of electric motor design, at least, not at anything like similar rates. Further, is it not true to say that slow speed motors must always rank lowly in P/W ratio by comparison with I.C. engines, especially in the small h.p. in which we are interested. There seems to me to be many other objections to the proposal, not the least the thought of these fairly heavy wheels rolling at 40/50 m.p.h., with our light plastic carriage attached.

I wish to put to Mr. Ridley the following proposition. Briefly—couple an electric motor to an oil pump with adjustable capacity. The type I have in mind is the Keelavite. Connect the inlet and outlet ports of the pump to a Keelavite oil motor, and couple the oil motor in turn through a suitable gear ratio to the differential; either rear or front axle. The electric motor can then be selected for the highest electrical characteristics. Speed, up to 2,000 r.p.m.; series or shunt wound. Also, I believe, it could be used regeneratively.

The vehicle would be operated as follows. The motor would be switched on and would be running before load is taken up. The controls should be greatly cheapened and lightened. To start the vehicle, the capacity of the oil pump is opened gradually, the electric motor speed remaining constant. The capacity adjustment offers an adjustable gear ratio to suit the torque necessary or speed required.

If the oil motor capacity was made greater than that of the oil pump, then, by opening this up to its maximum on down grades, regeneration might be effected simply. Alternatively, simple overdrive is possible by reducing the capacity of the oil motor on the level, or slight down grades, or unfavourable wind conditions.

These ideas may appear to introduce complications for the driver, but designers should find it possible to group the requirements into one foot pedal. Maybe I am missing obvious objections, but the possibilities appear to me to be attractive.

June 15. H. A. LAMBERT.
39 Gladeside, Shirley, Croydon, Surrey.

## Compulsory Registration

SIR,—I fail to understand how Compulsory Registration is the direct highway into the quagmire of complexity, as visualised by METEOR in your issue June 8. Indeed, just the opposite; it is an effective method of preventing slipshod work by mushroom firms, who have no reputation to preserve, as carried out during the building boom and since.

I have read with interest the articles of METEOR and *Megohm*, also various letters in the correspondence pages. Why the opposition to control of managements and operatives? Have not systems of control operated abroad with success for a considerable period?

After all, one does not trust one's body to an unqualified doctor, then why trust electrical installations to unqualified contractors and operatives? Electrical energy provided at suitable places, in an efficient and safe manner, can be a good servant to mankind. Also some restriction will have to be placed on the sale of accessories, which, in the hands of the unskilled, can become dangerous.

June 12. W. J. MANN.
32 Penderry Rise, Catford, S.E.6.

## Another New Plug

SIR,—While we still have more sizes of plugs than are necessary, we have during the last ten years or so obtained some sensible degree of standardisation, which the public do appreciate. Now we are faced with another suggested universal plug (fortunately not yet available), 2 to 13 A, of a bastard size and different in every respect to all existing standard plugs. (See THE ELECTRICAL TIMES, February 10.)

In connection with the new plug there are several pertinent questions I would like to ask.

Are ring mains going to be adopted?

Have the I.E.E., the Insurance Companies, and all supply authorities approved of this new suggestion?

Does the suggested new socket fill the gap, even if ring mains are approved, as it is made for surface wiring?

Is it intended to run all conduits or triple cable round the skirting boards of new houses to enable this suggested new socket to be fitted?

How could the new socket be fitted to an installation of sunk wiring?

Does the rubber bush form a satisfactory cord grip?

Is the plug top big enough to take a triple 15 A flex ?

The thing is wrong, and I do sincerely hope the trade will have nothing at all to do with the introduction of new designs of non-standard socket-plugs.

June 11. HARRY MOSS.
116 Horton Grange Road, Bradford.

### Automobile Batteries

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been such as to give him pardonable pride, and he is to a small extent reminiscent. Of that, more when we deal with the very excellent results shown in the report—1943 made a record profit, in spite of factors which tended to militate against it.

**Obituary.**—We regret to record the death, at the age of 60 years, on June 13, of **Mr. C. J. Neale,** manager of the Cardiff Branch of Siemens Electric Lamps & Supplies, Ltd. Mr. Neale joined the Company in May, 1912, as accountant at Cardiff branch, and in November, 1920, was appointed branch manager. In this capacity he had made a host of friends in the Electrical and Allied Industries of South Wales; all liked and respected him.

**Mr. P. Fink,** commercial assistant with the Walthamstow Electricity Undertaking, passed away on June 8, at Harrogate, after a short illness. He had been with the Walthamstow Corporation for the past 25 years, before which he was with the Southwark electricity undertaking.

With the deepest regret we heard the other day of the death, at Westerham, on June 15, of **Mr. William Alfred Moore.** Few who had business associations with W. T. Henley's Telegraph Works Co., did not know, and esteem "Bill" Moore—he had served the firm well and truly for 40 years at the time he retired, and in that period he made multitudes of "contacts"—and seldom did a contact not ripen into pleasant acquaintance or more. Of his two score of years at Henley's, he was for half of them advertising manager; but one of his achievements was to us, among many, the inauguration of the *Henley Telegraph*, a high-class periodical devoted to the house interest of Henley's—it was well written and most readable.

He also, with much labour, delved in the past, early and more recent, of Henley's, to compile the Henley History, an anecdotal narrative with nothing of the dryness of some histories in it. He had a romantic story to deal with and he did it cleverly, from the date in 1830, when young W. T. Henley set out very ill-equipped financially, to seek and find fame and fortune in London. "Bill" Moore was 68 years of age—he entered Henley's service in July, 1900, and retired in June, 1940.

# ELECTRIC SUPPLY NEWS

**Battersea.**—This London borough already has 298 "starlight" fittings for side streets, out of 1,920 authorised by the Borough Council. The Electricity Committee reports that work is proceeding as quickly as the supply of fittings permits.

**Colchester.**—The Electricity Committee has submitted to the Electricity Commission the outline of a scheme of works which it is suggested should be carried out during the five years following the end of the war. The proposals involve an expenditure of £600,000.

**Guildford.**—As from August 1, electricity meter readings are to be on the "continuous" system, instead of at the ends of quarters.

**Hazel Grove and Bramhall.**—The Urban District Council has held meetings and in other ways has considered the affairs of its Electricity Department; the findings have lately been disclosed. The inquiry follows demands by local ratepayers' associations after an increase in tariffs. The technical investigation was made by Messrs. Preece, Cardew and Rider, and the financial inquiry by Cash, Stone & Co. The Council in Committee at its meeting on May 23 unanimously passed resolutions: (*a*) That the consultants' reports (technical and financial) be accepted as having clarified the position relating to the electricity undertaking; (*b*) That in future the clerk of the Council be consulted by the treasurer and the chief electrical engineer and manager on all legal matters affecting the Electricity Undertaking; (*c*) That in future the treasurer be consulted by the clerk and the chief electrical engineer and manager on all financial matters affecting the Electricity Undertaking; (*d*) That in future the clerk, the treasurer and the chief electrical engineer and manager co-operate fully to ensure the efficient progress of the Electricity Undertaking; and (*e*) That with regard to the accountancy work of the undertaking the treasurer be responsible to the Council for the final accounts, and all matters incidental thereto, with the right to audit all subsidiary accounts and records of the electricity department as and when he considers it necessary.

It was also decided that the costs of the investigation and report be apportioned equally between the General Rate Fund and the Electricity Fund.

There was no discussion on the resolutions.

**Lincoln.**—By 15 votes to 11 the City Council has decided that two cooling towers are necessary at the electricity supply works. The proposed towers are to be of the circular concrete variety, 200 ft. tall. There is nothing particularly new about such a proposal, but Lincoln is a cathedral city, and such communities are apt to assess æsthetic amenities more highly than perhaps they should. Hence this proposal has raised a "storm of protest," and is no doubt responsible for the eleven "againsts" in the Council's vote. Councillor Martin, for instance, invited the Council to visualise what these cooling

towers would look like. The power station, he said, was " the Cinderella of power factors," (*sic*) now to be accompanied by " two ugly sisters." It would seem that the objectors have been searching the knowledge of the city electrical engineer (Mr. F. Newey) to see if there was no other way out. The answer led to the conclusion that any other way was too expensive, and there were two alternatives —either to wait until a better system was evolved, or to take power station to another site. The debate was a long one ; from it emerged another saying which cooling towers manufacturers might like to note—Alderman Rayment, chairman of the Electricity Committee, termed these towers " the cathedral of industry," the good they would do would not only serve the city's industrial needs, but probably they would be the means of removing all the smoky chimneys still existing in the city.

**Northern Ireland.**—In the Ulster Parliament the Prime Minister said he was satisfied that the quality of coal in Northern Ireland was equal to that in Great Britain. Satisfactory discussions were going on with regard to rural electricity, and he felt that given good will a solution would be found. There was a new Bill on the stocks dealing with the question of financial assistance to new industries.

**Portsmouth.**—We regret that by inadvertence in noting the Portsmouth Jubilee (E.T., June 8, pp. 660, 661), the caption of the first and third pictures were changed, the error would be obvious to our readers, of course.

**Retford.**—In connection with improvement of certain local supplies, the Corporation's Electricity Committee has recommended, and the Town Council has approved, the construction of overhead line at a cost of £1,240, and provision of substation equipment to cost £860. Sanction to a loan for the purpose is to be sought.

**Stalybridge, etc., Joint Board.**—At its recent meeting new tariff rates were approved by the Electricity Committee for welder service charges, and an alternative tariff was made available to meet the coming demand for increased lighting for mills and factories in view of the Factory Act requirements. The engineer submitted a report as to works contemplated for commencement at the end of the war, together with estimates of expenditure under various headings for the five years following termination of hostilities in Europe. The report was approved and submitted to the Electricity Commissioners.

**Stockport.**—At the recent meeting of the Town Council approval was given to a proposal by the Electricity Committee for alterations to pump house and cooling tower at the Electricity Works, in order to mitigate the nuisance caused by the emission of moisture from the cooling tower. It was stated that it was essential that Stockport should have a cooling tower in order to retain its place as a selected station. The new scheme would cost £17,500.

# NOTES AND NOTICES

## Putting Employees Wise

For the third successive year the Directors of the Brush Electrical Engineering Co., Ltd., Loughborough, have had a talk to a representative gathering of the Company's employees concerning the activities and position of the organisation. Mr. Alan P. Good (managing director), opening the meeting, said he thought it a benefit to employees to have some understanding of the financial side of the Company's affairs, and that was the object of the meeting. Sir Ronald W. Matthews (Chairman of the Company) explained the financial operations, and referred to the Company's increased income and other points in the balance sheet. Improvements had been effected in the organisation ; the conservative policy of paying back a considerable proportion of profits to ensure advantage being taken of improvements in machinery and equipment had resulted in increased turnover and output during the past twelve months. As to the war, Sir Ronald warned his audience against thinking that everything was over bar the shouting ; ere long, he thought, things were going to be a great deal more difficult. Industry here had done a good job, but within the next six months there would be need for even harder and more conscientious work. No matter how much material was lost, no man in the fighting forces must go short of anything he wants. A very sound foundation had been laid by the Company for post-war activities. Proposing a vote of thanks, Mr. E. A. Clarke, deputy convenor of shop stewards, spoke of the increased mutual understanding throughout the organisation, due largely to the Company's policy since Mr. Alan P. Good and his co-directors had taken over.

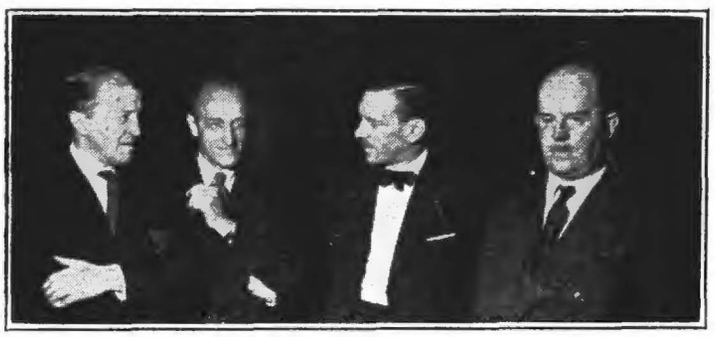
## Heating Apparatus

The Limitation of Supplies (Heating Apparatus) (No. 4) Order, 1944 (S.R. & O. 1944, No. 591), which covers the restriction period June 1 to November 30, 1944, may now be obtained (price 2d.) from H.M. Stationery Office. This Order makes no changes in the control on supplies of gas and electrical space-heating apparatus of a kind used for domestic purposes, the quota remaining at 15%. The Heating Apparatus Trades Register will not be revised during this restriction period, and those on the Register on January 1, 1944, are to be regarded as registered persons for the purpose of computing the value of sales during the standard period, which is still June 1 to November 30, 1939.

### Tom Marches Back

In the course of an extremely long run on the wireless, presentation of "Itma" has dug its way into the hearts of vast numbers of listeners in all parts of the country—who doesn't recognise "Can I do you now, sir?" for instance. Tommy Handley, to round off the "Itma" series, gave, on June 12, in the Home Service programme, a performance which he called "Tom Marches Back," a kind of Itma cavalcade. The show was carried out in the presence of some 2,000 employees of a General Electric Co. factory, "somewhere in England." The audience had a right good time, and we hear from the other side of the microphone that the facilities, enthusiasm and hospitality of the G.E.C. people were highly appreciated. Our pictures were taken on this occasion.

"Tom Marches Back," on June 12.



**ITMA with the G.E.C.**

Tommy Handley, Francis Worsley, and Ted Kavanagh, with a G.E.C. director.

### Bristol Engineering Directory, 1944

The "Bristol Engineering Directory, 1944 Edition," has now been issued by the Bristol Engineering Manufacturers' Association. This 84-page book gives gull information on Bristol's engineering activities, together with other technical information. The price, including postage, is 9d., and readers can obtain copies whilst stocks are available. The address is 104 Filton Avenue, Bristol 7.

## ELECTRICAL COMPANIES

**Dividends.**—*Franco Signs.*—Dividend of 10% for the year to March.

*East India Tramways Co.*—Interim dividend of 2%, tax free.

*Cawnpore Electric Supply Corporation.*—Final dividend of 5%, making 7% for 1943.

*Cable & Wireless (Holding Co.).*—Dividend of 4%, less tax, for 1943.

*Cable & Wireless (Operating Co.).*—Final dividend of 2½%, less tax, making 4% for 1943.

*Ruston & Hornsby.*—Dividend of 12½%, on ordinary stock, less tax.

**British Electric Traction Company.**—The revenue for the year ended March last was £767,962, against £760,293 for the previous year. After deducting general expenses and taxation and debenture interest, there is £316,441 available for appropriation, compared with £309,915 for 1942-43. The final dividend, less tax, proposed is 4% on the preferred ordinary stock (making 8%) and 30% on the deferred ordinary stock (making 45%), leaving £66,961 to be transferred to undivided profits account. Investments now stand at £6,795,102, of which £4,995,034 is in respect of holdings in subsidiary and associated companies; the amount at credit of reserve account remains at £520,000, and the sum at credit of undivided profits account is £2,261,208.

**Hopkinsons.**—The trading profit to January 31 was £97,174, against £89,634 in the previous year, and dividends received represent a further £6,502. The net profit is £74,043, against £62,598. The final dividend is 12½%, making 17½%, leaving to go forward £124,151. The meeting was held on June 16.

**Lightfoot Refrigeration Co.**—At this meeting Mr. F. Ryder said during the year a substantial number of the debentures had been redeemed, but there were still £78,000 outstanding. Desiring to accelerate elimination of these debentures, the directors are negotiating the sale of the Calcutta Ice and Cold Storage business; a very substantial payment on account has been received. It is intended to redeem the balance of the outstanding debentures before the end of the present year, and so to enter into the jubilee year of the Company better equipped for the post-war period.

**London Electric Wire Co. & Smiths.**—The balance after all expenses, taxation, etc., for 1943 was £97,491; taken from reserves no longer required is £25,000 and £128,258 was brought in, making, with a small sum for transfer fees, £250,772, which compares with £260,613 for 1942 (when the profit balance was £100,358). The final dividend is 5½%, making 7½%, less tax, leaving to carry forward £128,417. Resolutions are proposed to convert the shares into stock.

## ALLENDER'S CABLE & CONSTRUCTION

### GOOD RESULTS

The 48th annual general meeting of Allender's Cable & Construction Co., Ltd., will be held on July 3 next in London.

The following is extracted from the statement of the chairman (Sir Malcolm Fraser, , G.B.E.) which has been circulated in to stockholders, with the directors' port :—

The profit, after making provision for tation, is £566,363 ; and there remains a ance of £465,115. Adding the balance ught forward, £306,552, we have £771,667. vidends paid during the year amount to 2,196, and leave us with a figure of 9,471.

Your directors have decided to transfer to erve for war contingencies, etc., the sum £175,000, earmarked as a Contingent Reserve for Reinstatement of employees in the fighting services, to pay a final dividend upon the ordinary stock of 10%, absorbing £112,391, and, in addition, a cash bonus of 5% (both less tax), on all the issued ordinary stock. These altogether total £343,587, leaving £315,884—an increase of £9,332 on the preceding year.

As the figures show, the general trade of the company has been satisfactorily maintained. Stockholders will, I believe, regard the results of the year with considerable satisfaction. The Callender Group has 1,355 men and women serving in the Forces. Provision has been made for allowances to men on active service.

Finally, let me express in the warmest possible terms the directors' appreciation of the efforts of the employees at home and overseas in the extremely difficult circumstances under which the operations of the company and its branches have had to be carried on.

# BUSINESS ANNOUNCEMENTS

*Continued from page 728*

## COMMERCIAL INTELLIGENCE

### LONDON GAZETTE

**tnership Dissolved**

**Birmingham.**—Between Eric Parkinson and ert Hughes, carrying on business as Parkinson Hughes, 56 Albion Street, Hockley, Birmingham, tric welders. Business to be carried on by ert Hughes.

**plication for Discharge**

**Scarborough.**—Cooper, Arthur Coath, 1a Sherod Street, Scarborough, electrical engineer. te of hearing, July 4.

**pointment of Trustees**

**Liverpool.**—Taylor, Frank, 4 Mercer Court and Fenwick Street, Liverpool, electrical and neral contractor. Trustee, Mr. P. S. Booth, Rumford Place, Chapel Street, Liverpool.

**High Court of Justice.**—Skulnick, Michael, 83 llesley Court, Maida Vale, W., battery manufacturer. Trustee, Mr. P. Phillips, 76 New vendish Street, W.

**ended Dividends**

**High Court of Justice.**—Springvale Electrical , 2 Oakmead Gardens, Edgware. Last day for eiving proofs, July 1. Liquidator : Mr. H. P. unton, official receiver, Bankruptcy Buildings, rey Street, W.C.

## CONTRACTS CLOSED OR RECOMMENDED

***Where it is stated that tenders are accepted by a Committee it will be understood that this is subject to confirmation.***

LASGOW.—Accepted by Transport Committee : **Scottish Cables, Ltd.,** cables ; **Hadfields, Ltd.** and **Edgar Allen & Co.,** points for permanent way ; **R. M. Easdale & Co.,** trolley wire ; **Edison Swan Electric Co.,** battery plates.

UNDERLAND.—Accepted by Education Committee : **Gee & Brown,** Sunderland, electric lighting installation, Valley Road School, £239 10s.

## TRADE MARK APPLICATIONS

***Amongst recent applications for British trade marks are the following. This information is extracted from the Official Journal by permission of the Controller.***

**Lum-Arc.** 626503. Class 9. Cinematograph projectors, searchlights, and spotlights, all adapted for use with an electric arc. Accrometer Manufacturing Co., 22 High Street, Kingston-on-Thames.

**Syntha.** 627399. Class 9. Parts of scientific, electrical, etc., apparatus and instruments. Ronald Trist & Co., Bath Road, Slough.

## PROSPECTIVE BUSINESS

***The information given below is compiled from various sources, and while every care is taken to see that it is accurate no responsibility is taken.***

### Home

*Airdrie.*—Hostel, Kirkness Street.

*Blackpool.*—Four houses, Lostock Gardens, for T.C.

*Brighton.*—Prefabricated nursery school at East Moulsecombe.

*Coventry.*—Staff recreation room, Exhall Lodge.

*Croydon.*—Canteen kitchen building, Selhurst Grammar School.

*Grimsby.*—Nurses' quarters, Scarthoe Road Infirmary.

*Jarrow.*—Three temporary shops, for T.C.

*Kirkcaldy.*—Twenty houses, for T.C.

*Ledbury.*—School dining-rooms and kitchen.

*Leek.*—Maternity unit at County Institution, for Staffordshire C.C.

*Merthyr.*—Six shops, Galon Uchaf.

*Nottingham.*—Additions, County Hospital for Mental Defectives, Carlton.

*Redditch.*—Completion of 46 houses, Batchley Estate, for T.C.

*Rochdale.*—Extensions, Dunlop Cotton Mill, Ltd.

*Rowley Regis.*—Dining centre, Reddal Hill school.

*Stockton-on-Tees.*—New wing at Robson Maternity Home.

*Worcester.*—Conversion of Avenbury to maternity unit.

**Overseas**

*Palestine.*—E. S. Weinbaum & Co., P.O.S. 598, Tel-Aviv Palestine, ask us to note that they wish to get into touch with British manufacturers of electrical goods with view to arranging agencies. They give the Anglo-Palestine Bank, Ltd., Tel-Aviv, as reference.

## NOTES AND QUERIES

(13478) **Hellerman Electric, Ltd.,** address of? J.B.—Goodtric Works, Oxford.

(13479) **"Reliance" electric iron,** makers of? H.E.—British National Electrics, Ltd., Newarthill, Motherwell, Lanarkshire.

(13480) **Christy & Norris, Ltd.,** address of? S.A. & D.—Chelmsford.

(13481) **Grimston Electric Tools, Ltd.,** address of? J.S.F.—Progress Way, Purley Way, Croydon.

(13482) **"Prilect" electric iron,** makers of? R.R.—T. Price & Son (Stampers), Ltd., Spring Hill Passage, Spring Hill, Birmingham, 18.

(13483) **"Regal" vacuum cleaner** suppliers of? W.L.—S. A. Rowley, Ltd., 59 Skinner Lane, Birmingham.

(13484).—**"Sifam" ammeters,** makers of? F.J.M.—Sifam Electrical Instrument Co., Ltd., Leigh Court, Higher Lincombe Road, Torquay.

## MEETINGS TO NOTE

**June 22.**—I.M.E.A.—The annual general meeting, which was to have been held on this date, is postponed, *sine die.*

**June 22.**—I.E.E. Formal meeting to submit candidates for election and transfer.—Savoy Place, W.C.2.—2.30 p.m. Ballot meeting on July 6, 2.30 p.m.

**June 22.**—I.E.E., Devon and Cornwall Sub-Centre.—"Standardisation of Motor Dimensions," H. Marryat.—Royal Clarence Hotel, Exeter.—3 p.m.

**June 24.**—Commercial Travellers' Benevolent Institution.—Half-yearly Court of Governors.—4b Frederick's Place, Old Jewry, E.C.2.

(*Advts. continued from page* 728)