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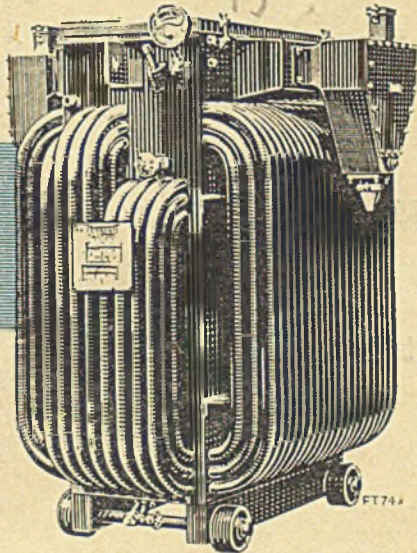
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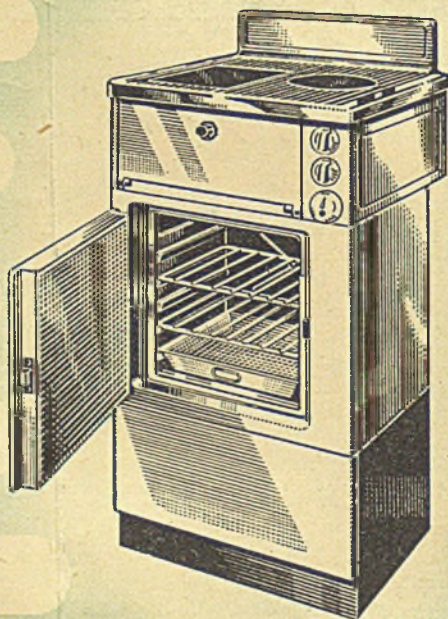
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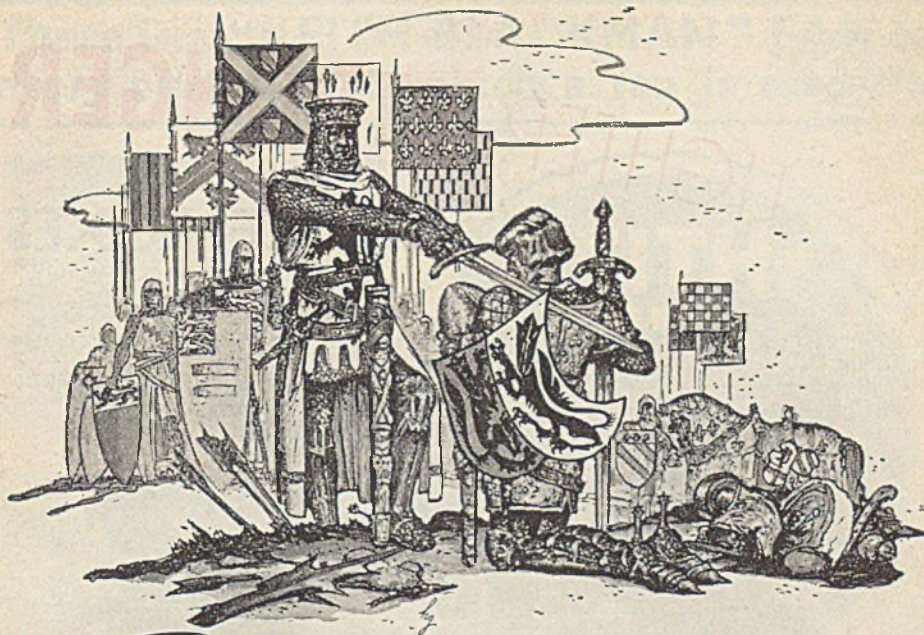
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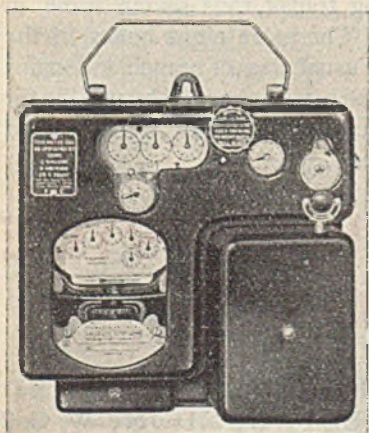


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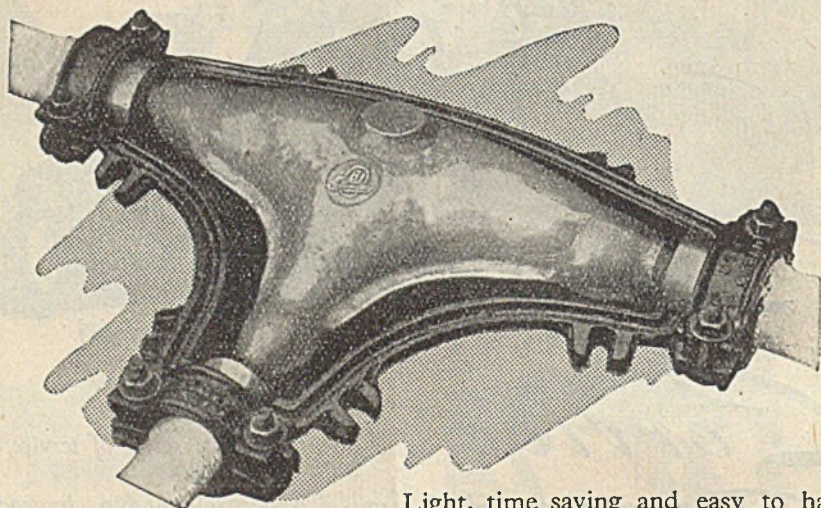
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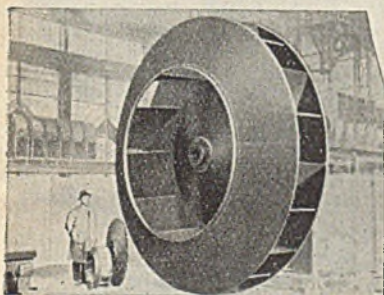
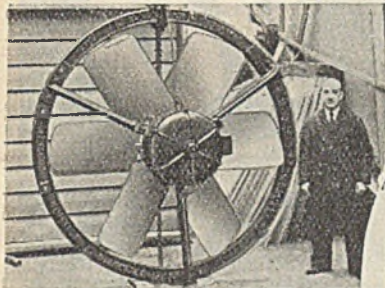
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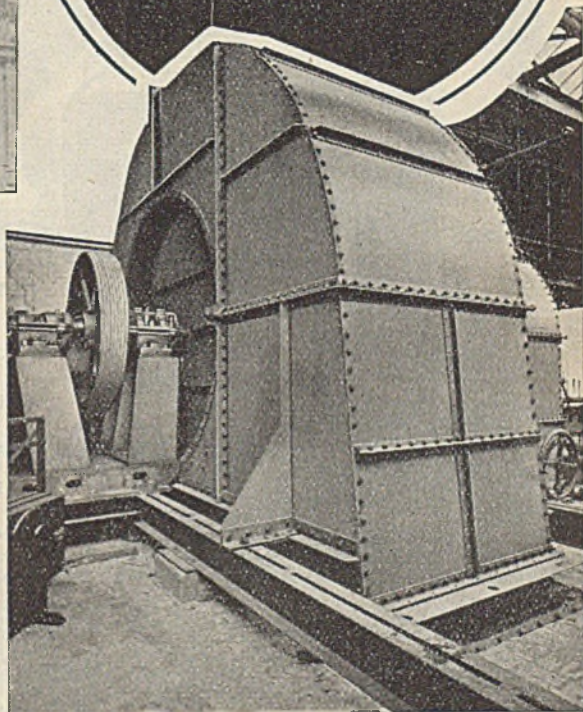
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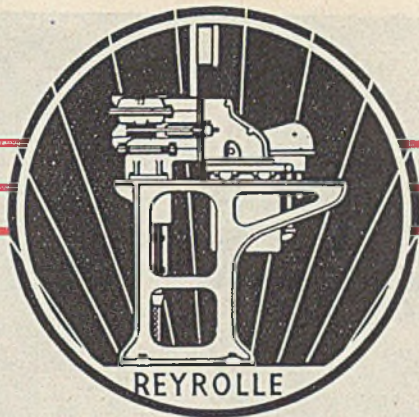
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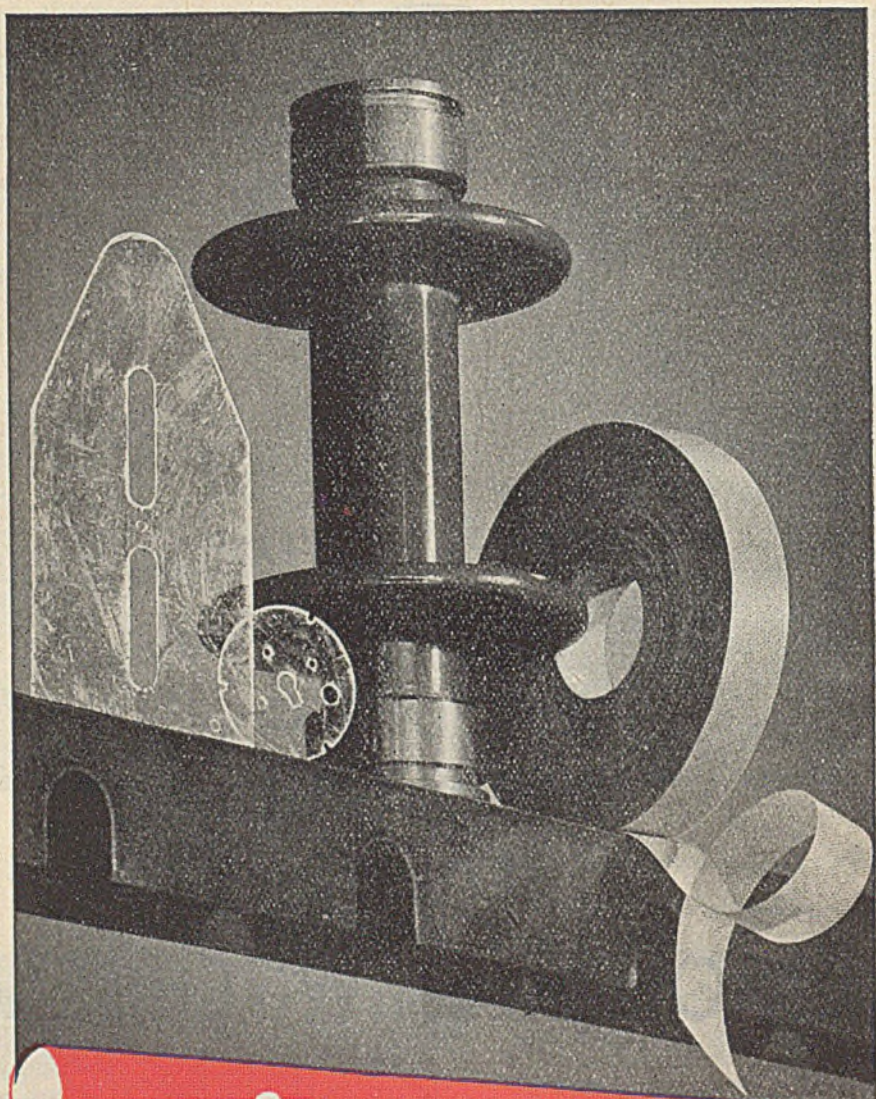
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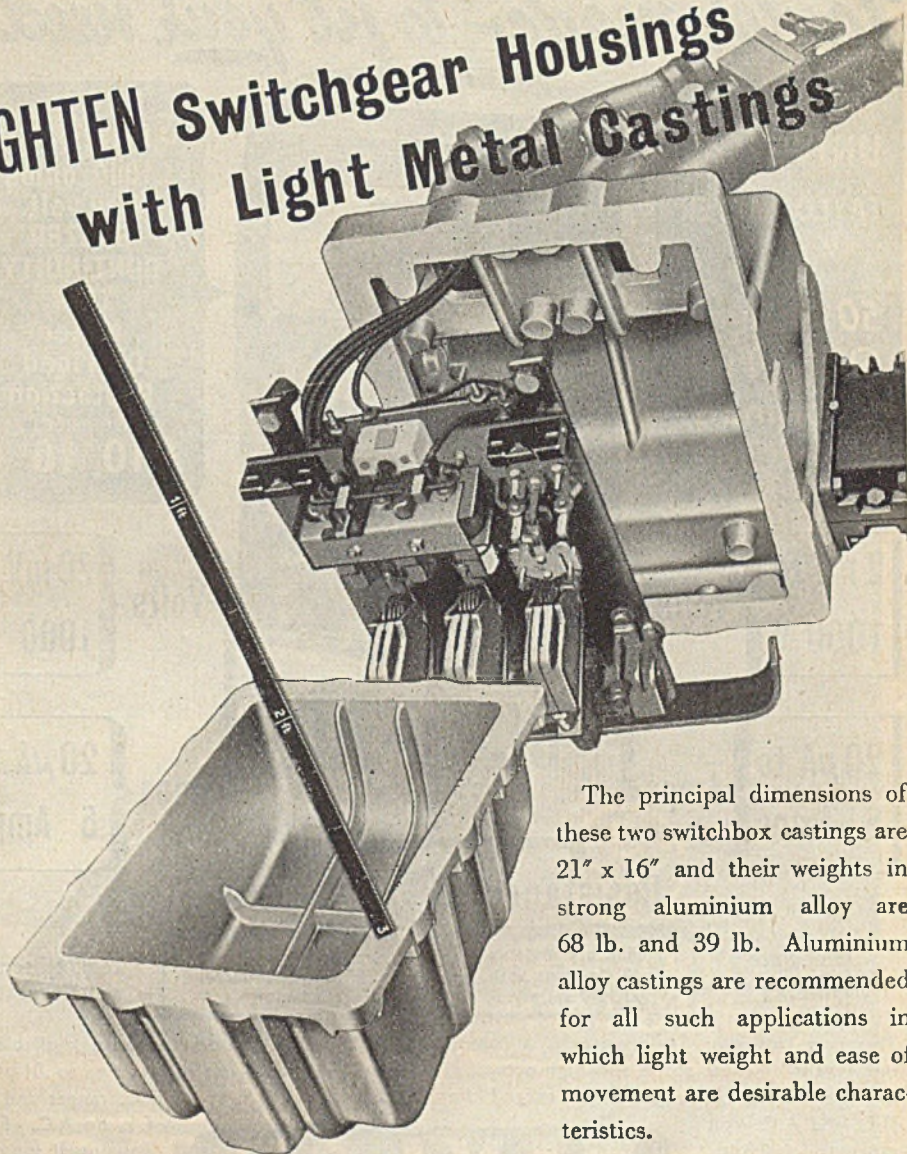
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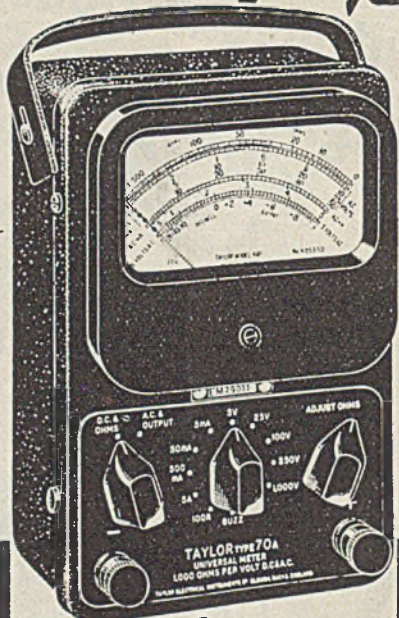
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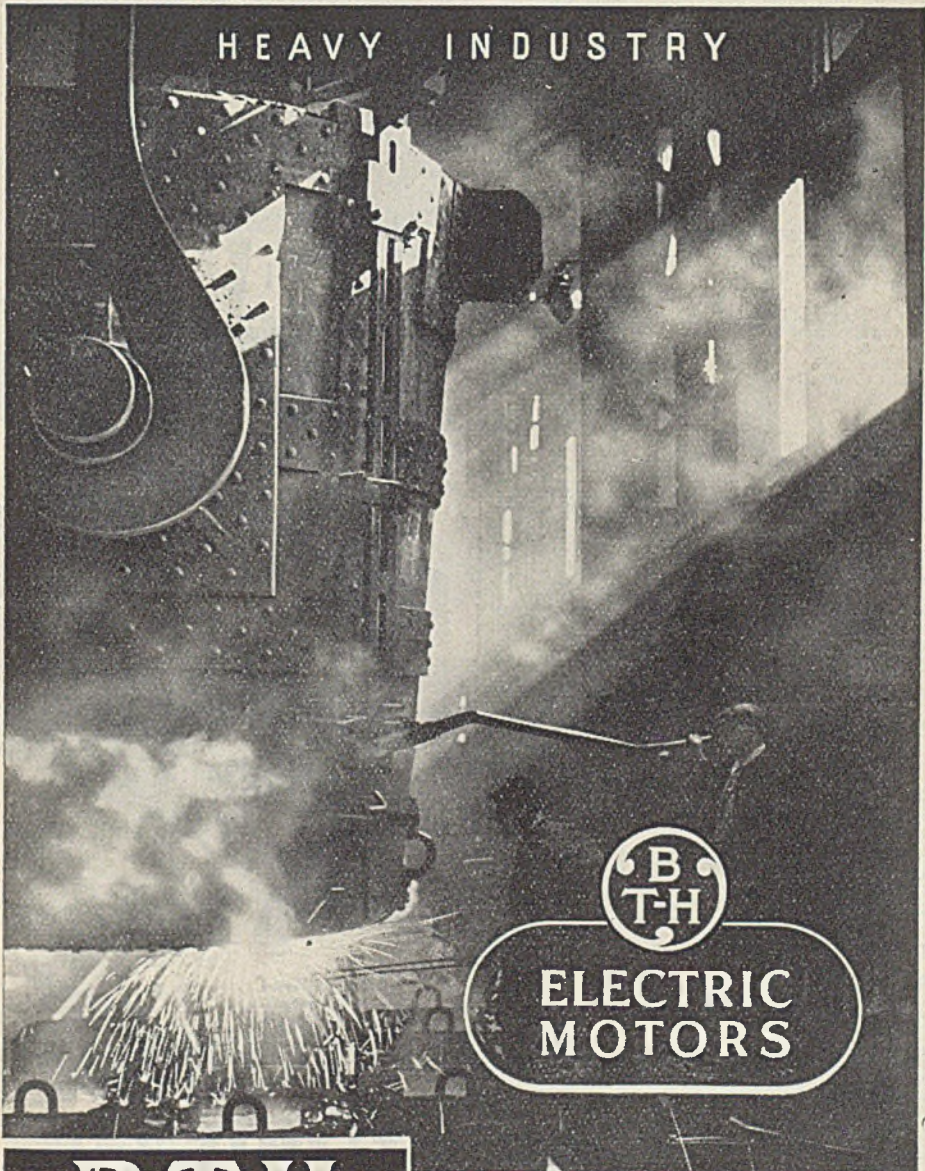
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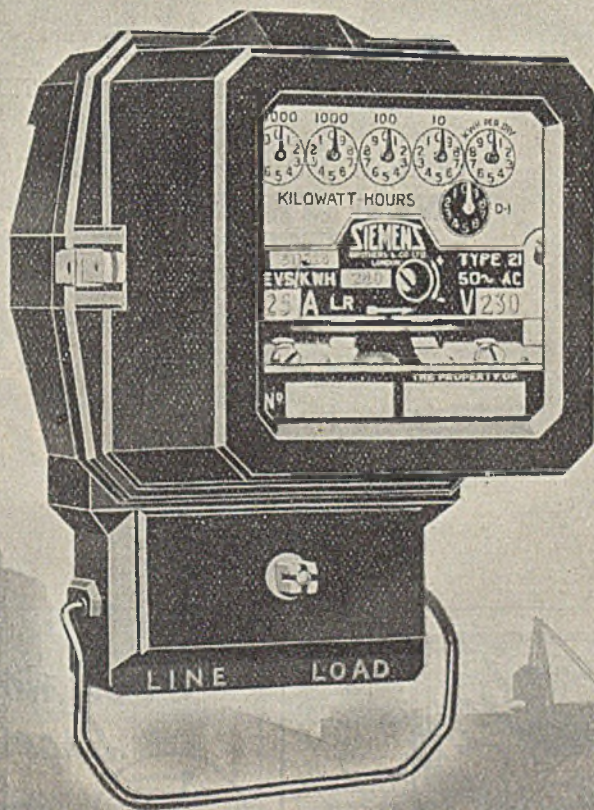
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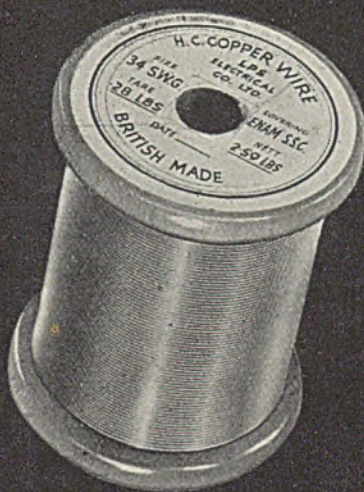
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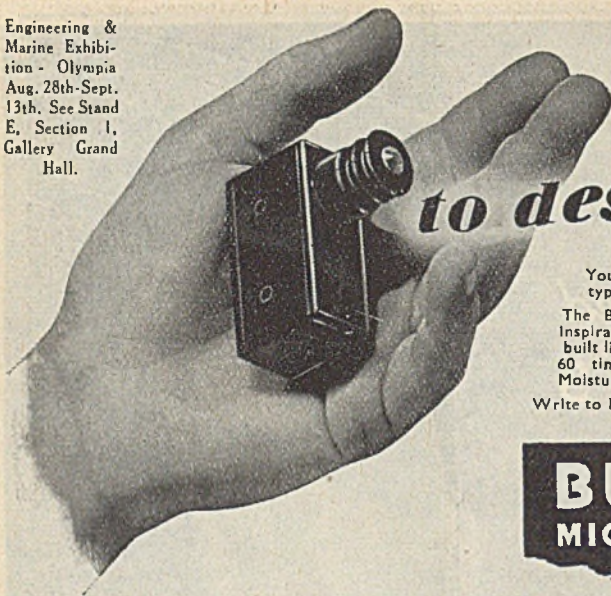
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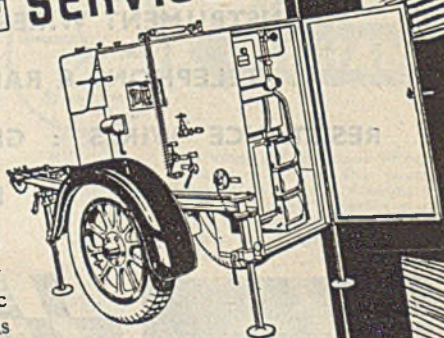
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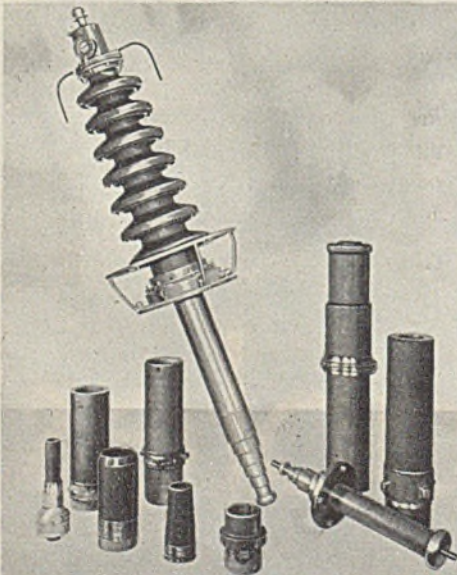
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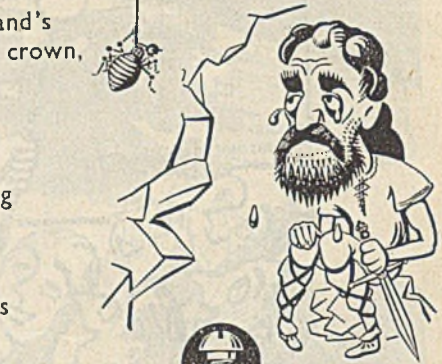
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crown,

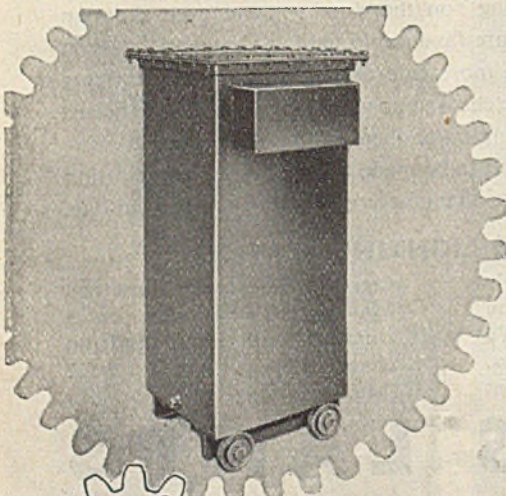
Owes to a Spider his renown,
For by that insect's efforts vain
He was inspired to try again.
The Spider's thread we know was long
And, for its size, surprising strong —
But nowadays the threads we use
Are those which form a part of screws
Which, while not suited to a King
For industry are just the thing.
Forget poor Bruce (he's out of date),
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Length	-	19 inches
Weight	-	12 lbs.
Number of blows	-	1,550 per min.

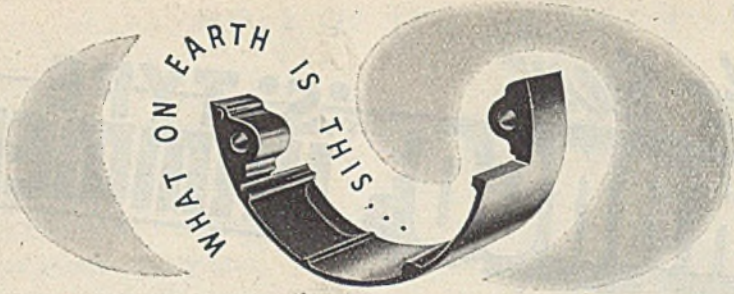
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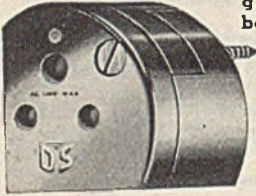
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The rather rummy looking object above is one section of the new DS skirt for surface mounting the DS conduit box type socket. The other section is an absolute twin, and they get together as shown below.

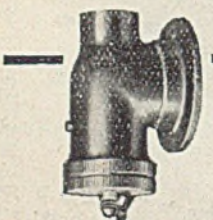
This enables the skirt to be fixed after the wiring has been completed and means greater ease for the wireman. Just another ingenious addition to the DS Fused Plug and Socket range.



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EIM47



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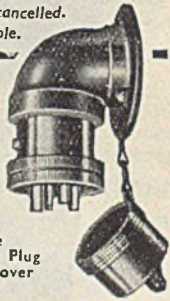


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SHEFFIELD CORPORATION ELECTRICITY DEPARTMENT.

DISTRICT MAINS ENGINEER.

APPLICATIONS are invited for the above position. Applicants must possess an engineering degree or equivalent technical qualifications admitting to corporate membership of the Institution of Electrical Engineers, and must have had a thorough engineering training including experience in the Mains Department of a large Supply Undertaking. The person appointed will be required to take charge of all mains and service work in a District containing heavy industrial and densely developed residential areas, distribution being mainly by underground cables of all voltages up to 33 kV.

The salary will be in accordance with Class M, Grade 8, of the National Joint Board Schedule, commencing at £635 per annum.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937. Applicants must preferably be not more than 40 years of age, or have had previous Local Authority service, carrying transfer value within the meaning of the Act. The selected applicant will be required to pass a medical examination.

Applications are to be returned to me not later than Thursday, 24th July, 1947, accompanied by copies of not more than three recent testimonials.

Canvassing or any communication to a member of the Council, either directly or indirectly, is prohibited, and is a disqualification.

JOHN R. STRUTHERS, M.I.E.E.,

General Manager and Engineer,
Commercial Street,
SHEFFIELD, 1.

SITUATIONS VACANT

CITY AND COUNTY BOROUGH OF BELFAST. ELECTRICITY DEPARTMENT.

APPLICATIONS are invited for the following positions—

(a) **Senior Technical Assistant (Distribution).** Applicants must have a sound electrical engineering training, be Corporate Members of the Institution of Electrical Engineers, and have experience in design, layout and estimating capital costs of extensive electrical transmission and distribution systems. They must not be more than 40 years of age on 1st September, 1947.

(b) **Mechanical Engineer.**

Applicants must have a sound mechanical engineering training, be Corporate Members of the Institution of Mechanical Engineers, and have experience in the maintenance of watertube boilers, steam turbines and ancillary plant, preferably in modern power stations.

The salary for each position is in accordance with Grade 6, Class J, of the National Joint Board Schedule of Salaries for Technical Engineers on the staff of Authorised Undertakers. The scale is £616 for the first two years, £630 for the third and fourth years, and £644 after the fourth year.

Preference will be given to ex-Service candidates possessing the required qualifications.

In computing applicants' ages for the purpose of the age qualification clause, any periods of war service in H.M. Forces will be deducted from applicants' actual ages, provided that this will not apply to applicants whose actual ages would be over 45 years on the date of taking up duty.

Applications must be made on official forms, which can be obtained from the City Electrical Engineer and General Manager, Electricity Department, East Bridge Street, Belfast, and, with copies of not more than three recent testimonials, should reach the Town Clerk, City Hall, Belfast, not later than 4 p.m. on Friday, 1st August, 1947.

Canvassing, oral or written, if proved to the satisfaction of the appointing authority, will disqualify.

JOHN DUNLOP,

Town Clerk.

NEW ZEALAND: Engineer/Salesman for cinema equipment company allied to leading circuit. First class technical training and thorough experience on installation and servicing of sound film equipment essential; commercial experience, energy, initiative and organising ability will enhance prospects. Applications (in strict confidence) should give full details including experience, qualifications, age, whether married, and present salary.—Write Box L.F.N., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

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FOR SALE

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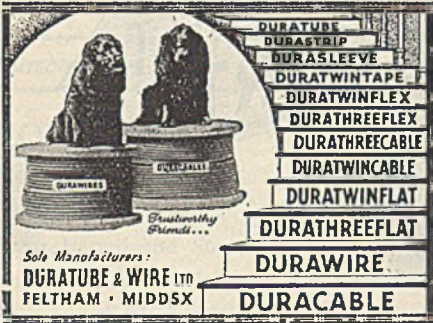
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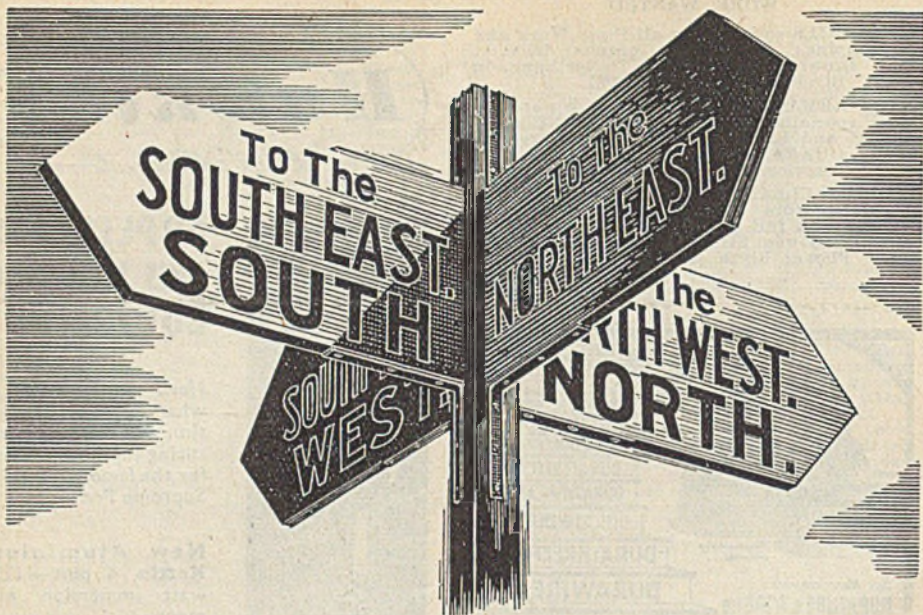
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Telegrams: "BENBROTRIG FLEET LONDON" Telephone: CENTRAL 3212 (12 lines)

Editor: STANLEY G. RATTEE, A.M.I.E.E.

Publisher and Manager: JOHN VESTBY

Number 3604

11 JULY 1947

Vol CXXXIX No. 2

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Load Staggering

WITH the experiences of last winter still fresh in the memory of industry and with only four months to pass before the possible return of cold spells, the time for designing a scheme for spreading the national power load by staggering working hours or for reducing the peaks by some other means, is growing dangerously short.

The maximum capacity available for demand will next winter be no better related to load than last, and bearing in mind the fact that the first negotiations to relieve the demand on generating capacity during the fuel crisis in February, as well as those opened later, failed in their result—we suggest that the importance of the matter in the national interest is not sufficiently appreciated.

One of the problems of which a solution acceptable to all parties is difficult to reach, is to devise a scheme covering wages and conditions under staggered hours, and though the compromise made last week in the engineering industry is hopeful, it can only be looked upon as a beginning, in that other industries have yet to reach agreement.

Different trades and localities require schemes varying in detail so as to meet their special requirements in a way that will not only spread electricity load, but which will too, cause as little disturbance as possible to costs and output.

There seems every reason for believing that industry may suffer from coal shortage this winter, and if to this

handicap is added dislocation as a result of power cuts as severe as those last winter, employment and export figures will be adversely affected. Plant deficiency before the fuel crisis last February was over 2 000 MW, and though by next winter some additional capacity will be available, the industrial and domestic loads have meanwhile increased. When to this demand is added the load at present lightened by summer conditions—such as that offered by space and water-heating, street, factory and other lighting—the national peak promises to be higher in megawatts and longer sustained than was that of last February. If in these circumstances, and in the absence of any workable scheme for flattening out the peaks, the industry is subjected to cold-spell conditions, the dislocation which will result in the form of power cuts may be even more chaotic than any yet experienced.

The Electricity Bill

THE Bill which last week received its third reading in the House of Commons, was read a second time in the House of Lords on Tuesday. Apart from minor amendments which the Government have promised to introduce later, it is unlikely that there will be further significant changes, and the Bill, as it now stands, may be taken to foreshadow fairly accurately the structure of the forthcoming Act. As Mr. GAITSKELL stated during the first day's debate, over 600 amendments were put down in Standing Committee, of which 197 were accepted, while later a further 254 amendments, of which 155 were accepted, were tabled. Many of the changes made have the effect only of removing obscurities in the original drafting. A few, on the other hand, represent Government concessions of some importance, granted as a result of Opposition insistence, and it must be conceded that the Bill, in its present form, has better chances of becoming a workable piece of legislation than when it was first prepared. Those who have followed the discussions closely will appreciate the value of the work done by those members who, like Sir ARNOLD GRIDLEY, have had many years' experience of the industry. While opposed on principle to complete nationalisation, they sought, in view of the Government's determination to carry the Bill to the

Statute Book, to ensure that it reaches there in as sound a shape as possible. That many of the more obvious defects and anomalies have now been removed is much to their credit.

Edmundsons' Fifty Years

THIS is the fiftieth year in the life of Edmundsons Electricity Corporation and in view of the nationalisation prospects facing the industry it was to be expected that Lord ROYDEN, chairman of the company, would have something to say on the subject at the annual meeting last week. In the first place the achievements of the group of companies, of which Edmundsons is the holding concern, are outstanding, and evidence of them is given by the fact that the number of consumers served has trebled since 1932, the output in units has increased by nearly ten times in the same period, and the average domestic price at 1.7d. represents a reduction of 62 per cent. During the same period coal costs have trebled, and the costs of turbo-alternators and boilers have, according to Lord ROYDEN, more than doubled since 1938. Other points referred to at the annual meeting are given elsewhere in this issue, and it may be noted with interest that the criticism made by THE ELECTRICIAN with respect to the burden placed upon the supply industry by the inferior and unsuitable coal delivered to it is upheld by facts and figures.

Export Target

IT has been clear for some time that the volume of exports set by the Government as a target for 1947 will not now be reached, but the Chancellor of the Exchequer is apparently, hopeful that the 140 per cent. increase over 1938 will be attained by the middle of next year. The progress made so far has, considering all things, been good; in the shipment of electrical goods, in particular, progress has been spectacular to say the least. Whether Mr. DALTON is justified in believing that by the middle of next year we shall be able to ship the volume of goods indicated, however, is dependent upon the arrangements to be made for a quicker release of materials to industry, the abandonment of many of the present controls, and a greater freedom for industrial initiative. There is evidence that the conditions obtaining in a sellers' market are giving way to a

more competitive form of trading, and the time cannot be far distant when this country, as well as others, will have to canvass for overseas orders, as was the custom before the war.

Handicap of Controls

TO achieve the export target of 140 per cent. above the 1938 volume mentioned by the Chancellor of the Exchequer last week, will require an expansion of exports of all kinds steadier than has hitherto been possible under direction and control. Experience at the British Industries Fair showed that although there was international interest in the goods we had to display, there was a certain amount of hesitation in the placing of orders on account of deliveries. For this, as in other matters affecting production, the Government must be held responsible, and the present machinery—based on war-time conceptions—for ensuring that materials are put to the best use, should be revised so as to meet the new conditions. The system of controls and direction now operating is part of a plan for winning wars; the results of production under it were, for six years, for immediate national or allied consumption, irrespective of price. We are now approaching the more stable condition where the products of industry have to be sold on an economic basis and in face of increasing competition. By continuing in these circumstances to apply a system designed to concentrate industry on the production of munitions of war, the Government is handicapping the industry of this country instead of helping it. The need to-day is for production covering all forms of capital and consumer goods to be sold against competing interests; the quickest way to satisfy it is to free industry from at least some of its bonds.

Generating Station Sites

IN his address before members of the Batti-Wallahs' Society, on June 26, Mr. R. H. MATTHEW, architect to the L.C.C., who will share in the working out of the details of the Greater London Plan, said the battle royal that had raged over the Bankside project had thrown up very forcibly the urgent necessity for consideration of the proper siting of generating stations over the whole of the London region, and he was glad to

know that the powers concerned were already in consultation on the matter. Subsequent inquiries by THE ELECTRICIAN elicited the fact that the problem is at present the subject of discussion by the Electricity Commissioners, the Central Board, the L.C.C. and all the local authorities in the Greater London area. These deliberations, inevitable at some stage in the carrying out of the Greater London Plan, have been accelerated by the Bankside controversy following closely upon the minor battle over the Ryo House project in the Lea Valley. It had become clearly evident that the urgency of the need for new power stations to meet the rapidly expanding electricity demands of the London district might result in further clashes of opinion arising from possible divergencies in the programme of the C.E.B. from the proposals of the planning authorities, and the best way of resolving those differences would be for representatives of the bodies concerned to have a round-the-table conference and see how far the rival claims of necessity and amenity over the whole area could be reconciled, and delay eliminated.

Time Wasting Opposition

FOR too long plans for the construction of new power stations and the extension of others to provide the increased generating capacity so vitally needed, have been held up all over the country by opposing interests, and reference to the time taken for the granting of consents is contained in an interim report on the scientific aspects of coal utilisation published by the Parliamentary and Scientific Committee, abstracts from which were given in last week's issue. "So important to the maintenance of our standard of living is the increase of the electrical generating capacity of this country," state the sub-committee responsible for the report, "that the possibilities for delaying construction should be severely curtailed during the present emergency." It is to be hoped that this sense of urgency will permeate all the Government departments concerned and that they will find some way of short-circuiting the cumbersome procedure that has to be followed at the present time before consent can be granted for the erection of a new station.

Portrait—Sir Claude D. Gibb



Born in Australia in 1898, Claude Gibb came to this country armed with a sound technical education which has served him well. Like so many outstanding personalities in the electrical industry, he is a keen educationalist and has given many practical examples of his interest.

awarded the C.B.E. He subsequently became Director General of Armoured Fighting Vehicles, and Chairman of the Tank Board. In the 1945 King's Birthday Honours List he had conferred upon him a knighthood, and in 1946 was elected a Fellow of the Royal Society.

Sir Claude takes a keen interest in educational matters, being Chairman of the Education Committee of the Institution of Mechanical Engineers, Chairman of the University of Durham Appointments Board, a member of King's College Council, Newcastle-upon-Tyne, and he has been a member of the Central Advisory Council for Education (England). It is natural, therefore, that the apprentices' training school at Heaton Works is among the best in the country. Sir Claude also takes a personal interest in the welfare of the employees at the works and is a strong advocate of better working conditions. Parsons Heaton Works are being transformed into bright pleasant places in which to work by the extensive use of colour.

In the interests of his company, Sir Claude has travelled widely, visiting Canada and U.S.A. in 1932; Canada again in 1935, while in 1936 he undertook a "round the world trip," visiting U.S.A., New Zealand, Australia, India, Iraq and Egypt. Last year he again went to Australia and in six weeks covered a distance of over 30 000 miles—all by air.

Sir Claude is deputy chairman of A. Reyrolle and Co., Ltd., a director of the Parolle Electrical Plant Co., Ltd., Newcastle, and the Parsons and Marine Engineering Turbine Research and Development Association, Wallsend. He is a Vice-President of the Institute of Mechanical Engineers, President of the North-East Centre of the Institute of Welding and the North-East Section of the Institution of Production Engineers, Member of Council of the British Welding Research Association and of the General Board of the National Physical Laboratory. A Member of the Council of the North-East Coast Institution of Engineers and Shipbuilders, and a Member of the Standing Committee of the North-East Coast Engineering Employers' Association.

AFTER commencing work in 1923 in the turbo-alternator erecting bays of C. A. Parsons and Co., Ltd., of Newcastle, as an ordinary fitter, Claude D. Gibb was soon transferred to the drawing office and then to the outside staff, London district, where he attracted the notice of Sir Charles Parsons. He showed such outstanding ability that he was recalled to Heaton Works as manager of the test house, and in 1929, Sir Charles appointed him to the board of directors. In 1937, he was appointed general manager of the company; in 1944, joint managing director with Mr. F. G. H. Bedford, and in 1945 on retirement of the latter, chairman and managing director.

Claude Gibb was born at Adelaide, South Australia, in 1898, and studied at the School of Mines and the University, Adelaide, under the late Prof. Sir Robert Chapman. He graduated as Master of Engineering at the University and was awarded the Angas Engineering Research Scholarship. He served as a pilot in the Australian Flying Corps in the 1914-18 war.

During the late war, Sir Claude held the position of Director General of Weapons and Instrument Production in the Ministry of Supply, and in 1942 was

Plant Design and Standardisation

The Central Board's 1950 Programme Reviewed

Few technical papers recently delivered have attracted more attention than that prepared by Sir Johnstone Wright for the Centennial Meetings of the Institution of Mechanical Engineers last month. General manager and future chairman of the Central Electricity Board and now a member of the Organising Committee under Lord Citrine, Sir Johnstone gave many hitherto undisclosed details of the Central Board's programme for generating plant extensions, and also discussed the merits of plant standardisation. In view of the importance of his paper, therefore, we give on this and following pages an abstract of his remarks.

DOMINATING technical advances in generating plant design during the last twenty years, Sir Johnstone Wright's paper began, were two factors of paramount importance. In the earlier part of the century, the large boiler and large generating unit had been developed, but the effect of this was that when a generating station worked in isolation a correspondingly large amount of spare plant had to be provided as insurance against breakdown. The proportion of spare plant in the country consequently rose rapidly, and this was among the more important of the reasons for the adoption of the grid system. The establishment of the grid was the first of the two factors to which he had referred. Its first effect was something approaching a moratorium in plant construction. In the seven years from 1923 to 1929 inclusive, plant capacity increased by over 3½ million kW. On the 1929 ratio of plant to demand, at least a further six million kW would have been required in the following seven years, whereas the actual increase was only some 1 850 000 kW. It was not until 1936 that new plant again began to be installed at anything approaching the rate of growth on the system.

The second important factor was the outbreak of war, and the consequent veto on new plant construction. From the design point of view, therefore, the history of the last twenty years could conveniently be divided into two main periods, with 1939 as the dividing line—a period of planned restriction in new construction consequent upon the establishment of the grid, and a period of enforced restriction during the war.

In a reference to the economies effected by means of the grid, it was stated that in 1938, only 30 of the 171 stations then associated with the grid were running for the whole year, and 14 of these supplied 50 per cent. of the total units generated. The effect was a continued downward trend in fuel consumption per unit.

Turning to the present shortage of generating capacity, Sir Johnstone ex-

plained that by the end of 1946 the proportion of total installed capacity over 20 years of age had risen to 17.3 per cent., as compared with only 3.1 per cent. in 1939. The amount of plant out of service through breakdown or for maintenance had increased to 13.1 per cent., as compared with about 6 per cent. before the war. Furthermore, undesirable features of the fuel available resulted in a loss of capacity as high as 380 000 kW, and the average for December, 1946, was as much as 2.7 per cent. of installed capacity. The average amount of plant out of service during the working days in December, 1946, was, therefore, some 15.8 per cent. of the total installed. Towards the end of January, 1947, the plant deficiency reached two million kW.

The Central Electricity Board had, accordingly, arranged a programme consisting of approximately six million kW of new plant to be commissioned by 1950, while, if a reasonable level of national prosperity ensued, there was every reason to suppose that the national annual requirement for new plant would continue to be of the order of 1½ to 1¼ million kW over the decade from 1950 to 1960. When it was remembered that the greatest net addition to plant capacity in any pre-war year was just under 800 000 kW, in 1929, the magnitude of the task confronting the supply industry and manufacturers would be apparent.

Remarking that the general principle upon which plant programmes were devised was that, for each of the seven main areas served by the grid, imports and exports over inter-connecting transmission lines between adjacent areas should be kept to a minimum, Sir Johnstone said the programme up to 1950 would include 18 new stations. It was hoped that the revised planning procedure would reduce the time required to deal with proposals for their erection and extension.

The planning of the national plant requirements as a comprehensive whole facilitated the largest practicable measure of standardisation in design, which was im-

portant, having regard both to speed of construction and shortages of manpower. The six million kW of new plant would therefore be built to a minimum number of standards so far as steam cycle conditions, turbine and boiler capacities and the general arrangements of main and auxiliary plant were concerned.

Details were then given of the new plant proposed. Duplicates of existing plant operating on a 300-415 lb. pressure and 750-825° F. temperature cycle, installed as extensions to existing stations, would account for 450 000 kW (17 turbines and 35 boilers), or 7.4 per cent. of the total. Eighty turbines and 154 boilers, providing three million kW, or 49.3 per cent. of the total, would be built to operate on the 600 lb. pressure, 800-900° F. temperature and 340° F. feed cycle. Practically the whole of the plant to be installed as first and second sections of new stations designed for ultimate capacities ranging from 200 000-360 000 kW would be built for 900 lb. pressure at 900-925° F. and 385° F. feed cycle. This would represent 2 340 000 kW (42 turbines and 90 boilers), or 38.3 per cent. of the total planned.

Standard designs, therefore, accounted for some 95 per cent. of the total plant at present under construction. Technical progress in the industry was not, however, to be halted by the suspension of plant for operation at higher pressures and temperatures, and some 305 000 kW (six turbines and nine boilers), making 5 per cent. of the total, would operate at 1 200-1 400 lb. pressure and 825° F. (with reheating) to 950° F. temperature cycle.

The major proportion of the new turbine plant was designed to operate at speeds of 3 000 r.p.m., and could be broadly divided as between three frame sizes, namely:

- (a) 50 turbines of 30 000/31 500 kW, all operating on the 600 lb. pressure cycle;
- (b) 10 turbines of 40 000/45 000 kW (duplicates of existing turbines) built for operating on pressure cycles of 400 to 600 lb.;
- (c) 60 turbines of 50 000/60 000 kW (with common i.p. cylinders) for use with 600, 900 or 1 250/1 450 lb. pressure cycles.

Most of the turbine frames under (a) and (b) were of two cylinder design, and the major proportion of those under (c) working at 900 lb. or above were of three

cylinders. In addition, a further 25 turbines ranging from 15 000 kW at 3 000 r.p.m. to 75 000 kW capacity at 1 500 r.p.m. were under construction.

Similarly, a major proportion of the new boiler plant was being constructed to four sizes, and could be broadly classified as:

- (d) 49 boilers of 200 000 to 265 000 lb.;
- (e) 112 boilers of 300 000 to 365 000 lb.;
- (f) 16 boilers of 400 000 to 450 000 lb.;
- (g) Two boilers of 525 000 to 540 000 lb.

The boilers under (d) represented a mixture of chain grate stoker, spreader stoker and pulverised fuel fired plant. Those classified under (e), (f) and (g) were of the p.f. fired type and would provide over 60 per cent. of the total steaming capacity. They were also representative of future standard sizes, irrespective of the stop valve pressure for which they should be built. A further group of 109 boilers, largely duplicates of existing types, was being installed as extensions.

As a result of discussions with representatives of the supply industry and the manufacturers, the major proportion of the 18 new generating stations would take the form of self-contained sections, each comprising two turbo-sets and four boilers, any three of which could supply the full steam requirements of the sets. A limited number would be arranged on the unit principle of one boiler and one set, up to an output capacity of 60 000 kW per unit, and, in general, the unit principle would be adopted wherever suitable fuels could be made available.

Sir Johnstone Wright then reviewed some of the design features of the new programme. Ash disposal presented difficulties, particularly in p.f. fired stations, but experimental work was being carried out in the use of fly ash for the manufacture of industrial refractory blocks, partition bricks, road surfacing material, etc., which might ease the future situation.

With modern electrostatic precipitators, an efficiency as high as 98.5 per cent. under good combustion conditions could be obtained, but this fell off rapidly with a decrease in furnace efficiency. The serious deterioration in fuel quality had led to consideration of a combination of multi-cyclone arrestors and electrostatic precipitators, and this system would be employed in a number of the new stations.

The total evaporative capacity to be provided under the five year programme was 73 537 500 lbs. per hour, of which 66.9 per cent. was for pulverised fuel firing, 27.4 per cent. for chain grate and retort stoker firing, and 5.7 per cent. for spreader stoker firing. It was contemplated that in later programmes the major proportion of the new coal fired plant would be of the pulverised fuel type, while



Sir Johnstone Wright

spreader stokers would probably be used extensively for the balance.

The paper continued with a review of the types of boilers to be employed in the new programme, in the course of which it was stated that with large pulverised fuel boilers the fuel consumed for pressure raising in a 24 hour cycle on a two shift basis was only 0.4 to 0.75 per cent. of the total consumed in the period. The annual thermal efficiency obtainable at a large modern two-shift station was substantially the same as those obtainable at three-shift base load stations. Amongst the boilers described was the first slag type unit to be installed in this country.* It was designed for an evaporation of 525 000 lb./hr at 1 275 lb. 975° F.

Of the turbine plant in the new stations, 60 sets of 50 000-60 000 kW capacity at 3 000 r.p.m. were being constructed to new designs using a common low pressure cylinder, although the steam cycle might be at 600, 900 or 1 250/1 400 lb. pressure. All the plant had to be capable of operating safely under two-shift conditions. It had been agreed among manufacturers that feed heating trains for the 600 lb. pressure cycle should be designed for a final feed temperature of about 340° F.

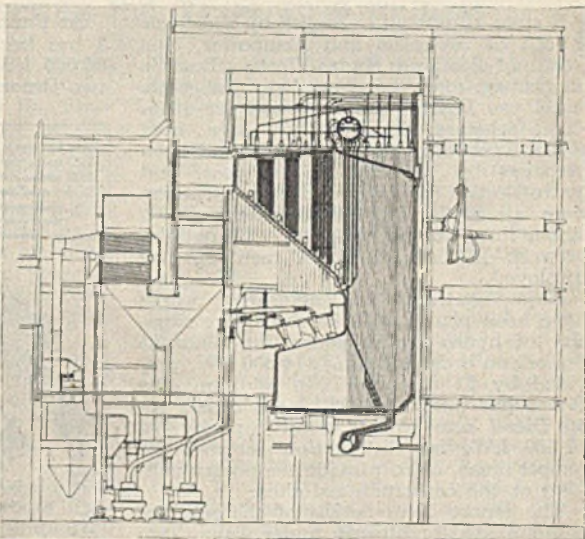
Standard turbine foundations blocks were being developed by some manufacturers to accommodate either their own condensing plant or that built by any sub-contractor, and a number of the larger machines would have a simple high-pressure cylinder free from nozzle or overload governing valves, operating under simple throttle governing and having economic performance at 100 per cent. load.

For output capacities up to 50 000 kW, alternator air cooling was being advocated by all manufacturers, but in general the 60 000 kW, 3 000 r.p.m. alternators would be hydrogen cooled. For the larger sets, governing mechanisms had in many cases been redesigned, and electrical and pressure operated relays added to close the main governing valves in the event of either a sudden drop in electrical load or a loss of vacuum.

After a reference to condenser plant and

* Stourport "B" station (Shrops. Worcs. and Staffs. Electric Power Co.). The equipment being installed in this new station was fully described in THE ELECTRICIAN of January 25, 1945.

cooling towers, the paper concluded with a survey of future developments. Definite schemes were now being developed for the installation of 15 000 and 20 000 kW oil-fired gas turbine sets operating on the



A 525 000 lb. per hour single drum slag type p.f. fired boiler, operating at 1 275 lb. pressure and 975° F.

open cycle, and this should make an important contribution to the problem of providing efficient, economic and flexible plant to deal with short period peak loads. An efficiency of about 28 per cent. could be achieved by the adoption of a two-line arrangement consisting of a high-pressure turbine driving the high pressure compressor, and a low pressure turbine driving the low pressure compressor and the electrical generator. Designs were also being developed for 30 000 kW sets, some embodying the double flow principle in the l.p. compressor and gas turbine.

With the present relation between the costs of oil and coal, the installation of special peak load plant could only be justified for a maximum annual load factor in the neighbourhood of 12 to 14 per cent. Development in the fields of nuclear fission and the production of clean gas from the combustion of normal fuel, however, might open up the possibilities of operating gas turbine plant on a closed cycle system, and outputs of 50 000 to 100 000 kW could be obtained on compressor and turbine frames of similar physical dimensions to those now being developed for 15 000 to 30 000 kW on the open cycle. When improved steels became available thermal efficiencies up to 45 per cent. or more might be realised.

Power in the Highlands

ANNUAL REPORT OF THE HYDRO-ELECTRIC BOARD

IN spite of difficulties caused by shortages both of materials and manpower, the North of Scotland Hydro-Electric Board's programme made good headway last year, states the Board's annual report for 1946. Eight schemes, designed to serve over 100 000 people in the Highlands, had been prepared by the end of the year, and hydro-electric projects under construction were already giving employment to a labour force numbering 4 000. Ultimately, between 10 000 and 15 000 men will be employed.

Major contracts for engineering works have been placed with 73 firms, the capacity of hydro-electric generating plant at present on order totalling 374 000 kW, provided by 21 machines. In addition, the Board has purchased or placed orders for 56 Diesel sets with a total capacity of 17 500 kW, for distribution schemes for remote areas, or to provide temporary supplies at the constructional sites.

The report gives details of the schemes contemplated or already under way. Two which reached Parliament during 1946 were the Mullardoch-Fasnakyle-Affric project (No. 7), for Ross and Cromarty and Inverness-shire and No. 4, the Cowal project. Of these, the former is the major undertaking promoted during the year, and it provides for three English Electric sets at Fasnakyle with a combined capacity of 66 000 kW, producing an annual output of 224 million units. The second project will consist of two 6 000 kW Harland Engineering Co. turbo-alternators at Loch Striven, with an estimated output of 14 million units.

Among schemes already under construction, the Loch Sloy project (No. 1) has already involved large-scale civil engineering works and will have four English Electric turbo-alternators totalling 130 000 kW, with an annual output of 100 million units.

The Morar scheme, with two Bruce Peebles alternators coupled to Boving Kaplan-type turbines, will provide 500 kW and is expected to be completed during the summer of next year. On the Lochalsh project, instead of the planned installation of 4 000 kW, it has been decided to proceed with an initial development of 500 kW.

Constructional scheme No. 2—the Tummel-Garry project—was commenced in January, 1946. Under this, three stations are to be built, at Errochty, with three units totalling 75 000 kW; at Clunie, with three units totalling 57 000 kW; and at Pitlochry, with two sets totalling 15 000 kW.

At Fannich, where work on scheme No. 3 has been in progress since early 1946, 24 000 kW capacity is to be provided by two Bruce Peebles alternators and Harland



The Scottish hydro-electric schemes at the end of 1946

Engineering Co. turbines at a power station sited at Grudie Bridge. Constructional scheme No. 6—the Findhorn-Duntelchaig project—is held in abeyance.

During the year, the report adds, considerable survey work for the preparation of new schemes was undertaken. These include the Glen Shira project for Argyllshire, approved by the Electricity Commissioners in February this year, and the Glen Lussa project, which was approved in March.

By the end of 1946, nine distribution schemes had been approved by the Commissioners. These related to the areas around Lochalsh, Morar, Gairloch, Bute, Orkney, Skye, Lochcarron and Arran. Progress has also been made in the preparation of further schemes, of which eight were submitted to the Commissioners for approval.

Progress of Electric Welding

A Review Covering the Years 1939 to 1945

TWO wars have waged since the advent of electric arc welding as a technical and commercial process, and in the years between advances were made not only in the manufacture of welding equipment and electrodes, but in the actual technique and application of welding. In the early months of the last war the welding industry, in conjunction with the British engineering industry as a whole, was mobilised and, looking back over the six years of war, there is no doubt that welding contributed very effectively towards final victory.

About three years were spent by Great Britain, the U.S.A. and the other allies in preparing designs for the welded fabrication of equipment required for the invasion of Europe, because welding offered the quickest means of production.

Electric arc welding was used for the construction of the Mulberry Harbour Pierheads; one welding firm alone employing nearly 200 welders on this work. The drums known as H.M.S. Conun built in connection with the Pluto scheme of pipe lines were arc-welded. The Bailey bridge was designed as a light, easily transportable sectional bridge, which could be erected quickly using man-power only, and which when erected would carry heavy tanks. Electric arc welding was utilised in fabricating over 450 000 panels for this bridge in four years. The electric welding process also played a large part in the construction of warships of all descriptions, in the building of landing craft and in the manufacture of armoured fighting vehicles, guns and small arms.

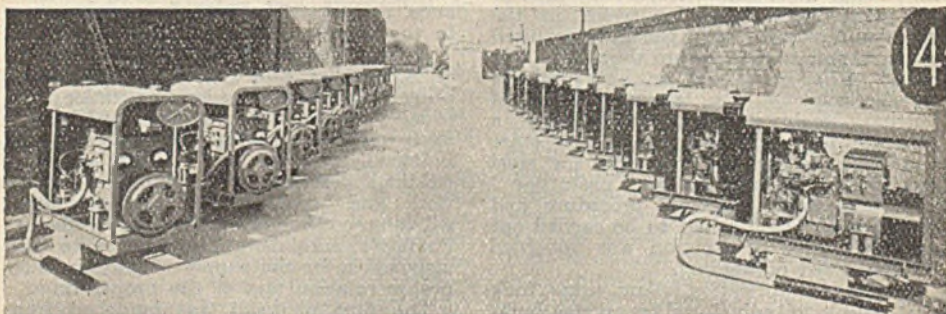
The story of the Mulberry harbour captured the imagination of the whole world.

The construction of the "prototype," designed by Lobnitz, Ltd., was carried out by Alexander Findlay and Co., Ltd., at their Old Kilpatrick Yard. On completion it was tested along with its bridging equipment on the Solway, and it was on the successful results obtained during these tests that the decision to build the other twenty-two pierheads, their bridging equipment and the breakwater, was arrived at.

The responsibility for the production of these vessels within the time limit set was entrusted to Alexander Findlay and Co., Ltd., in view of their successful completion of "prototype 2," but as the shipyard at Old Kilpatrick was already fully occupied with other Admiralty work, and all other shipyards were in the same position, sites to construct the "pierheads" were found at Leith, on ground being developed as an extension to Leith Docks, at Cairnryan, a military depot occupied by Royal Engineers, and at Conway in North Wales. Thirteen pierheads were built at Leith, four at Cairnryan and five at Conway, so that of the total of twenty-three, eighteen included the "prototype" built in Scotland, and site welding was carried out on a total of fifteen.

The "prototype" differed from the production pierheads in that it was built piece small with the hull entirely butt welded, the transverse and longitudinal bulkheads and the internal bracing being delivered to the site ready for installing in position.

In the light of experience gained with the "prototype," and having regard to the speed necessary in the completion of the production pierheads, it was decided that a greater measure of prefabrication should



Batch of Murex lightweight engine-driven welding plants as supplied for use by H.M. Forces in the field

be used and that certain alterations should be made in the design. These were alterations in detail only, and in principle the production pierheads were similar to the "prototype."

The extra prefabrication was mainly on the spud wells, the superstructure including the cross girder and the deck and bottom plates, which were delivered to the site having the longitudinal channels welded on. The deck treads were also shop welded.

REASONS FOR FABRICATION

The reasons for the prefabrication were:

1. The parts could be turned by crane so that welding was quicker by virtue of the use of larger electrodes in the downhand position.
2. More of the work was done under cover unaffected by weather conditions.
3. Most of the work being downhand, welders of less skill could be used.
4. The parts to be fabricated were contracted out to a large number of firms having the necessary facilities.
5. Work could be continuous even during black-out periods.

The reasons for lapping instead of butting were as follows: 1. To bring prefabricated parts into position with closely butting edges called for a degree of accuracy not likely to be obtained throughout the job, whereas laps could vary either way and still give close fit-up for welding. 2. In the "prototype" all the skin plates were planned to give a double vee preparation. This planing in itself was a task of considerable magnitude, and having in mind that the pierheads were 200 ft. long, 60 ft. wide, and 10 ft. deep at the sides, and that seventeen had to be built, it is doubtful if the planing capacity was available. In the production pierheads some of the plates were from universal mills (having rolled edges) and those that required planing could be batch planed. 3. It was necessary to employ welders of the trainee type and experience had shown that these, while they were usually capable of making quite good lap welds in the downhand position, they generally required some further tuition before they were able to do either positional or butt welding satisfactorily. 4. By lapping instead of butting, each compartment became a separate unit, allowing welders to start and carry on welding whenever the steel was erected in place. In the "prototype" with butt welds a certain procedure and sequence of welding had to be carried out and the speed of erection was governed by the speed of welding.

In the prefabrication many firms took part, and longitudinal and transverse bulkheads, bracing, sloping stays, spud casings, cross girders and deck and bottom plates were contributed from many sources.

Some of these parts were welded and some riveted according to the facilities in the shops concerned. Riveted and welded parts fitted in equally well. The Lanarkshire Welding Co., Ltd., carried out the making of spud casing parts in addition to much site work, and it is creditable to all concerned to state that there was no major hold up for want of materials at any time.

At the site it was arranged that the supply cable should run along the face of the four berths, being tapped to provide for a possible 40 to 50 welders at each berth. The plant installed was six-, three- and single-operator transformer type allowing for the moving of a variable number of operators from one berth to another. As the berths were very close together the men could be moved from one berth to the other by extending cables, and all cables were fitted with detachable connectors with this end in view.

Where there were numbers of welders using small electrodes on positional work, three- and six-operator transformers were converted to six and twelve operators respectively.

As the tides only served for launching on three or four days a month, the cable was extended to Newhaven Quay, about 300 yards distant, and welding plant installed there for fitting out.

This, of course, obviated any necessity for holding a pierhead on the berth beyond the prearranged time and so interfering with the laying down of the following vessel.

BUILDING A SHIPYARD

The first steelwork arrived at Leith on November 29, 1943; by this time (in little more than three months) a shipyard had come into being. Power, water drainage and railway had been laid on. Offices, workshops and stores had been built. Cranes were erected. Berths and launching ways were ready for the vessels.

This in itself was a remarkable performance, and contributed in no small measure to the success of the whole project.

At this site Mr. Robson, then chairman of A. Findlay and Co., Ltd., decided to bring in existing organisations under their usual supervision rather than build up a fresh undertaking with new personnel, and practically all the work there, erecting, welding, electrical work, plumbing joinery work and painting, was sub-contracted. All these contractors worked under Messrs. Findlay's administration, who were also responsible for the supply of parts in their proper rotation and at the proper time.

The first pierhead was launched from Leith on January 26, 1944; the second was launched in February and the third on March 11. It was at this launch that

the Minister of Supply asked for a total of nine from Leith by the end of April, and on April 30 the ninth pierhead was handed over.

The remaining four were completed within the required time, and the yard then went over to the construction of sixteen intermediate pontoons, another part of the same project.

In the prototype, the spud well plating above and below deck was welded piece small; in the later pierheads the plating was prefabricated. The same applied to the upper cross girders. The bottom plating and the deck plating were supplied with the channels and deck treads welded on, and wherever possible the angles, etc., forming means of attachment were shop welded to one of the plates.

The transverse bulkheads were shop welded in two pieces except for end bulkheads, where part was incorporated in spud wells when redesigned. The welded girder formed the seating for the spud winches. It was intended that holding-down bolt holes should be drilled on site, but these were ultimately templated and shop drilled which proved satisfactory. In welding large areas such as T.B., due allowance had to be made for contraction, especially noticeable in transverse bulkheads which determined finished sizes. Longitudinal bulkheads where large plates bounded by Ls tended to buckle had to be watched carefully. Transverse girders were riveted shop construction with bolted side connections to longitudinal bulkheads.

The additional fabrication and the alterations in design resulted in a reduction of the site welding to about 55 per cent. of the prototype reckoned in man hours.

At the start of the site work, by suspending operations on Bailey bridge work, about seventy welders were sent to the site. This number was augmented to about 150.

To sum up, in nine months from the time the job was proposed a complete shipyard had been established and thirteen all-welded vessels, each over 1 000 tons, had been built, launched, fitted out and handed over.

With regard to operation Pluto, one war correspondent wrote: "They wound a pipeline round a drum like a cotton on a reel; they towed it on a large bobbin, laid it under the Channel and across the Continent; they then pumped a million gallons of petrol to our armies every day." Each bobbin, and there were six in all,



Example of all-welded submarine. Illustration reproduced with permission of the Admiralty

was known as H.M.S. Conun; they were fabricated and constructed by Orthostyle, Ltd., Scunthorpe, Lines. The drums had to be designed to carry a water-borne load of 1 500 tons, and it was necessary that they should be as light as possible to permit carrying the maximum possible load of steel pipe; it was also essential for the drums to be watertight.

The prefix H.M.S. is used also in connection with shore stations, but in the case of the Conun it can be said that it really referred to a ship, not a stream-lined job or easy to handle, but nevertheless a ship designed to carry a heavy cargo of pipe some 80 miles in one continuous length, and complete with bulkheads and watertight compartments.

In view of these considerations and the fact that a time limit had been set for the completion of the work, welded construction was decided upon. To save time in preparation of material and to speed up site welding and to ensure watertight joints, it was decided to use deep penetration welding wherever possible. Orthodox erection methods were discarded in favour of prefabricating before erecting sections up to 15 tons for erection on site.

Concrete assembly floors were laid with suitable handling equipment and this arrangement enabled the handling in various stages, of four drums at one time. (Pits or trenches were used for the distribution of power cables only.)

To permit downhand welding and to facilitate erection and lining up of the plates, specially designed cradles with roller tracks conforming to the contour of the drum were built. With this equipment it was possible to rotate the drum in either direction by means of a monkey winch; it was therefore possible to use a welding procedure involving the use of large electrodes which is usually only permissible in shop welding.

The $\frac{3}{8}$ in. plates with unprepared edges for the shell of the drum were set up

with $\frac{1}{8}$ in. gap on the roller-tracks and tack welded. The conical ends were made from $\frac{3}{8}$ in. plate and, due to the shape of the plates, were prepared in the orthodox way with a 60° V and welded with two runs of "Fastex 5" 6 gauge and a sealing run of 8 gauge. The complete conical end was prefabricated on the concrete sub-assembly base; this arrangement not only speeded up production but permitted the maximum amount of downhand welding, leaving only the welds to connect the sub-sections to be carried out in position on the parent unit. The cone was connected to the drum by means of a circumferential weld and a closure plate. The flanges were prefabricated at the works in large sections and transported to the site; again this arrangement allowed the maximum amount of downhand welding.

The success of the methods employed can be gauged from the fact that the complete job (Conun II to VI) from the delivery of steel to the works, to the final launching took nine months.

During pipelaying operations in heavy weather, one of the Conuns with part load broke adrift and was driven ashore; in view of the fact that the Conun was designed to carry its load when supported by water, it was expected that when the tide receded it would collapse; however, beyond some buckling of the flange the Conun was undamaged and was ready for immediate service.

WELDED A.F.V.'S

At the outbreak of the war only two types of British light wheeled armoured vehicles were welded. At the termination of hostilities every A.F.V. produced in Britain incorporated an all-welded hull and turret and all post-war construction is based on welded construction.

In the early days many problems had to be solved in the welding of armour plates; after their solution it was found that the welded vehicles had greatly superior "battle-worthy" characteristics.

Welding reduces the weight of a tank; a welded hull is more rigid than one riveted and welding provides watertight joints. In the early days of the war, some doubts existed as to the mechanical reliability of welded joints in armour plate and the ballistic resistance of such joints was questioned. The superiority of welded tanks was, however, finally established at the time of Dunkirk. During an interim period riveted tanks continued to be built, but as soon as welded tanks were in production the faster rate of manufacture became apparent.

The mounting figures of production are of interest. In 1940 Great Britain produced 1397 tanks; in 1942 (before welding was fully introduced) the production was

4 944 tanks and in 1943 (when welded production was in full swing) the total of tanks produced was no less than 8 611. From 1940 onwards all British tanks were fitted with welded wheels.

At the beginning of the war, welding of armour was confined for the most part to plates up to 14 mm. thick but to-day armour plate up to 3 in. and 4 in. thick and over is being welded.

EXAMPLES IN ARMOURY

A number of guns such as the 25 pounder, 17 pounder, 3.7 A.A. Bofors., P.I.A.T., Spigot mortar and the Sten gun were all subsequently manufactured by welding. Space does not allow a detailed description of the manufacture of these guns. For instance, the manufacture of carriages for the 40 mm. quick firing anti-aircraft gun was constructed by welding and considerable use of jigs was made for increased output.

It may be recalled that the 40 mm. gun fires shells in rapid bursts, and at a rate of approximately 120 rounds per minute, and that the design provides for rapid movement from place to place when the equipment is towed by a high-speed tractor.

Many features of interest attach to the carriage or travelling platform, which is of all-welded construction. It is mounted on four pneumatic-tyred wheels, but these are not used when the gun is in operation, the equipment being lowered on to the ground. The main members of the platform are of welded box-form construction, and are joined together by welding where necessary, welding being also used for attaching the various bracing members, gussets, and brackets. Formerly, riveting was employed to serve the purpose of the welding at present used. The production of the carriage and mounting for the gun was entrusted to a number of private firms which supplement the production of the Royal Ordnance Factories.

Electric arc welding was also used during the war in aircraft production, and most of the work for the manufacture of individual members and connections was done with the aid of welded jigs and fixtures, often of a very complicated nature.

The greatest amount of electric arc welding in the army was undertaken by R.E.M.E., both in mobile and static workshops. Most of the welding work consisted of repairs and maintenance to heavy and light artillery tanks, lorries, and other mechanised vehicles. It is interesting to note that R.E.M.E. welding squads with portable welding plant were on the beaches of Normandy on the morning of "D" day. Their job was to repair damaged equipment and keep it in the fighting line.

As it was necessary to supply the Forces in the field with portable electric

are welding equipment, firms concentrated to a certain extent on the production of mobile army units and portable engine-driven sets up to 250 A.

In 1944 the War Office formed a Sapper Welding Unit designated No. 1 Welding Platoon, R.E., and the activities of the unit in the B.L.A. were fully described by Capt. A. Lithgow, R.E., in the February, 1946, Transactions of the Institute of Welding.

BAILEY BRIDGES

The performance of the Bailey bridges to the design of Sir Donald Bailey has received well-deserved tribute. Some details of their fabrication as carried out by one of the leading firms, Braithwaite and Co., Ltd., in their construction should be of interest.

The bridge is a through-type road unit, the girders of which are made up from panels 10 ft. long by 5 ft. deep, coupled together in pairs by means of high-tensile steel panel pins. The roadway is of timber carried on steel stringers supported by transomes, which rest on bearing plates located on the bottom chord. Footwalks cantilevered on the outside of the girders provide a crossing for pedestrians without impeding vehicular traffic. Where bridges of greater span or load-carrying capacity are required the girders are reinforced by placing additional panels over the top of the lower ones, and bridges with panels three tiers high with three rows of panels in each tier have been used.

The details of the bridge are so arranged that a team of a hundred men can erect a span of 130 ft., capable of carrying the heaviest tanks, in 1½ hours in daylight or three hours in the dark without lights, the only erection tackle required being two 15-ton jacks, some leather mallets and spanners and special chord jacking levers for the two and three-tier bridges.

Each panel is made of 37-42 ton high tensile steel sections having a yield point of 23 tons/in.², which under extreme loading conditions may be stressed as high as 19 tons/in.². The panels weigh 5 cwt. each and can be conveniently handled and stacked in standard 3 ton lorries, so that no special transport vehicles are required.

When the development of the bridge reached its trial stage, Braithwaite and Co., Engineers, Ltd., were co-opted to provide the jigs and fabricate the prototype panels. The bridge was erected at the Experimental Bridging Establishment at Christchurch and given full scale loading tests. Certain minor modifications suggested by the fabricators were adopted and a complete bridge was ordered. The experience gained in the fabrication of these prototype models enabled the company to provide the Ministry of Supply with a complete set of

manufacturing data, jig details and welding procedures, from which they were able to place indents on the many firms participating in the main production.

During the period July, 1941, to August, 1945, over half a million panels were produced, which with their component parts (i.e., stringers, transomes, ramps, etc.) called for nearly five million tons of steel. Of this amount 60 000 panels, requiring 17 500 tons of steel, together with 23 000 tons of components, were manufactured at the company's Newport and West Bromwich works, which were at the same time engaged in the manufacture of armoured fighting vehicles, bridging materials, and other equipment for the many other projects in hand.

During the peak period of their production the company's Newport works maintained a production schedule in excess of 400 panels per week, which together with their concurrent programme of transomes, stringers and other components, required a carefully detailed programme for co-ordinating the large input of rolled steel coming from mills in Great Britain and the U.S.A., and the output from 15 sub-contractors making 42 components for inclusion in these, running into the order of 100 000 units per set.

Finally, as a point of interest it should be mentioned that 9½ million feet of electrodes, weighing 525 tons, were used in the output from Newport works, and in order to keep pace with consumption a stock of half a million feet, weighing 30 tons, had to be continually replenished.

LANDING CRAFT

The Admiralty, early in 1944, placed orders for the L.C.T.8 craft with constructional engineering firms in England, Scotland and Northern Ireland, including Sir William Arrol and Co., Ltd. The majority of these firms received contracts for ships which were mainly riveted, with small parts welded, but one firm in Scotland was requested by the Admiralty to proceed with the preparation of drawings and the fabrication of an all-welded design. It is the all-welded hulls of these ships with which we are here concerned.

The weight of structural steel in one ship was approximately 400 tons, and the shop preparation, assembly and production welding were carried through in 14 days, i.e., 200 hours per week of shop output. There were 38 shop portions per hull, each about 8 tons, excluding deck houses and forward superstructures.

The dimensions of each portion were approximately 6 ft. 6 in. by 14 ft. by 20 ft. The berth assembly and tack welding of 38 shop portions which comprised one complete hull took 10 days, excluding deck house, forecastle, bow and ramp doors.

ELECTRICAL INDUSTRIES IN ITALY

LACK OF FUEL AND MATERIALS INFLUENCING POSITION

IN a recent issue of "Ricerca Scientifica e Ricostruzione," Piero Pittaluga reviews the present position of the Italian electro-technical industries. He points out that most of the important centres of these industries are in northern Italy and thus for the most part escaped serious war damage. At the end of the war, so far as buildings and plant were concerned, it should have been possible to resume at 92 per cent. of the pre-war level, but this was made impossible by serious lack of fuel, rubber, electrical steel and insulating material. Temporary or transitional plans of reconstruction in 1945 were based on the hope that, through the Allied control or otherwise, some of these essentials would somehow be provided. Some, in fact, did arrive, and though limited, permitted a start to be made in 1946.

Following are some notes on the position as it is to-day:—

Electrolytic copper.—Under the transitional plan 25 000 tons—half to the electrical industries—was anticipated, but it is not stated whether any was received. Under the U.N.R.R.A. supply plan 6 000 tons was allocated, of which again half was for the electrical industry; 4 500 tons was received. A third source was through the Italian delegation in Washington, from which 6 000 tons was hoped for but only 1 500 tons was received.

Laminations.—The transitional plan provided for 6 000 tons—two-thirds for generating plant and one-third for transformers—but this was not realised. The three principal Italian manufacturers of magnet iron before the war were (a) Soc. Terni, (b) Magona d'Italia, (c) Acciaierie e Ferriere Lombarde Falck (dynamo iron). Of these, the second has ceased manufacture owing to war damage, but the other two are making strenuous efforts to restore output, which reached about 1 000 tons per month in 1946. Imports are particularly required of the type 0.9 and 1.1 W/kg loss, though efforts are being made to increase output of this grade or lower in Italy.

Nickel-Chrome, Constantan, Manganin, Mumetal, Various Other Alloys.—Small amounts of these have been received, but whether sufficient is not stated.

Tin.—Of 1 700 tons looked for from the U.N.R.R.A. only about 400 tons arrived in May, 1946, of which 75 tons was allocated to the electrical industries. Addi-

tional supplies are expected under the new Belgo-Italian treaty.

Tungsten, Molybdenum, Tantalum, Nickel Wire, Nickel-Manganese.—These metals, mostly required for electric lamps and thermionic valves, have for the most part been received in sufficient amount.

Iron Powder and Permalloy.—The position appears to be the same as that of the nickel-chrome, etc., group.

Mica, Natural and Synthetic Rubber, Gum-lac, Insulating and Silk Paper.—Small amounts of mica in the usual two forms required for electrical purposes have been received, but more is wanted. Some 230 tons of synthetic rubber has been received out of total requirements of at least 1 500 tons for cables, etc. Other necessary materials in this group—lamp-black, various waxes, refined manganese dioxide, acetylene black, synthetic resins, fatty acids, butyl alcohol, phenol, etc.—have been received; but here again more is required.

Colophony (resin).—500-600 tons of this is required annually for cables, insulating materials, and batteries, mostly of the first grade or clear type.

Machines and Transformers.—Production of small and medium sizes (motors 0.25-100 h.p. and transformers up to 1 000 kVA) had at the end of 1946 practically reached pre-war level of output, i.e., 250 000 motors and 8-10 000 transformers, including some for export trade. During 1947 it is expected to increase outputs considerably. Including repairs and new construction it was anticipated that early in 1947 the total manufacturing capacity of generators would be 1.2 MW and of transformers 1 800 000 kVA; but these figures are said to be far below national demand.

The programme of new construction by the State railways includes 75 4-axle locomotives of a new type (2 000 h.p.) and repairs to 200 d.c. locomotives of various types; also a further 50 of the 4-axle type and 50 electric motors for suburban or short distance travel. Provision of tramways and trolley-buses has been somewhat delayed through lack of finance on the part of the supply industry. It is thought that in the field of electric traction generally there is some scope for export to countries whose transport has suffered badly from war damage. Shortage of essential materials is again the difficulty.

Electrical Personalities

We are always glad to receive from readers news of their social and business activities for publication in this page. Paragraphs should be as brief as possible.

MR. ANDREW WATT has been appointed electrical engineer for the L.N.E.R. at Newcastle-on-Tyne.

MR. E. THORNLEY, manager of the Birmingham branch of W. T. Henley's Telegraph Works Co., Ltd., retired on June 30, after 35 years with the company. Mr. F. C. Horsford, who has been appointed branch manager at Birmingham as from July 1, in succession to Mr. Thornley, joined the company in 1911. He was appointed engineering sales representative for the London area in 1922, and engineering sales



MR. F. C. HORSFORD

superintendent in 1942.

DR. EMRYS WILLIAMS, after ten years as lecturer in electrical engineering at King's College, Newcastle-on-Tyne, has been appointed Professor of Electrical Engineering at Bangor University. Dr. Williams, a native of Liverpool, is 37 years of age. He was formerly in the research laboratories of the General Electric Co., Ltd., at Wembley, and was chairman of the North-Eastern Radio and Measurements Group of the I.E.E. for the 1946-47 session.

MR. W. J. McLAUGHLIN has been appointed secretary of the Aluminium Development Association in place of Mr. Davies, who has resigned. Mr. J. D. Beddows, chief metallurgist since June, 1944 has resigned, and Mr. J. C. Bailey has been appointed technical officer to take over most of the duties carried out by Mr. Beddows.

MR. J. P. LEWIS has been appointed by Edgar Allen and Co., Ltd., to an executive post at the Imperial Steel Works, Sheffield. Mr. G. N. Gee has been appointed special technical representative in the southern half of England. Mr. B. B. Green, who succeeded Mr. G. Hallam as the company's representative in South Yorkshire, is, in addition, taking over the work carried on by the late Mr. H. Woodhead, in connection with the sale of crushing machinery, etc., to collieries.

From July 1 Mr. A. G. Griffiths will join Mr. Green as his assistant, and will also be available as a tool steel technical representative in the northern area.

MR. E. S. WADDINGTON, of Philips Industrial (Philips Lamps, Ltd.), has been elected vice-chairman of the resistance welding machine section of the British Electrical and Allied Manufacturers' Association.

MR. W. E. LOVERIDGE has been appointed resident director of Richardson, Westgarth and Co., Ltd., at Hartlepool, in succession to Mr. W. Nithsdale, who has retired.

MR. CHARLES H. ROSNER, managing director of Technical Publications, Ltd., Wellington, New Zealand, who own "The New Zealand Electrical Journal," is expected to visit this country on business at the end of the month. Mr. Rosner has acted as advertising manager for the New Zealand agents of the British Thomson-Houston Co., Ltd., Ransomes and Rapier, Ltd., British Insulated Callender's Cables, Ltd., and other firms.

MR. L. S. HARGREAVES, managing director of Aerialite, Ltd., and Mr. F. G. Hargreaves, works manager and director, will sail for America on the "Queen Elizabeth" on July 25, to consider new production methods and to inspect the latest cable making machinery. In connection with the company's export drive, Mr. L. S. Hargreaves visited Sweden recently to investigate the market possibilities, and similar visits to other countries are planned for the near future.

SIR CLIFFORD PATERSON, F.R.S., director of the research laboratories of the General Electric Co., Ltd., contributed a paper on "The Place of Industrial and Scientific Research in Industrial Management," at the Eighth International Management Congress held at Stockholm from July 3 to 8. Other British delegates included Mr. G. H. Bairstow, works manager, Kolster Brandes, Ltd.; Mr. J. F. Morton Burns, general works manager, Enfield Cables, Ltd., South Wales; Mr. C. C. Campbell, personal assistant to the sales director, G.E.C.; Dr. C. C. Garrard, resident director, G.E.C., Witton; Mr. H. B. Gough, director, Victor X-Ray Co., Ltd.; Dame Caroline Haslett, director, E.A.W.; Mr. W. J. Jennett, research engineer, G.E.C.; Viscountess Leverhulme,

E.A.W.; Mr. F. R. Livock, staff manager, G.E.C.; Mr. G. O. McLean, establishment officer, Edmundsons Electricity Corporation, Ltd.; Mr. L. E. Mather, chairman, Mather and Platt, Ltd.; Mr. J. H. R. Nixon, director, Brush Electrical Engineering Co., Ltd.; Mr. W. Puckey, director and general works manager, Hoover, Ltd.

MR. C. W. SULLY, who was director of the E.L.M.A. from 1922 until early in the war, celebrates his golden wedding on Monday next, July 14. He was last in London in May when he was the guest of the E.L.M.A. Council at their annual luncheon and is at present in Devonshire where he has been living since his retirement in 1940. Our most recent news of him was that he was in the best of health and good spirits. His many friends in the industry will join with us in offering him our warmest congratulations and good wishes on this anniversary.

SIR CLAUDE GIBB, chairman. C. A. Parsons and Co., Ltd., had a degree conferred upon him at the University of Durham Congregation at King's College, Newcastle-on-Tyne.



MR. A. B. SINGER

COUN. R. DARBYSHIRE, electrical contractor, was installed president of Blackpool Rotary Club, on July 3.

MR. A. B. SINGER, after a long association with the Marconi Marine group of companies, has joined Pilot Radio, Ltd., as sales manager. Formerly a retailer and engineer, the work for which he is best known has been in connection with the British Licensing Pool.

MR. T. R. MURPHY has been appointed maintenance engineer at the Blackburn Meadows generating station of Sheffield Corporation. Mr. Murphy received his early training with Messrs. Grayson, Rollo and Clover, Ltd., Liverpool, and afterwards with the Liverpool electricity department at the Clarence Dock station. His present position is that of site resident engineer with International Combustion, Ltd.

MR. A. KELSO, electrical engineer, Harrogate, chairman of the E.D.A., Mid-East Area Committee, on July 3, presided over a luncheon in connection with the

Royal Show at Lincoln, at which members of the E.D.A. Council, and their wives, were the guests of the Committee. Mr. H. J. Randall, past-chairman of the E.D.A. Council, replied to the toast of the association.

MR. H. NIMMO has accepted the invitation of the Executive Council to continue as President of the Association of Supervising Electrical Engineers for a second year. Mr. Nimmo, who succeeded Mr. E. R. Wilkinson in October, 1946, will deliver his second Presidential Address at the opening meeting of the association's London session on October 14, at the E.L.M.A. Lighting Service Bureau.



MR. H. NIMMO

In the course of a wide experience, Mr. Nimmo was the officiating electrical adviser and electrical inspector to the Government of Burma, and electrical engineer to the Burma Public Works Department during 1914-15. After service with the London Electrical Engineers R.E. (T), he was appointed in 1920 permanent electrical engineer Burma P.W.D., and later electrical adviser and electrical inspector to the Government of Burma until 1929, during which period he was allowed by the Burma Government to act as consulting engineer to the Rangoon municipality, Rangoon Port Commissioners, Maymyo Electric Supply Co. (water and steam stations), Maulmein Electric Supply Co. (producer gas station) and Bassein Electric Supply Co. (oil station). Mr. Nimmo joined the Electricity Commission as chief engineering inspector in August, 1929, and became an Electricity Commissioner in July, 1945, a position he still occupies.

Obituary

MR. W. H. TURNER, chairman and managing director of the Yorkshire Switchgear and Engineering Co., Ltd., on July 6, in his 75th year. Mr. Turner's health had declined in later years and culminated in a serious illness over the past few months. He was one of the founders of the company in 1907 and at that time their interests were mainly directed towards electric traction. In that sphere of the industry he will be remembered as the inventor of the automatic point controller which bore his name. Mr. Turner was also a director and founder of the associated company, the Electro Mechanical Manufacturing Co., Ltd.

E.C.A. Annual Meeting

Membership Now 2 239—Work of the Association

THE annual meeting of the E.C.A. was held on July 2, when the President, Mr. Hamlyn Drake, spoke to the following effect.

Comparing the position of the association to-day with that of a year ago, there were three main differences. First, the country was waking from its coma. The second main difference was that last year he endeavoured to avoid politics, and made apologies when they were unavoidably introduced. On this occasion it was impossible to avoid politics because, to an ever increasing extent, State control and interference formed an intimate part of their day-to-day lives, both private and public, and instead of being allowed to get on with the production of goods, time was being spent in form



MR. H. DRAKE

filling, and negotiation with Government officials.

The third main difference which might arise out of one or both of the other two was that the position of the country was infinitely worse than it was.

The past year had seen the first stages of the passing into law of the Electricity Bill. The association had sought to introduce amendments to the Bill in consultation with the Minister of Fuel and Power, by which any retail trading undertaking by the Central Authority and the Area Boards, would be on a commercial basis, so that competition between the Government in its trading activities and private enterprise would at least be on a fair basis. The Minister was sympathetic in his reception of the representations which were made to him, but there was abundant evidence—when the proposed amendments were discussed at the Committee Stage—that certain members representing the majority party in the House of Commons would not agree to accept such amendments. The Minister of Fuel and Power had given public utterance to his desire that there should be co-operation between the newly established Electricity Authorities and the electrical contractors; indeed, he would appear to welcome them as

“agents” on behalf of electrical progress. This was a position they had always occupied, and all the association sought to ensure was that the agents or the unpaid canvassers of the supply industry should at least have some measure of protection in their employment.

The electrical contractor and retailer had a definite role to play in the new scheme. Never before in the history of the association had there been such a degree of unanimity among contractors; never before had the association rendered such service to its membership of over 2 000.

The association had during the past twelve months instituted a new grade of membership—Class III Membership of the National Federated Electrical Association.

Judged by past experience some of the new entrants to the industry would inevitably fall by the way because of lack of business and administrative experience; some, however, would survive, and in due course would take their place as legitimate and even leading members of the industry. The association was anxious to hold out the hand of assistance to such newcomers, and by granting them Class III Membership of the N.F.E.A.—which in effect was probationary membership—would be able to offer guidance and assistance; and in due course when such entrants had achieved a reasonable degree of business stability, they would be welcomed as full members of the association.

The past twelve months had also seen the introduction of the association's Guarantee of Work Scheme, which incidentally resuscitated a proposal which was made some 20 years ago. As from January last the work of every member of the association was automatically guaranteed to the extent of £500. It was felt that the limit of £500 was sufficient for all normal work undertaken for the general public, but should experience prove the limit insufficient, then there was no reason why it should not be increased.

To itemise the service which the association continued to give in the counsels of the industry on technical and other matters would be impossible. It was active in its representation upon the Wiring Rules Committee of the I.E.E., upon the various Committees of the B.S.I. and in a variety of directions where the combined technical experience of the members of the association was of assistance in the industry's

progress. Its Technical Committee continued to operate and to provide a focal point for the association's representatives on all outside technical bodies. As in the past the association continued to be a member of the Federation of Associations of Specialists and Sub-Contractors and provided representation on various bodies associated with that organisation.

The N.E.C.T.A. continued to play its proper role in the trading structure of the industry and in negotiations with individual groups of manufacturers. Negotiations between the N.E.C.T.A. and the E.L.M.A., the N.E.C.T.A. and the C.M.A., and various groups of specialised manufacturers who are concerned with products of everyday interest to the members of the association were satisfactory. Negotiations ensued during the past year between the association and the Electric Fittings Manufacturers. It was disappointing that these particular negotiations had not yet reached finality, but there was reason to believe that something would emerge which would still further cement a co-operative spirit between manufacturers and contractors and retailers.

The past twelve months had seen the introduction and operation of the W.B.A. system of licensing electrical and other merchandise. The appropriate Ministry was, Mr. Drake understood, at long last reviewing the whole question and seeking, in consultation with the interests concerned, some better means. The restriction in carrying out work without a licence was still retained; the freedom which operated during the whole period of the war, by which £100 could be spent on any premises was, as would be recalled, reduced to £10 some two years ago. Despite the fact that the amount of £10 to-day possessed a comparable purchasing capacity of somewhere about £6, representations to the Minister had not produced any alteration in the amount.

In respect of labour negotiations, in spite of all efforts last year to find a basis upon which wages negotiations with the E.T.U. could be continued, failure to agree had to be recorded, with the result that from the third pay day in January, 1947, until quite recently, there was no wages agreement in the electrical contracting industry. As a result of negotiations a new agreement came into operation by which, with minor adjustment, the life of the old agreement had been continued, pending investigations as to whether it was possible to establish a new wages structure. By its terms of reference a special committee of the National Joint Industrial Council had to consider the practicability of introducing into the electrical contracting industry a system by which wages could be related to produc-

tion. Never before had the E.T.U. been willing even to consider "payment by results" and until now the N.F.E.A. had shared the generally accepted principle that in electrical installation work payment by results could easily produce scamped, and consequently dangerous work.

During the year the N.F.E.A. had explored with the E.T.U. the possibility of introducing into the industry a system of grading operatives. So far, however, the E.T.U. had been unwilling to accept any such differentiation between the members of their organisation.

In handing over the presidency to Mr. Norman Aish, Mr. Drake pointed out that his successor had been a member of the Council for many years, and had twice served as vice-president.

Electrical Statistics

THE monthly Digest of Statistics for June, published on Monday by the Central Statistical Office (H.M.S.O., 2s. 6d. net), shows that the weekly average consumption of coal by authorised electricity undertakings was 449 000 tons during the five weeks of May and 503 000 in April, as compared with 583 000 tons in March. The figures for the same months last year were 474 000, 444 000 and 566 000 tons, respectively. This reduction in weekly consumption was accompanied by a steady increase in distributed coal stocks at electricity undertakings, which stood at 2 485 000 tons in May, compared with 2 006 000 tons in April, and 1 728 000 tons in March. The equivalent figures for 1946 were: May, 1 208 000; April, 1 170 000; March, 1 176 000 tons.

The table relating to generating plant shows that in February and March deliveries of hydraulic turbines, which were entirely for export, amounted to 11.5 thousand B.H.P. and 16.7 thousand B.H.P., respectively. Steam turbo-alternators of over 10 000 kW capacity totalling 55 000 kW and 146 500 kW were delivered during the same months, of which 25 000 kW and 74 000 kW, respectively, were for export.

Electric cooker production rose from 15 200 in March to 18 100 in April and 18 500 in May. Electric wash-boilers, on the other hand, decreased in numbers from 19 900 in March to 16 200 in April to 13 100 in May. Immersion heaters, similarly, fell from 41 100 to 26 300 and 26 400 during the same three months, while electric meters showed in both months an increase over March production, the output figures being: March, 116 100; April, 139 600; May, 128 700.

Electricity Supply

Scarborough.—The assisted wiring scheme is to be re-introduced as far as labour and materials will allow.

Blackpool.—A trial borehole is to be sunk on a possible power station site east of Blackpool and north of Preston.

N. Ireland.—The Parliament of Northern Ireland has approved the recent White Paper on "Electricity in Northern Ireland," reviewed in our issue of June 20.

Ipswich.—Plans for the £10 000 000 power station on the River Orwell at Piper's Vale have been submitted to the Royal Fine Art Commission for approval.

Birkenhead.—Consent to the borrowing of £1 250 000 for the final extension to the power station has been granted by the Electricity Commissioners.

Nottingham.—Extensions to the generating plant at North Wilford power station, estimated to cost £1 708 145, are recommended by the Corporation.

Stoke-on-Trent.—Development of the undertaking to meet anticipated requirements during the next three years is estimated to cost £455 000.

Accrington.—Orders have been placed with the General Electric Co., Ltd., and Simon Carves and Co., Ltd., for the turbo-alternators, boilers and associated equipment required for the Huncoat station.

Belfast.—The City Electrical Engineer (Mr. W. J. McGirvan) opens his report for the year ending March 31, 1947, with recommendations for concessions to consumers, in the way of tariff adjustments, which would amount to £22 750. The revenue from sales of electricity and hire of appliances, etc., during the year, after deducting discounts and bad debts, amounted to £1 573 763, giving, after deducting working costs, a gross profit of £373 947. The net surplus on the year's working was £110 943, an increase of £20 362 over the previous year. Working costs increased by £25 673, against which capital charges and sundry expenditure decreased by £62 391. The total number of units sold was 402 782 818, an increase of 28 553 791, or 7.63 per cent. The largest single increase in sales, 19.88 per cent., was registered in domestic supplies; sales both to shipyards and transport undertakings, however, decreased. Of the total units sold in bulk, 35 166 186 were sold to the Ministry of Commerce and 123 171 810 to the Electricity Board for Northern Ireland. The number of

consumers connected to the supply network at March 31, 1947, was 96 936, an increase of 4 702 on the previous year. Power generated at the Harbour power



A main street in the Burgh of Cupar, Fifeshire, in which Metrovick "Poplar" lanterns and 140 W sodium discharge lamps have recently been installed. The Metropolitan-Vickers Electrical Co., Ltd., have carried out an extensive modernisation of the street-lighting in the town, using discharge lamps on the main thoroughfares and tungsten lighting elsewhere

station, totalling 253 445 880 units, showed a decrease of 10.3 per cent., but purchases from the Government station at Ballylumford, amounting to 208 428 400 units, increased by 44 per cent. Contracts have been placed for a 30 MW turbo-alternator, boiler plant and the necessary switchgear. These extensions are expected to be in service by the spring of 1949.

North Wales.—The North Wales Power Co., in conjunction with its associated company, Electricity Distribution of North Wales and District, Ltd., have made reductions of 1d. a unit in lighting and other tariffs. Corresponding reductions will be made to prepayment charges.

Shoreditch Jubilee Celebrations

Civic Dinner and Historical Exhibition

THE Shoreditch electricity undertaking celebrated its golden jubilee on Tuesday evening, July 8, by a civic dinner in the Town Hall. The Minister of Fuel and Power, Mr. Emanuel Shinwell, was chief guest, and among a number of personalities well known in the electrical world who were present were Mr. V. Z. de Ferranti (president, I.E.E.), Sir John Dalton (County of London E.S. Co.), Mr. H. J. Randall (City of London E.S. Co.), Mr. C. C. Morley-New (Electricity Commission), Mr. V. W. Dale (E.D.A.), Mr. J. N. Waite (C.E.B.), and Mr. Henry Goodrich, M.P. (London and Home Counties J.E.A.). Two past chief engineers of the undertaking, Mr. W. Weekes and Mr. P. C. Ebner, also attended.

The Mayor (Ald. W. H. Girling) proposed "The Visitors," and recalled that the original station in Coronet Street, Shoreditch, opened 50 years before by Lord Kelvin, had been the first in which the dust destructor and the generating plant were combined.

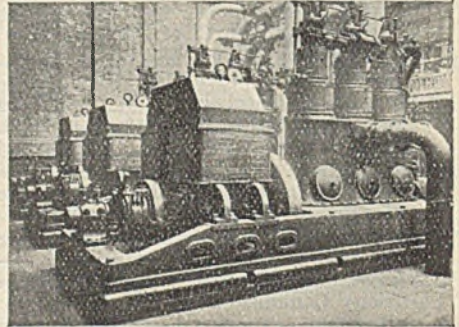
"The Shoreditch electricity undertaking" was proposed by Mr. Shinwell, who said, in the course of his speech, that he had been born a few hundred yards from the Town Hall. Of nationalisation, he claimed that the eventual public ownership of electricity supply had been envisaged as far back as the Act of 1882.

In electricity supply, Mr. Shinwell went on, much progress had been made, but there was much more still to be promoted. We had not yet equalled the standards of some other countries. Particularly at a time when shortage of manpower was a grave problem, the extension of supply was a matter of the utmost importance. The Government wished ultimately to provide electricity for every person in the country who desired it. That could not be achieved, however, without co-ordination, and the Bill to bring that about was now before the House of Lords. Meanwhile, the coal situation was gradually being improved.

Councillor W. Hebden (chairman, Electricity Committee) responded. After reviewing some of the early activities of the undertaking, he said that he hoped the Minister, under nationalisation, would give engineers as much scope as possible. Mr. Shinwell had now got a fine team of men behind him, and if he allowed them to exercise their own initiative as much as possible, he would not regret it.

The toast of "The staff of the electricity department" was proposed by Ald. J.

Abrahams (chairman, General Purposes Committee), who said that the present prosperity of the undertaking was entirely due to the efficiency of the staff. In an



The Willans and Robinson triple expansion engines with 1 100 V Electric Construction Co. d.c. generators, originally installed at Coronet Street, Shoreditch, in 1897

amusing reference to what he called "the good old days," he recalled a time, at the founding of the undertaking, when the chief engineer had earned only £250 a year and the meter reader 15s. per week.

The Borough Electrical Engineer and Manager (Mr. R. H. Rawll) replied. After paying a tribute to the late Dr. S. Z. de Ferranti, who, he said, had been so well known in the London electrical world, he claimed that the greatest characteristic of the men in the industry was their self-reliance. All those working in it were friends, no matter from which undertaking they came, and thanks to the efficient working of the four Whitley councils, there had been no major industrial quarrels. In short, he said, the industry was what the Royal Navy would describe as a "happy ship."

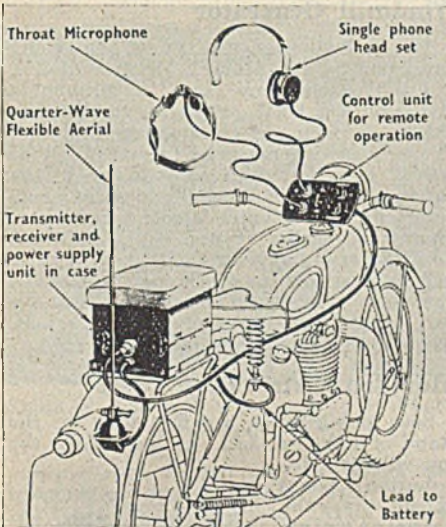
During the evening, a presentation was made to the Mayor by Mr. W. Weekes (chief engineer, 1925-1937), as a token of his long association with the undertaking. A public exhibition of old and new electrical products, in the Town Hall, will close to-morrow at 7 p.m. To-night, a social evening for all employees of the undertaking and their ladies is being held.

The Shoreditch station at Whirton Street, which has a total plant capacity of 24 500 kW and is classified as a selected station, has at present 18 394 consumers. Considerable change-over works to a.c. supplies are now in progress.

Equipment and Appliances

Mobile V.H.F. Radio Telephone

Communication between scattered parts of large farms, traffic control, passing instructions between signalmen and loco-



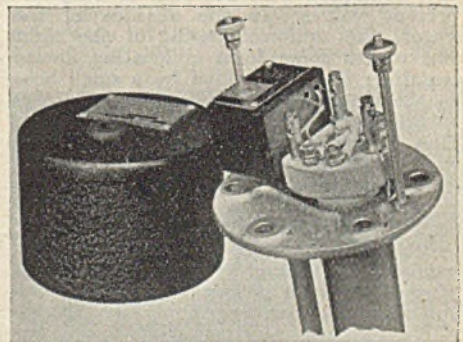
An artist's impression of the Plessey mobile v.h.f. "transceiver," mounted on a motor-cycle

motive crews and the direction of breakdown gangs are among various uses to which, it is suggested, a new mobile v.h.f. radio-telephone transmitter-receiver, developed by the Plessey Co., Ltd., may be put. The equipment incorporates in one case transmitter, receiver, power supply and send-receive switching units, measures only 8 in. high by 7½ in. wide by 9½ in. deep and weighs 16½ lbs. Some idea of its compactness can be gathered from the impression, above, of the complete equipment installed on a standard motor-cycle. The set will operate from a normal 12 V heavy duty battery and takes 5 A on "receive" and 10 A on "send." Servicing is facilitated by the form of unit construction adopted, the separate units each being on an individual chassis, attached to each other by half-hinges. Connections between transmitter, receiver and power supply are by flexible cables with plugs and sockets. Provision can be made for either f.m. or a.m. working by the interchange of detachable units. The aerial is the quarter-wave flexible type. The transmitter can be designed to operate on any limited frequency band in the

v.h.f. channel, and operating frequencies of transmitter and receiver need not be the same. The r.f. power output is 6 W at 50 Mc/s and 3 W at 160 Mc/s. The receiver is crystal-controlled and the circuit comprises an r.f. amplifier, grid mixer and a three-stage i.f. amplifier, followed by a diode second detector and noise limiter (for a.m.) and by a limiter and discriminator (for f.m.). Miniature valves are employed. The transmitter comprises a cathode coupled oscillator, the anode circuit being tuned to the third harmonic, followed by a trebler and two valves in a parallel push-pull doubler circuit. A common a.f. amplifier is used both for sending and receiving.

Thermostatic Immersion Heater

An immersion heater with self-contained thermostat is one of the latest products of Brightglow, Ltd., of Pinner, Middlesex. The heater has been designed for easy fixing, and both element and thermostat can be removed from the tank without disturbing the fixture or draining off the hot water system. A drilling template is supplied with each model. The sizes available are 2 kW, 3 kW or 3½ kW, for 230-250 V a.c. only. The heater will fit, state the makers, into the smallest copper cylindrical tank, as well as the usual galvanised hot water storage tanks. The terminals are contained inside a removable Bakelite casing, with the thermostatic control



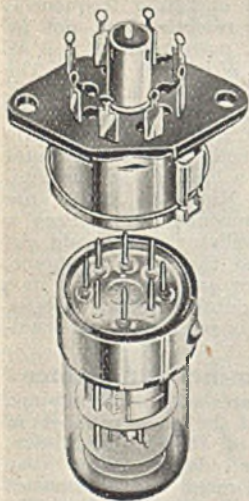
In this view of the new Brightglow immersion heater, the casing has been removed from the head, revealing the terminals and self-contained thermostatic control unit

mounted alongside. An aperture in the casing permits temperature adjustment.

Spigotless All-Glass Valves

A new range of a.c./d.c. receiving valves fitted with spigotless bases, to

be released later in the year, was announced recently by the Mullard Wireless Service Co., Ltd. The new valves are



A Mullard spigotless B8A valve with typical socket

development of the Mullard all-glass valves (such as the war-time E.F.50) which were designed to overcome the disadvantages of large capacitances between the electrode connections. In the new design, a flat glass disc, into which are fused metal rods serving both as contact pins and electrode supports, replaces the glass pinch and plastic base. As a result, insulation between pins is much higher than in conventional constructions, and internal capacitances and inductances are greatly reduced. The result is improved performance on short and very short waves. The new valves are also greatly reduced in size, and have the additional advantage of heaters rated at only 100 mA, compared with 200 mA used by the present valves. In the absence of the spigot, the uniform spacing of the eight pins makes some form of locating device essential: this is provided by a small boss on the metal rim of the valve, which fits into a corresponding groove in the socket. This is spring-loaded, so that when the valve is pressed home it is effectively secured. A new low temperature sealing process, employing a special cement, is used in manufacture. Among the types which will be available are a single-diode-pentode, a triode-hexode, an output pentode with an output of 4.2 W and a half-wave rectifier.

Compact Radio Receiver

The requirement of quality performance in a set of small dimensions is met, it is claimed, in a new G.E.C. three-waveband a.c./d.c. superhet. It has a black and ivory plastic cabinet and the "thermometer type" tuning scale. An easily extended aerial is provided. Delayed a.v.c. and a speaker acoustically matched to the cabinet are other features of the design.

With four valves, plus half-wave rectifier and a barretter, the receiver works on total mains voltage, and employs no dropping cord. The wavebands covered are 16.5 to 50 metres, 192 to 550 metres, and 1 000 to 2 000 metres, and the set will operate on 200-250 V mains. An export model has one medium and two short wavebands.

Windmill Generator

A windmill generating set is being developed by the Scottish Electromill Co., Ltd. The company had experimented earlier with a 1 kW set and several installations were made throughout Scotland. The new model, designed to give 4 kW at 110 V, is expected to be available in the autumn. It will include developments designed to eliminate defects which were found in earlier types and, although designed essentially for the export market, will be available for the home trade. The new generators should be especially suitable for isolated and exposed sites overseas, where there is a strong prevailing wind.

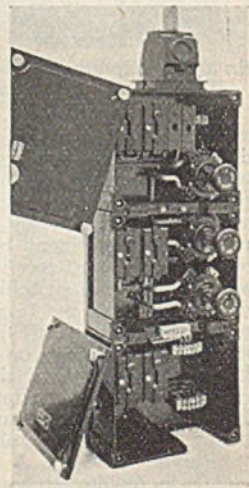
Moulded Distribution Cases

Seen publicly for the first time on the stand of Bakelite, Ltd., at the B.I.F., the

low-voltage distribution boxes shown in the accompanying illustration are an interesting example of moulding technique.

The equipment, which was designed and manufactured by J. G. Statter and Co., Ltd., is made so that the standard cases interlock to form a rigid structure when completely assembled. Known as the "Metric" extensible service

termination, it is fitted with "pull off, push on" type switches and can be arranged in any formation to suit the shape of the space available. Not only the cases, but fuse carriers and fittings generally are produced as mouldings, the plastics material used being Bakelite X20/5.

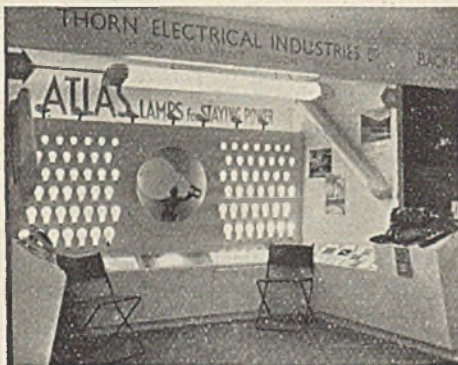


An assembly of distribution cases, made throughout with Bakelite mouldings

Industrial Information

Novel Display of Lamps

The central feature of the stand of Thorn Electrical Industries, Ltd., at the I.M.E.A., Exhibition, Bournemouth, was a novel display of Atlas pearl lamps of



Stand of Thorn Electrical Industries Ltd., at the I.M.E.A. Exhibition

varying sizes fretted into a panel and illuminated from behind with multi-coloured fluorescent tubes. Atlas fluorescent lighting fittings and ballast gear, including the new range of 30 W fluorescent fittings for domestic use were shown.

New Branch at Workington

Downes and Davies, Ltd., have opened a branch at Oxford Buildings, Oxford Street, Workington, from which they will serve the West Cumberland Development Area. The company's clients in the rest of the Lake Counties Area, Durham, Northumberland and the South of Scotland will, as before, be served from the branch at Paternoster Row, Carlisle.

South Midlands Students' Section

Arrangements have been made on behalf of the I.E.E. South Midlands Students' Section for a party of 30 to attend a matinee performance of "Twelfth Night" at the Shakespeare Memorial Theatre, Stratford-on-Avon, on Saturday, July 19. The afternoon will conclude with a meal in the theatre restaurant. Applications for tickets should be made to Mr. R. E. Crick, 5, The Drive, Erdington, Birmingham.

Leicester Electrical Society

Founded only two months ago, the Leicester Electrical Society has already 108 members. Anyone connected with the electrical industry in Leicester, Leicester-

shire and Rutland is eligible for membership, and the purpose of the society is "to encourage goodwill, comradeship and technical discussions." A programme of technical lectures and social functions is being arranged for the 1947-48 session, commencing in September. The hon. secretary is Mr. R. Burton, 37, Tennis Court Drive, Leicester.

Success of Floating Exhibition

The South American Saint Line, Ltd., can claim much of the credit for the fillip given to British export trade in South America, by the recent successful tour of the first post-war "Floating Exhibition," on their cargo liner, the m.v. "St. Merriel." More than twenty thousand visitors have seen the exhibition during its visits to South American ports and orders valued at nearly £1 000 000 have been taken. Among products exhibited, for which the largest number of orders was taken, were, British Oil Engines (Export), Ltd.'s Diesel and vapourising oil engines, the Brush Electrical Engineering Co.'s battery electric "Pony" truck, and J. H. Carruther's reciprocating pumps.

I.M.E.A. and Sieflash Tubes

We reproduce on this page a photograph of Lord Citrine, together with Mr. V. W. Dale, general manager and secretary of E.D.A., on the stand of Siemens Electric Lamps and Supplies, Ltd., at the I.M.E.A. Exhibition. Particular interest was shown in two cable exhibits, one a sample of an old cable laid in the Strand in 1889 and recovered in June,



Reproduction of a photograph of LORD CITRINE and MR. V. W. DALE of the E.D.A., taken with equipment incorporating the Sieflash tube

1925, after 36 years' continuous service, and the other, a sample of the company's most modern submarine 33 kV cable, 3 miles of which will shortly be laid in a single length to the Isle of Wight by Siemens Brothers and Co., Ltd. The photograph is of special interest in that it was taken by the increasingly popular flash tube technique, the apparatus used incorporating a "Sief flash" tube.

Cheerful Rationing

Among the recipes on this month's "Cheerful Rationing" card, issued by the E.A.W., 35, Grosvenor Place, London, are several for summer dishes and drinks that have been tested in the E.A.W. Housecraft School. They include rhubarb mould, gooseberry fool, vanilla blancmange and ice cream, iced coffee and barley water.

Efficiencies of Fluorescent Tubes

The new high efficiency fluorescent powders, which were discovered and developed at the G.E.C. Research Laboratories, Wembley, for use in 4 ft. and 5 ft. fluorescent lamps, are being used now in Osram high tension fluorescent tubes. As in the case of the 4 ft. and 5 ft. lamps, the efficiencies of the h.t. tubes have been increased, as follows:

	Initial Efficiency (after 100 hours)	Average Efficiency Throughout life	Final Efficiency
New ...	40 L/W	31 L/W	26 L/W
Old ...	31 L/W	24 L/W	22 L/W

In addition, the average life figure has, it is claimed, been increased by approximately 67 per cent. These figures apply to daylight, intermediate and warm white colours. The new powders, which were first incorporated in 4 ft. and 5 ft. daylight fluorescent lamps, are now being used for warm white lamps, so bringing the efficiencies to the same level.

E.R.A. Exhibit at Royal Show

For the first time, the Electrical Research Association, which has been carrying out much valuable research in electrical methods in agriculture and horticulture during the last few years, staged an exhibit in the E.D.A. pavilion at the Royal Agricultural Show, Lincoln, to indicate something of what is being done in this direction. There were many photographs and diagrams illustrating the investigations which are in progress. These cover a wide range of subjects, including particularly the drying of hay, grain, hops, seeds and other crops, dairy sterilisation, barn and field machinery soil warm-

ing, soil sterilising, and pest destruction. The possibilities of generating electricity by wind power are also being studied. There were some fascinating models illustrative of the new methods used in the experimental work which is at present being undertaken, together with a selection of the specialised instruments used in the researches. These indicated very clearly the thoroughness with which the E.R.A. carries out its investigations. Copies of an illustrated brochure entitled "Research in Rural Electrification," giving a general account of the background of E.R.A. work, were available at the stand.

Annual Holidays

The works of the Jackson Electric Stove Co., Ltd., at Clifton Road, Luton, will be closed from July 19 to 26 inclusive for annual holidays.

Certification of Electricity Meters

The Electricity Commissioners announce with respect to the partial resumption of meter certification, that from reports received from meter examiners they are satisfied that Regulation 60 CIB can now be revoked, and steps are accordingly being taken to secure the repeal of the regulation with effect as from October 1 next. After the revocation of the regulation it will be obligatory for all meters installed, otherwise than by special agreement, to be certified, and ordinary consumers will have a right to require a certified meter. Undertakers who have not yet replaced uncertified meters installed since August 1, 1943, or are not yet in a position to recommence certification, should take the necessary steps forthwith and should consult the meter examiners in regard to any difficulties. When normal certification procedure is resumed it is anticipated that meter examiners will deal with all certification requirements during the periodical visits to undertakings, but the Commissioners will be prepared to continue



The exhibit of the E.R.A. at the Royal Show, Lincoln

for the time being postal certification in cases of exceptional urgency. Certification of meters at manufacturers' own testing stations will continue to be permissible for the time being.

With regard to the testing of meters and apparatus, the Commissioners have reviewed the relaxations permitted by them during the war, and have decided that the normal testing of apparatus and the approved methods of testing meters should now be resumed.

The relaxations referred to in part (B) of the Commissioners' letter of July 1, 1940, and part (D) of their letter of April 5, 1946, are now withdrawn subject to certain exceptions.

Consulting Engineers

We have received a copy of the report of the Committee of the Association of Consulting Engineers for the year ended April 30.

Flame-Proof Lighting Fittings

The B.S.S. for Flame-Proof Electric Lighting Fittings (Bulkhead and Well Type) (B.S. 889) was first issued in 1940. In the 1947 revision an appendix prescribes dimensions for six sizes of well glasses, recommended as standard in order to facilitate manufacture and effect economies in production. The dangerous atmospheres covered are: Methane; petroleum vapour and acetone vapour; town gas or coke-oven gas with not more than 60 per cent. hydrogen content. Copies can be obtained from the B.S.I., 24, Victoria Street, London, S.W.1, price 3s., post free.

"Lighting Service"

The summer number of "Lighting Service," the house journal of the E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, London, W.C.2, contains an article in which is given a brief analysis of the results of lighting tests carried out in the rayon weaving industry by Mr. J. W. Howell, the Bureau's area engineer in Leeds. Readers who would like to receive complimentary copies of the journal should send their names and addresses to the Bureau for inclusion in the mailing list.

Organisation for Standardisation

The first meeting of the Council of the International Organisation for Standardisation since the ratification of its constitution (which was drafted in London last October at a meeting of 28 nations) was held in Zurich from June 17 to 20. The Council consists of the National Standards bodies of Australia, Belgium, Brazil, China, France, India, Norway, Switzerland, United Kingdom, U.S.A., U.S.S.R. The Council appointed M. Henri St. Leger to be general secretary, and his office will

be in Geneva. The meetings were presided over by Mr. Howard Coonley, of the U.S.A., who was elected President of I.S.O. in London last October. The International Electrotechnical Commission also held a meeting of its Council under the chairmanship of its President, M. Emile Uytbroeck, of Belgium. As a result of the joint meeting between the I.E.C., and the I.S.O., it was agreed to recommend to the constituent members of the I.E.C. that the I.E.C. should affiliate with the I.S.O.

Twenty-first Anniversary Celebrated

The staff of Hilmor, Ltd., together with many friends, gathered at Frascati's Restaurant recently for a dinner and dance to celebrate the 21st birthday of the firm. The company's chairman, Mr. Siltzer, presided, supported by Mr. J. H. Hawes, managing director, and Mr. Hampson, director. In the course of the speeches it was mentioned that the firm was founded as a result of Mr. J. H. Hawes' service in the Royal Naval Air Service during the 1914-18 war, when he was impressed by the great difficulties experienced by mechanics in the bending of light gauge tube. From this experience he developed the Hilmor tube bending machine. The name "Hilmor" was derived from his wife's maiden name, Hilda Moore. During the late war the company produced special machines for the Services and millions of actual bends. One of their buildings was destroyed by enemy action. With the return of normal business the board have pushed ahead with the reconstruction of their factories and have taken over full control of the East London Engineering Works at Leytonstone for the manufacture of tube-bending machinery.

Supply for Central Line Extension

The supply for energising the western extension of the Central Line from North Acton to Ruislip will be provided by the Metropolitan Electric Supply Co., and will be received as three-phase current at 22 000 V, 50 cycles. Supply will be accepted at a switch house located at Old Oak Common, from whence it will be transmitted by means of 22 000 V cables to various sub-stations, for conversion to d.c. at 630 V; it will then be distributed to the conductor rails. Five sub-stations will ultimately be in service, and the 22 000 V cables are arranged to form two loops, one to feed three sub-stations at Old Oak Common, Greenford, and Ruislip, respectively, and the other to feed two further sub-stations located intermediately at Brentham and Northolt. Each sub-station is equipped with 22 000 V switchgear for controlling the incoming supply and for its distribution, and each circuit includes an automatic circuit breaker. The converting plant in each sub-station consists

of two separate units, each comprising a step-down transformer, together with a mercury arc rectifier. The transformers are of the oil-insulated, natural cooling type, and produce a six-phase supply on their low voltage side. The rectifiers are of the steel tank, water-cooled variety, and are each equipped with vacuum pumps and high speed d.c. circuit breakers. Each unit has a continuous capacity of 1500 kW. In addition, each sub-station is equipped with d.c. switchgear for controlling the supply to each section of the conductor rails and also with transformers for supplying the lighting circuits and escalators at passenger stations. Equipment is also provided for the operation of signalling apparatus; this includes an air compressor and two frequency-changing motor-generators to produce single-phase, a.c. at 600 V and 33½ cycles. The whole of the apparatus in each of the five sub-stations is controlled from a single switchboard, located at Old Oak Common, and all other sub-stations will be unattended, except for a routine daily inspection. The main electrical contractors were W. T. Glover and Co., Ltd., cables; switchgear and rectifiers, B.T.H. Co., Ltd.; frequency changers for signalling system, the Metropolitan Vickers Electrical Co., Ltd.; Alley and McLellan, Ltd., air compressors.

Battery-Electric Travelling Shop

Brush Coachwork, Ltd., of Loughborough, supplied the chassis for the travelling shop illustrated, specially fitted for the sale of greengrocery and fish, to the order of Batley Co-operative Society, Ltd., Yorks. The special body is mounted on a 25/30 cwt. model of their "Brush-Bred" battery-electric four-wheeled van.



Brush-Bred 25/30 cwt. battery electric travelling shop

The van, which has a range of 40 miles on one charge, is being used for street sales in neighbouring small villages, a role for which this class of vehicle is ideally suited. It is fitted on one side with a shop front

suitable for the display of fruit and vegetables and on the other it has a fish counter. On each side there is a roller shutter for locking up when travelling or garaging and a roller blind protects the displayed goods and the customers from rain or sun.

"Industrial Wales" Exhibition

Among those who will have stands at All-Wales and Monmouthshire Exhibition, "Industrial Wales," to be held at Olympia from August 28 to September 13, are the following:—

Aberdare Cables, Ltd. (insulated power cables); Guest, Keen and Nettlefolds (wire rods, etc.); Elco Clocks and Watches, Ltd.



The G.E.C. stand at the Royal Show

(electric synchronous clocks); South Wales Switchgear, Ltd. (electrical switchgear of all types); Modern Electric Power Products (British Electric Meters), (electric meters, clocks and domestic appliances); Dowling Co. (Electrical Manufacturers), Ltd. (electric fires, irons, etc.); Thorn Electrical Industries, Ltd. (electric light fittings and domestic electrical appliances); Santon, Ltd. (electric water heaters, rotary switches); British Arc-Welding Co., Ltd. (electrical welding).

Trade Publications Received

A leaflet from Runbaken Electrical Products, 71-73b, Oxford Road, Manchester, describing their "Oilcoil"—an oil-insulated ignition coil for motor vehicles.

An illustrated booklet published by Channel Conduits, Ltd., 156, Great Portland Street, London, W.1, describing their new channel conduit system for electrical installations.

An attractive souvenir booklet of the Royal tour of the Union of South Africa, published privately by the Chloride Electrical Storage Co., Ltd., Grosvenor Gardens House, London, S.W.1, and the Chloride Electrical Storage Co., South Africa (Pty.), Ltd., 1301-4, Escom House, Rissik Street, Johannesburg.

Contracts Open

WE give below the latest information regarding contracts for which tenders are invited. In the case of overseas contracts, particulars are to be had from the Board of Trade, Millbank, London, S.W.1 (corner Horseferry Road), unless otherwise stated:—

Cumberland, July 14.—Electrical installation at Aspatria Council school and schoolhouse. Names to County Architect, 4, Alfred Street, North, Carlisle.

Burnley, July 14.—Supply and delivery of e.h.t. cable. Specification from Borough Electrical Engineer, 43, Grimsshaw Street, Burnley.

Darlington, July 16.—Supply of (a) over-ground feeder pillars; (b) underground disconnecting boxes. Specifications from Borough Electrical Engineer, Haughton Road, Darlington.

Dundee, July 21.—Supply, delivery and erection of automatic CO₂ fire extinguishing equipment for 33 kV sub-station at Clepington. Specification from Town Clerk, City Chambers, Dundee.

Hornsey, July 28.—Provision of all labour and materials for electrical installation in 116 flats at North Hill, Highgate. Specification from Chief Electrical Engineer and Manager, Electricity Showrooms, Crouch End, N.8.

Accrington, July 31.—Tenders invited for purchase of: 2 000 kW B.T.H. Curtis turbo-alternator, three-phase, 50 cycles, 6.6 kV, 3 000 r.p.m., with Cole-Marchant condensing plant. Further particulars from Borough Electrical Engineer, Corporation Electricity Works, Hyndburn Road, Accrington.

Newport, July 31.—Manufacture, supply and installation of 3 kV main and pilot cables, by companies fully experienced in laying of submarine cables. Specifications from Electrical Engineer and Manager, Electric House, Dock Street, Newport, Mon.; deposit, £1 ls.

Halifax, August 18.—Manufacture, delivery, laying and jointing of 33 kV underground cables and manufacture, delivery and erection of 33 kV metal-clad switchgear and control panels, etc. Specifications from Borough Electrical Engineer and Manager, 19/23, Northgate, Halifax; deposit, £1 ls.

Reigate, August 22.—Supply of (a) six units, each comprising three oil-immersed, 11 kV, 300 A switches and six eight-way isolator and fuse units; (b) six 500 kVA, three-phase, 50 cycles, oil-immersed transformers. Specifications from Engineer and Manager, Electric House, Linkfield Corner, Redhill, Surrey.

In Parliament

Royal Ordnance Factories.—The Minister of Supply stated that it was the present intention of the Government that Royal Ordnance Factories should continue indefinitely to manufacture civilian goods.

Bankside Power Station.—In the course of a recent answer, the Minister of Fuel and Power stated that the first part of the new station would not be ready for some three years, and it was too early to say definitely what type of fuel oil would be used. The plant, however, was being designed to be capable of burning low-grade fuels which had not so far been used at any other generating station in this country. Mr. Shinwell was also asked whether he would arrange for the station to be converted to a thermal-electric station for the supply of hot water as well as electricity to the adjoining area to be redeveloped. The Minister answered that the purpose of the station was to provide additional electricity in the London area

at the earliest possible date. The owners of the station, however, had given an undertaking to give full consideration to the question of district heating when the local authorities concerned were in a position to state their heat requirements. The provision of an external heating system, he said, would affect the design of the plant, but would not reduce the size of the station.

Street Lighting.—The Minister of Transport stated that in the interests of safety and the prevention of crime it was desirable that, from August 10, the end of double-summer-time, the present restrictions on street lighting should be somewhat relaxed. He would not consider postponing the resumption of street lighting until October 10. Local authorities have been informed by the Ministry, it is understood, that from the date of resumption, street lighting will be permitted up to a consumption of 50 per cent. of pre-war usage.

Company News

GREAT NORTHERN TELEGRAPH CO'S. HOLDING CO., LTD.—Total div. for 19th financial year ending June 30, 1947, will be 13%, or Kr. 7.02 per share of Kr. 54. Carry-fwd. Kr. 2 415.99.

SWAN HUNTER AND WIGHAM RICHARDSON, LTD.—The company is maintaining the interim dividend on the £1 711 064 ordinary at 4% for 1947. Warrants for the dividend will be posted on August 30. The final dividend for 1946 of 8% was accompanied by a bonus of 4%, making 16%, less tax.

CABLE AND WIRELESS (HOLDING), LTD.—Rev. 1946 £1 412 266 (£2 145 362). To exes. £60 593 (£56 736), dirs.' fees, £12 810 (£14 221). Funded stk. service £11 866 (£289 567), inc.-tax £67 356 (£232 873), lvg. prft. £1 259 641 (£1 551 965). Ord. div. 4% (4% and spec. 5%), fwd. £386 678 (£324 523).

HERBERT TERRY AND SONS, LTD.—Full rpt. 1946 shows blee. for year, after taxn., etc., £89 381 (£70 478), plus other income £6 215 (£9 988), mkg. £95 596 (£80 466). To deprecn. £8 648 (£8 288), pensions £4 278 (£5 060), dirs.' fees £250 (£150), lvg. net prft. £82 419 (£66 968). Fin. ord. div. 1s. per sh., mkg. 1s. 6d., or 30%, per 5s. sh. (35%, inclgd. bonus 5%), to equaln. of divs. acct. £10 000 (£5 000), contngs. res. £10 000 (£30 000), gen. res. £30 000 (nil), fwd. £27 807 (£26 051).

ULTRA ELECTRIC (HOLDINGS) LTD.—A proposed increase of £15 000 in the capital, to be considered at an extra-ordinary meeting on July 16, will prepare the way for a further issue of capital. There is still £18 750 of the present authorised capital unissued, and the chairman, Mr. E. E. Rosen, has stated that particulars of the proposed issue will be sent to shareholders shortly. The present issued capital of £281 250 is in 5s. ordinary stock units.

BROADCAST RELAY SERVICE, LTD.—Group trdg. prfts. to Mar. 31, £450 848 (£387 913). Deduct. deprecn. £22 949 (£18 335), replacements and contng. £127 000 (£77 000), taxn. £150 455 (£194 155), dirs.' fees £2 137 (£1 787), bank and deb. int. £12 691 (£3 648), minority interests in sub. cos. £1 256 (£4 510), lvg. net blee. £134 360 (£88 478), plus distributions by sub. cos. from prev. undivided prfts. £5 380 (£3 123 retained) mkg. £139 740 (£85 355). Brot. in £42 261 (£37 716). Pref. div. from date of issue £6 187, intm. 5% net (3½%), on ord. £40 405 (£28 283), fin. 8% (6½%) net £64 648 (£52 527). mkg. 13%, free of tax (10% net). Fwd. £70 761 (£42 261).

GARRARD ENGINEERING AND MANUFACTURING CO., LTD.—After crediting £41 462 for claims arising on cessation of war-time con-

tracts, trdg. prft. to Jan. 31 was £37 766 (£93 455), plus E.P.T. recoverable £24 855 (nil), mkg. £62 621 (£93 455), less tax £23 500 (£52 240), deprecn. £12 186 (£11 282), dirs.' fees £1 280 (£1 444), lvg. net prft. £25 655 (£28 489). To res. nil (£7 000), addit. deprecn. bldgs. £10 000 (£5 000), fin. div. 12½% (same), mkg. 25% (30%, inclgd. 5% bonus), fwd. £23 517 (£22 415). Curr. assets £362 636 (£388 986), which include stk. and work in prog. at £209 653 (£166 023). Curr. liabs. £166 147 (£222 685). Total resvs. have been incrsd. by £16 701 to £189 812 by the additn. of £15 600 to contng. res. owing to revised method of valuing wk. in prog. and inc. £1 101 in blee. fwd.

WHITEHALL ELECTRICAL INVESTMENTS, LTD.—The position of the company's undertakings in Greece was referred to in the statement circulated with the accounts. The Athens electricity and transport services had made good progress, it was stated, in the restoration of their services. The electricity company sold 194 million units in 1946, compared with 188 million in 1939. A long-term scheme of capital works for Athens and Piræus was under continuous study, and the Board was under the opinion that the company would be justified in finding a part, but not the whole, of the large amount of new money which the undertakings required. It was not possible to estimate when the company's investment in Greece would again yield a return, but, given certain conditions, there was every reason to expect that the companies would regain their prosperity.

W. T. HENLEY'S TELEGRAPH WORKS CO., LTD.—Consolidated accounts show trdg. prft. £728 928 after E.P.T., overseas taxn., bad debts and contn. After deductg. dirs.' and auditors' fees, deprecn. of machinery, etc., absorbs £120 235, and U.K. i.-tax. £264 185, lvg. net prft. £330 132. Parent co.'s trdg. prft. £633 482 (£582 829). Dirs.' and auditors' fees £10 550 (£10 250), deprecn. of machinery, etc., £94 973 (£85 849) and U.K. i.-tax at £274 406 (£273 294), lvg. net prft. £253 553 (£213 436). Post-war cont. res. receives £75 000 (same), staff pension fund £10 000 (nil) and prof. div. absorbs £4 950 (£4 793). Ord. dist. unchanged at 20% with a fin. div. of 10% and cash bonus of 5% again follg. int. of 5%, lvg. carry-fwd. at £413 822 £393 219). Current assets in parent balance-sheet stand at £3 647 122 (£3 086 151) with current liab. at £1 737 635 (£1 226 716) and res. and undist. prft. £2 508 822 (£2 413 219).

MEXICAN LIGHT AND POWER CO., LTD.—

At the annual meeting, held recently in Toronto, the Chairman (Mr. H. Special) reported that during 1946 there had been an increase of 8.5% in sales to all classes of consumers, and a 13% increase in power consumed in low tension services. The company had under construction a new unit of 25 000 kW at Nonalco steam plant and the Federal Commission of Electricity had under construction at its Ixtapantongo plant, which was interconnected with the company's system, a new unit of 27 900 kW.

CHLORIDE ELECTRICAL STORAGE CO., LTD. The accounts of the company for the year ended March 31, show consolidated profit after providing £259 721 (£145 046) for depreciation and allowing for E.P.T. and profits tax, of £984 956 (£606 230). To facilitate the consolidation of the accounts of companies in the group it has been decided to change the parent company's financial year to the calendar year, and the next consolidated accounts will be made up to December 31, 1947, and pre-

sent to the stockholders in 1948. Of the group profits £572 067 (£346 119) is required for income-tax and £13 696 (£4578) is attributable to outside shareholders. The consolidated balance sheet shows current assets of £7 176 043 (£5 840 134), cash standing at £2 026 378 (£432 011), and current liabilities and provisions £3 673 670 (£3 017 801). Balance sheet total is £7 953 626 (£6 637 709). The parent company's profit for the year has risen from £439 928 to £761 430, after providing for E.P.T. and profits tax, to which is added £10 873 received from subsidiary profit realised on sale of fixed assets. Provision for income tax requires £469 657 (£237 976). General reserve receives £100 000; the profit on sale of fixed assets has been utilised to write down shares in subsidiary companies. A final dividend of 5% again makes 10% on the "A" and "B" ordinary stock, while the bonus is repeated at 10%. After allowing for staff fund, the carry-forward is raised from £171 877 to £213 847.

Company Meeting

Automatic Telephone & Electric Co., Ltd.

Record Peace-Time Output

The annual general meeting of the Automatic Telephone and Electric Co., Limited, will be held in Liverpool on July 16.

The following is an extract from the statement by the chairman, Sir Alexander Roger, K.C.I.E., circulated with the report and accounts:—

Profits, including adjustments, total £440 335. The balance available is £238 869, from which your directors recommend a final dividend of 7 per cent. on the ordinary stock, making 10 per cent. for the year, plus a cash bonus of 2½ per cent., and a dividend of 10 per cent. on the deferred stock and shares plus a cash bonus of 2½ per cent., all subject to tax. In spite of difficulties and delays we have succeeded partially in our policy of providing new machinery and equipment. In addition, we were fortunate in being able to buy a small factory in the Liverpool area which will help the increased output required during the next few years for home and export trade.

For many years we have, with your approval, kept our dividends at a reasonable level and have extended our capital assets at home and abroad by ploughing large sums back into the business which, measured in volume of output, is much greater than at any time before the war. We have been able to do all this without increasing our capital.

It is impossible to forecast how long the present high basis of prices will continue, whether they will rise further or whether they will go down. In our view there is little probability of the latter happening for some time to come, and it may be that we will come to you for powers to issue additional capital. If we do, and I hope it will not be found necessary, it would probably take the form of a short term redeemable character.

Telephone production requires little material but much labour, and year after year I have emphasised the suitability of our products for export. We have spent much money and great effort in expanding our activities, and we have substantial business on our books from some 60 countries, of which not a small proportion comes from hard-currency countries.

The year 1946 was a most difficult one. We achieved a large output—the largest we have ever had in peace-time, if 1946 could be called a year of peace—but it was in spite of immense difficulties of every kind, which prevented the smooth, even flow of work from raw material to finished product essential to a mass production factory such as ours. Our management right down to the charge-hand have worked harder, accompanied by more worry, than during the war. It is sad to reflect that a Government largely composed of men and women who have never had to manufacture or sell anything in a competitive market intervened in every industry and business, disregarding successful experience which exists everywhere and adding immeasurably to the difficulties of production. The one thing industry is being urged to do is to produce, and industry wants to produce, but the doctrinaire plans of our Government seem to do little but distract and retard.

In this perilous period in the history of the country, industry, commerce and business want an end to the disturbance and frustration inherent in schemes of nationalisation and the spate of legislation that goes with it, a gradual cancellation of controls and every use made of skill, experience and willingness on the lines and methods which have been proved so successful in war and peace. The country has wasted enough time on experiment and there is not a minute to lose.

Commercial Information

Mortgages and Charges

NOTE.—The Companies Act of 1908 provides that every mortgage or charge shall be registered within 21 days after its creation, and that every company shall, in its annual summary, specify the total amount of debt due from it in respect of mortgages or charges. The following mortgages and charges have been registered. The total debt prior to the present creation, as shown in the annual summary, is given—marked with an *—followed by the date of the summary, but such total may have been reduced.

EXCELARC ENGINEERING CO., LTD., Liverpool.—June 2, £2 430 mortgage, to City of Liverpool; charged on land at Kirkby Trading Estate, Kirkby (lately known as Royal Ordnance Factory) with building, etc., thereon known as 5B14 with fixed factory plant and fixtures. *Nil. May 14, 1946.

ELLIOTT BROTHERS (LONDON), LTD.—May 22, £6 000 charge, to Woolwich Equitable Building Society; charged on Lamorna, The Avenue, Radlett. *Nil. July 1, 1946.

UNIVERSAL ELECTRICAL CO., LTD., Woodford Green.—May 29, £400 debenture, to Mrs. J. Levy, London; general charge.

Satisfactions

TELE-RADIO INSTRUMENT CO., LTD. (formerly KINGSTON TELE-RADIO SERVICING CO., LTD.), West Molesey.—Satisfaction June 3, of debenture registered December 11, 1946.

B. E. T. ELECTRICITY SUPPLY CO., LTD., London, W.C.—Satisfaction May 28, of debenture stock registered December 19, 1934, to the extent of £145 000.

ZELCO, LTD., London, E.C., manufacturers of electric, gas, etc., lamps.—Satisfaction May 31, of debentures registered April 20, 1932, to the extent of £250.

County Court Judgments

NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessary for debts. They may be actions. But the Registry makes no distinction. Judgments are not returned to the Registry if satisfied in the Court books within 21 days.

KIERMAN AND JEFFREY (a firm), 141, Stanstead Road, Forest Hill, Kent, electrical engineers. £13 13s. 6d. April 22.

DEETH, L. A. (male), 238a, Fulham Road, South Kensington, Middlesex, building and electrical contractor. £17 15s. 5d. April 16.

HIPKISS, W. H. (male), 18, Bath Row, Birmingham. 5, electrical factor. £135 10s. 11d. March 19.

LEWIS, S. (male), 288, Monument Road, Birmingham, 16, radio and cycle dealer. £10 9s. 4d. April 15.

BENNETT, — (male), 6, Palmers Road, New Southgate, Middlesex, radio and electrical dealer. £13 13s. 2d. April 24.

First Meeting

ATTRACTA ELECTRICAL AND ENGINEERING CO., LTD., 58-58a, Guildford Street, Russell Square, W.C.1. Court: High Court of Justice. Creditors: Date, July 15, 1947, 11.30 a.m., Columbia House, 4th Floor, Aldwych, London, W.C.2. Contributors: Date, July 15, 1947, 12 noon, Columbia House, 4th Floor, Aldwych, London, W.C.2.

Dividend

PRENTICE, Donald Walter James, described in the Receiving Order as D. W. J. Prentice (male), 59, Brecon Road, Fulham, S.W., electrical engineer. Court: High Court of Justice. Amount per £: 2s. 3½d. First and Final. Payable: July 18, 1947, at the Bankruptcy Buildings, Carey Street, London, W.C.2.

Appointment of Trustee

FARRINGTON, James A., trading as The Radio Services, at 8, Upton Lea Parade, Wexham Road, Slough, Bucks, and residing at 62, Lake Avenue, Slough, radio dealer. Court: Windsor. Trustee: Findlay, Leslie Stewart, 4, Charterhouse Street, London, E.C.1, chartered accountant. Date of Certificate of Appointment: June 30, 1947.

Metal Prices

	Monday, Price	Inc.	July 7 Dec.
Copper—			
Best Selected (nom.)...per ton	£135 10 0	—	—
Electro Wire bars	£137 0 0	—	—
H.C. Wires, basis	£155 0 0	—	—
Sheet	£178 10 0	—	—
Bronze Electrical quality			
1% Tin—			
Wire (Telephone) basis per ton	£177 15 0	—	—
Brass (80/40)—			
Rod basis per lb.	1s. 2½d.	—	—
Wire " "	1s. 6½d.	—	—
Iron and Steel—			
Pig Iron (E. Coast Hematite No. 1) ...per ton	£8 19 0	—	—
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Mild Steel Tape (Cable Armouring) basis 0.04 in.	£21 15 0	—	—
Lead Pig—			
English	£91 10 0	—	—
Foreign and Colonial... ..	£90 0 0	—	—
Tin—			
Ingot (minimum of 99.2% purity)	£442 10 0	—	—
Wire, basis per lb.	5s. 6½d.	—	—
Aluminium Ingots ...per ton	£80 0 0	—	—
Spelter	£70 0 0	—	—
Mercury (spot) per bott.	£17 3 6	—	—

Prices of galvanised steel wire and steel tape supplied by O.M.A. Other metal prices supplied by B.L. Callender's Cables, Ltd. The latter prices are nominal only, and do not include any allowances for tariff charges.

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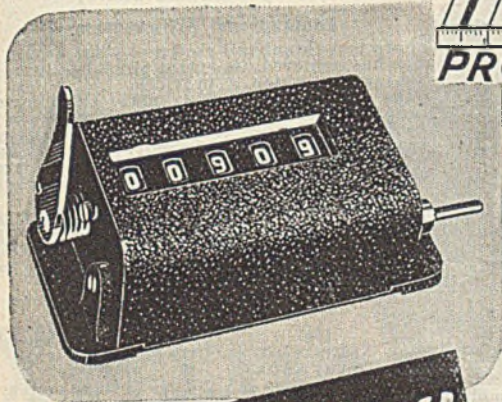
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Edmundsons Electricity Corporation, Ltd.

Speech by the Rt. Hon. Lord Royden, C.H., Chairman of the Company

The 50th ordinary general meeting of Edmundsons Electricity Corporation, Ltd., was held at the company's offices on Thursday, July 3, 1947. The Rt. Hon. Lord Royden, C.H. (chairman of the company), presided, and in his address to the shareholders said:—

"This is the fiftieth year in the life of this great company; it is also likely to be its last. These two facts are an epitome of the remarks I shall make: one speaks of great achievement, the other of ruthless extinction.

Edmundsons is not the only efficient undertaking, distinguished by public service and success, which is facing an arbitrary and nationally harmful destruction under the Electricity Nationalisation Bill to satisfy academic party doctrines.

In their recent speeches many of the responsible leaders of the industry have condemned this measure, which the nation is certain to regret—I suspect with bitter recrimination against those who introduced it.

As chairman of Edmundsons, therefore, since our report comes late in the calendar year, I found myself faced with a mass of sound evidence backed by skilful argument, which reinforced my own convictions.

I decided that my principal task in defence of what I believe to be humanly right as well as nationally expedient—namely the encouragement of free enterprise in business as opposed to state management—should be an appraisal of our industry's success. But it is natural, in view of the bitter and mendacious attacks which have been made on our own company over the past year, that I should deal first with Edmundsons' record. Edmundsons' contribution to rural electrification has been outstanding. I think it right that the devoted service of all our employees should receive this unqualified praise.

Certain Socialists have seen fit to undermine industrial loyalties by insinuations of inefficiency and neglect. Now they are in power they call pharisaically for unity. We prefer to cement a happy relationship by praising solid achievement in which all have played their part in the service of the community.

Therefore, my first objective to-day is to show what all of us in Edmundsons have done, so that employees and public alike may have a clear picture of the measure of our success, and what it has meant to consumers of all kinds.

The Advantages of Holding Companies

Some Government spokesmen do not ignore the real facts about our company. They acknowledge its efficiency. Some even pay a tribute to the work of holding companies generally. Mr. Hugh Gaitskell, the Parliamentary Secretary to the Ministry of Fuel and Power, did so in a speech which he made during the Committee Stage of the Electricity Bill on March 25. He said:

"These (electricity) holding companies are not in the main purely financial companies. They perform important executive and managerial functions; indeed I think those who would speak in favour of the company form of organisation in the past would particularly point to the good work done by the holding companies.

"One considers for instance a case like Edmundsons, which undoubtedly is a highly efficient organisation and run to a considerable extent from the centre."

These are correct and reasonable statements.

They are completely undermined, however, by the general attitude of the many irresponsible socialist orators, partly pamphleteers and propagandists. The real and lively services rendered to the public by large scale organisations in electricity supply are twisted insidiously for party-political ends by insinuations, half truths and even deliberate misrepresentations.

Looking upon Edmundsons as one group—as indeed it is—with a central inspiration and a decentralised, and therefore flexible, management, what do we see as its future? It will be split up among seven Area Boards, disintegrated, distorted and destroyed.

Edmundsons' Achievement

Here is a thumbnail sketch of what Edmundsons has achieved, its extent territorially, and the services which it provides.

The corporation has six main subsidiaries and owns twelve other companies, covering a total area of more than 15 000 square miles. A great measure of uniformity of tariffs has been brought about within this vast area, which represents nearly a quarter of England and Wales.

It is sometimes suggested that holding companies have little to offer to their subsidiaries in the way of services. This is untrue—par-

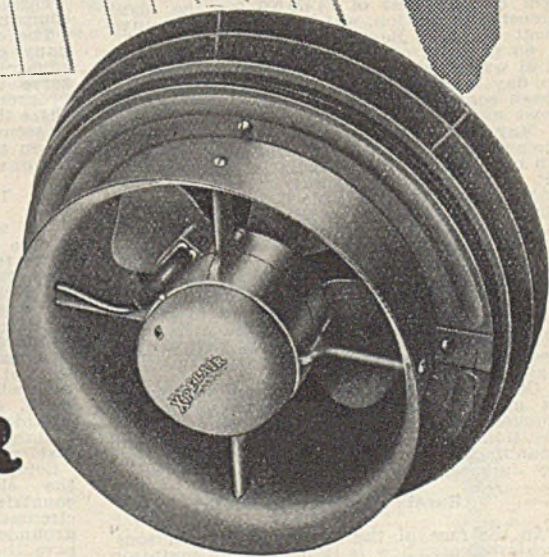
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		TABLE A			
		1932	1946	Increase or decrease	
Increase in consumers	...	170 000	Nearly 550 000 (To-day 565 000)	Over 3 times as much	
Increase in output of units	...	387 million	3,536 million	Nearly 10 times as much	
Increase in capital expenditure	...	£17 million	Over £41½ million	2½ times as much	
Mains constructed	...	Over 5 200 miles	Over 15 500 miles	3 times as much	
Receipts from sales of electricity	...	Over £2 million	Over £12 million	6 times as much	
Average domestic price	...	4.5d.	1.7d.	Reduction of 62%	
Decrease in return on capital expenditure	...	4.5% (1935)	2.8%	Reduction of nearly 40%	
Average cost of coal per ton for generation	...	13s. 8d.	44s.	Over 3 times as much	
		TABLE B			
		1938	1942	1947	i.e., To-day
2 turbo-alternators cost	...	228 000	£307 000	£532 000	2½ times as expensive as in 1938
2 boilers cost	...	£251 000	£541 000	£755 000	3 times as expensive as in 1938

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Continued from page 128

ticularly of Edmundsons. It offers great advantages—in management, engineering, secretarial, accounting and legal matters. Large scale purchase of materials ensures the cheapest prices—cheaper, owing to their bulk, than would be available to component companies were they buying as separate entities. It also acts as a reservoir of development capital at a lower rate of interest than would be procurable by smaller companies independently on the open market. All these advantages lead towards three vital ends; efficiency, expansion and economy.

You will have noticed some striking graphs and figures at the end of the report and statement of accounts. May I emphasise them by calling your attention to Table A?

Rising Costs

Coal costs were not the only ones to rise. I doubt if either shareholders or the public realise the enormous increase in the capital costs of erecting and equipping a power station to-day, compared with nine years ago.

I will give you practical examples of what I mean. The comparisons are exact.

In 1938 we built and equipped our Little Barford generating station. In 1943 the first part of the power-house at Llynfi was finished, incidentally in the record time of 19 months. In 1947 the second section of Llynfi was planned. All are on the same model, so I am comparing like with like.

Little Barford, which has precisely the same capacity as the two parts of Llynfi, cost—only nine years ago—£2,468,000.

The first section of Llynfi cost £1,685,000. The cost of the second section, which is a duplicate of the first, will be over £2,525,000—an increase of 50 per cent. in five years. Add to these two figures £260,000 for the cost of works, common to both sections, and we get a total cost of £4,470,000 for the Llynfi generating station, which is the exact equivalent of Little Barford.

So the cost of a 120,000 kilowatt station in 1938 was much less than half its counterpart to-day because, if the whole of Llynfi had been contracted for this year, it would have cost more than £5,310,000.

May I give two more detailed, but exactly comparative, examples of this paralysing rise in costs, which is particularly onerous when it concerns heavy plant? These examples, which are shown in Table B, have been taken from Little Barford (1938) and Llynfi (first section 1942, and second section 1947). They will probably shock everyone who reads them.

It will be seen from these figures that the present-day money value of Edmundsons' assets is reflected neither in the balance sheet nor in the Stock Exchange share prices. Consequently compensation which is based on Stock Exchange valuation bears progressively less relation to the true value of the undertaking as the months go by.

Can anyone say that destructive inflation is not already with us, and can anyone suggest how we are to meet foreign competition if the cost of a prime necessity of manufacture is to be so profoundly affected by increasing prices?

Rural "Neglect" a Myth

In the face of the figures of Edmundsons' achievements, how is it possible to maintain that the electricity supply industry as at present constituted has neglected rural areas—for Edmundsons' areas of supply are predominantly rural?

Rural electrification, according to a recent Socialist pamphlet, is "only a dream" in England. It is utterly impossible to reconcile this statement with the known facts

about Edmundsons which I have just given. I can only suppose that such remarks are made to create prejudice and hatred among the ignorant by constant repetition.

Edmundsons' Service

The nature of the service we give to consumers is varied in kind and wide in scope. In the first place the corporation owns, among others, two of the most modern generating stations, Llynfi and Little Barford. In addition, our consumers get the benefit of pioneering work in research of every kind, bringing about cheaper costs and greater efficiency.

I am continually surprised by Government spokesmen's references to co-ordinated research as though this were something which only nationalisation could bring about, and which does not exist to-day. Our research is most up to date, and has a direct impact on our various areas, which as I have said, cover nearly a quarter of England and Wales.

Despite the immense rise in costs, no war-time or post-war increases of tariffs have taken place.

In pre-war years 134,000 customers were given free wiring. Only shortages of materials and labour have prevented this service from starting up again. Edmundsons also provides 180 service centres, all easily accessible to consumers, and carries out a broadly based programme of public education about electrical matters, on farms, in showrooms, and through advertisements, demonstrations, lectures, displays and exhibitions—all of which are free. I have heard of such amenities being put forward by Socialist speakers as the prospective fruits of nationalisation. Such men are hopelessly out of date. These "coming benefits" have long been with us.

These are only a few indications of our companies' service.

The crucial test of any public utility company or industry is to answer fairly and squarely the following questions: Does it serve the public? Does it succeed? Does it progress year by year? If the answer to these three questions is "Yes," then the future is secure. From the facts and figures I have given there can be no doubt that "Yes" is the answer in the case of Edmundsons.

The Achievement of the Industry

Let us now examine the general position of the industry in the light of these same three test questions: service, success and progress.

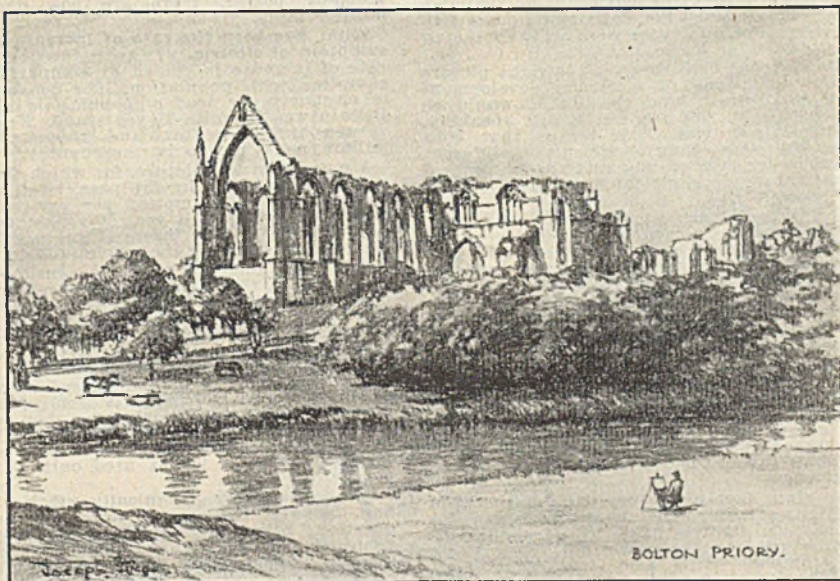
What basis is there for the allegations of its backwardness and inefficiency compared with other countries—an insinuation put about with increasing emphasis over the past 12 months? Has any new case for nationalisation of electricity supply emerged from the proceedings of the Electricity Bill in Parliament, or from the actions of the industry outside? I say "new case," because there was certainly no case for it when I spoke to you last year.

Comparisons are too often made between the electrical development of different countries, without due attention to differing circumstances. It is easy, on political grounds, unrestrained by any considerations save those of passing expediency, to trump up false charges against any great human or industrial activity.

I should be speaking the truth if I were to tell you that only 22 per cent. of the population of the U.S.A. are actually connected domestic consumers, but this would give an entirely false impression, if I did not add that

Continued on page 132

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Continued from page 130

some 80 per cent. of the houses in the U.S.A. have a supply.

Similarly an American might say that only 24 per cent. of the population of Great Britain are domestic consumers of electricity—which is also true. But if he did, he should add that even in 1939 electricity was available to 90 per cent. of the country's houses and 69 per cent. of all houses were actually taking a supply.

The statement which gives the right picture of the conditions of electrical development in Great Britain and the U.S.A. would be that both countries are, electrically speaking, advanced countries. This means that both have overcome many difficulties—different in each case. Geography and the pattern of industrial development cause these differences.

I venture to suggest, however, that these figures about comparative development in Britain and the U.S.A. may be something of a shock to those who are in the habit of presenting the picture of an all-electric America and a benighted Britain. The close resemblance of the position in both countries is sufficiently remarkable to be worth more than a passing mention.

Again, one hears of the supposed superiority of electricity supply in Scandinavian countries, yet in Norway only about 50 per cent. of rural supply has been achieved, and in Sweden the price for rural electricity is higher than in this country. Other examples favourable to Great Britain could be given.

The plain fact about comparisons between electricity development in various countries is that all figures have to be used with extreme care if they are not to mislead. Sadly enough, it is also true that comparisons are often used in order to mislead.

Five Basic Questions

The general achievement of the electricity supply industry in Great Britain should be examined under five headings, which can be presented in the form of questions. The answers to these questions are positive.

Has the price of electricity gone up or down? Down—despite the immense rise in the cost of coal, labour and every other commodity. The average prices of electricity have been constantly reduced in the last 20 years—both for domestic and industrial supplies—at a time when the cost of living has rapidly increased.

In round figures the domestic price has fallen from 3d. to 1½d. a unit, and the price for all purposes from 1½d. to 1d. a unit.

In an industry where fractions of a penny are the measure of success or failure, these reductions are a great achievement.

This drop was not caused by economies due to the operations of the Central Electricity Board—though I have no criticism to make of the efficiency and usefulness of this fine organisation—but by the success of the policies of the municipal and company undertakings.

What has been the rate of increase in the number of consumers? In the six years before the Second World War, new domestic consumers were being connected at the average rate of some 800 000 a year. In 1939 there were 13 000 000 houses in Great Britain and just over 9 million domestic consumers had been connected. If, therefore, the same rate of progress could have been maintained after the war began, when of course only work necessary to national survival could be undertaken, the whole country would have been covered by 1944, except for the remotest houses. This is the background to the 69

per cent. connection figure which I gave you earlier in this speech, and suggests how near we were eight years ago to supplying practically everyone.

How many consumers are there to-day? Despite every handicap imposed by war and the catastrophic material shortages of the post-war period, there are now about 12 million users.

What has been the rate of increase of consumption of electricity? An indication of the rate of increase is gained by comparing consumption with population. The consumption of electricity *per head of population* in Great Britain was 73 units 25 years ago. To-day it is ten times greater, and there are two million more people in the country.

A more accurate picture, for which the data was not available in the past, is shown by Edmundsons. Consumption *per domestic consumer* was 400 units a year 10 years ago. To-day it is 1 200. This figure is slightly higher than the average for the whole industry.

As to the increase in units consumed for all purposes, this has of course been tremendous. According to information released in May this year by the Electricity Commissioners, consumption in 1946 was nearly 35 000 million units, almost a tenfold increase since 1920. Over the same period, power consumed for industry has increased sevenfold, power for shops and business premises nearly tenfold, and finally power for homes and farms has increased nearly 38 fold. Industry used 8½ times more power than homes and farms in 1920; in 1946 it used only 1½ times more.

Is the industry technically efficient? My first answer is in the form of another question: how could such results have been achieved without technical efficiency? I have already indicated the kind of service which Edmundsons provides for the public. The industry as a whole is no less zealous. Output of electricity per ton of coal has consistently increased with the discovery of improved generating methods. In 1923 a ton of coal produced 825 units of electricity. To-day it produces nearly twice this quantity. Were it not for the bad quality of the coal, it would produce still more. Research into technical matters over a wide field is continually in progress.

Promises for the Future

The categorical answers to these five basic questions are the kernel of the industry's case against nationalisation. Nor must it be supposed that we are standing still, or that our plans for the future are not laid. Nationalisation cannot offer results even as good as those now being achieved under the shadow of extinction. Ministers have already hedged considerably when the supposed benefits of nationalisation have been under review. The wording of the Electricity Bill itself about cheapness, for instance, is sufficiently cautious. One of its objectives is stated as:

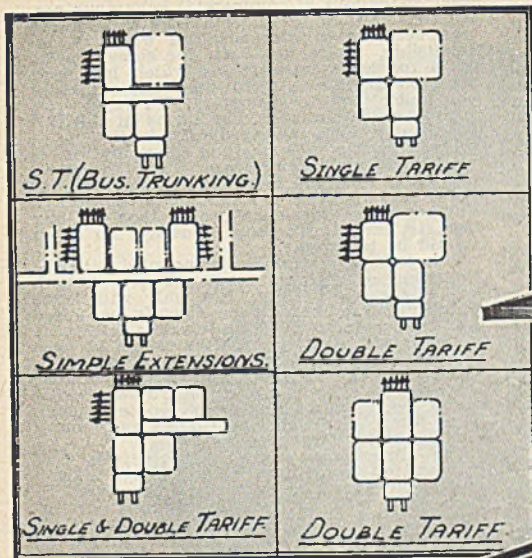
"the development and cheapening of supplies so far as practicable . . ."

The Minister of Fuel and Power on February 25 during the Committee Stage of the Bill, considerably clarified his views on the possibilities of cheaper electricity under the new regime. He said:

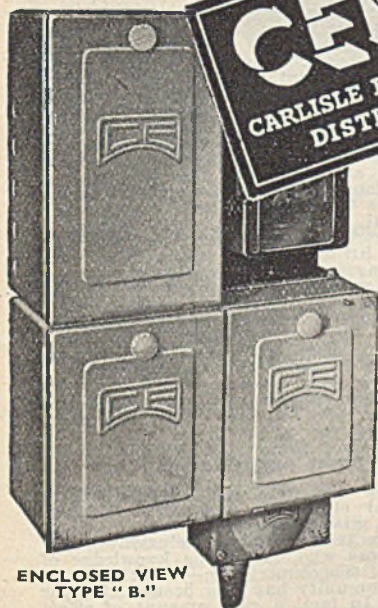
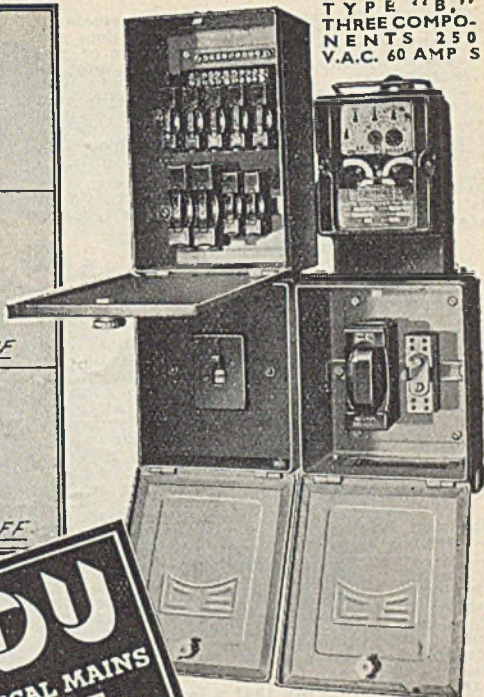
"There can be no guarantee that every potential consumer in the country will be supplied with either a cheap or an abundant supply until the physical resources to enable that to be done are available."

and (referring to cheapness in rural areas):
"That depends on a variety of conditions and factors—distance; the cost of the trans-

Continued on page 134



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Continued from page 132

mission line, the administration associated with distribution and the like. It does not matter whether it is nationalisation or private ownership, physical factors cannot be ignored."

It is evident that a retreat is being prepared from political false-promises of cheaper electricity. The industry has brought down the price to a very low level by prudent and efficient management. I fear that the Minister will have little to offer to consumers in this field. His statements indicate that this fact is being brought home to him by circumstances.

Crippling Shortages

I do not think that people understand the nature and extent of the material shortages which are crippling the industry at this time, the effect which they have on rural electrification schemes, and how companies like Edmundsons have to delay the connection of thousands of consumers because of them. The companies are now unable to connect more than 200,000 new consumers at most each year. As I have already mentioned, the pre-war connection rate for the whole industry was 800,000 new consumers a year. The comparison between these two figures demonstrates, I think, the disastrous results of the shortages.

War-time regulations necessarily held the industry in a strait-jacket. Even before the Government relaxed a fraction of its controls, a new start was made on wider rural electrification schemes. Materials and labour shortages then became acute. Sometimes materials were short, sometimes labour, sometimes both. It is a vicious circle, difficult to break, unless a change of policy about controls becomes possible. The position gets worse every day.

Other difficulties are that a large percentage of electrical apparatus has to be exported, a lengthy bureaucratic routine is enforced by the Government for getting licences, nearly all contractors have such quantities of orders booked that they are unwilling to take more, and finally, there is a severe shortage of transport vehicles for the carriage of materials and for maintenance.

Scarcities extend over the whole field of electricity supply and include cables—and their components, lead, jute, textiles and paper—wooden poles, ceramics, copper conductors, transformers, switchgear and fittings. The wooden pole shortage is particularly acute, and the Post Office has until recently tended to get more than its fair share of the small stock available. Copper conductors take anything up to eight months for delivery. Whole schemes are often held up because of the shortage of only one of these materials. Up goes the cost as a direct consequence.

The point I wish to emphasise is this. The new organisation proposed by the Electricity Bill will have to operate under these conditions of country-wide, and incidentally world-wide, material shortages. If on these grounds the industry is hard pressed to-day, the proposed Electricity Boards will be just as hard pressed. The large measure of dislocation which will inevitably follow nationalisation—it will mean a minimum of two years delay for new electrification plans—is an additional menace to the service which consumers receive to-day.

Nationalisation of electricity, added to the present burden of material shortages within the industry, may well lead to another disastrous industrial breakdown in the country.

Compensation

It also seems to me that, under the Electricity Bill as it stands, certain hitherto

accepted canons of commercial behaviour are violated. Electricity undertakings will receive treatment as to compensation which is indefensible. There has been for some time a basis for such transactions which has been accepted as fair—a word used but evidently not understood by Ministers. I refer to net maintainable revenue. The terms in the Bill penalise prudent management.

The Government's method of valuation is arbitrary and inaccurate. The Minister's reasoning that the impartial examination of industries would be too difficult is repugnant. Furthermore, experience proves that no long time is needed. To secure justice, no effort should be too great.

This false valuation is also coupled with the reduction of interest to 2½ per cent, which hits every stockholder. Not only will large numbers of individuals be directly penalised by the reduction of interest; charitable societies will also suffer. One thinks at once of such bodies as the Ecclesiastical Commissioners, the Salvation and Church Armies, Queen Anne's Bounty, etc., on whose revenue many good works and poor people depend. Then there are pension funds and many similar saving organisations.

The Government's penal "principles" of confiscation might have been designed to curb customs evaders or currency defrauders. In fact they will hit, either directly or indirectly, the ordinary man and woman all over the country. These are the people—in many instances the poorest and frailest—whose incomes will be reduced by one-third or more.

Comparison Between Companies and Municipalities

The Government has paid lip service to municipal electricity undertakings, citing their efficiency as an example of effective public ownership. Speakers contrast company enterprise unfavourably with that of municipalities. This is unjust, ignorant or prejudiced talk. Both parts of the industry are rightly proud of their record, and the differences which Government spokesmen try to accentuate are not the real differences. The latter arise because the problems of rural development and salesmanship bear no resemblance to urban problems—a fact which the Central Authority will soon discover.

It is remarkable that despite the fact that in Great Britain the municipalities' electricity areas have a population density of 1813 to the square mile as opposed to the companies' 278, the difference between their average domestic price is only 1d. a unit in favour of the municipalities. The transmission and distribution capital costs per consumer in England and Wales amount to £45 for each rural consumer and only £30 for each urban consumer. The correct deduction is that both company and municipal undertakings are efficient.

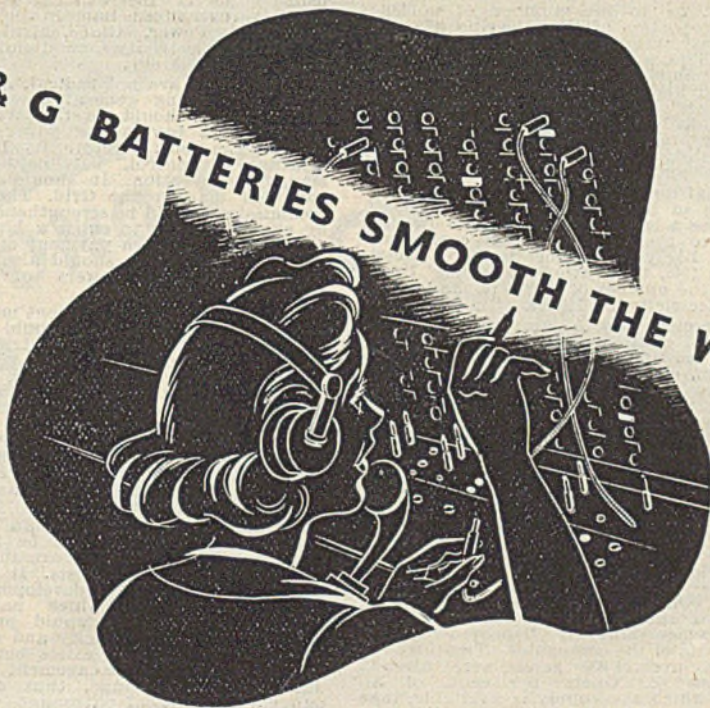
Rural Electrification

I will now try to clarify certain figures about rural electricity and rural holdings which have misled many.

First there is the common delusion—chiefly held by those who have little knowledge of the ways of the countryman—that the entire farming community has long been calling for electricity. In fact, a vast amount of effort and considerable expense has been involved in canvassing the advantages of electricity to the rural dweller. It must also be added that, of some 85,000 agricultural holdings now using electricity in England and Wales, about half use the supply for lighting only. They use it as an amenity in their houses, rather than to help them in their farming.

Continued on page 136

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Continued from page 134

Secondly, as to the number of holdings and the proportion of these having a supply of electricity, the true position is this. The Electrical Trades Union Journal recently gave the total number of agricultural holdings in England and Wales as 366 000. This, however, includes the large number of holdings of less than five acres which are never considered for practical purposes because of the constant amalgamation and changes in the use of the land.

The actual number of holdings of five acres and above in England and Wales is 290 600, and of these a large number have no dwelling attached to them, and will be correspondingly less likely to become users of electric power. In 1946, the National Farmers' Union estimated the number of farms in the country without electricity at 160 000.

It is extremely easy to paint a black picture of the rural electrification of England, by a considered misuse of these figures. To understand them, certain facts have to be remembered. Had it not been for the war, all but the remotest houses and farms in the country could by now have been connected. Socialist propaganda does not scruple to forget this and to ascribe to neglect the effects of the necessary restrictive measures which were forced upon the industry by the Government in war-time. The connection of farms went on even during the war, at the rate of about 2 500 a year; only essential work was permitted on new electrification in any case. Since then, material shortages—not the unwillingness of the companies—have gravely restricted the rate of connection.

All talk of the countryside being neglected, electrically speaking, is disproved by the achievements of the companies. Two-thirds of all farms over 1 000 acres were already supplied in 1945. Ninety per cent. of all farms, to which the supply is available, take it.

These two facts are proof, first of the companies' untiring efforts to take the supply out into the countryside and secondly of the strict relation of prices charged to costs incurred.

From the Committee Stage of the Electricity Bill we have evidence that the Minister of Fuel and Power is beginning to realise the difficulties which the companies have already largely overcome. I will venture to say too that there is no possible chance of the Government dealing with rural electrification more quickly than the companies under the £72 000 000 scheme, which they and the National Farmers' Union put forward in September, 1946.

The Alternative to Nationalisation

It is sometimes difficult to estimate whether a particular industry is being nationalised because it is efficient or because it is inefficient. It is my view that electricity supply is being nationalised because it is efficient, because it can help to disguise the deepening coal catastrophe and because it is a key to Government control of industrial affairs, and therefore to power.

It has been said by protagonists of nationalisation that the industry has no alternative to offer. Far from having no alternative to offer, the industry is perfectly aware of the rearrangements required in its structure, but insists that they can, and therefore should, be carried out without the wholesale disruption of nationalisation. The Electricity Bill will dislocate the industry, forcing a radical re-organisation too fast, and at an entirely wrong time.

The industry's aim would be towards legislation for the correct type and measure of rearrangement, at the right speed. It

suggests that this should be carried out by using properly the existing organisations, suitably rearranged—namely the Ministry of Fuel and Power, the Central Electricity Board, the Electricity Commissioners and the supply undertakings.

The changes are not radical, and would be on the following general lines. The legislative model should be the Water Act of 1945, with a few added powers to ensure action. The Central Electricity Board should continue to control, but neither own nor manage, generation. It should continue to own and manage the Grid. The Electricity Commission should be strengthened as a body by enabling them to enlist a higher quality of personnel through payment of commercial scale salaries. They should also have wider powers, including powers of compulsory amalgamation.

The larger and more efficient municipal and company undertakings should own and manage new consolidated distribution areas designed to promote greater efficiency and procure better balanced loads. This would involve the elimination of certain company and municipal concerns, which should be compensated impartially in cash on the basis of net maintainable revenue. Payment should be made by the retained company and municipal undertakings. Employees should be safeguarded against losses, if any, resulting from the rearrangements.

The advantages such a plan would have over nationalisation would be these. Consolidation of areas under existing ownership would tend to reduce costs. It would avoid the inevitable delay in development and the general dislocation which nationalisation will bring about. It would preserve competition between electricity and gas, and the healthy rivalry which exists between undertakings. Business management of the industry would continue, thus avoiding the dangers of political patronage—of which we are already seeing the first fruits—and of additions to our already swollen bureaucracy. Finally, the industry would remain independent. It would not be chained to gas and coal, and possibly be called upon to make good their losses, as may well happen under nationalisation.

The Fuel and Power Crisis

Although much has been said about the fuel and power crisis, sufficient attention has not perhaps been paid to the recently published report of the Central Electricity Board, which makes the industry's position admirably clear.

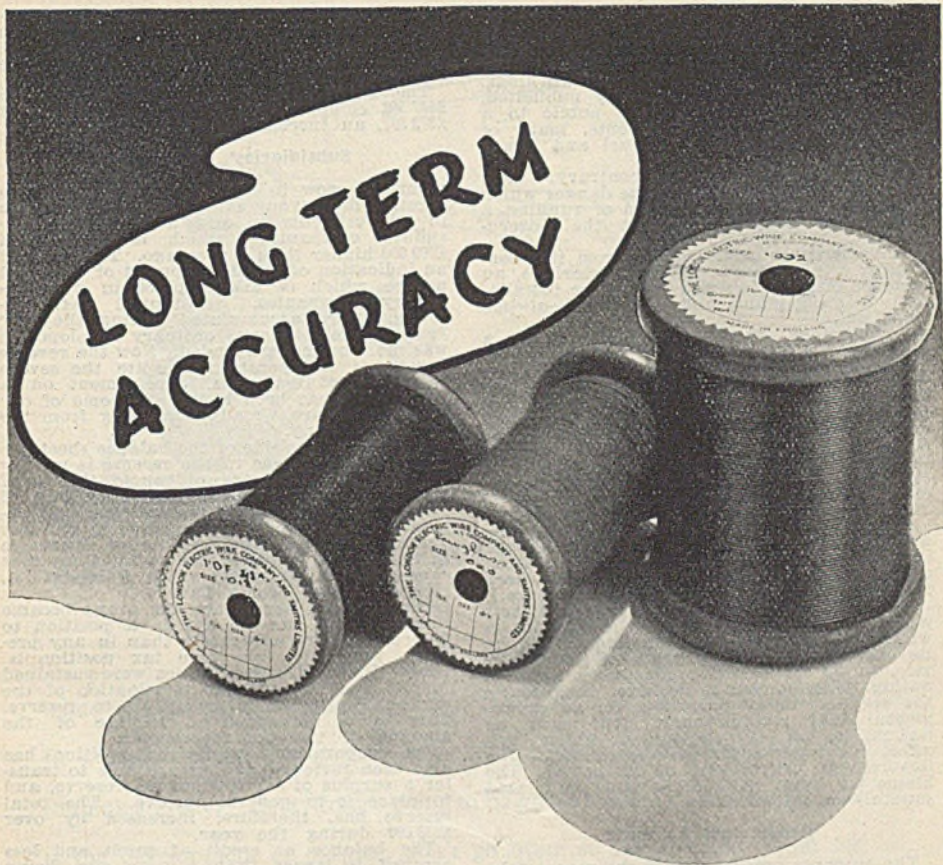
First, the plant shortage was due to a Government decision during the later stages of the war to disregard the Central Electricity Board's advice on plant production. The industry is therefore without responsibility for the crisis.

Secondly, the weather last winter merely underlined the national disaster which, according to the President of the Board of Trade, cost the country £200 million in exports alone.

Thirdly, the crisis in electricity supply will last at least until 1950—a fact of which the public seem totally unaware and which the Government seems equally unwilling to emphasise as it should.

Early in 1946 the Ministry of Fuel and Power decided that the stock level at power stations at the beginning of the winter of 1946-47 should be cut to four weeks' supply, although the Central Electricity Board had repeatedly urged a return to the pre-war level of 10-12 weeks' stock, warning the Ministry "that widespread interference with supplies of electricity was likely to occur."

Continued on page 138



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Continued from page 136

The coming crisis was, therefore, clear to the Cabinet at least a year before it actually broke. After just scraping through the winter of 1945-46, instead of issuing stern warnings, urgently couched and adequately publicised, the Government subjected the public to a barrage of conflicting statements, many of them from the Minister of Fuel and Power himself.

The industry, on the contrary, gave repeated public warnings of the danger which threatened—only to be accused of running a "villainous campaign against the Government."

Our emergence as a country from this continuing crisis depends on plant priorities, an increase of materials and labour for installation of such plant, and more coal—*always more coal.*

Furthermore, there will have to be a reduction in the quantity of bad coal delivered to power stations, if even present levels of efficiency are to be maintained. The amount of inferior and unsuitable coal has now reached such proportions that at times during 1946 as much as 380 000 kilowatts was being lost from this cause alone, with a resultant financial burden to the industry of over £2 million. In December, 1946, plant out of service reached the maximum high level of 15 per cent., compared with the annual level of 6 per cent. before the war, and this was partly due to low quality fuel. For the same reason, the hitherto steadily increasing thermal efficiency of generation has been retarded for the first time in many years.

All the burdens which result from the facts which I have detailed to you the industry is willing and able to shoulder, and backed by its experience and long years of public service, to do its best for consumers and the nation. The moment is decisive, dangerous—the very reverse of propitious for an experimental and revolutionary step, such as nationalisation of electricity, which will affect the whole future of the country. The Government has decided on its course. The blame for what will follow must be placed squarely on its shoulders.

Report and Accounts

The accounts presented with the report take the usual form and comprise four separate statements: the corporation's balance sheet, its profit and loss account, the consolidated statement of assets and liabilities of the corporation and its subsidiary companies and the consolidated statement of profits.

I will start with the corporation's own profit and loss account. It will be seen that there is a considerable increase under the heading of "Profit on services rendered and goods supplied." This increased profit is due to the increased rate at which development was taking place during the year under review. In this connection it is interesting to note that the turnover of capital and revenue goods was £2 000 000 more than in the previous 12 months and that the total purchases of goods and materials, excluding coal, for which this corporation was responsible amounted to a figure of over £6 000 000.

The largest single item which appears in our profit and loss account is the item "Dividends and interest receivable from subsidiary companies," and this figure is for all practical purposes the same as a year ago. The profits of many of our operating subsidiaries were such that increased ordinary dividends could have been paid, but without discussing the question as to whether it would or would not have been the policy of Edmundsons' board, or of the boards of the subsidiary companies, to recommend such larger dividends, the terms of the Electricity Bill prevent any higher rate of distribution.

On the debit side of the profit and loss account the only item which has varied from last year is the taxation provision where a sum of £155 000 has had to be set aside compared with £90 000 in the previous year.

The net profit for the year amounts to £647 362, compared with last year's figure of £572 397, an increase of some £75 000.

Subsidiaries' Development

Turning now to the corporation's balance sheet, I draw your attention to the increase in "Investments in and advances to subsidiary companies" which is more than £700 000 higher than a year ago. This is itself an indication of the development of a capital nature which is taking place in our subsidiary companies. Substantial cash resources were accumulated during the war years, largely because ordinary development was more or less suspended. Now the reverse process is in operation. Despite the severe shortages of materials, development on a large scale has been begun and some of our subsidiaries are already borrowing from the parent company.

On the liability side of the balance sheet the substantial increase in the reserve is worthy of mention. There are, of course, the usual additions to reserve from the operations of our sinking funds and from last year's appropriation from profits as approved at our last general meeting. The two major increases in the reserve are both due to the same root cause, the termination, as at December 31, 1946, of Excess Profits Tax.

For the first time since the group became liable to this tax we are in a position to determine more accurately than in any previous year what the true tax position is. Excess Profits Tax deficiencies were sustained in 1945 and 1946 and the termination of the tax enables us to place £90 000 to reserve. This is a conservative estimate of the amount of the tax recoverable.

The corporation's whole tax position has also been reviewed and we are able to transfer a surplus of £55 000 from tax reserve, and to place it to general reserve. The total reserve has, therefore, increased by over £238 000 during the year.

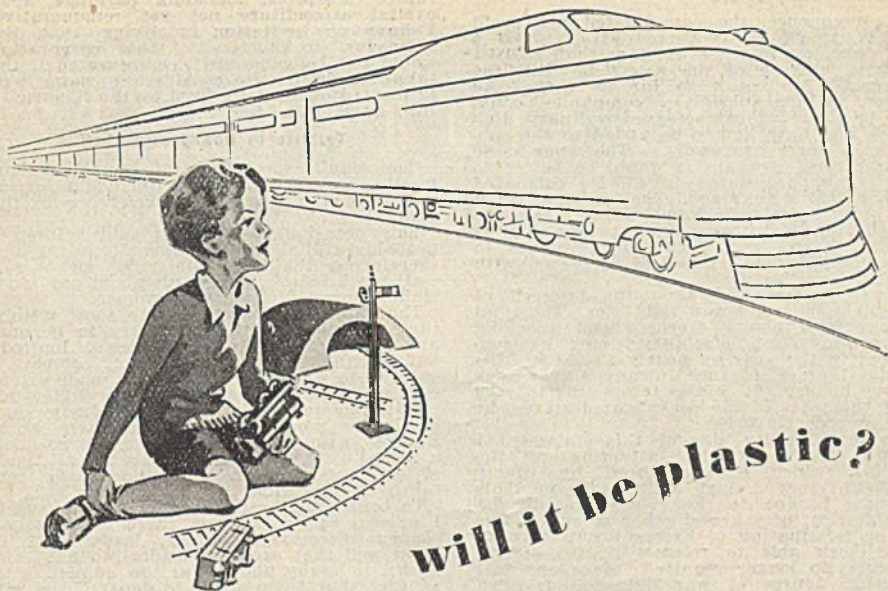
The balance at credit of profit and loss account is larger than a year ago, being some £70 000 higher at £527 494. This figure which in more normal times could be described as "the available balance" is not now in that category, due to the provisions of the Electricity Bill. It will be remembered that our interim dividend was increased from the usual rate of 2½ per cent. to 3 per cent. in the expectation that your board would now be recommending a dividend which would make the total distribution for the year 6½ per cent. or even 7 per cent.

From the figures before you it will be apparent that the board, without being accused of an unreasonable lack of prudence, could have distributed the higher figure. In that event the take-over price under the nationalisation proposals instead of being 31s. 6d. would have been considerably higher. As it is, we must restrict our total distribution for the year to 6 per cent. and add over £100 000 to the amount to be carried forward to next year.

Revenue Advance

I now turn to the consolidated accounts: here again I deal first with the statement of consolidated profits. It will be seen that the gross revenue from sale of current has again advanced and during 1946 amounted to £12 119 000. Expenses have also risen but smaller sums are required for contingencies, for deferred maintenance, and for taxation.

Continued on page 140



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Continued from page 138

In consequence, the consolidated net profit stands at £909,851 compared with £620,499 a year ago, an increase of more than £280,000.

Again because of the Electricity Bill the increased profits, in so far as they have arisen in our subsidiary companies, could not be paid out in increased ordinary dividends and have had to be added to the subsidiaries' carry forwards. The amount so appropriated—perhaps it would be better to say not appropriated—is £274,240 compared with £40,000 a year ago. The increase in the net profit accruing to Edmundsons Electricity Corporation is thus somewhat less than it might have been. The net profit to December 31, 1946, is £630,164 compared with £531,295 for 1945.

Finally, a few words about the statement of consolidated assets and liabilities. The total of our fixed assets, freehold and leasehold properties, plant, machinery, etc., has advanced in the year by nearly £3,000,000. This is the largest advance in any single year in our history. It is also interesting to note that the total of the consolidated statement now exceeds £50,000,000.

On the liability side of this statement I would draw particular attention to the surplus which has advanced by nearly £2,500,000 since I last addressed you. This increase is due to the release, mainly by subsidiaries, of tax and other reserves. Due to the termination of Excess Profits Tax we have been able to release £750,000 of tax reserves no longer required. Since our last meeting, figures of war damage sustained by the electricity industry have been published. It is apparent that we had over-provided for war damage contributions which may one day become payable under the long promised Public Utilities War Damage Act and because of this we have been able to release £500,000.

Contingencies and deferred maintenance have also been carefully reviewed and a further £750,000 has been released from this reserve also. In addition, as I have already mentioned, the subsidiaries have added £274,000 to their carry forward. These and some minor items make up the total increase of £2½ millions.

Inadequate Compensation

Anyone examining these figures might well ask whether the take-over price for Edmundsons' ordinary stock (3s. 6d. per £1 unit) is not an entirely inadequate basis for compensation. The accounts before you are not themselves a complete answer to this question, but they show this much:—

There is in the corporation's reserve sheet a reserve of	£ 1,350,674
To this can be added—	
E.P.T. refund	718,764
Provision for taxation	135,000
Proposed transfer to reserve	20,000
Carry forward of	304,994
Excess of market value over book value of the marketable securities	109,375
Total disclosed reserves are therefore	£2,098,807

The most substantial reserve, however, is undisclosed. It lies in the true value of our investments in our subsidiary companies. If the ordinary shareholdings alone are valued on a 4 per cent. basis, which appears to be the approximate basis of valuation upon which the take-over prices of like securities has been fixed, there is a further reserve of over £4,000,000 making a total of £6,200,000, or more than 18s. per £1 unit.

Furthermore it can also be argued that nothing has been taken into consideration for

future prospects, including earnings upon capital expenditure not yet remunerative. I have no hesitation in saying that the ordinary stockholders of this corporation would not be generously compensated if the take-over price were considerably more than £2 instead of the price fixed by the Electricity Bill, namely 3s. 6d.

Tribute to Board and Staff

Chairman's speeches at annual general meetings are accustomed to include a formal but none the less sincere reference to the staff.

This occasion, as I have said before, is probably a final annual general meeting and therefore a final opportunity for me to say—all too briefly—a few words about our large staff of some 12,500 men and women.

The capacity of employees to show visibly their devotion to their industry in general and their company in particular is limited; but it can be measured by their company's success—to which I have already made extensive references. Loyalty and zeal follow interest and good relations. No industry has employees more interested in their work. Further, none has a better, and few so good a record of happy relations between all types of employee. To this Edmundsons is certainly no exception.

To bring out these characteristics to which I have referred, however, there is one other element necessary, namely, leadership. I know well that excellent leadership has been shown in many places, far too numerous to mention, but I am going to depart from my usual rule of anonymity in one case and one only.

I am not given to praising men for bare duty done; but, when a degree of efficiency has been achieved in the short space of fifteen years such as Edmundsons has achieved, I feel I should be guilty of a grave omission if I were not to refer to the outstanding leadership of Brigadier-General Wade H. Hayes, our managing director.

He joined Edmundsons in 1932. During these fifteen years he has carried the full weight of the heavy responsibilities, which are inherent in a rapidly expanding business like Edmundsons, with a resilience, a resource and a courage which have commanded and therefore obtained the respect and admiration of his staff and his colleagues on the board. The results are his most striking testimonial. A great edifice has been built of which he was the architect and inspiration.

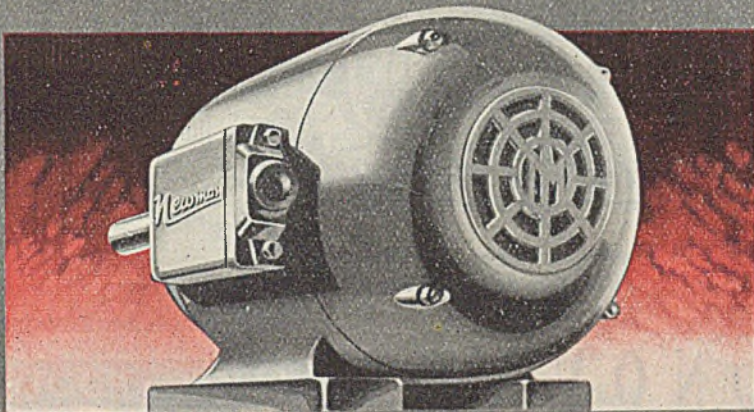
It is right at this point to mention specially the managers of our subsidiary companies, our technicians and the senior members of the staffs on whom the major responsibilities fall.

It is too easy to forget the nature and extent of the service which the staff—particularly the outside staff—renders to the public. Their task cannot be confined within definite hours. There is no five day week. They are daily and nightly on call—in all weathers and at all times. Frost, snow, flood and storm demand longer hours and harder conditions from those who maintain the supply in the electricity industry. This is something which merits recognition, and I take this opportunity of commending our staff to the public which they serve.

May I say a final word about my fellow directors? We could not have carried out our trust, which we have looked upon as being for the benefit of consumers, employees and shareholders alike, had we not worked together both hard and loyally. We can afford to disregard those smaller minds who choose to pillory directors.

I end by thanking personally the staff, the managing director and the other directors with all the sincerity at my command. The report was unanimously adopted.

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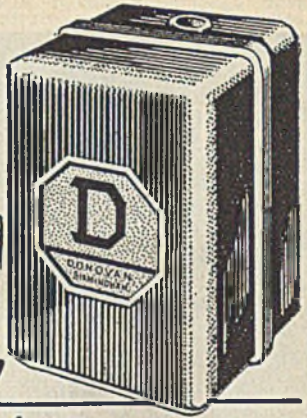
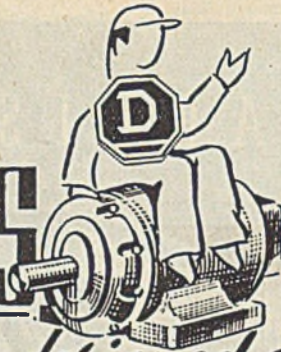
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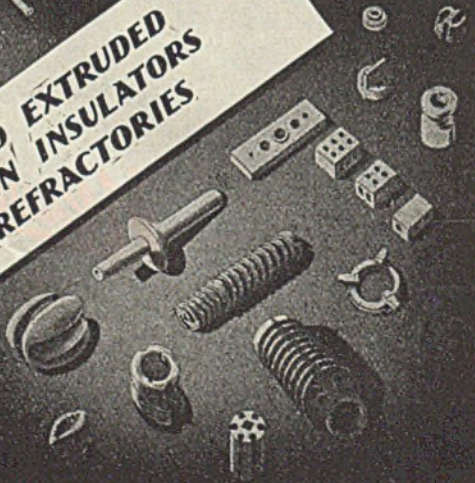
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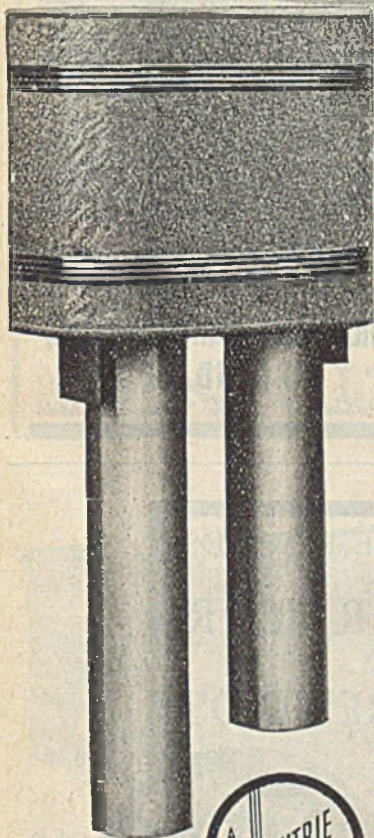
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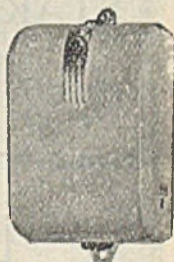
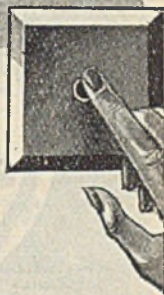
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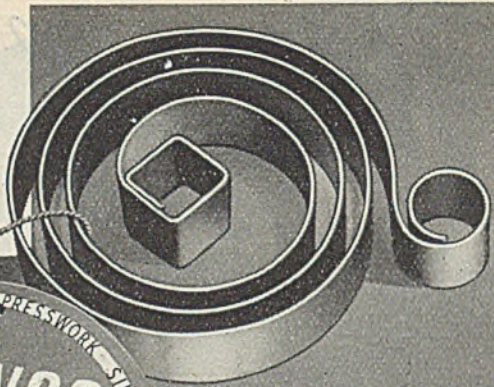
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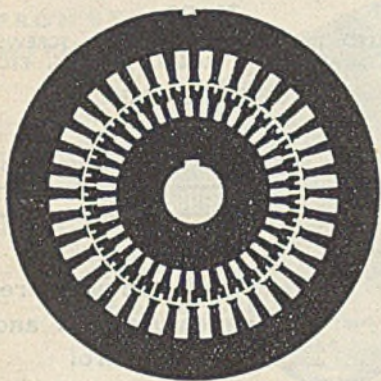
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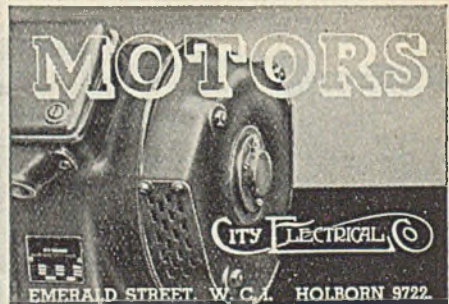
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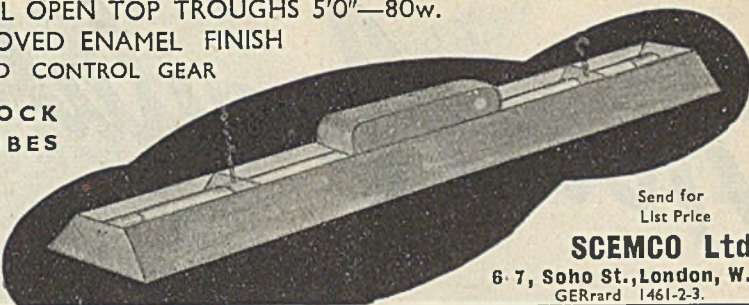
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11 JULY 1947



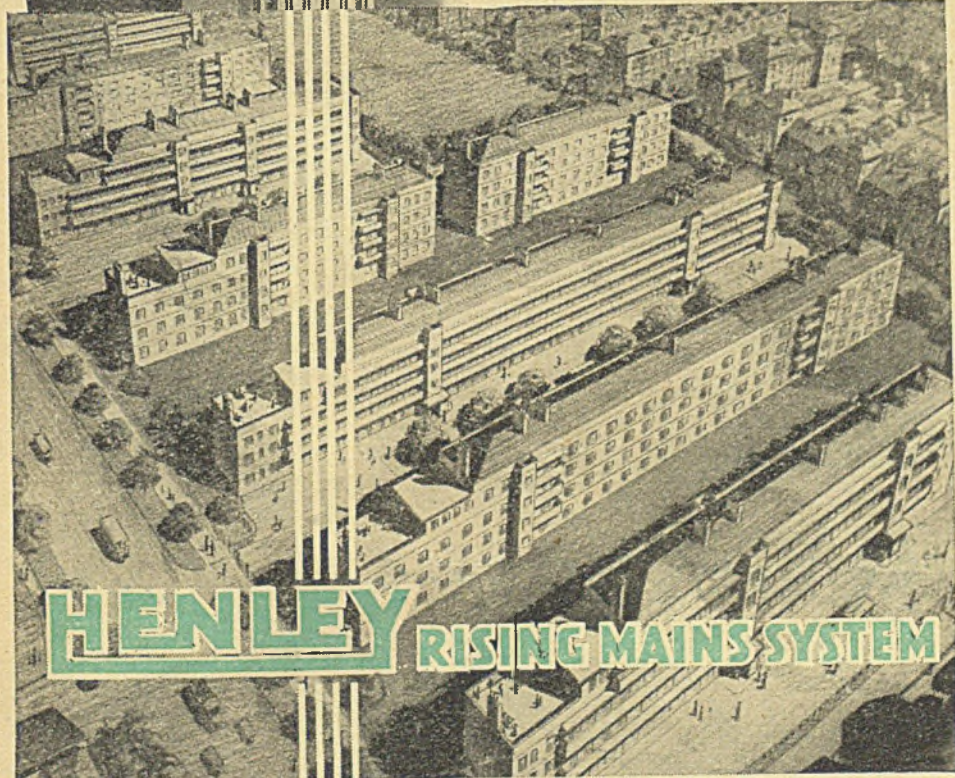
Installing a HENLEY
Rising Main Distribu-
tion Box.

"FLATS GOING UP"

Bethnal Green Electricity Undertaking are installing the HENLEY RISING MAINS SYSTEM in the eight blocks of flats being erected under the new L.C.C. scheme at the Minerva Street site.

Mr. E. E. Jolly, M.I.E.E., A.M.I.Mech.E., the Borough Electrical Engineer, has chosen this system because it is specifically designed for multi-floor buildings of this type.

An artist's impression of the flats on Minerva Street site, Bethnal Green, London, E.2. (Main Contractors: Holland, Hannen & Cubitts Ltd.). These flats were featured in a recent B.B.C. broadcast entitled "Flats going up."



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Printed in Great Britain by **STRAKER BROTHERS LTD.**, 194-200, Bishopsgate, E.C.2, and published by **BENN BROTHERS, LTD.**, at Bouverie House, 154, Fleet Street, London, E.C.4. (Registered at the General Post Office. Entered as Second Class at the New York, U.S.A., Post Office.)—Friday, July 11 1947.