THE

ELECTRICIAN

THE TECHNICAL NEWSPAPER OF THE ELECTRICAL INDUSTRY

25 APRIL, 1947

SIXPENCE

The FINISHING TOUCH in the ELECTRICAL INDUSTRY ★

A First Class Product deserves a First Class Mark

"Trapinex" Paint Transfers provide the modern method of marking first class products in brilliant effect, truly worthy of the greatest names in industry. That is why the manufacturers of electrical equipment featured here and many other leaders in all industries pin their faith to "Trapinex" Paint Transfers, for capitalising their goodwill throughout the world.

"Trapinex" Paint Transfers are **printed** with special paint of colours many times

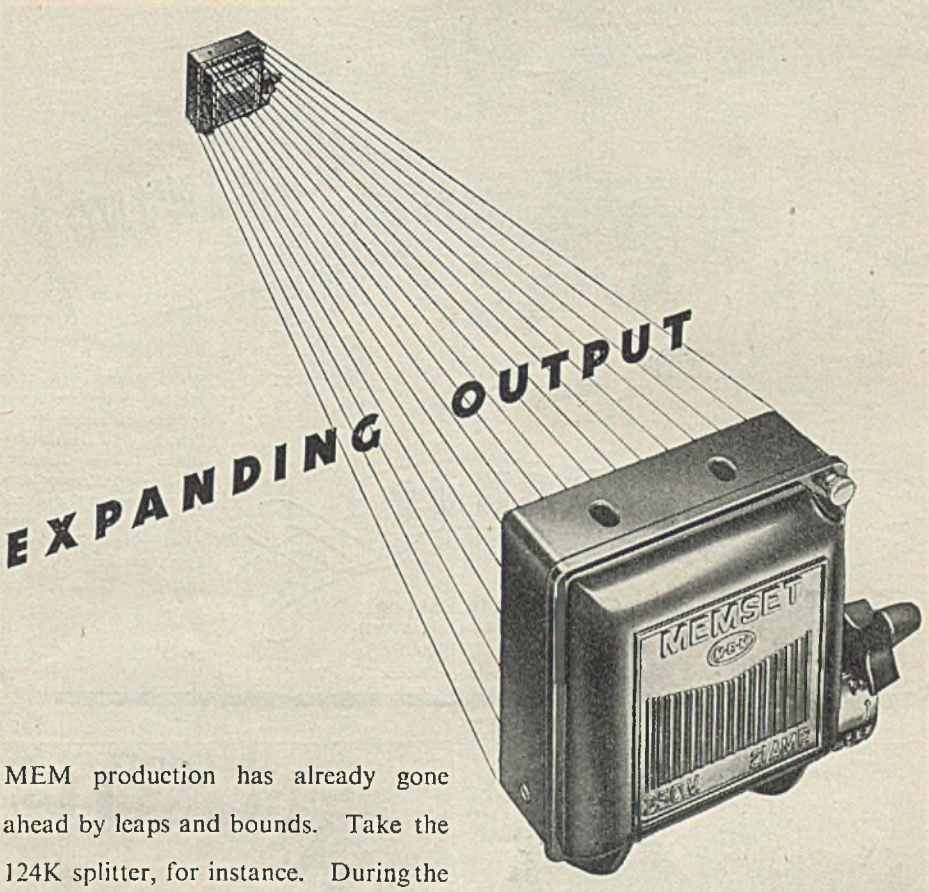
brighter than printers' ink. Any number of colours may be printed and applied to any smooth surface, in striking design or cut out effect without film or paper background to mar the distinctive display—Brilliant, Durable, Weatherproof, and so easy to apply.

ADVICE freely given, but when you write for prices please state: (1) Size, (2) Quantity, (3) Number of Colours, (4) Purpose, (5) Wording required, (6) A rough sketch would help. WE HAVE NO STOCK LINES OR PRICE LISTS.

★**EVERY INDUSTRY** has a thousand uses for "Trapinex" Paint Transfers (additional to the more obvious uses for publicity, display and packaging) in Workshop, Factory, Office, for Nameplates, Brand Marks, Monograms, Patent Numbers, Instructions, Diagrams, Wiring Layouts, Warnings; Type, Catalogue or Serial Numbers.

TRAPINEX Paint PROCESSES

Trapinex (Regd.) Paint Transfers are fully patented and manufactured only by
TRAPINEX LTD., 19, COMMERCE WORKS, HIGH ROAD (Opposite Town Hall), WOOD GREEN, N.22
'Phone: Bowes Park 6811 'Grams: 'Trapinex, Wood, London' Cables: 'Trapinex, London'



MEM production has already gone ahead by leaps and bounds. Take the 124K splitter, for instance. During the last six months production has increased fivefold. With other lines, too, we are going all out to catch up with the heavy demand both for housing and for industrial purposes. But demand is still greater than supply, so that MEM goods are still hard to come by. To make sure you get a fair share of available supplies, it is still the best plan to keep in touch with your wholesaler.

MEM Switch, fuse and motor control gear, electric fires and localised lighting equipment

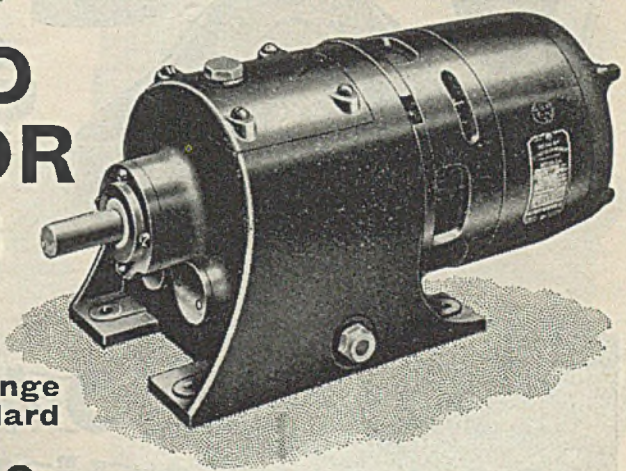
Midland Electric Manufacturing Co. Ltd., Birmingham, 11 : Branches in London & Manchester

B T-H

FRACTIONAL HORSEPOWER MOTORS

The most popular in the country

LOW-SPEED MOTOR UNITS



A complete range for any standard voltage

A.C. or D.C.

Spur-geared ½ H.P. Low-speed Motor Unit with co-axial shaft for speeds down to 22 r.p.m.

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Designed and built as a unit incorporating an electric motor and speed reducing gear.

SPUR OR WORM GEARS

BTH products include all kinds of electric plant and equipment; Mazda lamps and Mazdalux lighting equipment.

BTH RUGBY

THE BRITISH THOMSON-HOUSTON COMPANY LIMITED, RUGBY, ENGLAND. A5729

AEI

INDEX TO ADVERTISERS IN THIS ISSUE

SUMMING UP THE STARS

Admittedly, he'd have an easier job counting the different designs in the LUNDBERG range. They may not be as numerous as the stars, but there are nearly a thousand types to choose from, satisfying every kind of switch requirement from the Tumbler to the Triple-pole switch. Every one bears the traditional mark of LUNDBERG skill and craftsmanship

See Lundbergs' accessories
'BIF' BIRMINGHAM STAND C 507
Simplex Electric Company

LUNDBERG

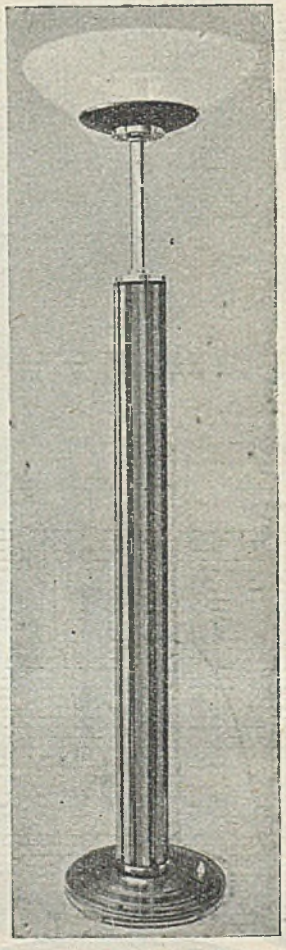
REG? TRADE MARK
LEKTRIK

A PRODUCT

A P LUNDBERG & SONS LTD. (Established 1882)
491-493 Liverpool Road London N7

WE ARE EXHIBITING THIS MODEL AT THE B.I.F. — EARLS COURT

LIST No. 611A



LIST No. 611A

'GLECO-PLASTICA' DE-LUXE CLUSTER

An attractive fitting for translucent indirect lighting. Pressel switch at base for foot operation.
Other models with varied details in construction and finish available.

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GLECO LTD.

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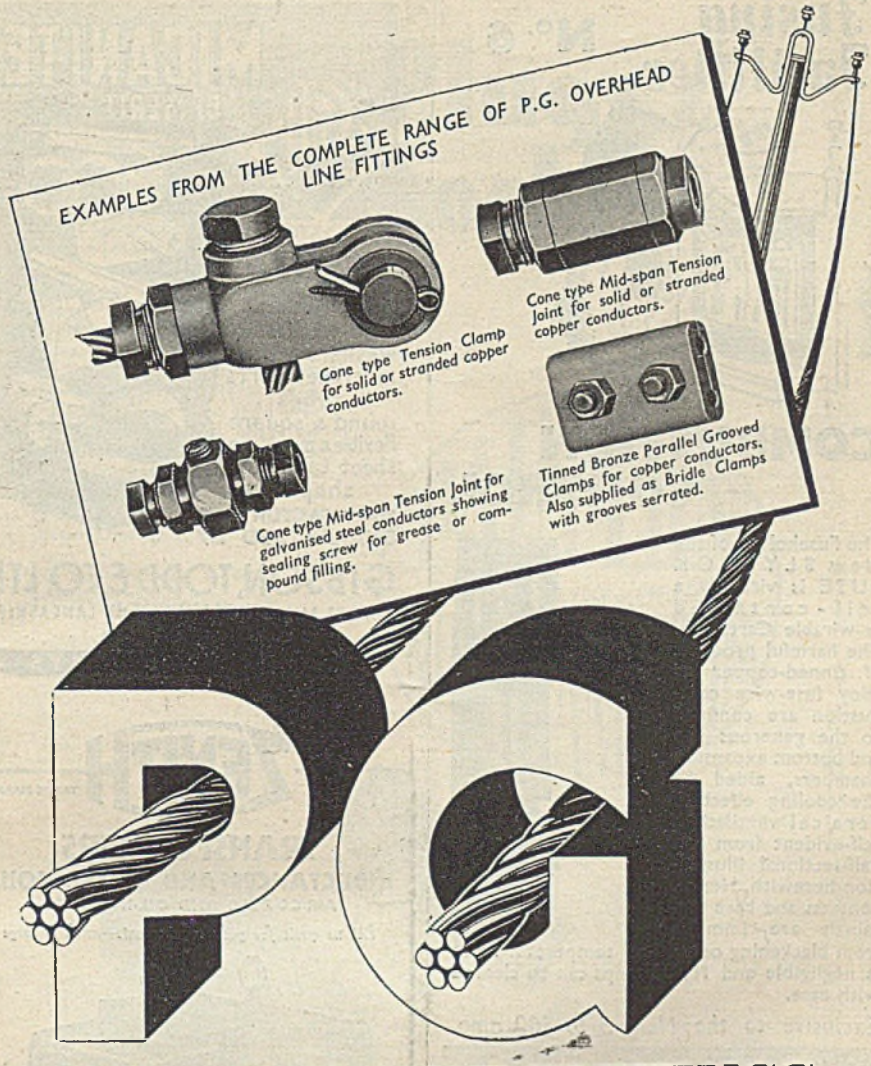
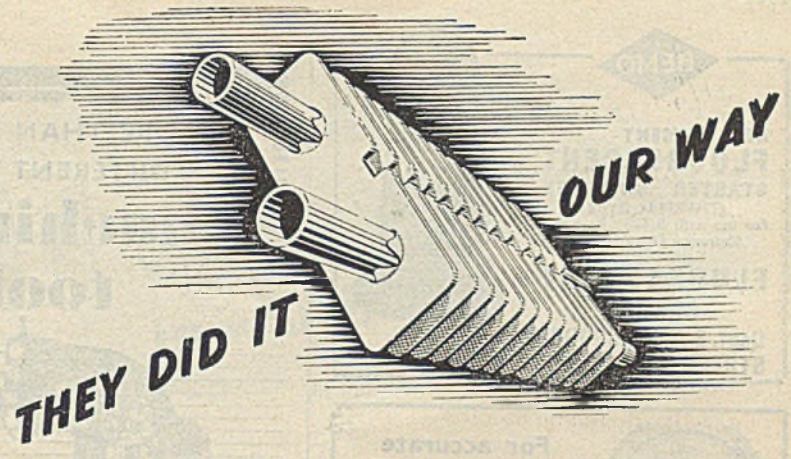


OVERHEAD LINE FITTINGS

PIRELLI-GENERAL

MANUFACTURERS OF EVERY KIND OF ELECTRIC CABLE

Advt. of Pirelli-General Cable Works Ltd., Southampton.



The article was a Copper Heat Exchanger

The Job was to sweat on the fins using a minimum of solder and man hours and without employing skilled labour.

The Method was by using Fryolux Solder Paint. This was trickled on to the tubes between the fins. The whole unit was then placed in an oven and heated and the job was done. For quantity production a special container was made having the requisite number of spaced holes from which Fryolux Solder Paint flowed on to the tubes between the fins

FRYOLUX Solder Paint

FOR TINNING AND SWEAT SOLDERING

Apply by brushing, spraying or dipping—heat by any convenient means—and the job's done.

70% SAVING IN MATERIAL

50% SAVING IN LABOUR COSTS

FRY'S METAL FOUNDRIES LTD., TANDEM WORKS, MERTON ABBEY, LONDON, S.W.19

And at MANCHESTER . GLASGOW . BRISTOL and DUBLIN

you will have

11 days

in which to visit the

BRITISH INDUSTRIES FAIR

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The 1947 Fair, open from 5-16 May, offers both Home and Overseas Buyers an unequalled opportunity of comparing the exhibits of a large number of competing firms. The immense range of products displayed at the Fair will be carefully grouped to facilitate the quick and easy comparison of prices and quality.

Once again the world-famous British Industries Fair will enable the buyer, after a lapse of seven years, to establish direct contact with his suppliers and to discuss his marketing problems in person with the actual manufacturer.

Catalogues will be available on 30th April (Price 2/6) on application to Export Promotion Department, Board of Trade, 35 Old Queen St., London, S.W.1, or the Birmingham Chamber of Commerce (Inc.) 95 New Street, Birmingham, 2.

BIF

LONDON

(Olympia & Earls Court)

Trade Buyers 9.30 a.m.-7.30 p.m.

Buyers' Badge 2/6

BIF

BIRMINGHAM

(Castle Bromwich)

Trade Buyers 10 a.m.-6 p.m.

Buyers' Badge 2/6

THE PUBLIC — Hours of admission to the Public at Olympia and Earls Court are limited for the convenience of Home and Overseas Buyers:—Monday to Fri. 4.30 p.m.—7.30 p.m. Sat. 9.30 a.m.—7.30 p.m. Birmingham Section open to the Public 10 a.m. — 6 p.m. daily. Admission 2/6.

ELECTRICAL EQUIPMENT and ACCESSORIES will be shown in Birmingham

MISCELLANEOUS ADVERTISEMENTS

TENDERS

STATE ELECTRICITY COMMISSION OF VICTORIA,
22-32, WILLIAM STREET, MELBOURNE, AUSTRALIA.

TENDERS are invited for Porcelain Disc Insulators for 220 kV Transmission Lines, in accordance with specification No. 46-47/159.

Full particulars available from Agent-General for Victoria, Victoria House, Melbourne Place, The Strand, London, W.C.2.

Tenders accompanied by preliminary deposit of £25, and endorsed "Specification No. 46-47/159," are returnable at the Commission's office, 22-32, William Street, Melbourne, by 11 a.m. on Wednesday, 4th June, 1947.

The Commission does not bind itself to accept the lowest or any tender.

W. C. PRICE,
Secretary.

SITUATIONS VACANT

COUNTY BOROUGH OF PRESTON.
ELECTRICITY UNDERTAKING.
Switchboard Attendant.

APPLICATIONS are invited for the appointment of a D.C. AUXILIARY SWITCHBOARD ATTENDANT for shift duties at Ribble Generating Station No. 1, Penwortham, Preston.

Applicants should preferably have had experience in the operation of switchgear, and it is desirable that technical education shall have reached at least Ordinary National Certificate standard.

The appointment is a permanent one and will be subject to the provisions of the Local Government Superannuation Act, 1937. Conditions of service will be in accordance with those of the National Joint Industrial Council for the Electricity Supply Industry, the present rate of pay being 31d. per hour.

Applications stating age, qualifications and giving full particulars of training and experience, accompanied by not more than two recent testimonials, and endorsed "SWITCHBOARD ATTENDANT," should be forwarded so as to reach the undersigned not later than 10th May, 1947.

G. A. ROBERTSON.
M.Sc.Tech., M.I.E.E., M.I.Mech.E.,
Borough Electrical Engineer.
40 and 41, Lune Street, PRESTON.
17th April, 1947.

UNIVERSITY OF GLASGOW.

APPLICATIONS are invited for appointment to an Assistantship in Electrical Engineering. Salary £300 to £450 according to qualifications and experience.

Applications (three copies) should be submitted to the Secretary of the University Court, The University, Glasgow, W.2, not later than 31st May, 1947.

ROBT. T. HUTCHESON,
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LECTURER in Electrical Engineering and Allied Subjects up to B.Sc. standard wanted. Commencing salary £400-£500 according to qualifications.—Apply Principal, Faraday House College, Southampton Row, W.C.1.

EXPERIENCED Male Winders for power transformer heavy winding. Write or call, giving full particulars to—The Personnel Officer, The British Electric Transformer Co. Ltd., Clayton Road, Hayes.

CONTRACTS Draughtsman required, experienced in layout and design of L.T. distribution equipment and switchfuse gear. Apply stating age, salary, experience, to—Manager, Cantie Switches, Northgate Works, Chester.

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UNIVERSITY OF LIVERPOOL.
FACULTY OF ENGINEERING.

Dean: Professor R. G. Batson, M.Eng., A.K.C., M.I.C.E., M.I.Mech.E.

PROSPECTUS and full particulars may be obtained, on application to the Registrar, of Courses designed for Students desiring to qualify as Mechanical, Electrical, Civil or Marine Engineers, as Naval Architects or as Metallurgists and Metallurgical Engineers.

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TELEPHONES, Ex-Admiralty for Ships, Mines, Factories. Handsets, Jacks and Plugs, Indicator Lamps and Jacks. 25 000 RELAYS (20 types), 150 000 yds. Sleeving, Switch Keys. Five tons Ebonite and Fibre rod, sheet and tube. 5 line Switchboards. 10 line Portable metal switchboards. Accumulator Capacity Testing sets. 5 bank Indicators and Jacks. 4 way flat and concentric Jacks and Plugs. Resistance wires, Nichrome, Cupro Nickel, Eureka and Constanton. Laminations, Interleaving Paper. Call and inspect.—Jack Davis, 30, Percy Street, London, W.1. Museum 7960.

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ONE E.C.C. Electric TRANSFORMER, 150 kVA, volts 6 300/400. One "Phillips" Welding TRANSFORMER, A.C., 18 kVA. Primary volts 200/250 or 400/450. Secondary amps. 50-350. Two "Phillips" Welding TRANSFORMER, A.C., 10 kVA. Primary volts 200/250 or 400/450. amps. 15/200. One "Phillips" welding TRANSFORMER, volts 190/440, amps. 20/175.—Offers Henry Hawkins, Ltd., Cannock, Staffs.

1—85 h.p. L.D. M. 3 Bearing Slip Ring Motor 400 volts 3 phase 50 cycles, with Control Gear.—Oldfield Engineering Company Limited, 96, East Ordsall Lane, Salford, 5.

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COMPLETELY reconditioned and equal to new. Sizes: 6 ft. by 6 ft., 16 ft. by 8 ft., 24 ft. by 12 ft., 48 ft. by 16 ft., 60 ft. by 16 ft., 8 ft. by 8 ft., 20 ft. by 12 ft., 36 ft. by 16 ft., 54 ft. by 16 ft., 72 ft. by 16 ft. No purchase licence required. Offered subject to being unsold.—D. McMaster and Co., 21c, Mount Bures Works, Bures, near Colchester, Essex. Telephone: Bures 351/3.

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7 500 EX GOVERNMENT SURPLUS Receiving and Transmitting Units. Ex Government stocks of WIRELESS RECEIVERS and components, all new. To be disposed of at a fraction of original cost. ROTARY CONVERTORS including voltage control regulator and meter fuses and spares. Enclosed in ironclad cabinets. Input 24 volts D.C. Output 230 volts 75 watts. OSCILLATOR UNITS for short wave reception. RECEIVING AND TRANSMITTING UNITS all complete with 10 to 15 valves. 24 and 12 volt MOTORS model de luxe slow motion dials, etc., etc. Many other lines for the wireless trade. Callers only.—Alec Davis, 8, Percy Street, W.1.

2—PRACTICALLY new, "Reyrolle" Type 10 CHF Variable Speed, enclosed ventilated Commutator Motors, Shunt characteristics. 5/1.67 H.P., 1 440/480 r.p.m. 400 volts 3 phase 50 cycles.—Oldfield Engineering Company Ltd., 96, East Ordsall Lane, Salford, 5.

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FLUORESCENT FITTINGS. — Trough or Flush type fitted "Constead" or Hi-Craft Ballast control gear, complete with tubes. Delivery 7/14 days. Apply:—Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Tel.: GER. 1461/2/3.

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FLUORESCENT LIGHTING.—We guarantee our Control Gear. All types including "Constead," Hi-Craft Ballast, Transtar, etc. Immediate replacement free of charge if defective in any way. Apply:—Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Tel.: GER. 1461/2/3.

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FLUORESCENT LIGHTING. — 30 watt fitting complete with self-contained control gear and 36 in. tube, £6 12s. 6d. Immediate delivery with guaranteed component and tube replacement service.—Apply Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Tel.: GER. 1461/2/3.

FLUORESCENT LIGHTING. — Write for details of our amazing OUTDOOR UNIT. Guaranteed weatherproof with rubber insulated unbreakable glass covering with 1, 2 or 3 tubes. Ideal for garages, sports stadiums, wharfs, etc.—Apply, Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Tel.: GER. 1461/2/3.

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ARC Welding set F.W.C. 250, Comp., 6 kVA Condenser. 100 and 60 amp. D.B. Pole Switch fuse, new. 2 Volspray paint outfits.—Hawkins (Byfleet) Ltd., Surrey. Byfleet 2513.

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ONE Pullin Portable Dynamometer Standard Watt Meter for D.C. and A.C. voltage range 250; two current ranges, 2.5/5 amp. Standardised on the 9th December, 1946, with qualified engineer's signature. Price £31. Inspection.—Bate Electrical Co. Ltd., 12, Brooks Mews, W.1.

DE luxe model door chimes, Protectafil shock absorbers, radio transformers and rewinds, chokes, starter switches, 2 and 3 kW immersion heaters. Send for list.—J. E. Wildbore, 26, Marlborough Street, Oldham, Lancs.

ONE 100 kW Motor Generator by General Electric Co., input 440 v., 3-ph., 50 cycles, output 220 v. D.C.; also one 70 kW Motor Generator, input 440 v., 3-ph., 50 cycles, Fuller Mfg. Co., output 460 v. D.C., B T.H. Can be seen running at—Manganese Bronze and Brass Co. Ltd., Dock Road, Birkenhead.

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3—230 volts 1 phase 50 cycles brand new Motor Driven Forge Blowers, complete with Starters, inlet 3½ in., outlet 2½ in., 10 in. w.g., 90 CFM.—Oldfield Engineering Company. Limited, 96, East Ordsall Lane, Salford, 5.

1—CANNING Motor Generator set, 400 volts 3 phase 50 cycles, output 6 volts, 3 000 amperes.—Oldfield Engineering Company, Limited, 96, East Ordsall Lane, Salford, 5.

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3 PHASE Oil Cooled Welding Transformers, 70 kVA, 415 V input, tapped star output. 192, 155, 110 V. 90 kVA, 400/173 V. With 30 kVAh condenser for P.F. correction.—John Hickton and Co. Ltd., Halesowen.

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PYROVAC All-volt Immersion Heaters, with the finest heating elements in the world. Large stocks, immediate delivery.—Cestrian Electrical Co., Northgate, Chester. 'Phone 455.

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OVER 1 000 RATINGS ACTUALLY IN STOCK HERE.

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3 in. by 3 in. by ¼ in., 6s. doz.; 3 in. by 3 in. by ⅜ in., 6s. 9d. doz.; 3½ in. by 3½ in. by ¼ in., 6s. 9d. doz.; 3½ in. by 3½ in. by ⅜ in., 7s. 6d. doz.; 6 in. by 3 in. by ¼ in., 8s. 9d. doz.; 6 in. by 3 in. by ⅜ in., 9s. 6d. doz.; 6½ in. by 3½ in. by ¼ in., 9s. 6d. doz.; 6½ in. by 3½ in. by ⅜ in., 10s. 9d. doz. Carriage paid. Crossed cheque with order.—**S.T.C. Manufacturing Co.**, 33, Grange Road, Ramsgate.

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RUBBER STAMPS can assist in many ways. Are yours satisfactory and in good condition? W. L. Boughton, maker of all kinds, 53, Kenley Road, Merton, London, S.W.19.

SUPERIOR Type Builders' Ladders now in production; also Steps, Trestles and Extension Ladders.—Phone: Shaftesbury Ladders, Ltd., 453, Katherine Road, E.7. Grangewood 3363/4.

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LEATHER FINGER STALLS.—Made of Chrome Hide. Very strong and hard wearing. Length 3 in. Price 4s. per doz. Prompt delivery. Sample on application.—Willson Brothers, Industrial Clothing Manufacturers, Epsom, Surrey.

ATLAS lamps from stock, delivery in London, Surrey, Sussex and Kent; other lines include clocks, toasters, fires, irons, kettles, fans, fittings, chargers, speakers, etc.—Drubel Radio Distributors, Ltd., 39a, Stafford Road, Croydon. Croydon 1107.

ELECTRIC MOTORS, A.C. and D.C. We supply all types and sizes of Electrical Machinery—Slow Speed Reduction Gears can be supplied to customers' requirements with short deliveries. Send your enquiries to The Electro Power Co. Ltd. (formerly Be-Be, Eng.), 3, Retreat Close, Kenton, Middlesex. Tel.: WORdsworth 4928.

JUNCTION Electric Irons, superior design and quality, supplied with suitable stand. Also Junction Nickel plated Torch Cases. Supplied for home trade and export. Also large selection of household electrical appliances, Fires, Radiators, other electric Irons, Toasters, Table Lamps, Torch cases, Dry batteries, etc. Please write for full list. —Brooks & Bohm, Ltd., 90, Victoria Street, London, S.W.1. Tele.: Vic. 9550/1441.

TIME SHEETS.—Our stock-printed Time Sheets are remarkably cheap compared with specially printed ones. On decent quality 8 in. by 10 in. paper:—100, 3s. 6d.; 500, 15s.; 1 000, £1 7s. 6d. Post Free. Send for sample.—F. H. Brown Ltd., P.O. Box 26, Burnley, Lancs.

TINNED STEEL ARMATURE BINDING WIRE.—All even numbered sizes from 16 s.w.g.-28 s.w.g. supplied from stock on 7 lb., 14 lb. or 28 lb. reels.
FREDERICK SMITH & CO. WIRE MANUFACTURERS LTD., CALEDONIA WORKS, HALIFAX.

PATENT

THE Proprietor of British Patent No. 554848 for "ELECTROTHERAPY," desires to enter into negotiations with a Firm or Firms for the sale of the patent, or for the grant of licences thereunder. Further particulars may be obtained from MARKS AND CLERK, 57 and 58, Lincoln's Inn Fields, London, W.C.2.

WANTED

WANTED.—TRANSFORMER, 200 kVA, 11 000/3 300. State maker, price and location for inspection.—Glebe Mines, Ltd., Eyam, near Sheffield.

2—400 volts 3 phase 50 cycles Slip Ring Motors, 100 and 150 h.p., speeds 500 and 750 r.p.m.—Box L.E.O., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

APPROXIMATELY 12 Admiralty pattern 500 watt, 12 or 24 volt, L.D. and C. D.C. Generators.—Oldfield Engineering Company, Ltd., 96, East Ordsall Lane, Salford, 5.

WANTED urgently in first class condition, 2 100 amp. 3 P. and N. Switch Fuses.—Langley London Ltd., 161, Borough High Street, London, S.E.1. Phone: HOP 2946 (7 lines).

4 H.P. (or larger) motor and starter wanted, 480-volt, single-phase. — G. F. Baker, Stillington, York.

CAPACITY available in perspex department for further orders of a mass production type.—T. W. Cawood and Son, Shopfitters, Doncaster.

FLUORESCENT Lighting Tubes, worn out and useless, 5 ft. and 4 ft. wanted, any quantities, 2s. 6d. each, plus carriage. Letters only to S. H. Brown, 37, Tavistock Square, W.C.1.

A.C. MOTORS, 1-100 h.p., 500-1 500 r.p.m. Any make fitted with ball and roller type bearings. Must be good machines, such as you yourselves would buy. Alternatively motors for rewinding will be considered.—Oldfield Engineering Co., Ltd., 96, East Ordsall Lane, Salford, 5.

LAMINATIONS.—Large types required in any reasonable quantities. T's and U's. Also 75's and 4A's.—Par Metal Company, Wallworth Bank, Congleton.

ELECTRICAL steel sheet or laminations of reputable make, .014 in. to .020 in. thick will be purchased for cash in any quantity by Davenset Electrical Works, Leicester.

AN unlimited number of modern A.C. motors urgently required for essential work. Highest cash prices paid for suitable units. We also want all types of motors for conversion and rewinding. Send details to Sales Dept., A. P. Watson, 104, Upper Brook Street, Manchester, 13.

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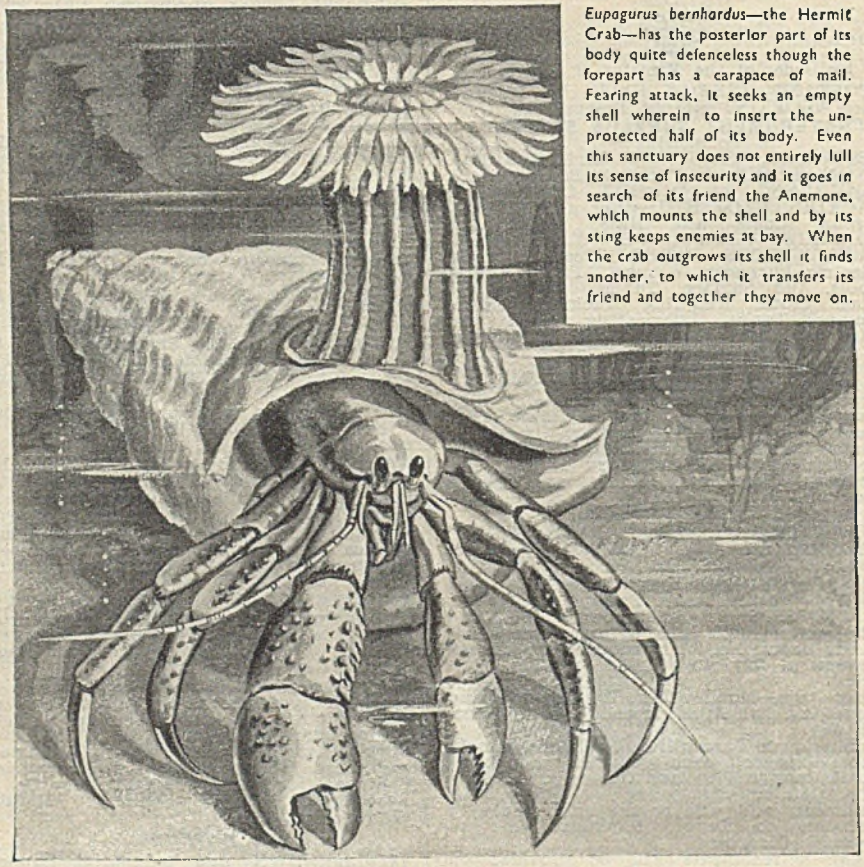

Eupagurus bernhardus—the Hermit Crab—has the posterior part of its body quite defenceless though the forepart has a carapace of mail. Fearing attack, it seeks an empty shell wherein to insert the unprotected half of its body. Even this sanctuary does not entirely lull its sense of insecurity and it goes in search of its friend the Anemone, which mounts the shell and by its sting keeps enemies at bay. When the crab outgrows its shell it finds another, to which it transfers its friend and together they move on.

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Electricity Generation

TWO reports made available this week concern the grid on the one hand and the manufacturing industry on the other, and in view of the supply conditions obtaining both warrant serious attention. It is true that the reports, namely that of the Central Board and that of the B.E.A.M.A., deal with the circumstances of 1946, but the findings published therein are a useful guide to what may be expected in the generation, plant replacement and extension field in the current year.

The Central Board report stresses the importance of the highest possible priority being given to the construction of generating stations, and points out that the uncertainties associated with the reconversion of industry to peace-time production make it difficult to form a reliable estimate of the time which will be required to re-establish the normal balance between generating capacity and demand. Experience in the eighteen months since the war ended, however, makes it apparent that several years must elapse before the position can be rectified, even if measures are taken to ensure that no obstacles are placed in the way of obtaining consent to the construction and extension of power stations, and plant manufacturers are given the fullest facilities for carrying out the work.

An indication of how the balance of generating plant and demand is worsening was given last month when despite the maintenance of domestic power cuts, the amount of current generated showed

an increase of 4.3 per cent. on the figures for March, 1946. Other indications are that the February output, which was affected by the industrial shut-down, was 6.3 per cent. above the February, 1946, level, while the increase in January, when there was considerable load shedding, was 12.8 per cent. Among the factors which brought about these increases, which were but an extension of those already recorded in the latter part of 1946, was the shortage of coal for domestic and commercial consumption, and since the prospects of any appreciable improvement in this connection are far from favourable, it is reasonable to suppose that the gap between demand and plant capacity to meet it will widen.

Generating Capacity

AT the end of 1946 the number of selected stations associated with the grid remained at the 1945 figure, namely 142, and their aggregate installed capacity was 11 588 306 kW, a net addition of 272 275 kW having been made during the year. Arrangements have been made for the construction of eighteen new stations by the winter of 1950, when an aggregate of 5 892 700 kW of new plant is due for completion, but the delays in obtaining consents to develop new sites for the stations have so far been a serious setback to the programme. Some hope has been expressed by the Board of a speed-up in the departmental planning procedure, but, as pointed out in THE ELECTRICIAN of April 4, there is as yet little evidence of realisation. A large measure of progress has been achieved in the standardisation of generating plant —both in steam conditions and sizes and designs of turbo-alternators and boilers— and, given the requisite materials and skilled labour, much of the time lost in the last eighteen months as a result of the slowness of officialdom to reach decisions, could, by such standardisation, be made good—if only it was possible to get manufacturing started in earnest.

Gas Turbines in Power Stations

THE old saw, "Necessity is the mother of invention," was exemplified over and over again during the war, and now that coal, on which the electricity supply industry of this country is almost entirely dependent, has become scarce and expensive, the need for alternative sources of energy has inspired investigations in several directions. The development of atomic energy for application to the generation of electricity holds great promise for the future, but, in the meantime, following the successful production of jet engines for aircraft propulsion and their experimental application to railway locomotion, manufacturers have turned their attention to the design of gas turbines for use in generating stations. The progress that has been made is reflected in an interesting reference to the subject in the annual report of the Central Electricity Board. "These developments," states the report, "hold promise of an important contribution to the problem of providing efficient, economical and flexible plant to deal with the short-period peak loads which occur on public electricity supply systems. The Board hope in the near future to be able to arrange for the installation of one or more machines of this type of 15 000 kW capacity." In a rapidly changing world there are already indications that "King Coal's" smoky sway over the destinies of this land is being challenged from more than one direction, and in the not too distant future will have to give way to cleaner and more powerful forces.

B.E.A.M.A. Report

THE plant position referred to earlier, is commented upon in the B.E.A.M.A. report, and with the same emphasis displayed by the Central Board, the former naming as the major requisites essential to prosperity, the production of plant for the supply industry, the provision of industrial electrical equipment for reconversion, and the manufacture in due season of greatly increased quantities of goods and machinery for export. Emphasising that the electrical industry is the nodal point in national recovery, the report states that though public notice has recently been directed to the shortage of generating plant, the fundamental shortage is of new stations, the extension, siting and construction of which must precede the increased production planned for plant and equipment generally. The manufacture of these electrical products is a long-term process and the present shortage is a direct consequence of official delays in settling sites and in the placing of orders. Another point of national importance mentioned

in the report is in reference to the fact that though the President of the Board of Trade has frequently stressed the importance of increasing exports to the hard currency countries, no recognition has been given of the difficulty in respect of electrical products as those countries have in general well-organised manufacturing industries of their own which are protected by substantial import tariffs.

Defeating Its Own Object ?

THE possibility that the reimposition of the full purchase tax on electric cookers, wash-boilers and water heaters may, instead of achieving the fuel economy aimed at, have the contrary result, is pointed out by the E.D.A. Council, who have also drawn the attention of the Chancellor of the Exchequer to the fact that the Budget proposals discriminate unfairly between varying methods of cooking and heating in that they do not apply to those using solid fuel. The greatly enhanced price of those appliances, because of the high purchase tax, declare the Council, will lead to increased capital costs of house building, which will be reflected in the rents of the houses, and, in consequence, housing authorities may be tempted not to instal such equipment. Every house built or restored must have some means whereby the occupiers can cook, wash clothes and heat water, and if those functions cannot be performed by electricity or gas, solid fuel will have to be used, causing a greater demand on the nation's limited coal supplies.

Steel and Nuclear Physics

THE inclusion of atomic energy plants in the list of steel priorities, as already announced, may well have occasioned surprise. In some quarters there will be criticism that at a time of acute shortage of metals, a special preference should be given to a consumer whose first dividends may perhaps lie in the distant future. Those most intimately connected with the British atomic energy projects have estimated the first practical contribution of nuclear physics to national power production to lie somewhere between the next five and 25 years. The steel allocations to the Government research establishments to-day, cannot, therefore, assist in the solution of the present fuel crisis. It should be remembered, however, that those countries early in the field with a commercially practicable atomic pile, both from a viewpoint of cheap power for home manufacture and as a valuable piece of equipment for the export market, will be rewarded. British prestige in the manufacture of conventional power plant is still deservedly high. If the generating stations of the future are to be uranium-fired, it will be no easy task to overhaul the American lead. But we have in this country all the scientific and engineering skill required, and the decision—whether dictated primarily by the need for an atomic bomb or a nuclear power station will make no substantial difference to the result—to stake critically needed materials on a technological gamble will be watched, on the whole, with anxious approval.

Marconi Commemorated

IN the same year that MARCONI gave the first decisive demonstration of his wireless signalling apparatus in this country, PROF. J. J. THOMSON, in the course of a Royal Institution lecture on cathode rays, delivered what is generally accepted as being the first satisfactory proof of the existence of the electron. The fiftieth anniversary of the former event has been suitably celebrated this week, first by a Government dinner, at the Guildhall, and by the opening, in London, of a MARCONI exhibition, at which much of the inventor's original equipment may be seen. The jubilee of the electron will be the subject of ceremonies later in the year. The work of both pioneers was eventually brought together, mainly by the introduction of the thermionic valve into radio engineering, but it is interesting to reflect that MARCONI, even if he heard of PROF. THOMSON'S momentous paper, would possibly have attached little importance to it. It has often been said that, had MARCONI listened to the mathematical physicists, his successful broadcast to Newfoundland would never have been made. It is equally possible that, had he paid too much attention to the newly-found electron, the development of wireless communication might have been slower.

The B.E.A.M.A. Report

Realistic Plan of Power Plant Production

AN impressive record of the achievements of the electrical industry, in spite of sustained handicaps, and of the manifold activities of the association and the work of its committees and technical sections during the year 1946-47 is given in the annual report of the Council of the British Electrical and Allied Manufacturers' Association. Extracts are given below:—

The year was for the electrical, as well as other industries, one of sustained handicaps. Shortages of materials and inconsistencies in their supply, shortage of labour, and other bottlenecks for increased production, were difficult to overcome. Nevertheless electrical manufacture made progress during the year. The numbers employed increased by 6½ per cent., with an increment in the number of men, but a decrease in the number of women workers. The industry now employs 480 000 workers, of which 160 000 are on electrical engineering, 265 000 on cables, apparatus and lamps, and 55 000 on wiring, contracting and erection.

THE FUNDAMENTAL SHORTAGE

Referring to the urgent need for power plant, the Council points out that the fundamental shortage is that of generating stations, the extension, siting and construction of which must precede the increased production planned for the plant and equipment. The manufacture of these products is a long-term process and the present shortage is a direct consequence of delays in settling the power station sites and programmes and in the placing of orders. In the year 1946 the generating plant makers produced the total of 810 MW, of which 540 MW were supplied to power stations in this country, the balance being to meet long-dated export orders from Empire and foreign territories. But for shortages in skilled labour and essential materials, the output for the year could have been virtually doubled with the facilities then available. Extensions to the works of heavy plant manufacturers are in hand and the electrical industry has a realistic plan of production to meet (as it has done successfully for years) the demand for power plant and equipment at home and abroad. With adequate supplies of labour and materials, the Council is confident that all demands can be met.

Despite delays in production caused by abnormal conditions, electrical exports in 1946 exceeded in value £50 millions, compared with £23 millions, which was the highest figure in pre-war years. Electrical goods and apparatus at £37.39 millions not only formed the bulk of our exports (74 per cent.), but showed the greater rise (178 per cent. by value) when compared with pre-war trade; electrical machinery exports, including steam generating plant and condensers, were by weight slightly below the 1938 record. More than half (55 per cent.) of U.K. electrical exports went to Empire countries, and 4.3 per cent. to "hard-currency" countries. It is particularly difficult to increase exports of electrical products to the latter, as those countries have, in general, well organised electrical manufacturing industries of their own which are protected by substantial import tariffs.

Commenting on the fact that in the Electricity Bill, the Minister of Fuel and Power is seeking powers to manufacture electrical plant and fittings, and recording the several statements of the Minister on that matter during the debates in Parliament, the Council states: ". . . . the electrical manufacturing industry does not fear any fair competition from the Central Authority, because our industry is efficient, progressive, and capable of meeting overseas as well as home demands, and can offer economic terms and experienced service that should discourage the Central Authority (as it has the electric supply undertakings) from embarking on manufacture."

TECHNICAL ACTIVITIES

The standardisation and technical activities of the association, states the report, have increased and during the year over 30 technical committees and sub-committees have been at work. The number of B.S. specifications for equipment and materials used in the electrical industry grows steadily, reflecting new developments and the need for equipment designed for particular applications. The Council's Standardisation Committee which reviews and, where necessary, co-ordinates the work of the technical committees, met regularly during the year and dealt with a variety of subjects. These are described in the report.

The Publicity Committee is engaged on the examination of plans for a comprehensive catalogue for the electrical trade.

During the year 15 new members joined the association, making a total of 335.

The Grid in 1946

NINETEENTH ANNUAL REPORT OF THE CENTRAL BOARD

THE rapid increase in the national requirements for electricity in the latter part of 1946 and the inability on certain occasions to meet the demand at times of peak load were characteristics that were not unforeseen, but both were affected by abnormal factors, state the Central Electricity Board in their nineteenth annual report published this week. The principal factor contributing to the increase in consumption was the stimulus given to the use of electricity for domestic and commercial heating by the shortage of coal. The installation by the Board of gas turbines in the near future is indicated.

The increase in the demand for electricity exceeded the capacity of the new generating plant brought into service and on 54 occasions during the year, 51 of them in the latter half, it was necessary to shed load in order to avoid widespread interruptions of supply. The amount of load shed reached a maximum of 930 000 kW on December 16, when some supplies had to be curtailed for as much as five hours. Load shedding on a greater scale and over longer periods will be unavoidable during the next two or three years, with a consequential dislocation of industrial production, unless means are adopted to spread the demand more evenly over the 24 hours. The diagram reproduced on this page shows that the major part of the advance recorded in 1946 was due to the continued expansion in the estimated sales to domestic and farm consumers. Sales to industrial consumers are estimated to have increased by only 1½ per cent. in the year.

Arrangements have been made for the construction of 18 new stations by the winter of 1950, by which date an aggregate of 5 892 700 kW of new plant is due for completion. A large measure of progress has been achieved in the standardisation of generating plant and will be extended. The Board express the earnest hope that alterations which they understand have been made in the departmental planning procedure will lead, not only to a reduction of the time taken for dealing with proposals for the erection or extension of generating stations, but also to a clearer appreciation of the place which electricity must take in any effective system of planning, its requirements in order to fill that place and the consequences which must follow if those requirements are not met.

The situation in regard to coal supplies caused the Board even greater anxiety than in previous years. Early in 1946, the Ministry of Fuel and Power decided that the stock level at the beginning of the following winter must be cut to four weeks' consumption. The Board had no doubt that such a margin would prove insufficient and warned the Ministry that widespread interference with supplies of electricity was likely to occur. By the middle of May, stocks had fallen to a minimum level of 1 046 000 tons, representing an average of two weeks' consumption in the previous winter. The rate at which stocks were replenished was much slower than in previous years and, despite some reallocation of available supplies, the maximum stock reached at the beginning of the winter was only 2 140 000 tons, as compared with 3 200 000 tons in 1945 and 3 555 000 tons in 1944.

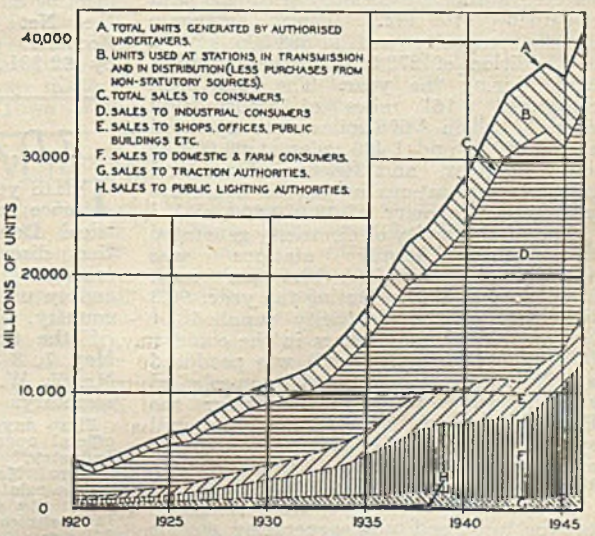


Diagram showing the development of public electricity supply in Great Britain

As a result of the flat rate increases per ton, together with the increased costs

of transport and handling charges, the average cost of fuel consumed at all the steam generating stations had risen from 20s. 3d. per ton in 1938 to 38s. 7d. in 1944, 43s. 4d. in 1945 and 45s. 3d. in 1946. A further deterioration in the quality of fuel prevented the improvement in thermal efficiency being reflected in a reduction in fuel consumption, the average for 1946 being 1.506 lbs. per unit sent out as compared with the 1938 figure of 1.430 lbs. per unit. The combined effect of the increase in the cost of fuel and the increase in consumption per unit sent out resulted in the average cost per unit sent out in 1946 being 137 per cent. above that in 1938. The pithead price per unit of heat supplied to the generating stations rose with the increasing ash content of the coal, and the freight and handling charges in respect of this inert material, together with the ash handling charges, result in an annual financial burden on the supply industry and their consumers of over £2 000 000. The loss of output capacity arising from the use of inferior and unsuitable coal on occasions exceeded 380 000 kW.

STATISTICS AND DEVELOPMENTS

At the end of the year, the number of selected stations associated with the grid remained at 142. Their aggregate installed capacity was 11 588 306 kW, a net addition of 272 275 kW having been made during the year. The grid itself comprised 5 161 miles of transmission lines, of which 3 675 miles were operated at 132 000 V and 1 486 miles at 66 000 or lower voltages, and 348 switching and transforming stations having an aggregate transformer capacity of 13 920 200 kVA.

The total quanity of electricity generated at public supply stations was 41 240 000 000 units, or 10.6 per cent. more than in 1945. During the year, 99.3 per cent. of the electricity supplied by the authorised undertakers in the country (excluding North Scotland) was produced at stations, including 46 non-selected stations, which were generating for the Board. The load factor on the grid system, based on the maximum demand actually met, rose from 45.1 per cent. in 1945 to 46.6 per cent. in 1946.

A new 132 000 V line, from Neepsend to the proposed new generating station at Staythorpe, to reinforce the connection between the Mid-East and Central England areas, is to be constructed so as to be suitable for later operation at 264 000 V. For the purpose of providing data for the design of this line and possible higher voltage development, a three-phase bank of testing transformers has been ordered and will be used to test an experimental length of overhead line designed for operation at voltages up to 400 000 V.

The successful development of gas turbines now taking place in this country, state the Board, holds promise of an important contribution to the problem of providing efficient, economical and flexible plant to deal with the short-period peak loads which occur on public electricity supply systems. They hope in the near future to be able to arrange for the installation of one or more 15 000 kW machines of this type. The Board are also keeping in close touch with the development of atomic energy for application to the generation of electricity.

The accounts show that the gross receipts from the sale of energy during the year amounted to over £95 000 000, and that the credit balance of the general purposes revenue account for the year was £6 408 080, which was less than in 1945 by £537 803. The overall cost to the electricity undertakers who received their supplies at the new grid tariff introduced at the beginning of 1946 was some 3¼ per cent. lower than would have resulted from the retention of the previous tariffs, representing a reduction in the price charged for those supplies amounting in the aggregate to approximately £585 000. After meeting all outgoings, the credit balance of the Net Revenue and Appropriation Account carried forward was raised by £2 331 397 to £11 173 128.

E.D.A. Sales Conference

THIS year's Sales Management Conference, arranged by the British Electrical Development Association, for the free discussion of practical problems amongst representatives of electricity supply undertakings from all parts of the country, will be held in the Balmoral Room of the Connaught Rooms, London, on May 7, 8 and 9. The chairman will be Mr. V. W. Dale, general manager and secretary. The programme is as follows:

First day: 9.30 a.m., registration; 10 a.m., official opening; 10.15 a.m., "This Essential Industry," an introductory talk by the General Manager opening a discussion on public relations and consumer services in the electricity supply industry; 2 p.m., "Trends in Technical Service," by Mr. J. I. Bernard; 7.15 p.m., E.D.A. films at the Gaumont British (Large) Theatre, Film House, 142, Wardour Street, W.1. Second day: 10 a.m., "Staff Training—(a) E.D.A. Facilities," Mr. J. A. Stedman; "(b) Within the Electricity Supply Industry," Mr. C. F. Wells; 2 p.m., "Electricity in Schools," Mr. S. H. Loweth; 3.30 p.m., Electric Vehicles. Third day: 10 a.m., "Showroom Design and Lay-out," Mr. C. Warrenne; 11.30 a.m., "Dairy Farming and Electricity," Mr. E. G. Quested; 12.30 p.m., conference luncheon, Connaught Rooms: 2 p.m., "Photography," Mr. W. White; 3 p.m., general discussion.

Wireless Jubilee Dinner

TRIBUTES TO MARCONI AND W. H. PREECE

THE fiftieth anniversary of the first demonstration of wireless telegraphy was commemorated by a dinner at the Guildhall, London, on Monday night.

Lord Listowel, the retiring Postmaster-General, who presided, proposed the toast of "The memory of Signor Marconi and Sir William Preece" (engineer-in-chief of the British Post Office, 1892-99). He referred to the inestimable value of wireless as a means of bringing the peoples of the world to a better understanding.

Dealing with the discovery and development of wireless communication, Lord Listowel recalled a number of early wireless experiences by Post Office engineers. In 1882 W. H. Preece (later Sir William Preece), when the cable linking the Isle of Wight with the mainland broke, successfully used the sea to maintain telegraphic communications. In 1884, in examination of faulty telephone circuits in Gray's Inn Road, London, it was found that messages transmitted along gutta percha insulated telegraph wires, carried in iron tubes beneath the road, were being read on telephone circuits carried on roof poles more than 80 ft. above the ground. To discover to what distance circuits could be separated from each other before those inductive influences ceased, Preece made a series of experiments on the Town Moor at Newcastle-on-Tyne in 1885, and in the following year on the banks of the Severn. After more experiments the Engineering Department of the Post Office set up a permanent installation in 1899 which gave telephonic communication between Anglesey and the Skerries lighthouse, a distance of three miles.

The first commercial wireless induction circuit was established in March, 1895, when the cable connecting the Island of Mull with the mainland near Oban was damaged and, pending the arrival of a cable ship, Post Office engineers set up wireless telegraph communications, using an existing overhead wire along the coast of the island for one circuit and a gutta percha insulated wire laid on the ground of the mainland. Many telegrams were thus transmitted before the cable was repaired.

Replying to the toast of "The Radio Scientists," Sir Edward Appleton, F.R.S., Secretary of the Department of Scientific and Industrial Research, said it was clear that the starting point of much of the great achievements of British radio scientists was the work of Marconi himself. Sir William Preece had played an important official part in those early days in providing Marconi with the necessary facilities and encouragement.

The Marconi Exhibition

COMMEMORATING both the Jubilee of wireless telegraphy and the founding, 50 years ago, of the Marconi company in this country, an exhibition of considerable historical interest is now being held at Queen's House, Kingsway, London, the head office of the English Electric Co., Ltd. The opening ceremony was performed on Tuesday by Sir George Nelson, and the exhibition will remain open to the public until May 2.

By means either of the original equipment or of replicas and photographs, the development of wireless communication during the past 50 years is outlined, and the earliest exhibit is of the apparatus used by Marconi during the famous Bristol channel trial of 1897, the success of which led to the adoption of wireless signalling by the Services and the Post Office.

In the field of broadcasting, a series of photographs depict the early transmitters erected at Chelmsford, Writtle and Savoy Hill, while a two-valve domestic receiver of the early 1920's is an impressive reminder of the astonishing progress made in receiver design alone within recent memory. The historical section of the exhibition ends with a reference to the pioneer work carried out by Marconi and Franklin on the short-wave beam system.

In the remainder of the exhibition, the story is brought up-to-date with a display of the company's post-war products, many of which may be seen in operation. A short-wave high-speed telephone and telegraph transmitter, made for the Royal Tour, and several communication receivers and transmitter-receivers illustrate the latest trends in the direct line of succession from the 1897 equipment.

The less closely related and newer branches of telecommunications are represented by direction finders, one of which, a large apparatus for use on aerodromes and short stations, gives visual indication of bearings on a cathode-ray tube, depth sounders, measuring instruments and a diathermy unit designed for cranial surgery. There is also a demonstration of the company's newest P.P.I. radar, intended for the Merchant Navy.

British Mine Locators

Methods of Detecting Buried Objects

IT WAS recently reported that British engineers with mine detectors were locating, with considerable success, sunken anchor buoys and small vessels in the silted up estuary of the River Seine. A highly sensitive beach-mine locator was being used, performing, within a week, a task which by ordinary methods with a diver might have taken several months. At the recent exhibition of the Physical Society, this instrument was among several for locating buried objects to be shown by the Electrical Research Association, who were responsible for their development during the war.

The problem of detecting ferrous-type objects arose in connection mainly with unexploded bombs and the clearance of beach mines in the early days of the war, and the E.R.A. began investigations in August, 1940. At the same time, parallel investigations began in other laboratories.

The principle upon which the location of magnetic objects depends is that these will cause a change in the earth's magnetic field. Theoretical investigations showed that a practical instrument would have to measure a distortion of less than 1×10^{-7} gauss per cm. in a reliable manner and in addition be robust and portable. This theoretical requirement, in fact, was never satisfied, but when the results of all the investigations were reviewed, it was agreed that the mu-metal magneto-meter developed by the E.R.A. was the type most suitable for further development. The instrument was capable of locating 250 kg. bombs at a depth of 20 ft. and was used extensively for the location of beach mines throughout the war. The locator used on the Seine, and illustrated on this page, was of this pattern.

In these magnetic locators, the field sensitive element is a length of mu-metal wire, the a.c. resistance of which varies with the field along the axis of the wire, this variation being associated with a change in skin effect of the wire with magnetic saturation. Variation of this resistance is detected by a suitable bridge circuit operating from a 1 kc/s oscillator. Each locator has two field sensitive elements, one vertically above the other, the field gradient between them being measured to give an indication of the presence of ferro-magnetic material, the earth's field being sufficiently uniform in the absence of any distorting influence.

The locator is compact, consisting only of a search unit, or probe, which contains the mu-metal elements, and a small cabinet housing the measuring bridge and its auxiliary equipment.

Equipments of this type locate only magnetic objects, but it was also necessary during the war to develop a method of locating buried non-magnetic objects, and one method employed was to use an oscillator, feeding a search coil, and an amplifier, with its input connected to a further search coil. The disposition of the coils is such that there is little or no mutual inductance in the absence of any nearby metal object. The proximity of a conductor increases the coil coupling, and this gives a signal to the operator.

A magnetic locator being used to search for sunken buoys and shipping in the River Seine

Yet another form of location developed by the E.R.A., which may have peace-time applications in the location of underground cables and geophysical prospecting of shallow formations, relies on a remote field source, an alternating field being set up over the area of the earth to be searched by means of a large loop of cable laid on the grounds in the vicinity.

The detecting equipment consists of a suitably balanced coil system and amplifier. The locator is quite insensitive to uniformly distributed magnetic bodies, such as the soil itself, but detects any discrete metallic objects, magnetic or conducting. On account of the elimination of ground effect, it has a greater range than those instruments already described and will, for example, detect a Teller mine at a depth of five feet.

The Faraday Lecture

ELECTRICITY GENERATION AND WHOLESALE DISTRIBUTION

THE Faraday Lecture of the Institution of Electrical Engineers was given before a large audience at the Central Hall, Westminster, on Monday, April 21, by Mr. J. Hacking, chief engineer of the Central Electricity Board.

Mr. Hacking pointed out, in his opening remarks, that the necessary suspension of the building of generating plant during the war meant that the shortage of such plant was likely to continue for several years, and said that some months ago the Central Electricity Board tried to foresee the position for the next few winters, realising that to meet a given peak load it was necessary to have a generating capacity 4½ per cent. above the demand. They foresaw a deficit of some 1 000 000 kW during the winter which had just passed. That did not represent the load which it was expected to be necessary to shed, because when plant became overloaded its speed tended to fall, which automatically caused a reduction in the demand; but that could not be allowed to proceed too far, because it also affected the motors driving the auxiliaries in the generating station, so that more might be lost in generation than was gained in loss of load. It was, therefore, necessary to limit the fall of speed to about 4 per cent. It was anticipated that the load to be shed would be of the order of 500 000 kW, and that the shedding would take place between 8 a.m. and noon and for 1½ hours in the afternoon. The actual conditions were very much worse; instead of the 10 million kW anticipated, the demand was nearly 11 million kW.

PROSPECTS NEXT WINTER

It had been expected that it would be necessary to shed load on many occasions during the past winter, and to shed even more load for longer periods in the winters of 1947-48 and 1948-49, and that there would be some improvement, though the position would not be entirely satisfactory, in 1949-50. That would depend on getting into commission a very large capacity of generating plant which was on order, and, in spite of the difficulties, now that the Government had decided to give the highest priority to generating plant that hope might be realised.

Load-shedding during the last winter had been on a serious scale. From January 1 to February 7, load was shed on 41 occasions on 25 different dates, all due to shortage of generating plant, not of coal, while after February 7 there was a much more serious crisis, entirely due to shortage of coal.

Since 1920 there had been a very great increase in the amount of coal used for the supply of electricity. Taking the figure of coal used for the generation of electricity sold by public supply undertakings in 1920 as 100, the figure for 1946 was 940, or 9.4 times as much. In the case of gas, over the same period the growth had been slow, being 1.6 times in 1945 that used in 1920, while in 1945 the raw coal supplied to non-industrial consumers had fallen to 65 per cent. of the 1920 value.

GREATER INDUSTRIAL DEMAND

In 1938, of the total output of electricity about 50 per cent. was used for industry and 26.5 per cent. for domestic purposes, while by 1942 the percentage used by industry and risen to 63.5, and that for domestic purposes had fallen to 22.5. This proved that electricity was far from being a luxury, and was in fact a vital factor in the national economy. Between 1938 and 1945 the industrial use of electricity went up by 50 per cent.

The Central Electricity Board had to estimate the probable future requirements of generating plant, and their estimate provided for almost doubling the load in 1960—70 000 million units, as against 35 000 million in 1945. In the six years before the war the actual output of the country doubled, so that this doubling in fifteen years was likely to prove a very conservative estimate.

Electricity demand varied widely from hour to hour, from day to day and from season to season, as well as from year to year. January 30 of this year was the day of maximum demand. The difference between cold weather load and normal weather load (which was called the " cold weather hazard ") represented some 1 800 000 kW, which was 18 per cent. of the normal weather load. That compared with a figure for 1938 of only 5.5 per cent. The cold weather hazard had grown enormously, largely due to the growth of the heating load.

In addition to having the plant available to meet the demand, it was necessary to have additional capacity to deal with break-downs, maintenance and so on. In the days before the grid, the amount of spare plant above the maximum demand was 60 per cent., but with the pooling possible as a result of the grid it had been possible to reduce that figure

to 20 per cent. If under independent operation it had been possible to reduce the spare plant to 40 per cent., that would still have represented 20 per cent. more than was at present required, and by 1950 that would have represented additional plant equivalent to 13 additional stations, each of 200 000 kW. Particularly in view of the problem of providing sites for new generating plant, that meant that the grid had made a very great contribution to the problem of generating plant, besides enabling economies to be made by concentrating generation on the more economic stations and enabling bulk supplies to be given at points remote from generating station sites. In the early days of the war there had been a very considerable shift of population and production from the South-East and East to the South-West. It would not have been possible to construct new generating plant, but by means of the grid it had been possible to transfer large blocks of power.

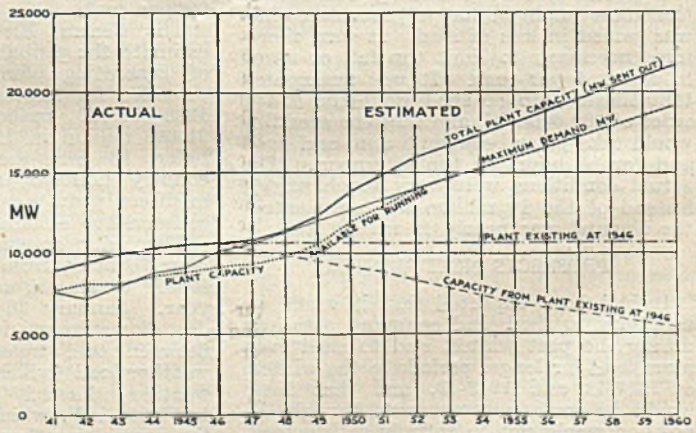
To provide the new plant necessary to meet the expected demand, and to replace plant becoming obsolescent, between now and 1960 it would be necessary to provide 17 million kW of new plant, or 1½ as much again as existed at the present time. How was this to be done? Water-power and tidal power could not help substantially. The water-power resources of this country were very small, and if fully developed would not supply more than 5 to 10 per cent. of the total requirements in 1960. It was clearly in the national interest that water and tidal power should be developed when it became convenient to do so, but they would not solve the problem.

Thermal generating stations must, therefore, be provided, and the natural fuel for thermal generating stations was coal. There was no reason to expect better efficiency with thermal stations burning oil. Taking as a basis the efficiency of the new coal-burning plant now being installed, and the present prices of coal and oil, to supply 5 per cent. of the total units estimated to be required in 1950 from stations burning oil would represent an extra cost of £1½ million per annum, involving the payment of £4½ million per annum for the fuel imported, and saving 1½ million tons of coal per annum. Provided it was available, therefore, coal was clearly the fuel to be used.

It might be suggested that, if the stations were to burn coal, they should be located on the coalfields, That would be the correct place for them if it were always cheaper to transmit electricity from a coalfield to a load centre than to transport the coal. In this country our coalfields were widely spread, and many were in close proximity to the coast. It was very much cheaper to transport the coal by sea from such coalfields to generating stations on estuaries than it was to transmit the electricity. When comparing electricity transmission with transport by rail the position was materially altered, but for the distances involved in this country it was still true in general that it was cheaper to transport the coal than to transmit the electricity.

A more fundamental requirement for the siting of generating stations was the quantity of water required. For every 100 000 kW of generating plant, it was necessary to circulate through the condensers 5½ million gals. of water per hour. Sites with this large quantity of water available were rare. The best sites were on large rivers and estuaries. Where such sites were not available it was necessary to have cooling towers, but a cooling tower station of 100 000 kW still required 1½ million gal. of water per day.

Within a radius of 12 miles from Charing Cross there was situated 20 per cent. of the total demand of the country. By 1960, assuming that all the sites likely to be available had been used, the load for



This graph, taken from a Faraday Lecture slide, shows the estimate of the minimum additional plant required by 1960

the London area was estimated to be 4 379 000 kW and the total generation available 3 815 000 kW, leaving a shortage of 564 000 kW which must be met from outside, probably from stations further down the Thames Estuary.

GAS TURBINES AT 60 MW

The development of gas turbines for aviation purposes had focused attention on the possibilty of their use in future for the generation of electricity. In Switzerland a plant of 10 000 kW was in operation, and another of 27 000 kW was fully developed. As at present being developed, the gas turbine used air as the working fluid, pumped up by an air compressor and heated by burning fuel in the air stream, the heated air being expanded through turbines. A clean fuel such as oil or gas was necessary; the development of this gas cycle for coal did not seem to be an immediate possibility, though trials were proceeding. The only cooling water required was to cool the air at different stages in the compression, and the total water requirements were not more than half those of the most efficient steam stations. A capacity of 15 000 kW was immediately practicable, and it might be possible to go up to 60 000 kW or more.

At temperatures below 1 100° F. the gas turbine would not be as efficient as the steam turbine, but there was a probability of substantial improvement when it was possible to go to higher temperatures, and there had been developments during the war of materials able to withstand these high temperatures. When making a comparison with the aeroplane, however, it must not be forgotten that an aeroplane engine ran for relatively few hours between overhauls, but for electricity generation a turbine must give efficient service over a period of 12 months. The gas turbine should be a cheaper installation than the steam turbine, and might have a use for generating stations not required to operate at a very high load factor.

The object of an electricity generating station was to convert as much of the heat in the fuel to electricity as possible, and the heat was rejected in the cooling water at a temperature of not more than 15° above the inlet temperature, which was insufficient to enable it to serve, except in a few instances, any useful purpose. With a view to improving efficiency, however, the possibility of district heating systems had been considered. It was possible to design a turbine installation to pass out heat at any desired temperature, but as one varied the temperature, so one varied the ratio betwen the electricity generated and heat supplied, and for a district heating scheme it was necessary to put an installation in for a definite ratio between those two types of output; if the actual ratio varied materially from the designed ratio, there would be relative inefficiency.

At present there was little information available as to the extent to which district heating would catch on with the public, but the probable demands for electricity were well known. There was a serious risk of inefficiency if district heating was adopted on a large scale, but the scheme had possibilities, and it was desirable that trial plants should be installed, being put in primarily for district heating, the electricity generated when meeting the heat demand being supplied to the system. A committee of the Department of Scientific and Industrial Research had been considering the matter.

There remained the question of the use of nuclear power for electricity generation. For this purpose it was necessary to rely on the fission of the isotopes of uranium and thorium, though there was a possibility that in due course energy might be liberated, not by breaking down the elements, but by the building up of light atoms into heavier atoms, as by combining hydrogen atoms to form helium atoms, which was believed to be the main source of the energy radiated by the sun. To be of any value, the nuclear action must be self-propagating, so that it was reasonable to refer to elements which had this property as nuclear fuels. Information from American reports seemed to indicate that if uranium 238 and thorium could be fully used, there should be no difficulty in meeting the power requirements of the world for several hundred years, but in this country we might have to rely on imported fuel if nuclear power became a possibility. Substantial developments were unlikely in this country for another five years, and it might be ten years before large commercial installations were available for producing nuclear power.

ECONOMICS OF ATOMIC POWER

It was estimated that the capital cost of a nuclear power station would be 2½ times the cost of a steam station, and from American estimates it would appear that there would be an equality of price with coal if coal of 13 500 B.Th.U. cost 10 dollars a ton, which would represent 47s. 8d. to 54s. 7d., according to the rate of exchange adopted, as compared with the present average price of 45s. The only conclusion was that it might in due course be possible to construct such generating stations, but that they were not likely materially to reduce the cost of generating electricity. It should be remembered also that generating costs were only about 45 per cent. of the total cost.

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. ERIC E. JONES has been appointed manager of the communications division of the Mullard Wireless Service Co., Ltd., through which will be marketed the products developed and manufactured by Electronic Transmission Equipment, Ltd., a new company formed by the Mullard Wireless Service Co., Ltd. The board of directors of E.T.E., Ltd., comprises Air-Commodore A. V. Harvey, Messrs. T. E. Goldup, N. Gunn and H. B. R. Boosman. Mr. Gunn will be the secretary of the new company.

MR. E. E. JONES

MR. R. F. BURSTON, of Greenock, has been appointed chief assistant electrical engineer with the Stockton - on - Tees Corporation.

MR. H. MOORHOUSE, as chairman, and Mr. G. Downham, as vice-chairman, have been nominated by the Committee of the I.E.E., North Midland Students' Section, for election for the 1947-48 session.

MR. C. J. BRITON (Harvey and MacNaughton, Ltd.), has been elected president, and Mr. A. O. Bruty (A. G. Bruty, Ltd.), vice-president, of the Society of Irish Electrical Traders.

MR. BERTRAM KELLY, engineer and manager of the Douglas electricity department, is retiring on superannuation, and the Council has placed on record its appreciation of the services rendered by him over a quarter of a century from the inception of the undertaking. Previously, Mr. Kelly served as chief assistant engineer with the Manx Electric Railway, and had had experience with Lowdon Bros., of Dundee; Crompton Parkinson, Ltd., at Chelmsford; the L.C.C., at Horton central station; the Hornsey electricity department: and the Midland Railway.

MISS MARGARET LOCKWOOD received a warm welcome at Perivale recently when she inaugurated a six weeks' production drive by Hoover, Ltd. She was entertained at lunch by Mr. J. A. Wykes, deputy managing director, and Mr. F. H. Bunn, director and general sales manager. Others present were Mr. W. M. Tribute, advertising and publicity manager, Mr. R. L. Webster, personnel manager, and Mr. B. H. Dyson, works manager. During a tour of the factory, Miss Lockwood showed great interest in the mechanics of electric vacuum cleaner making.

MR. L. H. J. PHILLIPS, sales manager of the radio department of the Metropolitan-Vickers Electrical Co., Ltd., who is one of the official delegation, led by Sir Robert Watson-Watt, representing the British radio industry at the forthcoming Second International Conference on Radio Aids to Marine Navigation, was among the passengers on the Queen Elizabeth on her return voyage to New York. During the war, Mr. Phillips was superintendent of the radio department of the Royal Aircraft Establishment, South Farnborough, and later Deputy Director of Communications Development at the Ministry of Aircraft Production.

MR. C. M. BECKETT has been appointed chief sales engineer of the rectifier section of the sales department at the head office in Edinburgh of Bruce Peebles and Co., Ltd. Other chief sales engineers appointed in the respective sections of the department as the result of reorganisation are: Rotating plant section, Mr. A. W. Boller (contracts), Mr. N. L. Jones (quotations); transformer section, Mr. W. M. Clark (contracts), Mr. F. S. Langham (quotations).

Chief sales engineers of Bruce Peebles and Co.—Left to right: MESSRS. C. M. BECKETT, A. W. BOLLER, N. L. JONES, W. M. CLARK *and* F. S. LANGHAM

The Ministry of Supply have announced that the reconstituted Heavy Electrical Plant Committee, under the chairmanship of Mr. John Wilmot, Minister of Supply, which is to serve as a medium for advice and co-ordination of the Ministries concerned, the two Electricity Boards and industry, and to act as a steering body for increasing and accelerating the output of heavy electric plant for home generating

stations, consists of the following members:—Mr. W. Leonard, M.P., Mr. A. Woodburn, M.P., Joint Parliamentary Secretaries, Ministry of Supply; Sir George Bailey, the Metropolitan-Vickers Electrical Co., Ltd.; Mr. John Belliss, Belliss and Morcom, Ltd.; Sir Claude Gibb, C. A. Parsons and Co., Ltd.; Sir George Nelson, the English Electric Co., Ltd.; Sir Harry Railing, the General Electric Co., Ltd.; Dr. H. Warren, the British Thomson-Houston Co., Ltd.; Mr. A. P. Good, the Brush Electrical Engineering Co., Ltd.; Sir Summers Hunter, Richardsons Westgarth and Co., Ltd.; Mr. C. A. Atchley, Harland Engineering Co., Ltd.; Mr. B. H. Leeson, British Electrical and Allied Manufacturers' Association; Mr. C. K. F. Hague, Babcock and Wilcox, Ltd.; Mr. G. H. Hopewell, Foster Wheeler, Ltd.; Mr. E. W. Thompson, John Thompson Water Tube Boilers, Ltd.; Sir George Usher, International Combustion, Ltd.; Mr. F. G. Mitchell, Mitchell Engineering, Ltd.; Mr. A. W. Bennis, Bennis Combustion, Ltd.; Mr. W. A. Woodeson, Clarke Chapman, Ltd.; Mr. K. J. McKillop, Water Tube Boiler Makers' Association; Mr. T. Kirkham, Boving and Co., Ltd.; Mr. R. B. Potter, Simon-Carves, Ltd.; Sir Mark Hodgson, United Society of Boiler Makers; Mr. F. Foulkes, Electrical Trades Union; Sir John Kennedy, Electricity Commission; Mr. J. Hacking, Central Electricity Board; and Mr. A. Fulton, North of Scotland Hydro-Electric Board. The Ministries of Fuel and Power and Labour, the Board of Trade, the Scottish Home Department and the Admiralty are also represented.

MR. JAMES FORD, chief clerk of the electricity department of the Stalybridge, Hyde, Mossley and Dukinfield Transport and Electricity Board, who died intestate, left £2 068 (net £1 616).

Obituary

COUN. ROBERT HENRY SCOTT, chairman of the Transport and Electricity Committee, of Newcastle-on-Tyne City Council since November, 1945.

MR. FRANK KILLEEN, shift charge engineer at the Chamber Hall power Station, Bury, Lancs, where he had been employed for over 30 years, aged 56 years. He served his apprenticeship at the Rochdale power station, and went to Bury at the beginning of the 1914-18 war. Mr. Killeen was a keen member of the Manchester branch of the Electric Power Engineers' Association from its inception, and was a past chairman.

Presentation to Mr. V. Watlington

AT the conclusion of the business at the annual meeting of the British Electrical and Allied Manufacturers' Association, on April 17, the retiring chairman, Mr. E. C. Holroyde, made a presentation to Mr. V. Watlington, the late director, and Mrs. Watlington. The gift took the form of a cheque subscribed to by the members in token of their appreciation of Mr. Watlington's valued services.

MR. V. WATLINGTON

The chairman said Mr. Watlington had retired from the directorship of the association after having been connected with it for over 35 years, during fourteen of which he served as director. Prior to that he was chairman and a member of the Council. They all know something of the very fine work he had done for the association and the industry. His activities had extended in many directions. He had taken much interest in the work of the I.E.E., the British Standards Institution, the E.R.A., F.B.I., F.T.C., and the E.I.B.A., and many others. All those bodies had greatly benefited by his efforts. He also did much to assist in the development of overseas trade, and was one of the best known figures in the electrical world. During the war the organisation of B.E.A.M.A. was used extensively by Government departments, and much of the extra work fell upon Mr. Watlington, whose personal services were also called upon in an advisory capacity. At the same time he served on many Government committees. By his tactful handling of many delicate situations he had brought about co-operation when it seemed impossible, and at all times his leadership and encouragement had been an inspiration to them all. They were very glad that he was now one of their vice-presidents, and that they would be able to call on his services and assistance when required. His success in life had been greatly helped by Mrs. Watlington, and they were very pleased indeed to have her with them that day.

Mr. Watlington, in acknowledgment, said he had had a very interesting time with the B.E.A.M.A. It was the kind of work he liked and he had enjoyed it. He thanked the members for the cheque, and said Mrs. Watlington and he had decided to go for a month's holiday in Switzerland.

Mrs. Watlington also expressed her thanks for a bouquet.

Book Reviews

Calculating Machines. By Prof. D. R. HARTREE, F.R.S. (Cambridge: The University Press.) Pp. 40, with two plates. Price 2s. net.

It is agreed that the impact upon complex mathematical problems of such calculating devices as the ENIAC, in which a combination of mechanism with the almost instantaneous response of the thermionic valve permits simple multiplications to be carried out at the rate of one million per hour, and more difficult operations pro rata, will be considerable. Prof. Hartree, who has used the ENIAC in the U.S.A., is one of the foremost authorities on such devices, and this booklet is a transcript of his inaugural lecture, as Plummer Professor of Mathematical Physics, at Cambridge last year. He describes the American machine, outlining its scope and limitations, and discusses shortly the requirements of future electronic calculators, of which two are now being built in this country. Finally, he speculates on possible changes, brought about by these machines, in our approach to physical problems. The particular suitability of the calculators to handle integral equations may, he thinks, wean physicists from their present tendency to regard a differential equation as the basic way of formulating problems and instead to look at the phenomenon as a whole.

Electric Motors and Generators. (London: Odhams Press, Ltd.) Pp. 384. Price 9s. 6d.

It is the lot of most electrical engineers to enter some branch of their business or profession fairly early in life, and to remain in that section for good. Whilst they acquire much knowledge of their own line, they invariably forget almost all they learnt about the other branches of applied science. Those who have not kept fresh their knowledge of electrical machinery cannot do better than acquire this book. It is the work of several experts, not of a single author, and is very suitable for all who wish to "brush up" their knowledge. It contains just the right amount of mathematics for those who do not aspire to be designers and presents it in a simple way. In dealing with specific points it may be appropriate to suggest that it would have been better to have omitted the classical use of the term "armature," in applying it to the stator of an a.c. generator—see page 43. Old students will no doubt remember this classical definition, but it is never used in the practical world, where a stator is known only as the fixed part of an a.c. machine, and an armature as the rotating part of a d.c. machine. Chapter 4 contains some very clear definitions of the various parts of armature and rotor windings, and all the chapters on windings are very useful. On the subject of power house cleanliness (page 125), the authors must have been fortunate if they have always found them clean. The writer's experience has generally been that they are ideal places for the collection of a particularly abrasive type of grit, especially if powdered fuel is used. It is a pity that some of the illustrations were not presented in half-tones, as a few of these would have enhanced the appearance of the book. No doubt this reign of austerity, not the publisher, is responsible. All the diagrams and drawings are well reproduced, and the reader soon becomes accustomed to meeting this type of illustration on almost every page.

P.T. on Essential Appliances

THE Council of the British Electrical Development Association, at their April meeting, unanimously agreed to ask the Chancellor of the Exchequer to remove the purchase tax from electric cookers, wash-boilers and water heaters. In his letter to Mr. Dalton, Mr. V. W. Dale, general manager and secretary of the association, pointed out that the Budget proposals discriminate unfairly between varying methods of cooking and heating inasmuch as they do not apply to solid fuel appliances. The E.D.A. Council are of the opinion that the greatly increased purchase tax will have a harmful effect on the national housing programme. Because of their inclusion in the Government's temporary houses, cookers, wash-boilers and water heaters are now regarded as standard equipment for a modern home, and the increased price of those appliances due to the high purchase tax would lead to increased house-building capital costs which would be reflected in higher rents chargeable to the tenants. If housing authorities were tempted not to instal the appliances, the tenants, the majority of whom were in the low wage-earning group, would be forced to buy the apparatus at prices well beyond their capacity to pay. The purchase tax on those essential articles would not achieve fuel economy, for houses built or restored must have some means whereby the occupiers could cook, wash clothes and heat water, and if this could not be done by electricity or gas, then solid fuels would have to be used, causing a still greater demand on the nation's limited coal supplies.

The Spur of Security?

By Sir Ernest Benn

IN a period of war there is no unemployment and yet people put their best legs forward and production on the highest level is, in fact, achieved. From that unquestioned experience it is argued that a similar freedom from the risk of unemployment should induce in time of peace, a similar willingness to work; the theory is that the desire to serve is no less sincere in peace than in war and can be encouraged, fostered and cultivated without the help of such penalties for failure as have hitherto been thought to be essential. Necessity is no longer regarded as the mother of invention, well paid organised research is recommended as giving a better assurance of progress and improvement; the fear of want as a spur to effort is looked back upon as perhaps the worst of the evils of the bad old days. Now, such fear having been removed—on paper—Parliament is busy eliminating other minor objections to the old system such as private ownership and personal profit.

PRODUCTION HALVED

No social reformer, however enthusiastic, will argue that these arrangements have enhanced the effectiveness of labour or that, in consequence of them, the rate or quality of production has improved. On the contrary social reformers, of all shades of opinion, are now constrained to admit that, whatever good may have come from their endeavour to relieve the worker of the natural risks of his position, it is the fact that the product of the man-hour has been for these and other reasons, reduced by half. All parties are at one in proclaiming the need for production and all are alarmed at the obstinate strength of the tendency in the opposite direction.

Trade union restrictions, designed to spread the work over more men and longer periods, have always ignored the fact that production is the only source of purchasing power. In order to safeguard the immediate position of the individual worker they have deliberately encouraged the inflationary evil of less work for more money and sacrificed the community to the supposed interests of a single class. On the outbreak of war this attitude was abandoned in favour of national service, but has now been resumed and intensified. Some justification is to be found in industries where, from lack of materials, full production is impossible; with less than half the paper on which to print, the printer would be more than human if he over-strained himself, and this applies to all those industries that are short of coal and other essentials. That it is wrong, that it puts up prices and speeds inflation is not denied; but habits are stubborn things and provide, for the moment, the complete answer to the argument that the service of the public can be a satisfactory substitute for private gain and will supply the stimulus to effort hitherto provided by the fear of poverty and want.

These special and, as we hope, passing difficulties are absent from at least two clearly defined branches of work and need where no obstacle bars the path to the perfection of the socialist ideal. The nation is in desperate straits for coal and houses. Coal mining has been purged of everything to which the miners' union has ever objected. Royalties, profits, private ownership, capitalistic management, one after the other, have been sacrificed on the altar of " production for use and not for profit," and each concession made to the fetish has simply whetted the appetite for more, until the nation is reduced to acceptance of the pledge of a Communist that the present inadequate production will be maintained by adopting the five-day week. No less disappointing is the final proof that building labour cares nothing for the homeless and is willing to grind the faces of the poor more thoroughly than any of the old fashioned tyrants.

TRADE UNION ALARM

Other trade unionists are beginning to show alarm. The President of the Clerical and Administrative Workers' Union, Mr. R. E. Scouller, at the conference at Bridlington declared: " The really important factor is the lower output of the men employed, who appear to think they are getting their revenge on profiteering employers for generations of ill-treatment. Removal of the fear of unemployment meant that some other incentive must be found to induce men to give of their best and it has not yet been found. An enormous increase in output is easily possible and is completely necessary if we are to get back even to the pre-war rate of house building."

So, through much travail, we must come to the conclusion that there is no spur in security. Of course some measure of security is obtainable by sections at the cost of all the rest, but when, as now, all seek security there is " no rest " on whom to put the cost, and all alike are brought to poverty, hunger and bankruptcy.

The B.E.A.M.A. Annual Meeting

ELECTION OF CHAIRMAN AND MEMBERS OF COUNCIL

THE thirty-sixth annual meeting of the British Electrical and Allied Manufacturers' Association was held at the Connaught Rooms, London, on Thursday, April 17, Mr. E. C. Holroyde, chairman of the Council, presiding.

The Chairman referred to the retirement last year of Mr. V. Watlington from the position of director of the association. Mr. Watlington, he said, had been associated with that body for over 35 years and became a member of the B.E.A.M.A. Council in 1925. In 1929 he was elected to the chair, and held that office for three years when he was appointed director. He brought to the association a fund of knowledge and experience, and did splendid work for that and allied associations. His advice and assistance would be available to the association for, he hoped, many years to come. In recognition of his outstanding services to the association and to the electrical industry, Mr. Watlington had been elected a vice-president of the association.

Mr. B. H. Leeson, the new director, was well equipped for the position, and they all wished him a most successful, pleasant and lengthy period of office, and assured him of their wholehearted support.

Since the last annual meeting, industry had had a very difficult time and they are still beset by many problems. The Council had seized every opportunity of making representations to the Government on matters adversely affecting their industry, and they felt that some good had resulted. The recent crisis was a serious setback and a great effort was necessary to recover the position.

WORK OF EXPORT DEPARTMENT

Referring to the setting up of an export promotion department of B.E.A.M.A., under Mr. Buist's direction, to assist in the development of the export trade in connection with the industry, the Chairman said that it was intended that, with the approval of the Board of Trade, the department should take over the functions of the electrical industry export groups.

He also referred to the work that had been done during the year in connection with the Control Commission for Germany, some 16 teams having been sent out through the association to investigate factories in Germany; to the work which had been done by the association in connection with trade negotiations with various countries; and to the work of the Contract Conditions Committee, which had been most valuable to members; and to that of the sections and their technical committees.

The Chairman announced the names of the newly elected members of the Council for the session 1947-48 as follows:—W. H. Allen, Sons and Co., Ltd.; the British Thomson-Houston Co., Ltd.; Brookhirst Switchgear, Ltd.; Elliott Bros. (London), Ltd.; Ferranti, Ltd.; the General Electric Co., Ltd.; Hick, Hargreaves and Co., Ltd.; and Micanite and Insulators Co., Ltd.

At the subsequent meeting of the Council, Sir George Nelson, chairman and managing director of the English Electric Co., Ltd., and Mr. E. C. Holroyde, vice-chairman of Crompton Parkinson, Ltd., were unanimously elected chairman and vice-chairman respectively.

THE NEW CHAIRMAN

Sir George Nelson is a vice-president of the association and has been a member of the Council since 1932. He was knighted in 1943 in recognition of his public services. Amongst those activities, he has been a member of the Government's Committee on Higher Education, a member of the Advisory Council of the Board of Trade, and a member of the Heavy Bomber Group Committee of the Air Ministry from 1939 onwards. He was chairman of the United Kingdom Tank Mission to America and Canada in 1942; in 1943 he became a member of the Reconstruction Joint Advisory Council and he was Chairman of the Government's Census of Production Committee in 1945. In the same year he assisted in the deliberations of the Government Committee on Future Scientific Policy. He was President of the Federation of British Industries in 1943-45. Sir George, whose own academic career was exceptional, has been a member of the I.E.E. from the earliest possible age, and later of the I.Mech.E., on whose Council he has sat since 1943. He has been a member of the governing body of Queen Mary's College of the University of London since 1945 and also of the General and Executive Boards of the National Physical Laboratory. He is president of the Union of Educational Institutions for 1946-47, and has been a member of the City and Guilds of London Institute, assisting its Council in the Executive and Technological Committees. In 1946 he was the first British industrialist to visit Russia after the war to re-open normal trade channels.

Sir George is also chairman of Marconi's Wireless Telegraph Co., of D. Napier and Son, Ltd., and of the Power and Traction Finance Company.

Military Generating Plant

Meeting Special Requirements of Services

THE war-time design and production of small generating sets for the Services was dealt with in a paper on "Generating Plant for Military Equipment," delivered before the Installations Section of the I.E.E., on April 17, by Mr. K. H. Tuson.

The military engineer, Mr. Tuson began, could offer no accounts of mammoth power stations or super high-voltage transmission lines, and in the field of armaments, few individual pieces of equipment required more than 20 kW. There were, however, many points of interest in the small power plants that had been evolved, and much work was done to co-ordinate varying requirements so that the same type of set could be used for different purposes by various arms of the Service.

Between 1939 and 1945, a total of 122 000 generating sets, with a combined output of 1 196 630 H.P., was made in this country. The essential requirements of most of these were robustness, compactness and light weight, interchangeability of parts and simplicity of operation. They had, in addition, to be capable of running continuously at the full rated loads—because that might at any time be necessary under service conditions—and, if possible, at temperatures from −40° F. to 130° F.

Mr. Tuson then described the individual requirements of sets for battery charging, searchlights, radar, and other kinds of fire control equipment, and the power controlling of batteries of heavy A.A. guns, as well as the necessity for careful screening. Some interesting details were given of the power systems employed on the estuary anti-aircraft forts, and various design difficulties were mentioned. Early experiences with American mobile generators, Mr. Tuson said, were not good, but towards the end of the war American sets of high quality were being supplied.

There had been two major errors of policy, the author thought, in the war-time production of military generators. One was the absence, in 1939, of reasonable specifications for generating plant, which gave heed to the necessities of large-scale and rapid production. The other was the failure to find or create new production capacity, or to develop new types of engines for stationary purposes until several years had passed.

COLONEL W. G. FRYER (War Office), who opened the discussion, said that the difficulties experienced with generating plant of the type in question were almost entirely mechanical; the electrical side was very adequate. In the future, not more than five to ten per cent. of any unit could be employed on maintenance, so that as more and more equipment was provided the same maintenance effort had to be spread over a wider field. The only way out was to provide equipment having a longer life, and in future it might be necessary to ask for a life of, say, 5 000 hours before major overhaul. The general opinion at the moment was that military plant ought with very little adaptation to be able to work at temperatures, ranging from −50° F. to 160° F.

MR. H. NIMMO (Electricity Commission) agreed with the author that it was necessary to co-ordinate varying requirements so that the same generating set could be used for different purposes by many arms of the Service, but said that from the paper it would appear that very little progress had been made in that direction. In November, 1939, he (Mr. Nimmo) went to France to advise on the provision of power for R.E. and other workshops, etc., and recommended that to ensure supplies mobile Diesel-driven generating sets should be employed. Eight 300 kW 400/230 V 50 cycles sets built on railway trucks were ordered at once, and some forty eventually were supplied to the War Office. Each was fitted with a transformer, so that if a supply was wanted a few miles from where the generating set happened to be it was possible to step up from 400 V to 11 000 V and run a line to where it was required. He was told that those sets had been a great success, at home and abroad.

BRIG. F. H. MACLENNAN (C.I.E.M.E.) pointed out that one difficulty which faced the Ministry of Supply in trying to provide engines with an assured life was that of fuel. In the middle of the war they were suddenly confronted with the necessity to use leaded petrol, which led to valve and other troubles. The oil engine technical section in his inspectorate had for some time, however, been carrying out tests on an engine which had a designed backlash in the valve gear and certain special parts in the valve mechanism which caused the valve to rotate each time it was lifted. Surprisingly good results were being obtained, and if leaded petrol continued to be used, that might do something to ensure longer life.

MR. I. O. HOCKMEYER (Ministry of Supply), speaking as one who at the

M.A.P. during the war had something to do with the design and development of a very similar range of sets used by the R.A.F., said he did not think that the method of screening to deal with radio interference laid down in B.S. 833 would be adequate for R.A.F. use; they had completely to screen any part which contained a source of interference, and then provide filters between the completely-screened part and the outgoing circuits. He did not agree that voltage regulators were particularly susceptible to temperature change; they could be temperature-compensated, and the R.A.F. had had no difficulty in that connection. Latterly they had specified the carbon-pile type of regulator, which was simpler from the point of view of radio interference suppression, the vibrating contact type having to be totally enclosed and provided with filters.

MR. A. N. D. KERR, who had had first-hand experience during the war with some of the plant in question, said that only those who had actually seen equipment handled in war could realise the astonishing ill-use which it suffered, which made robustness even more important than light weight. The difficulties on the mechanical side had been far greater than on the electrical. He hoped that if equipment was needed in future for similar duties, more attention would be paid in design to the actual requirements of users.

MR. G. A. MAUNSELL (Consulting Civil Engineer) gave a little of the inside history of the forts provided in the Thames estuary. In 1940, the military authorities felt it desirable to have some forts across the mouth of the estuary, but came to the conclusion that they would be too costly and take too long to construct. At about that time, however, his proposal came before them for ready-made forts, built in harbour and taken out complete to the last detail, and this was adopted. As soon as the decision was reached, all the Service experts began to spread themselves, one asking for one kind of radar and one for another, and so on. The effect was to double the capacity of the forts, and the electrical side was particularly complicated, with different voltages and different frequencies.

MR. T. G. MARTIN said that the balance to be struck between the robustness required for active service conditions and the compactness necessary for weight saving had always been a major problem to designers, but he thought that in future military requirements air-borne service would be more prominent than hitherto, and that more attention would have to be paid to compactness and saving weight than to the rugged characteristics of so much military equipment of the past. Reference was made in the paper to the need for very steady voltage and frequency conditions for predictor equipment, and he suggested that constant voltage transformers might find a ready application there. He was not in sympathy with standardisation of 230 V supply, because he believed that the evidence possessed by the Home Office Factory Inspectorate showed that a 400 V supply was hardly any more dangerous, and it would seem wiser to standardise on the higher voltage to save copper. Concluding on a human note, he said that in spite of all the fine machinery available, it was the man who could produce volts and amperes out of a hat at a critical moment who often made the most valuable contribution, and on such occasions as this one realised that the tradesman-soldier was the salt of the Army.

MR. COLLINS, from first-hand experience, suggested that many of the troubles experienced were due to lack of time for proper development. That the need for co-ordinating development and standardising design was now well recognised, he said, was indicated by the number of inter-Service committees now at work on the general question. Personally, he felt that the setting up of a single central authority to develop generating sets of the type in question would be an advantage.

MR. G. H. MANN, speaking as a manufacturer, emphasised that when war broke out the sudden and very large demand for small alternators and generators of all kinds was something new for the manufacturers, and it was a very big task to provide sets with all the virtues demanded of them in the difficult conditions which prevailed. It was essential not to be caught napping again, and experience showed that prototypes were needed which could be properly tested under all conditions before bulk production was required.

Replying to the discussion, Mr. K. H. Tuson referred to the enormous temperature range for which Col. Fryer had asked, and said it had been and would continue to be a subject of controversy whether to produce one article which could be used everywhere or save in production capacity and design difficulties by facing the extra complication of having two sets, one of which would be used only in temperate climates. He agreed that co-ordination between the Services had been inadequate during the war. Whether greater standardisation could be expected in future would largely depend on whether the suggestion made by Mr. Collins for a single central authority was adopted.

Irish Electricity Supply System

Interesting Features and Operation Discussed

POINTS of contrast between the Irish and British practice were discussed at a meeting of the I.E.E. Transmission Section on April 16, when a paper entitled "Record of Experience on the Irish Electricity Supply System," by Messrs. A. Burke, R. C. Cuffe and W. O'Neill, was read.

The Irish Electricity Supply Board, operating since 1929, generates power in hydro and fuel stations and delivers it to the consumers' terminals. The paper dealt with the more important or interesting features of the system and of its operation, having particular regard to possible differences in practice compared with the system in Great Britain. Sufficient particulars of the plant were given to enable the subsequent information on operation, performance and maintenance to be appreciated. Arc-suppression plant has been extensively used and experience has been obtained of a wide variety of types of transformer and of switch and control gear. Overhead lines and underground cables were dealt with and some fault statistics were given.

MR. H. WILLOT-TAYLOR (Edmundsons) said that many of the practices adopted in Ireland conformed very closely with those used by the companies with whom he was connected. He was pleased to find that Petersen coils were being used satisfactorily and increasingly in Ireland, even up to 110 kV. His own companies had now upwards of 40 in use, at up to 66 kV. He was also glad to find that in Ireland the coil was utilised to the full; i.e., they did not instal short-circuiting switches. Some of those concerned had recently discussed with the Commissioners and the Post Office authorities here whether the present wording of the Commissioners' consent could not be altered somewhat to make it clear that they did not insist, as some people supposed, on a short-circuiting switch being installed. As a result, they felt that utilising the coil to the full extent was justifiable, and it was nice to find that in Ireland this had been done for 17 years without an accident. With regard to cables, on a system employing Petersen coils some people felt that unearthed type cable should be installed, but it was their own experience that cable designed to withstand the normal surges with an adequate factor of safety on an earthed system could stand the 70 per cent. extra voltage which it got occasionally without any deterioration. He did not like the side-groove pin-insulator binding used on their 10-kV lines in Ireland. The stirrup-type binding in B.S. 1320 was, he thought, very much better, and if ever the authors used steel-cored aluminium conductors they would be well advised not to use the side-groove binding, or they would have vibration troubles. One area which his corporation took over was completely equipped with steel-cored aluminium with side binding, and they had had to re-equip the whole area with stirrup-type binding with aluminium stirrups, which overcame the trouble completely. He sympathised with the authors in having 28 000 spring-ring insulators still left on their system. There might not have been much trouble with them so far, but they had now been in for ten years, which was about the time when trouble started.

MR. C. W. MARSHALL (C.E.B.), dealing with points of contrast between the Irish and British systems, said the most striking concerned the neutral earthing. At the time of the design of the grid, the choice of solid earthing was dictated primarily by cost; it would have cost about £1 000 000 more to have Petersen coil earthing, and the authorities preferred to stick to the £1 000 000. With the scanty experience then available of high voltage systems, had Petersen coil earthing been adopted there might have been some real fun when the grid began. Even with direct earthing of the neutral, the neutrals on the 132 kV system flashed over with great violence and frequency in industrial areas and in the Thames estuary, and with Petersen coil earthing he felt sure there would have been the additional complication of tipping up the voltage and flashing over everywhere. He thought, therefore, that there must be some upper limit for the use of Petersen coils. Another point of difference was that Ireland had transformers coming from a large number of countries. It would be of great interest if the weight of transformers of similar capacity per kVA could be tabled, to see whether there was any big difference between the designs of different countries from that point of view, particularly in the case of Swedish transformers, in view of the alleged great superiority of Swedish transformer steel.

MR. P. K. DAVIS (Northmet) said that the Irish Electricity Supply Board seemed to be less circumscribed than we were in this country by regulations governing the

design of overhead lines, and if so they were fortunate, provided their standards of reliability and safety were similar to those in this country. It would appear from the paper that higher tensions and corresponding lower factors of safety than 2.5 had been adopted in Ireland, on the assumption that a similar basis of loading was adopted in both cases. The fact that special cradles at Post Office crossings were unnecessary in view of the reduction in conductor tension by one half meant that the cost of such crossings would be considerably reduced, and they should be more sightly. It was interesting to hear that the unearthed form of construction had been adopted in Ireland for all wood poles other than those on which switches or transformers were mounted. This was in accordance with the practice now standardised for light 11 kV lines in this country by B.S. 1320. The result of the systematic examination of wood poles in Ireland lent emphasis to the need for creosoting the poles adequately. The injection of sodium fluoride and sodium dinitrophenol required a certain admixture of faith as well, since some time must elapse before the complete usefulness of such treatment became apparent.

MR. P. B. FROST (Post Office), referring to the damage (mentioned in the paper) caused to underground P.O. cables by double earth faults on overhead power lines, said that the authors' remedy of interposing a transformer in the telephone line, while it protected the line and the plant in the exchanges from damage, increased the difficulty of operation considerably, because it was not easy to get signals through the transformer without considerable loss, and it added greatly to the problem of insulation tests on the line. The method adopted by the British Post Office when telephone lines had to be taken into large power, or transformer, stations, where the voltage was high enough and the power great enough to cause big local rises of earth potential, was to use a lead-sheathed cable covered by a special insulating compound, a rubber-wax mixture which gave a big breakdown value between the ground and the lead sheath. That had been used for about twenty years without trouble. The Post Office realised that the inevitable neglect during the war years had led to the piling up of a great deal of trouble in the form of poles requiring renewal. They were facing that by a special series of very careful inspections by trained people over all routes likely to be affected. The cost of replacing poles would be considerable, and at present they were difficult to obtain.

MR. F. J. LANE (C.E.B.), commenting on figures given in the paper for circuit-breaker trippings on faults over a period of six years, said that the percentage of correct trippings (88.8 for 10 kV, and 93-94 for higher voltages) corresponded closely to the figures for the grid, which was a little surprising; it was usual for supply authorities to claim percentages in the region of 99.9. The authors referred to the question of current transformer accuracy for impedance protection. In B.S. 81 (1936) the over-current factor related only to the thermal rating of the current transformer, and it had been realised for some time that something more was necessary for accuracy at heavy current ratings. A new specification was at present almost drafted, so that that position would shortly be rectified.

Mr. DAVIDSON (C.E.B.) pointed out that although previous speakers had welcomed the idea of crossing Post Office wires by reducing the tension, on high-voltage steel-tower lines it would be a very expensive method of making such a crossing. It would be necessary to put a terminal tower on each side, and that would mean considerable additional cost, and might be rather worse than what had to be faced at present.

MR. E. T. NORRIS (Ferranti) said that the special feature of the transformers used in Ireland, as compared with practice in this country, was the very large tap range. The authors mentioned a range of ± 25 per cent. in 23 steps. This brought the tap-changing gear from being an incidental feature of the design to being almost a controlling feature, and was probably due to the relatively long distances, for the powers transmitted, in Ireland. If that was so it was somewhat fortunate, because if such large ranges of tap-change gear were required under conditions of very large power concentrations, as on some parts of the grid, it would be a very different proposition.

MR. J. ANDREW LEE (chairman of the Section) said that the C.E.B.'s experience of spring-ring insulators was akin to that of Mr. Willot-Taylor. They had nearly completed the elimination of all the original spring-ring type insulators, and he thought that the rest would go in due course.

MR. R. C. CUFFE, replying to the discussion, described the method used to inject the wood poles with anti-fungus solution. As to the comparative weights per kVA of transformers from different countries, there were considerable variations between the products of different makers in the same country, but there was no doubt that the figures obtained from America in recent years were far in advance of almost anything else.

Industrial Information

Contract Price Adjustment Formulæ

The B.E.A.M.A. announce that for purposes of calculating variations in (a) "Rates of Pay"—the rate of pay for adult male labour at April 12, 1947, shall be deemed to be 110s.; (b) "Costs of Material"—the index figure for Intermediate Products last published by the Board of Trade on April 12 in 213.0 and is the figure for the month of March, 1947.

Lighting a Chemical Laboratory

The chief problem for the lighting department of the British Thomson-Houston Co., Ltd., when engaged in planning the installation for the chemical laboratory extension of the University College, Southampton, was to provide a reasonably shadow free illumination on the laboratory benches with particular regard to the illumination of apparatus having graduations on vertical surfaces. It was decided that fluorescent lamps would provide, most efficiently, the kind of lighting required and forty-three Mazdalux fittings have been installed in the laboratory and adjacent lecture rooms. A feature of this installation is the mounting of the light sources over the gangways between the benches rather than over the benches. This gives more effective illumination. The installation work was carried out by F. W. Cook and Co. (Southampton), Ltd.

View of chemical laboratory extension, University College, Southampton, lighted with Mazda fluorescent lamps

E.A.W. N.E. Branches

More than 200 members from the North-Eastern branches of the E.A.W. and friends, attended a luncheon at the Maison-de-Danse, Stockton, arranged by the Stockton branch, and addressed by the director, Miss Haslett. The Mayors and Mayoresses of Stockton and Thornaby were guests, and the Mayor of Thornaby, Alderman Shepherd, moved a vote of thanks to Miss Haslett. Mrs. Claxton Hudson presided.

Engineering Bodies Amalgamate

The Privy Council has approved the amalgamation of the Institution of Mechanical Engineers and the Institution of Automobile Engineers. The former was founded in 1847 and is celebrating its centenary in June, and the latter was founded in 1906. Both bodies enjoy Royal Charters and their members are entitled respectively to the descriptions of chartered mechanical engineer and chartered automobile engineer. The Institution of Mechanical Engineers has created an automobile division and, by special permission of the Privy Council, members of the automobile division will be entitled to use the style of chartered automobile engineer.

Electric Vehicles for L.N.E.R.

Among new road vehicles being put into service by the L.N.E.R. for express delivery of parcels forwarded by passenger train, are six special type 20 cwt. "Morrison-Electricar" battery vehicles manufactured by Crompton Parkinson Ltd. The vehicles are standard "Morrison-Electricars" with modifications and additional features specified by the L.N.E.R. for the class of serve involved. The driving motor is a 9 H.P. one-hour rated, traction type, directly coupled to a Hardy Spicer propeller shaft with a universal joint at each end. Driving energy is provided by a Young traction type battery of 36 cells, giving a 243 A-h capacity at the five-hour rate of discharge. Two of the six vehicles are now operating in the Hull district, each covering a daily distance of about 30 miles involving some 70 calls.

Lighting Service

Under the above heading, in our issue of April 11, it was stated that the 8 000 fluorescent lamps which are to be used in the London section of the British

Industries Fair would, after the Fair, be redistributed through normal trade channels. It has since been pointed out that these lamps are, in fact, being purchased outright by the Government, who will subsequently employ them elsewhere to complete other Government installations.

Industrial Electrical Trucks

In connection with a practical demonstration, arranged by Armand Dutry and Co. (Adeco), Ltd., at the Waldorf Hotel, London, on April 17, of the "Waltool" miniature workshop, of Bakelite construction, comprising a drilling machine, a grinding machine and a circular saw driven by a 1/75 H.P. motor, designed for the use of model and instrument makers,

The electric "Omnitruc" for use in works, warehouses and so on

jewellers and others, two new electric trucks produced by Tomlinson (Electric Vehicles), Ltd., 135, Gray's Inn Road, London, were introduced. One, the "Universal" works truck, with differential gearing, is powered by a ¾ H.P. motor supplied by 24 V batteries, and the consumption is from one to 2 kW per day. It has a platform area of 5 ft. by 3 ft., carries a load up to one ton, and has a range of 8-14 miles and a speed of 3-3½ m.p.h. The other, the "Omnitruc" has a 1½ H.P. motor, 36 V batteries, and consumes 1-2 kW per day. It has a speed of 6 m.p.h. and a range of 10-15 miles. The platform area is 6 ft. by 4 ft., with a loading height of 19 in., and it will carry up to a ton of goods. There is a seat for the driver. Another British engineering product, which was demonstrated, was the "Jigsaw" sawing and filing machine for sawing and filing metals, plastics and wood to any irregular shape or pattern. It is powered by a ¼ H.P. motor, 230 V single-phase, providing an upward and downward stroke of 2½ in. and two speeds—280 and 500 per minute. The throat capacity of the bow is 7½ in. All moving parts are completely enclosed.

Change of Address

The headquarters of the sales department and the publicity department of the Lancashire Electric Power Co., have removed from Walkden to National Buildings, St. Mary's Parsonage, Manchester, 3. (Telephone, Blackfriars 3317-8-9.)

Removal

The Donovan Electrical Co., Ltd., announce that their supply department at Flexley Road, Stechford, Birmingham, 9, moved on April 18 to 62/80, Granville Street, Birmingham, 1, from which address their head office and warehouse will operate. The address of the works at Northcote Road, Stechford, will remain unaltered.

Southend Exhibition

On Saturday, April 12, the Mayor of Southend opened a one-week "Southend and District Can Make It" exhibition in the Municipal College. It was arranged by the industrial section of the Chamber of Trade to bring to the notice of the public the industries carried on in the locality and the opportunity for employment offered by the 80 member firms. E. K. Cole, Ltd., as the district's biggest industry, made an impressive display of examples of all their products—radio and television sets, thermovent heating appliances, Ekco-Ensign electric lamps and fittings and plastics.

Bankside Site Approved

SUBJECT to the conditions that the boilers are oil-fired and that the building is set back from the Thames to allow a road and promenade along the river front, the proposal to erect a power station at Bankside, Southwark, is to be allowed.

Announcing this Government decision, the Minister of Town and Country Planning (Mr. Silkin) said that, in the circumstances, the site must be regarded as settled, but the Royal Fine Arts Commission would be consulted on the design of the building. The Government was satisfied, he added, that with the safeguards proposed the future of the south bank would not be prejudiced by the power station, nor, having regard to the distance across the river, could they accept the view that the historical dominance of St. Paul's would be threatened.

The site at Rotherhithe, which had been offered by the L.C.C., had been rejected, Mr. Silkin said, because it would take at least two winters longer than the other before electricity could be provided.

Electricity Supply

Bradford.—A new sub-station, costing £12 530, is proposed.

Wallasey.—It is intended to spend £47 100 on the supply of electricity to housing sites.

Bristol.—Improvements to the coal store at the Portishead generating station will, if approved, cost £27 000.

Sheffield.—Mains extensions, costing £13 290, have been proposed by the Electricity Committee.

N. Wales. — The North Wales Power Co. has decided to proceed with works which will increase the output from the Wolgarrog and Maentwrog generating stations by approximately 53 000 000 units. This will be secured by extending the present system of leets to convey additional water to the reservoirs and will not involve the construction of any new reservoirs or pipe lines. Preliminary surveys are now being made and meanwhile discussions with the C.E.B. are now in progress.

This striking window display, emphasising the need for economy in electricity and illustrating the gap between maximum demand and capacity, is being put into all the showroom windows of the County of London Electric Supply Co., Ltd., and its subsidiaries in South London, Kent, Essex, Surrey, Dorset and Hampshire

Harrogate.—A feature of the undertaking's Jubilee celebrations, on April 15, was a handsome cake, lit by 50 small bulbs, mounted on a miniature grid pylon. Made from rations saved by members of the Corporation staff, the cake was prepared by the demonstrator at the Electricity showrooms.

Liverpool.—Replying to the Crosby Chamber of Trade, which asked for an adjustment of electricity charges to offset the cuts during the fuel crisis, Mr. J. Eccles, City Electrical Engineer, stated: "The two-part tariffs enable a consumer to obtain his electricity at a cheaper rate than the authorised flat scale of charges. All two-part tariffs are on an annual basis and should not be viewed in relation to any temporary reduction in use. If the fall in usage of any consumer is such as to make any other appropriate scale in the published tariffs cheaper, the consumer will be given advice and facilities for such a change on application."

Electricity Generation.—The effects of the statutory restrictions on electricity consumption are indicated in the March generation statistics, issued by the Electricity Commissioners. The Official Returns show that 3 983 million units were generated by authorised undertakers in Great Britain during the month, as compared with a revised figure of 3 820 million in the corresponding month of 1946. This figure represents an increase of only 4.3 per cent. (163 million units) over the same month in the previous year. Before the crisis, generation was running at 12 per cent. above 1946 levels. During the first three months of 1947, the total number of units generated was 12 334, compared with the revised figure of 11 424 million units for the corresponding period of 1946, an increase of 910 million units, or 8 per cent. The total number of units sent out during March, 1947 (i.e., units generated, less units consumed in the stations by auxiliary plant and for lighting, etc.), was 3 758 million, as compared with the revised figure of 3 608 million in the corresponding month of 1946, an increase of 150 million units or 4.2 per cent. During the first three months of 1947 (i.e., up to the end of March) the total number of units sent out from the generating stations of authorised undertakers was 11 656 million, compared with the revised figure of 10 797 million for the corresponding period of 1946, an increase of 859 million, or 8 per cent.

Hartshead.—The Stalybridge, Hyde, Mossley and Dukinfield Electricity Board

has approved the revised expenditure to be incurred on the 1950 extensions to the Hartshead generating station, now estimated to cost £1 023 510. Officials of the Board will undertake the extra work in connection with the extensions and will receive as remuneration 1½ per cent. of the capital cost. The scheme provides for one 30 000 kW turbo-alternator and one 150 000 lb./hr. boiler.

Eire.—Work is scheduled to begin next month on the Electricity Supply Board's oil-burning generating plant outside Dublin. The new station, which will have an estimated annual output of 40 million units, is expecting to be operating within a year.

Finchley.—Expenditure on the undertaking for the period 1948/9 is estimated to be £50 000, and will cover cables and equipment for sub-stations, transformers, mains and services.

Douglas, (I.o.M.).—Estimates for the next 12 months for mains, services and transformers, amounting to £23 200, have been approved by the Electricity Committee.

Carlisle.—The Commissioners have consented to the borrowing of £207 725, this being the supplementary sanction in connection with the extensions to the Willow Holme station.

Middlesbrough.—The Town Council has applied for sanction to borrow £24 500 for electricity capital works, mainly concerned with the reinforcement of the present network.

Darlington.—The Electricity Commissioners have sanctioned the borrowing by the Town Council of £1 821 for mains and plant, and £1 735 for rectifier equipment to deal with the increased traction load.

Mansfield.—The town's 11 kV system is to be extended to New Mill, at a cost of £4 537. It is also planned to erect a sub-station costing £3 411 at Forest Town, for which sanction has been obtained.

Chester.—The Electricity Committee, which is to erect sub-stations and extend mains at a cost of £29 500, is also seeking sanction to borrow a further £75 000 for mains and services and £15 000 for plant.

Wakefield.—Estimates for the year of £12 000, for mains and services, £5 000 for sub-stations and equipment and £3 000 for domestic apparatus, have been approved by the Electricity Committee.

West Hartlepool.—After considering a report by the Borough Treasurer on the Electricity Bill, the Corporation has decided to grant special discounts to use up the balances in the electricity revenue accounts, and has asked for a report on the best method of putting the scheme into operation.

Poplar.—Further tenders for the new generating station at Brunswick Wharf recommended by the Electricity Committee include six boiler units and ancillary plant, at £2 881 432, by Messrs. Clarke, Chapman and Co., Ltd., and turbo-alternator plant, at £424 500 and £714 396, by the Metropolitan-Vickers Electrical Co., Ltd.

Coming Events

Friday, April 25 (To-day)

I.E.E.—London. Measurements and Transmission Sections. "Ultra-High Speed Relays in the Fields of Measurement and Protection," by W. Casson and F. H. Last. *5.30 p.m.*

JUNIOR INSTITUTION OF ENGINEERS.—London. At the Connaught Rooms, Great Queen Street. Annual Dinner. *6.15 p.m.*

Saturday, April 26

I.E.E., LONDON STUDENTS' SECTION.—Visit to National Physical Laboratory, Teddington. *9.30 a.m.*

I.E.E., N. MIDLAND STUDENTS' SECTION.—Leeds. "Mine Lighting," by O. Seymour. *2.30 p.m.*

Monday, April 28

I.E.E.—London.—Discussion on "Domestic Water Heating by Electricity," opened by R. Grierson and Forbes Jackson. *5.30 p.m.*

I.E.E., WESTERN CENTRE.—Cardiff. Installations Group. "Some Aspects of Site Insulation Testing, with Special Reference to E.H.T. Switchgear by Schering Bridge Method," by W. Hyland. *6 p.m.*

INSTITUTION OF POST OFFICE ELECTRICAL ENGINEERS.—London. At Faraday Building. "Repeater Station Power Supplies," by K. W. Hix. *5 p.m.*

Tuesday, April 29

I.E.E., N. WESTERN CENTRE.—Manchester. Transmission Group. "Record of Experience on the Irish Electricity Supply System," by A. Burke, R. C. Cuffe and W. O'Neill. *6 p.m.*

I.E.E., IRISH BRANCH.—Dublin. Conversazione and Presidential Visit.

I.E.E., S. MIDLAND CENTRE.—Birmingham. Radio Group. "New Possibilities in Speech Transmission," by D. Gabor. *4 p.m.*

Wednesday, April 30

I.E.E., N. MIDLAND CENTRE, SHEFFIELD SUB-CENTRE.—Sheffield. "Rural Electrification. The Use of the Single-Phase System of Supply," by J. S. Pickles and W. H. Wills. *6.15 p.m.*

TELEVISION SOCIETY.—London. At the Royal Institution, Albemarle Street. Second Fleming Memorial Lecture. "The Dawn of the Electron Age," by Dr. J. A. Crowther. *5.30 p.m.*

INSTITUTE OF WELDING.—London. At the Institution of Civil Engineers, Great George Street. "The Welding of Copper and the Copper-Rich Alloys," by Maurice Cook and Edwin Davis. *6 p.m.*

Friday, May 2

I.E.E., N. EASTERN STUDENTS' SECTION.—Newcastle-on-Tyne. At the County Hotel. Annual Dinner, Annual General Meeting, which was to have been held on Friday, April 25, will precede. *7.30 p.m.*

Electricity Bill in Committee

Position of Directors—Compensation to Local Authorities

TWO important Government decisions, announced when the sittings of the Committee were resumed after the Easter recess, were that directors of companies will now be allowed to act as stockholders' representatives in connection with the payment of compensation and that an additional sum of £5 000 000 is to be made available for compensating local authorities against loss of revenue resulting from nationalisation of their undertakings.

Making the first concession, Mr. Shinwell said he had no bias against directors and had decided, after due reflection, that the words used in the Bill were a little derogatory. After he had promised to look into several other points raised by the Opposition, Clause 18, which provides for the appointment of stockholders' representatives, was passed without a division.

When the discussion on the compensation terms of Clause 17 was continued, however, the Opposition offered further criticism, and called upon the Financial Secretary to give adequate reasons why the Government had in this instance decided to base compensation on Stock Exchange prices.

The Stock Exchange prices, Mr. Glenvil Hall asserted, broadly gave a value which a willing buyer and a willing seller put on any given security. If that was not so, he failed to see why they were ever published.

Contending that the Government must stand by the compensation clauses of the Bill, Mr. Glenvil Hall said that the terms of compensation for an industry taken over must necessarily vary and, so far as they could, they must do justice to the people dispossessed. They could not treat the stocks of the Central Electricity Board and the J.E.A.'s in a way different from other electricity undertakings, because although they were semi-public bodies, no Treasury guarantee had in fact been given. Where there was a Treasury guarantee, the Opposition case, he claimed, had been met in a " clear and generous way."

In view of the adoption of the scheme under which stocks in the hands of holders will at the time of transfer be regarded as British Electricity stock at the value the stock is given on vesting day, the Government has now dropped Clause 19, which deals with accrual and payment of compensation.

Announcing that the sum of £5 000 000 was to be made available for additional compensation payments to local authorities, Mr. Shinwell said that in the Government's view any loss sustained due to income tax set-off, superannuation, or severance would be adequately met by this sum. He rejected claims from both sides of the Committee to provide compensation for loss of electricity income, in many cases partially used to benefit ratepayers. Later, he said that he was not pretending that every little claim that could be presented by a local authority as regarded income tax set-off, superannuation and so on, would be met, but it would be reasonable to devote the sum of £5 000 000 in order to meet more or less substantially the claims of the local authorities. Discussions would be held with the authorities to decide on the basis of allocation.

Mr. Glenvil Hall said that local authorities and other experts had put the loss by severance at about £1 000 000 a year. " A period of five years should be sufficient to enable local authorities so to reduce their overhead charges as to cause the loss to disappear," he added. The loss to superannuation funds caused by the reduction of interest rates as a result of the Government's cheap money policy was not a matter appropriate to that section of the Bill.

An amendment was defeated on a division by 21 to 11, and Clauses 20 and 21 were ordered to stand part of the Bill.

Hydro-Electric Schemes

THAT the Government do not intend at present to embark on the development of hydro-electricity other than in the North of Scotland area was indicated, during question time, by the Minister of Fuel and Power.

A number of questions, by Mr. Ellis Smith and others, was asked on the possibility of tidal barriers, etc., in the Mersey, Thames and Lake District, and in the course of his replies, Mr. Shinwell stated that the resources available for such schemes were limited by man-power and materials, and were at present concentrated on the North of Scotland district.

Regarding the Severn Barrage, the Minister said they were proceeding with the construction of a model tidal plan at a cost of approximately £40 000. They must proceed in that direction before coming to a final decision. He was bound to say, from the facts before him and the advice tendered, that he did not feel disposed at the present moment to proceed with the scheme.

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:—

Heston and Isleworth, April 26.—Supply and delivery of one 10 cwt. electric vehicle (enclosed van type). Particulars from Borough Electrical Engineer and Manager, 11, Staines Road, Hounslow.

Middlesbrough, April 26.—Supply and delivery of: (a) one 11 kV, three-phase oil-immersed and compound filled metal-clad ring main tee-off unit, comprising two oil-break isolators and one circuit-breaker; (b) one 250 kVA, 11 000/440/250 V three-phase oil-cooled indoor transformer; (c) one meter testing set, single-phase, 0/500 V, 0/100 A, unity/zero power factor, complete with voltmeter, ammeter and power-factor meter and suitable for use on 240 V, single-phase supply or a three-phase four-wire 415/240 V, 50 cycles supply. Specification for items (a) and (b) from Borough Electrical Engineer, Corporation Electricity Department, Snowdon Road, Middlesbrough; deposit, £1 1s. each.

Newcastle-under-Lyme, April 29.—Supply and delivery of: (a) one 500 kVA rectifier, with transformer; (b) sub-station switchgear, comprising 14 panels for 11 kV and seven for 400 V, with ancillary equipment; (c) four 250 kVA, one 400 kVA and three 500 kVA sub-station transformers. Specifications from Messrs. Mackness and Shipney, Consulting Engineers, Parliament Mansions, Abbey Orchard Street, London, S.W.1.

Blackpool, April 30.—Supply and delivery of p.i. lead covered underground cables for 12 months. Specification from Borough Electrical Engineer, Electricity Offices, Shannon Street, Blackpool.

Cleethorpes, April 30.—Supply and delivery of l.t. cables. Specification from Electrical Engineer and Manager, Grimsby Road, Cleethorpes.

Manchester, May 1.—Supply of six tons B.S. grade "D" plumbing metal and two tons B.S. grade "G" jointing metal. Specification from Chief Engineer and Manager, Electricity Department, Town Hall, Manchester, 2.

Madras, May 1.—Supply, delivery, erection and commissioning of transformers having the following ratings, for the Basin Bridge "B" power station, Madras: Two of 7 500 kVA, 11/5 kV; two of 1 750 kVA, 11 000/415 V; one of 1 250 kVA, 11 000/415 V and two of 200 kVA, 415/415 V. Copies of form of tender and specification from Merz and McLennan, Milburn, Esher, Surrey; deposit, £5 5s.

Spenborough, May 2.—Supply and delivery of mercury discharge street lighting equipment. Specification from Electrical Engineer and Manager, Electricity Department, 24, Market Street, Cleckheaton, Yorks.

Salford, May 3.—Supply of: (a) 500 MVA, 33 kV, metalclad switchgear; (b) four 15 000 kVA, 33/6.6 kV transformers; (c) 4 300 yds. 0.3 sq. in., 33 kV, three-core cable; (d) four neutral earthing resistors; (e) 250 MVA, 6.6 kV, metalclad switchgear. Specifications from City Electrical Engineer, Electricity Department, Frederick Road, Salford, 6.

Hastings, May 5.—Supply, delivery and erection at Broomgrove power station of one 11 kV, three-phase, 500 MVA, rupturing capacity switchboard, comprising five units. Specification from Borough Electrical Engineer and Manager, York Buildings, Hastings.

Sale, May 5.—(a) Supply, delivery and laying of 1 700 yds. 0.2 sq. in., 6.6 kV cable and the laying of 1 200 yds. 0.25 sq. in. l.t. cable in same track; (b) supply and delivery of two 500 kVA, three-phase standard indoor core-type double-wound O.N. cooled transformers. Specifications from Borough Electrical Engineer, Town Hall, Sale, Manchester.

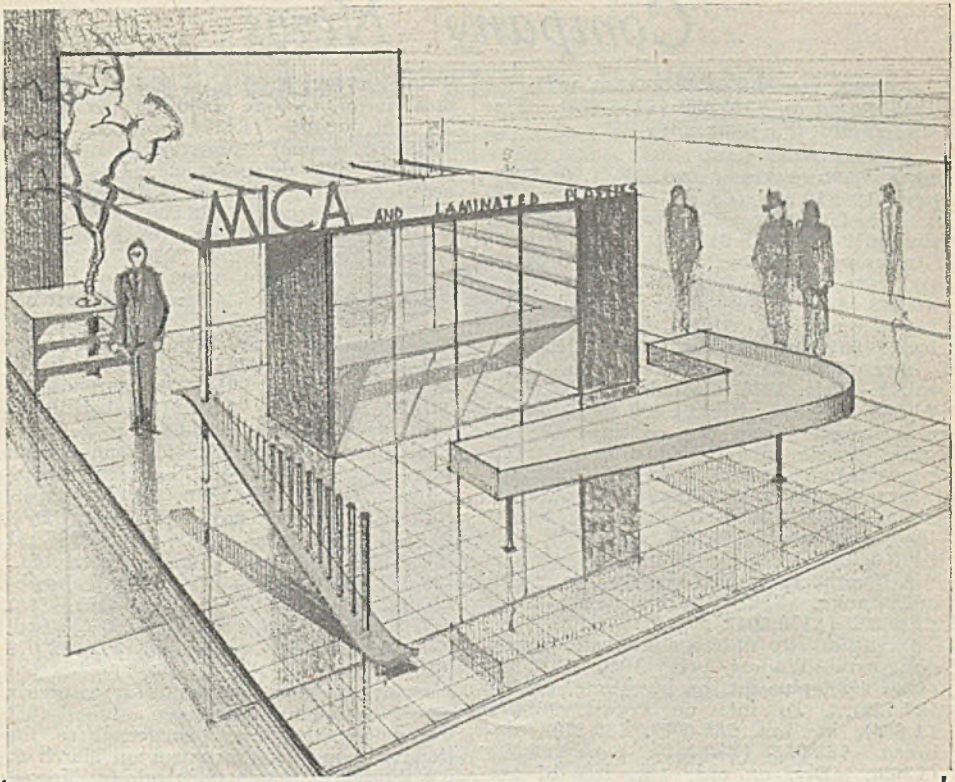
Plymouth, May 10.—Supply, delivery and erection of one 100-ton, overhead electric travelling crane. Specification from City Electrical Engineer, Armada Street, Plymouth.

Dartford, May 10.—Provision of additional light points in houses on the Council's estates. Specification from Town Clerk, Town Clerk's Office, Dartford, Kent.

Liverpool, May 14.—Supply and delivery of: (a) twenty-four 1 000 kVA transformers, 11 000/415 V; (b) twelve 500 kVA transformers, 11 000/415 V; (c) twelve 15 kVA transformers, 11 000/240 V. Specifications from City Electrical Engineer, 24, Hatton Garden, Liverpool, 3.

Willesden, May 19.—Electrical installations in 44 houses and 10 flats, in four contracts. Specifications from Borough Electrical Engineer and Manager, Electric House, 296, Willesden Lane, N.W.2.

Blackpool, May 19.—Supply, delivery and erection of two 20 MVA and one 10 MVA 33/6.6 kV transformers, with on-load tap-changing equipment; and delivery, jointing and laying of various lengths of cable. Specifications from Borough Electrical Engineer, Shannon Street, Blackpool.



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Company News

WESSEX ELECTRICITY CO.—Net prft. for 1946 stated as £222 659 (£155 193). Fin. div. on ord. 3%, mkg. 5%.

WASTE HEAT AND GAS ELECTRICAL GENERATING STATIONS, LTD.—Prft. to January 31, £10 981 (£8 758). To gen. res. £2 138 (£2 292); ord. div. 8% (same); fwd. £19 084 (£19 041).

RUSHDEN AND DISTRICT ELECTRIC SUPPLY CO., LTD.—Net prft. 1946, after taxn., £9 172 (£4 893). Final div. 5%, mkg. 9% (same), gen. res. £1 000 (same), pension fund £861 (nil); fwd., £16 498 (£13 642).

SWITCHGEAR AND COWANS, LTD. (elec. engs.).—Prft. 1946, after depren and tax, £1 584 (£20 376 after £1 000 to pensions), plus transfer from war contings. £5 000 (nil). To res. nil (£2 000), div. 10% (20), bonus nil (5%); fwd., £22 252 (£22 263).

SHROPSHIRE, WORCESTERSHIRE AND STAFFORDSHIRE ELECTRIC POWER CO.—Net prft. 1946, after taxn. £95 000 (£135 000), etc., £172 329 (£166 515). Fin. div. 4% on "A" ord., mkg. 8% and 3% on "B" ord., mkg. 5½% (both same); fwd. £130 083 (£116 504).

UXBRIDGE AND DISTRICT ELECTRIC SUPPLY CO., LTD.—Trading prft. 1946 £225 337 (£201 698), plus int. on investmts. £8 357 (£7 729). To int. on depsts. £2 076 £1 854), inc.-tax £68 695 (£83 270). depreen. £83 055 (£80 340), res. £25 300 (£393). Div. on ord. 4%, free of tax (same), £54 000, fwd. £1 422 (£854).

LANCASHIRE DYNAMO AND CRYPTO, LTD.—Prft. for 1946 after tax £107 446 (£103 752). To depreen. £12 839 (£13 600), dirs.' fees £2 225 (£1 835), staff pensions £3 000 (£30 000), pref. div. £1 815 (£1 650), final ord. div. 10% (same) and bonus 7½% (same) and at three-fifths these rates on new ord. following interim of 5% (same) and of 3% on new ord.; fwd. £173 193 (£139 131). Group's current assets £1 719 019, current liabs. £643 025.

TAYLOR TUNNICLIFF (ELECTRICAL INDUSTRIES), LTD.—Consolidated bal.-sheet at December 31 shows creditors and taxation £222 037 (£151 632), reserves and prft. and loss £236 677 (£191 448). Stocks £52 633 (£44 302), debtors £179 678 (£114 291), investments £40 066 (£50 066), tax certs. £25 000 (£36 000), cash £136 513 (£95 157). Trdg. prft. £143 365 (£100 929), net prft. £47 378 (£31 470) and ord. div. 12½% (10%). Forward £229 (same).

CLYDE VALLEY ELECTRICAL POWER CO., LTD.—Full accts. 1946 show sale of current, etc., £3 088 297 (£2 967 927). To generation, distributn. and other exes. £2 579 654 (£2 469 212), lvg. £508 643 (£498 715). Add int., divs., etc., £21 952 (£18 569), E.P.T. addit. amt. recovered, 1945, £27 722 (nil) and E.P.T. estmtd. amt. recov. to date £150 000 (£220 000). To int. £406 (£437), conting. fund £275 000 (same), superann. contributn. £50 000 (nil), defd. reprs. nil (£30 000), acct. of future taxn. nil (£100 000), yr.'s div. on 6% pref. £18 000, 8% pref. £40 000. Fin. ord. div. 5%, mkg. 8% (same); fwd., £281 226 (£208 315).

LONDON ELECTRIC SUPPLY CO., LTD.—Accts. 1946 show by sale of current £1 383 901 (£1 183 204), plus rental of apparatus, etc., £33 241 (£27 635), fees £44 (£47), discounts £247 (£205), mkg. £1 417 433 (£1 211 091). To purchase of current £1 080 451 (£974 218), distrbn. of elec. (total) £69 564 (£58 691), rents, rates and taxes £22 624 (£22 351), management exes. £33 762 (£23 955), law and Parliamentary chrgs. £10 390 (£9 218), spec. chrgs. (incldg. skg. fnd. "A" and "B") £69 450 (£76 945), net pft. £131 193 (£45 714), add int. from invests., etc., £32 569 (£14 384). Pref. div. absorbs £41 952 (same), div. 6% on Ord. (3% plus 3% out of No. 2 res., mkg. 6%); fwd. £70 849 (£1 487), units sold 362 612 078 (306 919 271).

DELHI ELECTRIC SUPPLY AND TRACTION CO.—Stockholders have been advised that the undertaking was transferred to the Delhi Provincial Government on March 2. A valuation is now being made by Messrs. Merz and McLellan, and will be completed in the middle of the year, both parties having agreed to accept the valuation as the price to be paid for the undertaking. On the transfer being made, the company received from the Government a payment on account, but that sum is subject to revision upwards or downwards when the actual valuation has been completed.

CITY OF LONDON ELECTRIC LIGHTING CO., LTD.—Reporting on a general increase in the company's output of electricity during the trading year, Mr. John Braithwaite (chairman) said that the public nowadays was more electrically-minded than ever, and if sufficient supplies of generating plant and fuel were available, there would now be the greatest electricity boom in our history. The Electricity Bill, he said, would bring about a serious dislocation within the industry, but it was not too late for the Government to reconsider the compensation terms. Stock Exchange prices were wholly indefensible as a basis upon which to found compensation, which should instead be along the lines indicated in the Ministry of Transport White Paper of 1937, which had recommended compensation for loss of future profits on the basis

(*continued on p. 1102*)

(*Company News, contd. from p.* 1100)

of net maintainable revenue. The industry, he concluded, did not ask for inflated or even generous terms, but only for reasonable and fair compensation.

CLYDE VALLEY ELECTRICAL POWER CO., LTD.—Comments on the provisions of the Electricity Bill, as they applied to Scotland, were made at the annual meeting by the Chairman (Mr. Robert Robertson). The North of Scotland, he declared, was to be deprived of the alleged benefits of nationalisation, while Southern Scotland which included practically the whole of the industrial area, would be administered from the central control in London, and become, as far as electricity was concerned, a part of provincial England. Again, Southern Scotland was to be divided into two areas. The proper method of development was to have a combination of urban and rural demand, so as to obtain a proper diversity of load, but two-thirds of the consumption and 50 per cent. of the population were centred in the artificial south-west area. Obviously, the south-east area would be under a very considerable handicap in further development. Whoever was responsible for the conception of the scheme could have little knowledge or experience of electrical development in Scotland. Mr. Robinson thought that if the industry had to be nationalised, Scotland should be separated from England and administered as one entity. Under the Bill as it was, the benefit of cheap hydro-electric energy would go mainly to England, and Scotland was getting a raw deal.

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.*

KANGO ELECTRIC HAMMERS, LTD. (formerly MANSIONS MOTOR CO., LTD., AND MANSIONS MOTOR GARAGE CO., LTD.), London, S.W.—March 15, deb., by way of substituted security for a deb. dated December 3, 1937, and collateral to a charge dated December 3, 1937, securing to Westminster Bank, Ltd., all moneys due or to become due to the Bank; general charge. *Nil. December 30, 1946.

J. AND N. WADE (LONDON), LTD., Portsmouth, dealers in electric lamps, etc.—March 11, mort., by way of further security for moneys secured by four debs. dated April 20 and June 9, 1938, May 28, 1945, and February, 21, 1946, to Branch Nominees, Ltd.; charged on 1073 and 1075, Finchley Road, Hendon, together with plant, machinery, etc. *£3 000. June 14, 1945.

BARRETT AND WRIGHT, LTD., London, N., electrical engineers.—March 7, charge, to Miss P. M. Yeo, Rickmansworth, and others, securing £2 100 and further advances not ex. therewith £3 900; charged on 194 to 202 (even), Hornsey Road, Islington. *Nil. December 31, 1945.

BEAULAND PROPERTIES, LTD., Brighton—March 14, £1 750, further charge, to Alliance Bldg. Soc.; charged on ppty. *Nil. December 31, 1944.

BENN RADIO AND ELECTRICAL CO., LTD., Rugby.—March 17, deb., to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; general charge. *Nil. December 31, 1945.

T. HAMMOND AND CO. (ELECTRICAL ENGINEERS), LTD., Beaconsfield.—March 6, £5 000 debs.; general charge.

Metal Prices

	Monday, Price	Inc.	April 21 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 (60/40)—			
Rod basis ... ... „	1s. 2¼d.	—	—
Wire ... ... „	1s. 6½d.	—	—
Iron and Steel—			
Pig Iron (E. Coast Hematite No. 1) ...per ton	£8 19 0	—	—
Galvanised Steel Wire (Cable Armouring) basis 0.104 in. ... „	£34 5 0	—	—
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 99.9% purity) ... „	£440 10 0	—	—
Wire, basis ... ...per lb.	5s. 6¾d.	—	—
Aluminium Ingots ...per ton	£80 0 0	—	—
Spelter	£70 0 0	—	—
Mercury (spot) ... per bott.	£21 0 0	—	—

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

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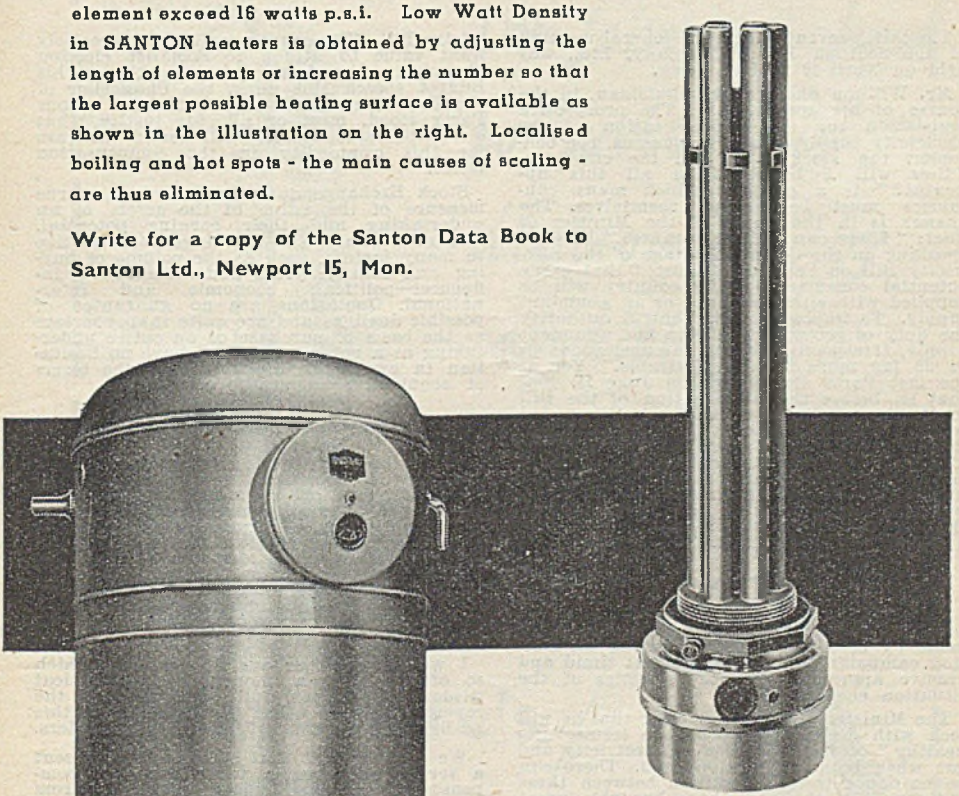

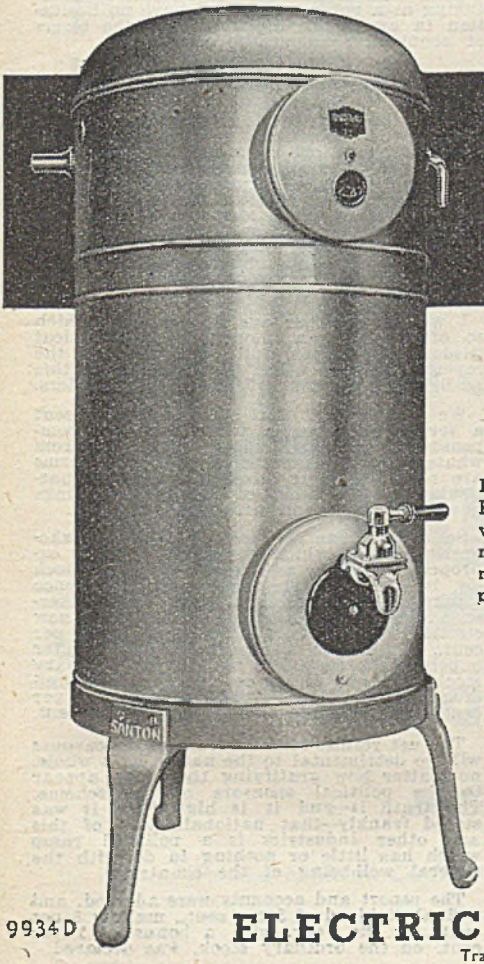

Left: SANTON Automatic Water Boiler. Provides an immediate bulk of boiling water, followed by a constant flow for tea-making etc. Special "simmering" element keeps water just on boiling but prevents liberation of oxygen.

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ELECTRIC WATER-HEATING

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Scottish Power Company

The Nationalisation Proposals — Mr. William Shearer on Confiscation

The thirty-seventh ordinary general meeting of the Scottish Power Company, Ltd., was held on April 18 in Edinburgh.

Mr. William Shearer, the chairman, in the course of his speech, said: The prospective legislation for the nationalisation of the electricity supply industry concerns, the consumer, the stockholder and the employee. "How will I benefit from all this upheaval?" is a question which many consumers must be asking themselves. The answer is in the words of the Minister of Fuel: "There can be no guarantee," he said, speaking on the Committee stage of the Electricity Bill on February 25 last, "that every potential consumer in the country will be supplied with either a cheap or an abundant supply. To impose on the central authority the duty of providing a cheap and abundant supply, irrespective of the circumstances, is to do far more than is desirable." Yet at the last Party Conference on June 11, 1946, that is, before the presentation of the Bill to Parliament, and when the public mind was being prepared for it, the Minister stated that "the objective as regards the nationalisation of electricity is two-fold. It is to make electricity available to every person in the country who desires it and to every industry which needs it, to bring it within the reach of the rural areas, and, over and above all, to cheapen it."

Glib Promises

This remarkable *volte face* indicates the facility with which glib promises can be made by certain gentlemen during an election campaign, and the somewhat timid and evasive approach when the realities of the situation emerge.

The Minister also made it clear that he will look with disfavour on what he terms "unhealthy" competition between electricity and gas when both are nationalised. There can be no doubt that competition between these industries in the past has brought great benefits to the consumer; but these, also, are apparently to go by the board.

The only tangible promise in the Bill, so far as the consumer is concerned, is that there will be another swollen bureaucracy to be paid for by taxation. No wonder that there can be no guarantee in the Bill of cheap or abundant electricity. The price of this experiment in nationalisation like all others, must be met out of the public pocket except to the extent that possibly, in the initial stages of the bureaucratic control, substantial reserves which were built up as the result of free enterprise may be utilised to conceal the true financial results. But that could only be a very temporary face-saving expedient.

Holdings to be Expropriated

I should now like to refer to the position of stockholders under the Bill, with particular reference to the price at which their holdings are to be expropriated, and their dividend rights. The pledge of the Labour Party prior to the last Election, that there would be just and proper compensation for any industry that was nationalised, has, in my view, been completely discarded in the basis of expropriation adopted in the Electricity Bill. The country will know precisely what value to attach to Socialist election pledges in the future. As recently as his Budget speech this week, the Chancellor of the Exchequer reaffirmed that the "Labour Party stood, most of all, for justice," but electricity stockholders will search in vain for this commodity in the compensation terms.

Stock Exchange quotations are not a true measure of the value of the assets of an undertaking and their earning potential. Market dealings and markings are sensitive to many factors, such as the volume of buying and selling; yield and extraneous influences—political, economic and international. Quotations are no guarantee of possible dealings and are quite inappropriate as the basis of purchase of an entire undertaking as a going concern. I have no hesitation in expressing the view that the terms of acquisition amount to confiscation.

Prudent Administration Penalised

Under the method adopted prudent administration is penalised and profligacy in financial operations rewarded. In his Budget speech, the Chancellor underlined once again the importance he attaches to industries ploughing back profits into the business. Yet it is precisely those companies who have carried out this policy in the electricity industry who will suffer most under the compensation terms of the nationalisation scheme. Could inconsistency be more inconsistent?

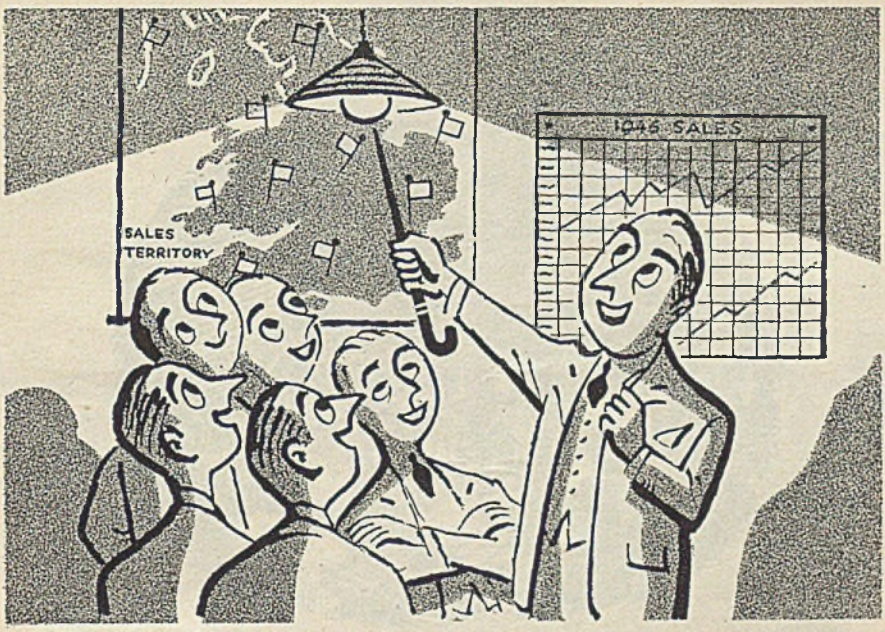
I wonder whether our Government, which so often claims a monopoly of political wisdom, has taken fully into account the repercussions on other Governments of this un-British treatment of British stockholders.

We are satisfied that our assets represent a very much greater value than the compensation proposed under the Bill. From whatever standpoint the expropriation terms are regarded, their inequity is evident, particularly when most of our undertakings have perpetual franchises under Statute.

So far as can be ascertained, the take-over prices at which our stocks will be expropriated will be as follows: Ordinary stock 46s. 1d. for each £1; 6 per cent. preference stock 31s. 4d. for each £1; 4 per cent. preference stock 22s. 4d. for each £1. If the new electricity stock carries interest at 2½ per cent., the income of stockholders will suffer a percentage reduction as follows: Ordinary stockholders by 36 per cent.; 6 per cent. preference stockholders by 34.7 per cent.; 4 per cent. preference stockholders by 30.2 per cent.

The net results of these frenzied endeavours will be detrimental to the nation as a whole, no matter how gratifying they may appear to the political sponsors of the scheme. The truth is—and it is high time it was stated frankly—that nationalisation of this and other industries is a political ramp which has little or nothing to do with the general well-being of the country.

The report and accounts were adopted, and a final dividend of 5 per cent., making 8 per cent. for the year, with a bonus of 1 per cent. on the ordinary stock, was declared.



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