

127.

ELECTRICAL REVIEW

FOUNDED
1872

Vol. CXXXIX. No. 3594

OCTOBER 11, 1946

9d. WEEKLY

COMPACT



6/12-
9/16

CORRECT

The return of RUBBER

The Cable Makers' Association is glad to announce that supplies of natural Rubber and other materials required for producing the highest classes of insulating compounds are once more fully available, and that it has been able to re-establish, for sale from 1st October, the well-known C.M.A. grades of cable which have made its reputation throughout the world.

specify

C.M.A. CABLES



*Regd. Trade Mark
Nos. 556, 585-6-7*

MEMBERS OF THE C.M.A.

The Anchor Cable Co. Ltd.	W. T. Glover & Co. Ltd.	Liverpool Electric Cable Co. Ltd.	Pirelli-General Cable Works Ltd. (General Electric Co. Ltd.)
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Connollys (Blackley) Ltd.	W. T. Henley's Telegraph Works Co. Ltd.	The Macintosh Cable Co. Ltd.	Siemens Brothers & Co. Ltd. (Siemens Electric Lamps and Supplies Ltd.)
The Craigpark Electric Cable Co. Ltd.	Johnson & Phillips Ltd.	The Metropolitan Electric Cable & Construction Co. Ltd.	Standard Telephones & Cables Ltd.
Crompton Parkinson Ltd. (Derby Cables Ltd.)	The India Rubber, Gutta-Percha & Telegraph Works Co. Ltd.		Union Cable Co. Ltd.
Enfield Cables Ltd.	(The Silvertown Co.)		
Edison Swan Cables Ltd.			



WHO'S *been looking through my eyes?*



A maintenance man in an Electricity Department doesn't have much time for reflection in these days of shortage in materials and labour.

It's always seemed to me as if Heatrae planned the design of their Water Heaters from MY point of view and to save my legs from repeated journeys.

My experience is that HEATRAE are so nearly breakdown-proof that they need minimum attention from me.

Being only human, I appreciate that point.

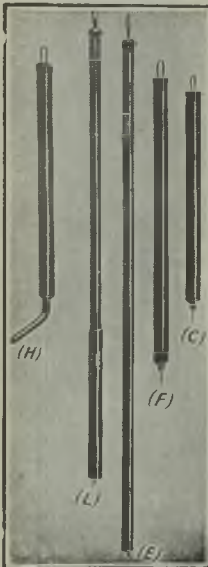


leaders in electric water heaters

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GRAMS : HEATRAE, NORWICH

PHONE : NORWICH 25131



IS IT ALIVE? THE "PARTRIDGE" PRESSURE DETECTOR

(Regd. T.M. No. B.581955)
will infallibly tell you, giving visible and audible indication (No earth connection required)

Type	Range up to	Length of handle
C	Volts 11,000	36"
E	60,000	84"
F	15,000	48"
H	11,000	36"
L	33,000	72"

Also makers of "Westminster" Vacuum Tube Detector and H.T. Earthing Rods

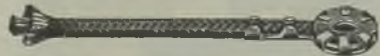
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of various types, also Bars.



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for every conceivable purpose.



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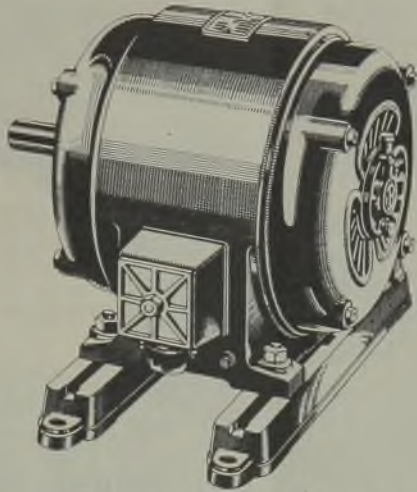
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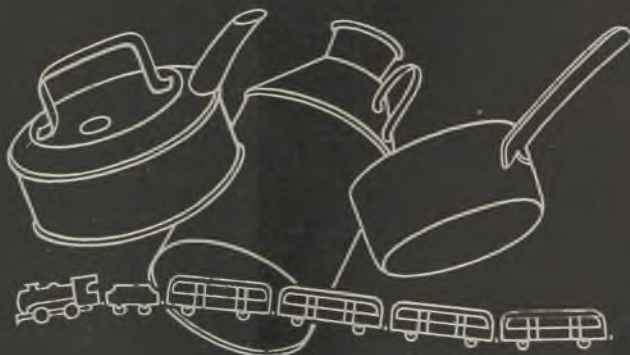


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70% saving in material

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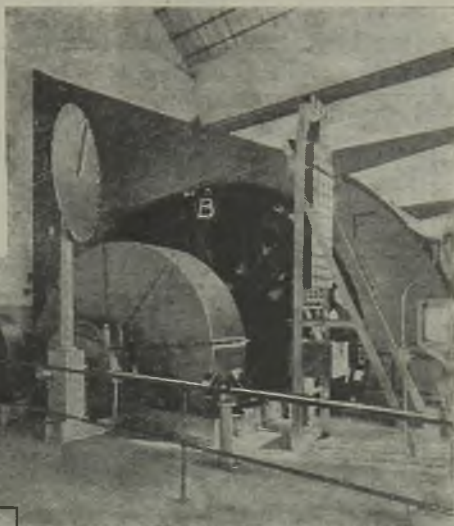


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A.C. WINDING
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AT A
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3,900 H.P. Peak, 423 R.P.M., 6,600 volts.

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6,600 volt Reversing Contactors.
Three breaks in series per phase.
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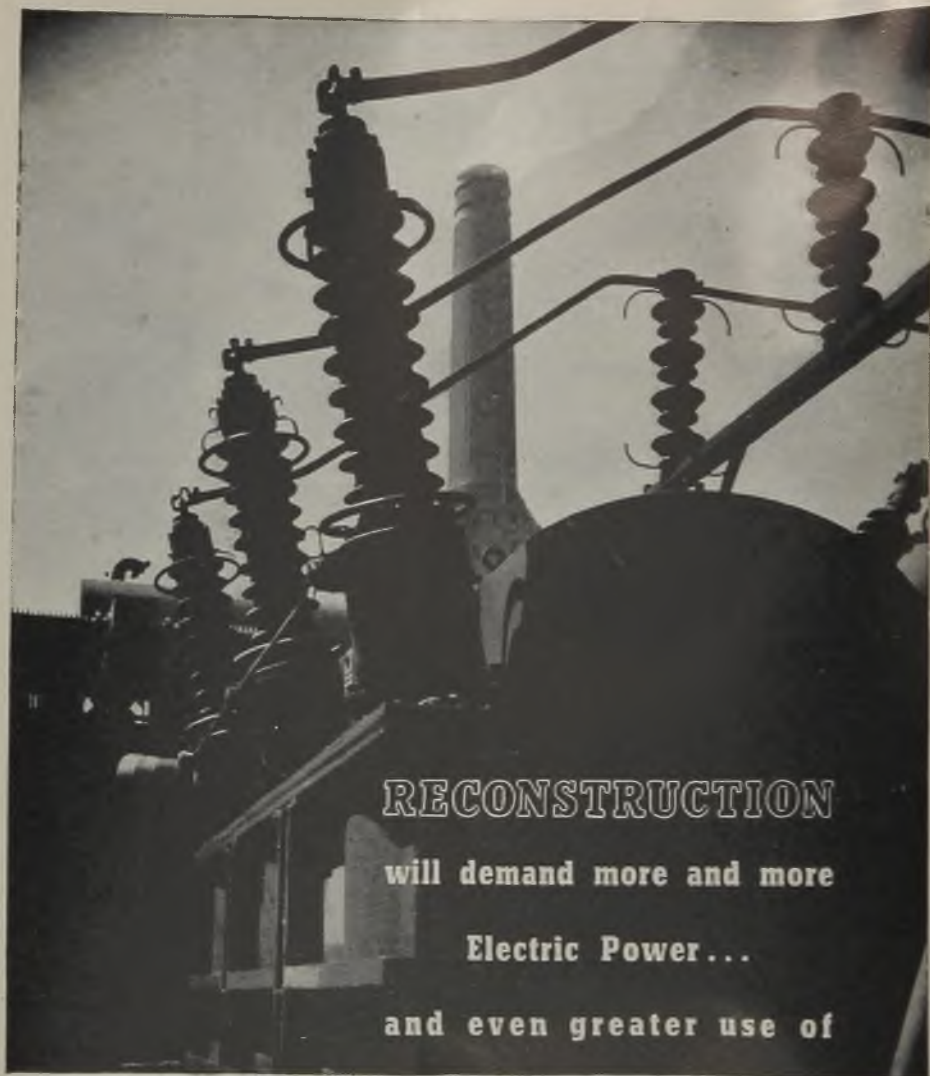
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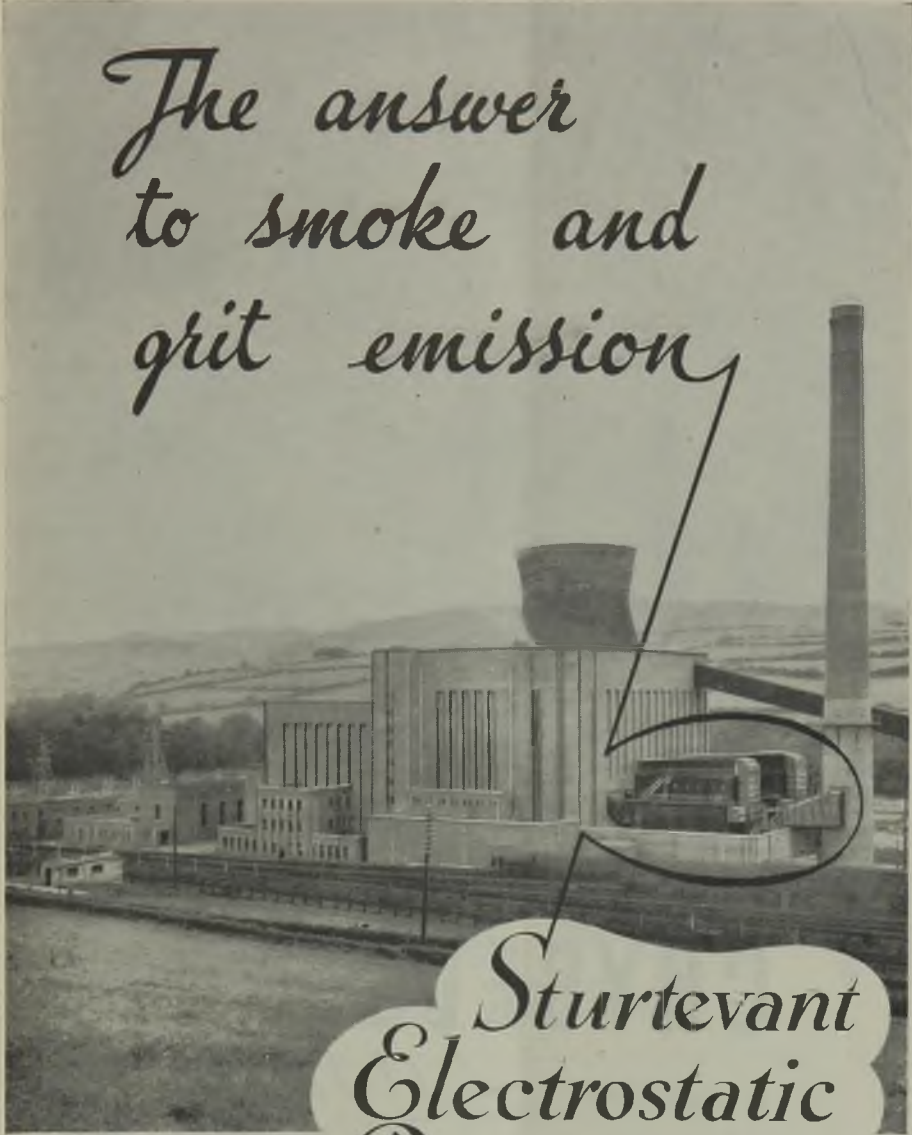
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to the Largest home*

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ELECTRIC COOKERS

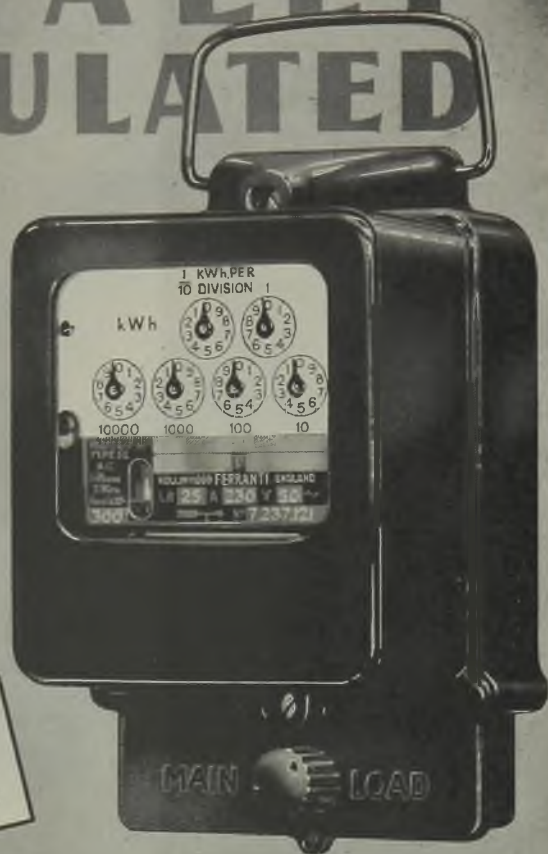
can be fitted into any scheme, individually or in bulk, the same beautiful porcelain enamel finish and distinctive colour tones distinguish all models.

Your problem may be a housing estate, or a luxurious home. You may be interested in one unit or a planned kitchen. We have designed and created Models for every occasion. Just give us an idea of your problem and let us send you a fully explanatory reply which will also tell you about the many features which have made **MOFFAT** Electric Cookers famous throughout the world.



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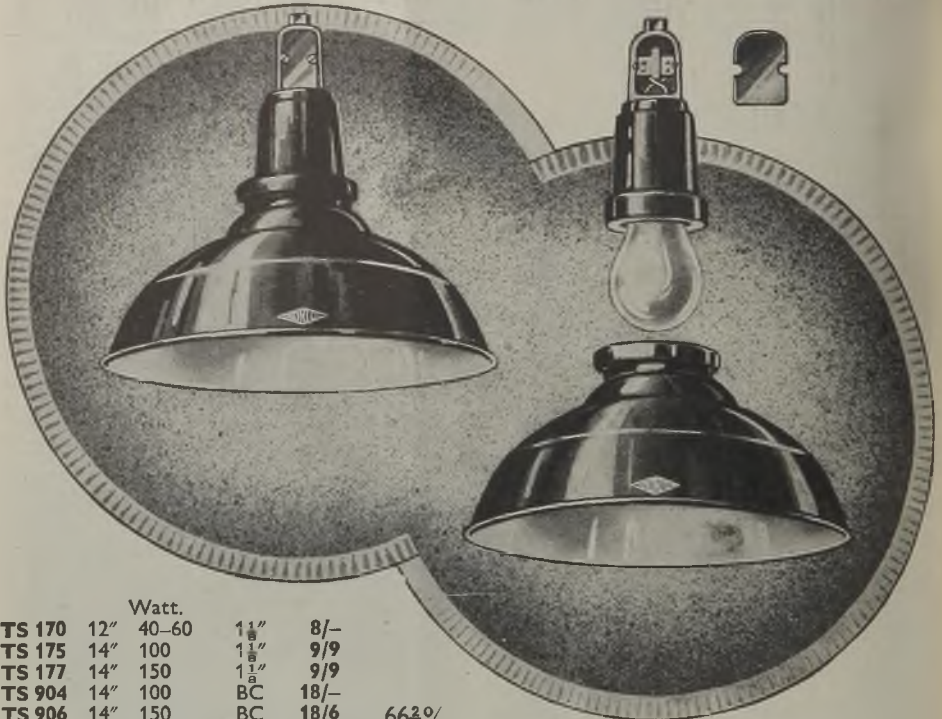
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66 2/3%
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**SLIP-IT-ON.
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OVER THE LAMP
FOR CLEANING.**

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Have one spare clean reflector. Remove dirty one (lift, turn, and it's off). Replace with clean one. Repeat over whole installation.

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Remove Lid, connect Mains and Earth,
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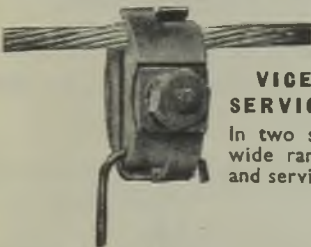
Here are a few typical items from the wide range available.



INSULATING SHROUD
for nut type service taps.
Insulates neatly and efficiently.



NUT TYPE SERVICE TAP
specially designed to prevent loosening due to vibration.



VICE TYPE SERVICE TAPS
In two sizes, for a wide range of line and service wires.



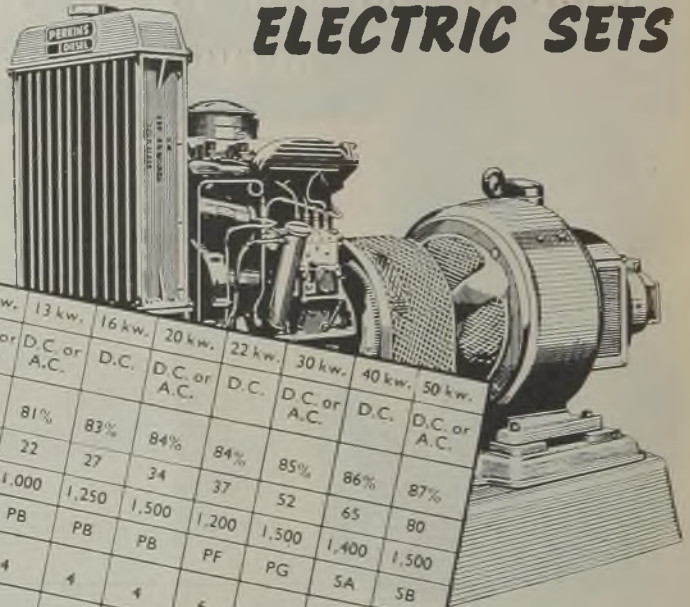
VICE-TYPE SERVICE CONNECTORS
for jumper connection work at "non-tension" junction points.

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Current	D.C. or A.C.	D.C. or A.C.	D.C.	D.C. or A.C.	D.C.	D.C. or A.C.	D.C.	D.C. or A.C.
Generator Efficiency	80%	81%	83%	84%	84%	85%	86%	87%
Engine B.H.P.	18	22	27	34	37	52	65	80
R.P.M.	1,000	1,000	1,250	1,500	1,200	1,500	1,400	1,500
Perkins Engine	PA	PB	PB	PB	PF	PG	5A	5B
No. of cylinders	4	4	4	4	6	6	6	6
Approx. full load fuel consumption Galls. per hr.	.9	1.1	1.4	1.7	1.8	2.4	3.1	3.8

❖ F. Perkins Ltd., maintain a highly trained technical electrical staff whose services are at the disposal of enquirers.

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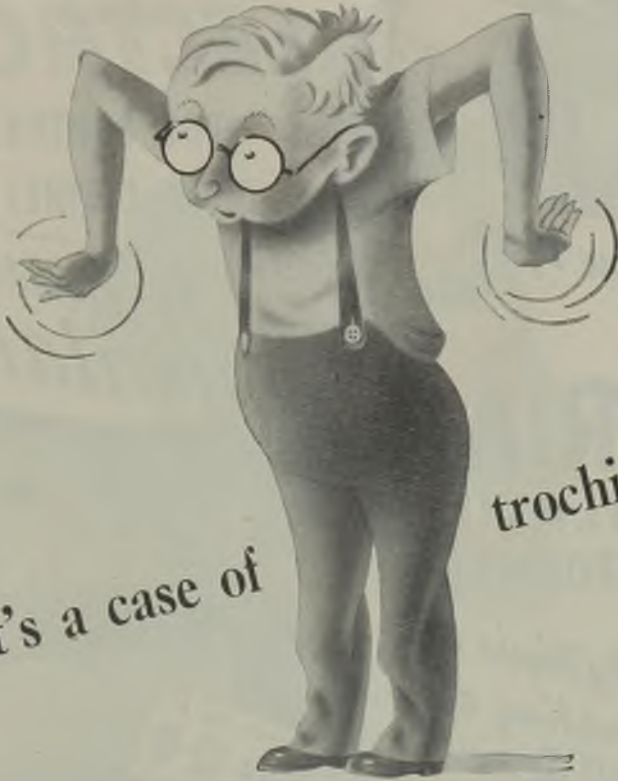
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"It is a case of trochilics" said the Superior Apprentice. "The inter-relation between the scaphoid, unciform, trapezoid and associated bones and ligaments of the wrist is such that it is mechanically incapable of trochilic movement and thus fundamentally unsuited to such rotary action as putting on nuts or screwing in screws."

The foreman breathed heavily. "I never said no such thing. I said the proper way to screw in screws is with a Desoutter power tool."

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The LECTROSS portable electric clothes horse enables every woman to be sure that her urgently needed personal laundry is thoroughly dried and aired, even on damp and rainy days. Safe—it cannot harm baby or scorch the most delicate fabrics. Economical—its BLACK HEAT element never glows and consumes less than one unit per hour. Specially useful to the young mother. Supplied with chromium rails & white or pastel bases.

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I see her not dispirited, not weak, but well remembering that she has seen dark days before — indeed with a kind of instinct that she sees a little better in a cloudy day, and that in storm and battle and calamity she has a secret vigour and a pulse-like cannon; I see her in her old age, not decrepit, but young, and still caring to believe in her power of endurance and expansion. Seeing this I say, All Hail!

Mother of Nations,
Mother of Heroes,

with strength equal to the time.

R. W. Emerson,

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FOR THAT REBUILT FACTORY

... and this time you want an installation planned for the future. New processes ... new developments ... new extensions — they will all come along and your electrical installation must be prepared to meet the new calls. A J. & P. planned and executed installation is designed for the future as well as the present—
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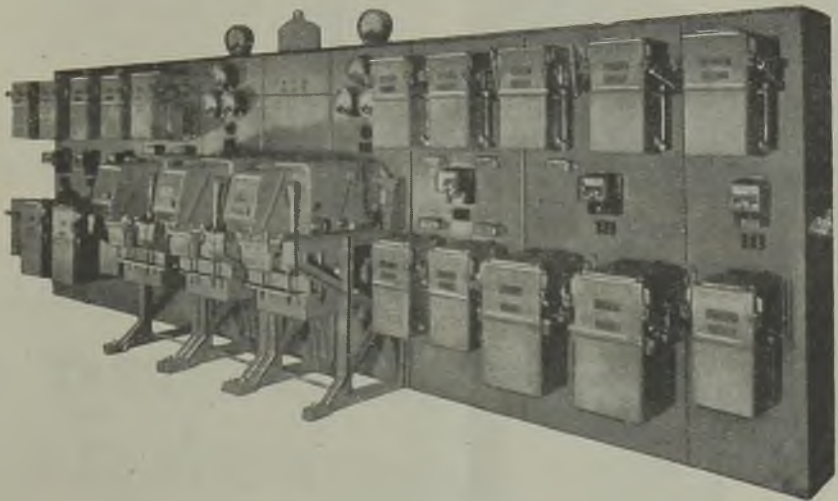


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This 660 volt oil-break switchgear
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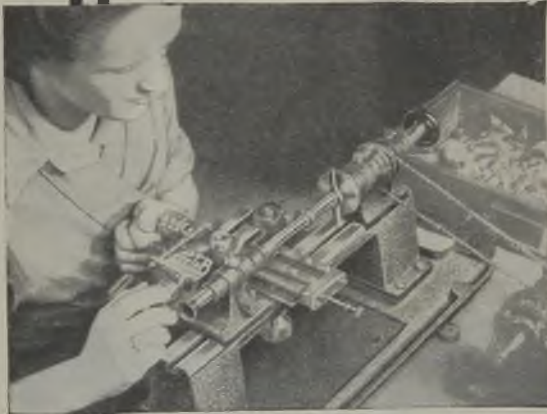
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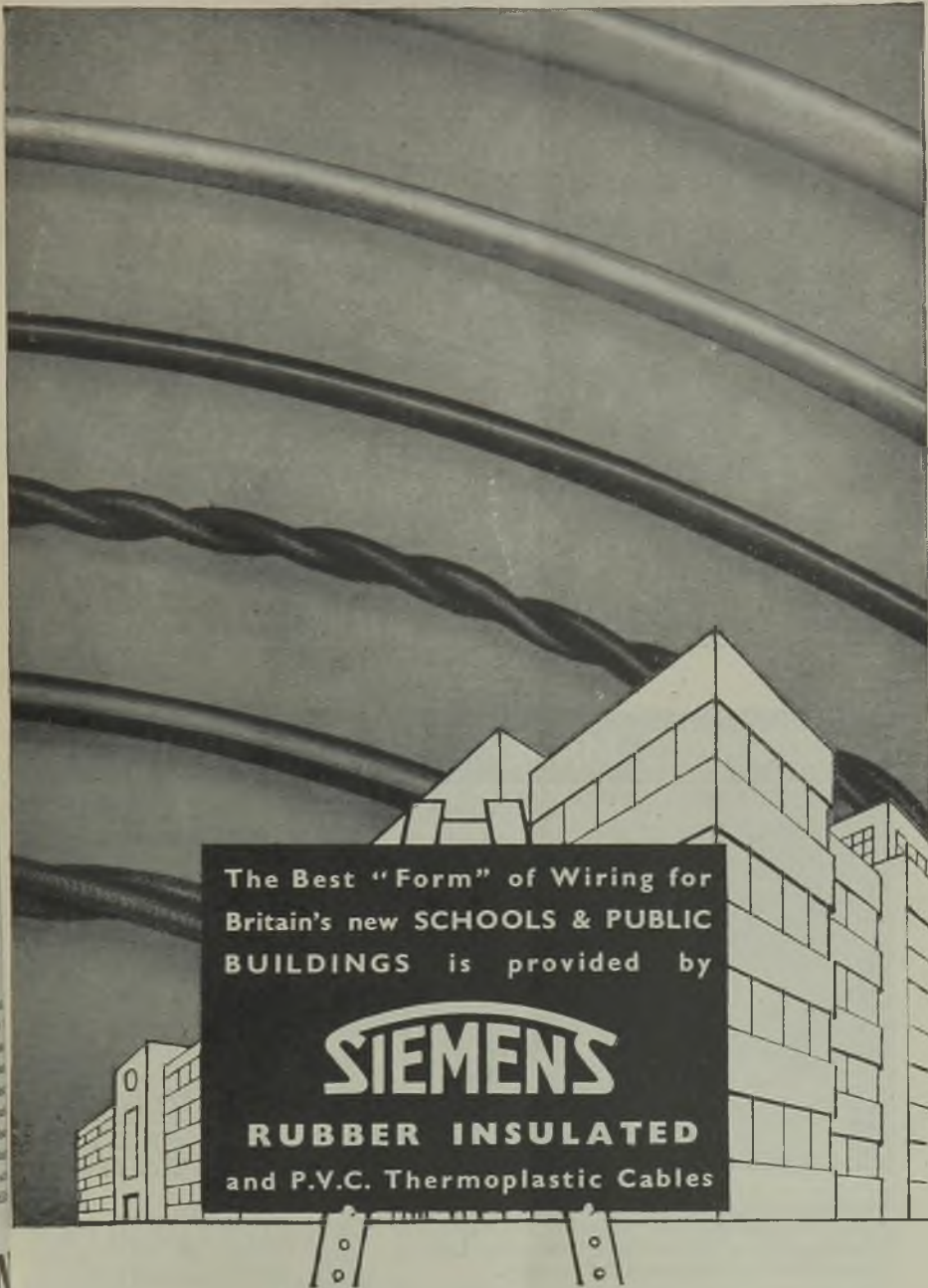
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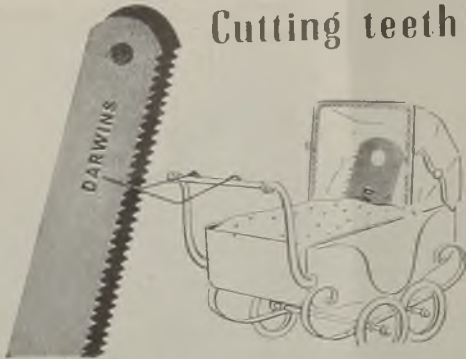


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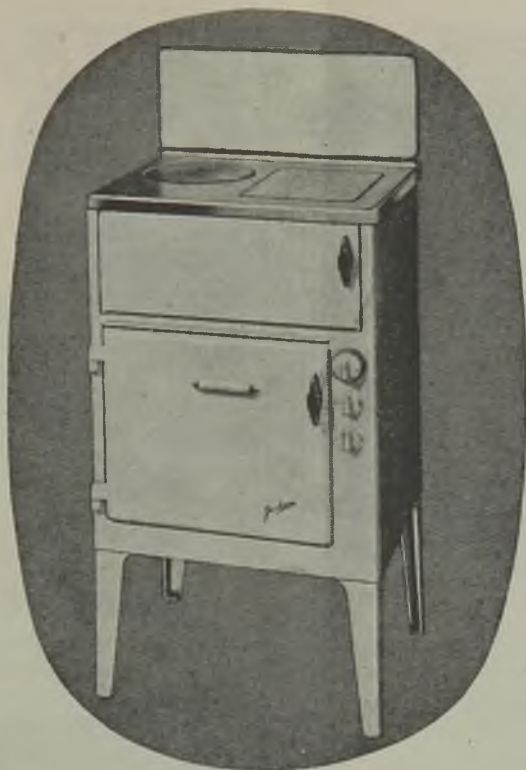
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RELIABLE SWITCHGEAR

is the key to Efficiency
in Industry

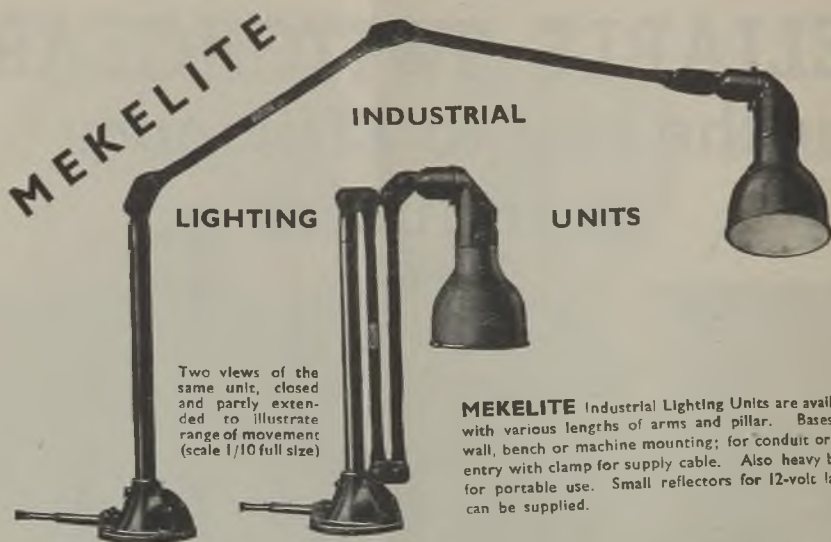


We have a comprehensive range of switchgear for all industrial applications evolved from long experience and proved by short-circuit testing

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Two views of the same unit, closed and partly extended to illustrate range of movement (scale 1/10 full size)

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Catalogue sent free on request.

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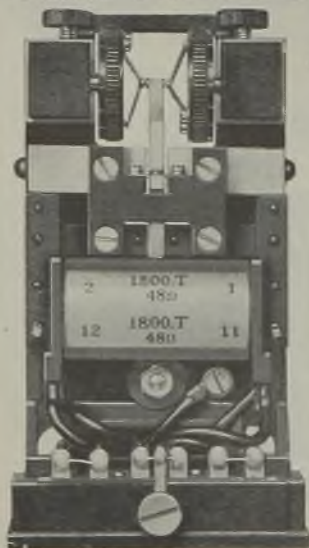
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POLARISED RELAY



Main features of Standard Model: High Speed. Short transit time. Negligible distortion up to 300 c.p.s. Contact gap a function of input power, hence small distortion almost down to failure point. High contact pressures. No contact chatter. High sensitivity—robust operation at 5mV.A. at 100 c.p.s. or 0.2mW.D.C. Great ease of adjustment. Magnetic bias adjustment giving absolutely smooth control. Balanced armature—hence immunity to considerable vibration and no positional error.

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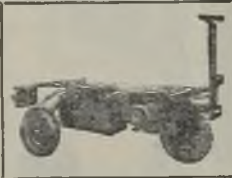
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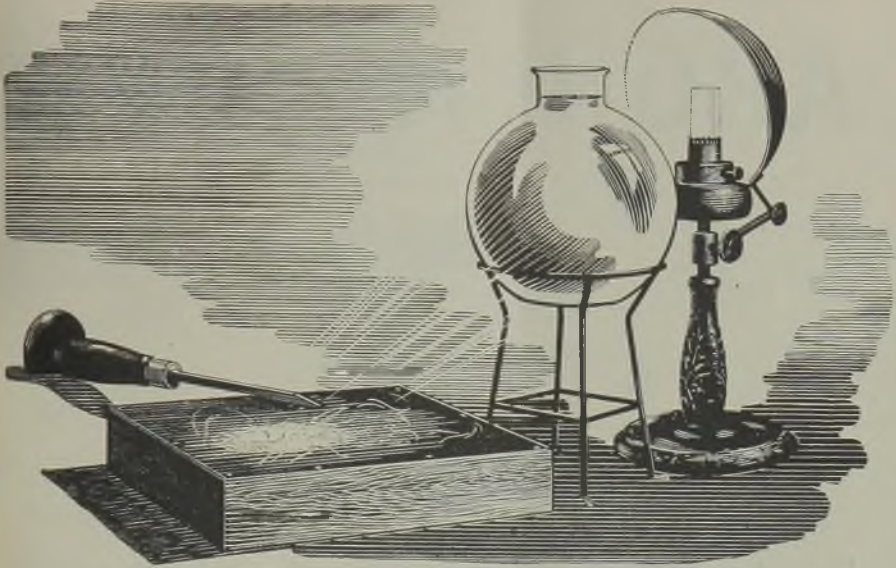


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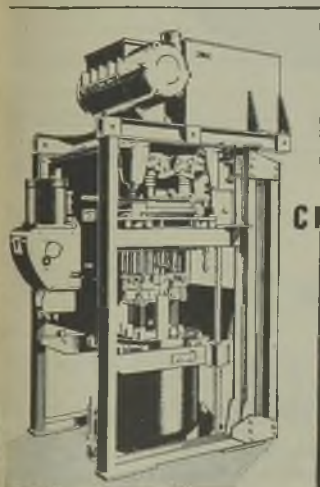
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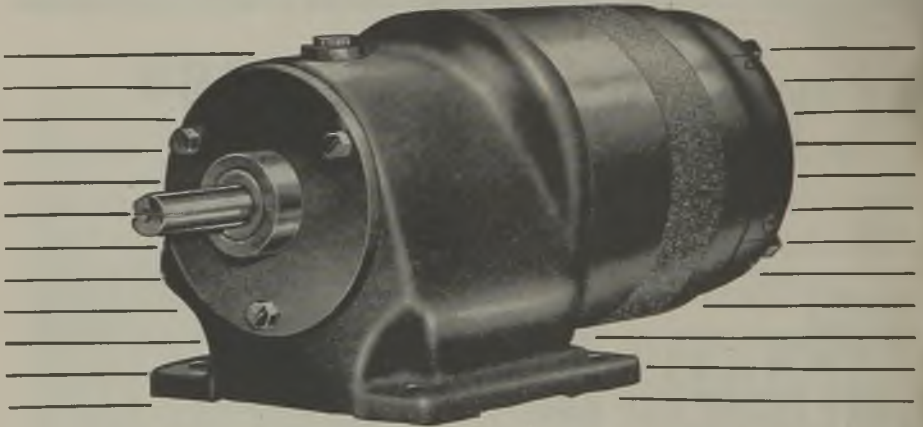
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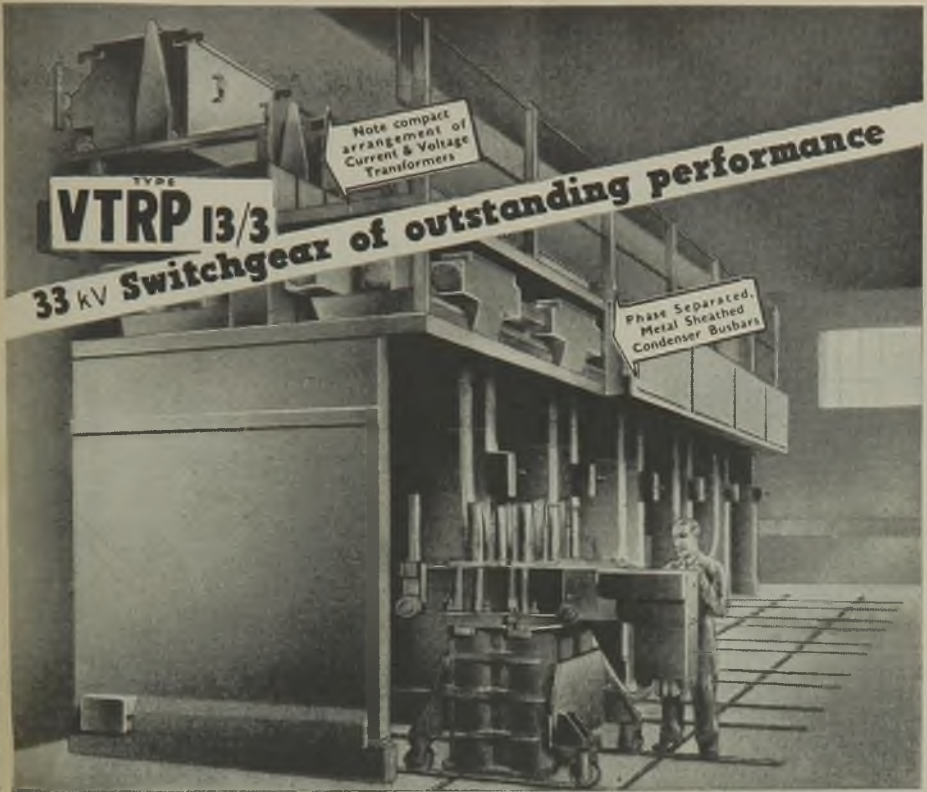
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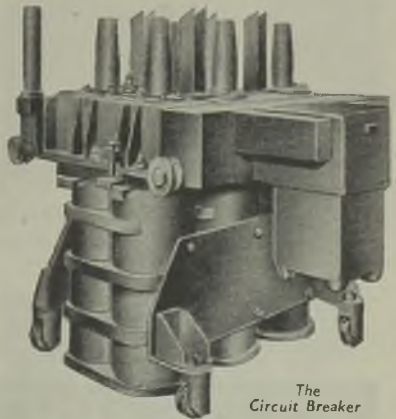
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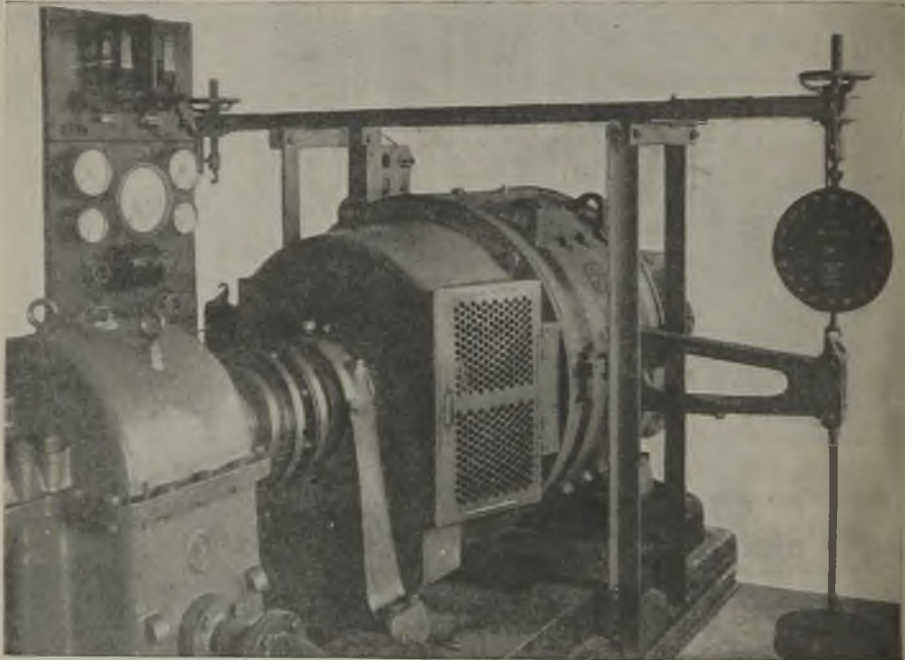
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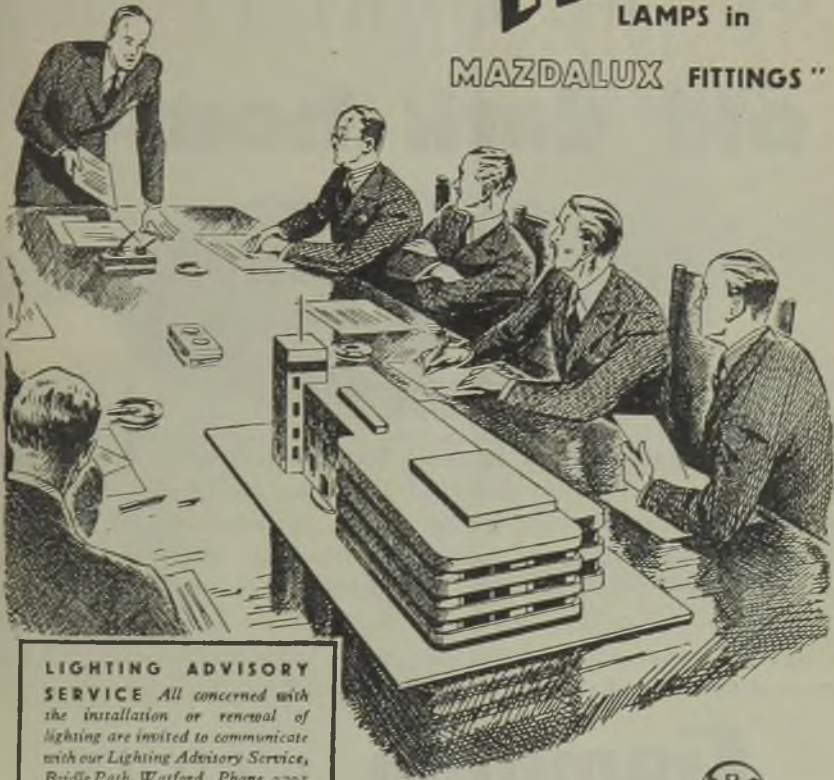
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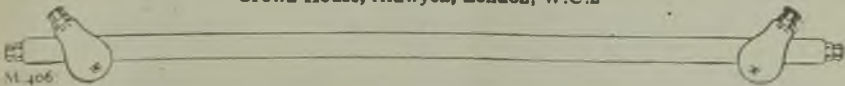
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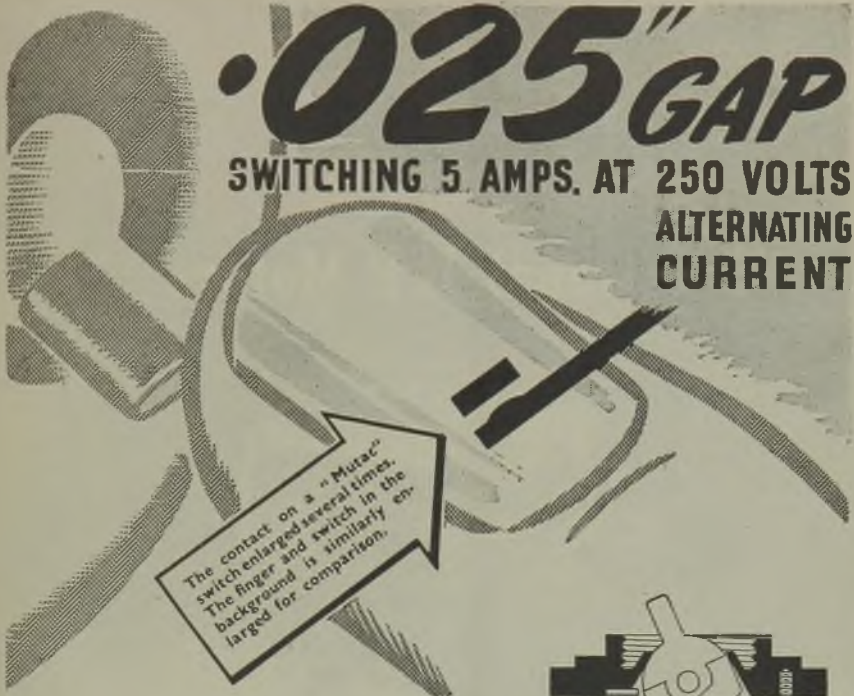
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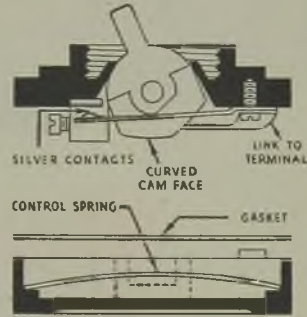


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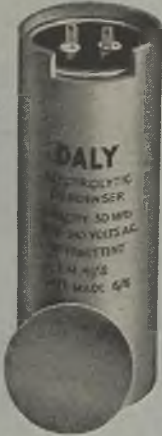
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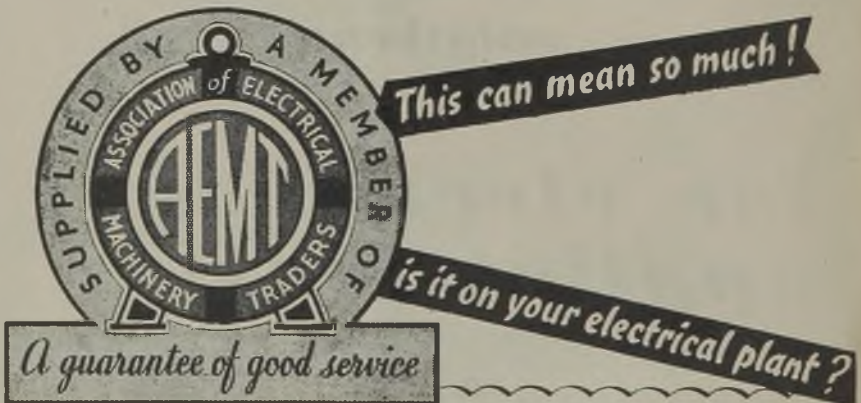
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ELECTRICAL REVIEW

October 11, 1946

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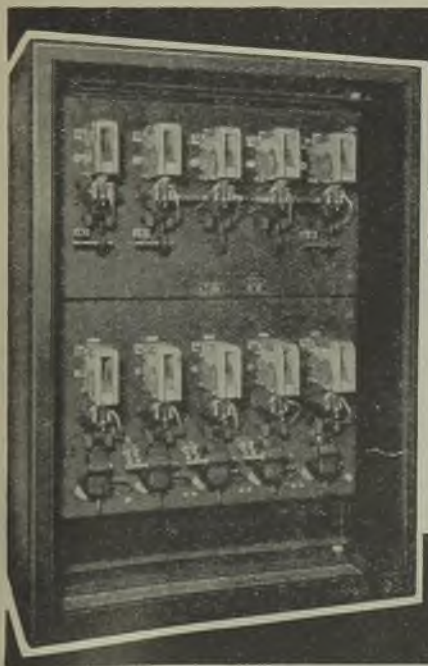
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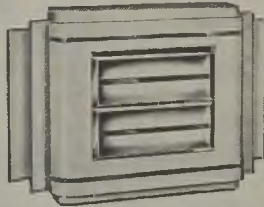
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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXIX. No. 3594.

OCTOBER 11, 1946

9d. WEEKLY

The All-Electric Idea

Re-Examination after Thirty-Six Years



THIRTY-SIX years ago a presidential address was delivered at the Institution of Electrical Engineers that was a declaration of faith. Briefly, its theme was that all our wants in the way of light, power and heat would be met by converting the coal used in this country into electricity, provision being made for by-product recovery.

The faith thus professed, supported as it was by logical reasoning and founded upon scientific and economic principles, became an inspiration to electrical engineers the world over. Its influence was all the greater because the speaker, Dr. S. Z. de Ferranti, had so often justified his faith through his works and had shown that in willing the end he was able to devise the means.

Inspiration and Example

This inspiration was in its way probably as potent a factor in electrical progress as was Ferranti's pioneer work in the long-distance transmission of electricity which was necessary to give reality to his vision. Believing that this address constituted a landmark, we reproduced it in full in this journal (as was possible in those days) with a view to giving it as wide and as immediate a public as possible.

Although the goal still lies ahead and there are many applications for which electricity may now seem unsuited, it should be clear from the magnitude of the progress made since 1910 that any doubts in relation to details of this kind are wisely qualified by the words "at present."

It is a measure of the practical quality

of the ideas enshrined in this vision of the future that in his presidential address last week Mr. Vincent de Ferranti could examine them in the light of modern developments and of his own wide experience as an engineer and reaffirm his faith in their relevance to what may reasonably be expected. One favourable factor is the very much healthier state of the electrical manufacturing industry to-day and, as a consequence, the large amount it can now put aside for research and for new methods and machinery.

Illimitable Scope

In the task he set himself of estimating the length of time that is likely to elapse before the coming to maturity of the all-electric age, he was able to trace observable trends, based on a wealth of accumulated data, and to show how almost illimitable is the scope for electrification. Whether the dates tentatively put forward prove closely accurate or no is immaterial. They may be hastened or retarded by outside factors. It seems certain, however, that ever-increasing appreciation by the public of the advantages of electricity will lead to more insistent demands for its service.

Any long-term plans made on behalf of the public that fail to take full account of this will lead to waste of money and frustration of popular wishes. They may delay the outcome, but they will not alter the shape of things to come. The conclusion of our leading article of November 18th, 1910, may here be appropriately re-applied: "Broader views, such as the

President has set before us, must be encouraged and instilled. Mr. Ferranti has led the way before; he leads again and we confidently accept his guidance; we must look ahead—and go ahead.”

Heat— Electricity Stations

IN time to give perspective to yesterday's discussion at the conference on “Fuel and the Future” came the authoritative Interim Memorandum on District Heating, reviewed in this issue. This report should give the quietus to statements regarding the extensive use of the system abroad and to extravagant hopes of combining it with the production of electricity in large public generating stations. No mention is made of back-pressure turbines, the theoretically high thermo-dynamic efficiencies of which have provided the basis for some of the more extreme claims, presumably because an *a fortiori* case for the more practicable, though less efficient, pass-out units has not been established. In certain limited and localized fields district heating offers more promise, generally when steam is raised specifically for the purpose.

Welding Research

THE growing number of engineers who specialize in the rapidly expanding field of welding and the new problems that have continually to be solved well warranted the attention paid to these subjects in the presidential address of Mr. Arthur Dyson to the Institute of Welding last week. Welding produces more rigid structures than does riveting and the requirements vary greatly with conditions. Much research of a fundamental character will be necessary, as Mr. Weigel, director of the Welding Research Council, U.S.A., pointed out on the same occasion, with a view to drawing up specifications for steel to suit individual types of structure.

“Mobility” and Housing

It is frequently complained that workers are reluctant to move from areas suffering from industrial depression to other districts where work can be found for them. Most people have a dislike of “being torn up by the roots” but this would be more easily overcome if they could be assured of proper living accommodation if they moved. To satisfy this need is the joint responsibility of the local authorities, the

industrialists who need labour, and the Government Departments charged with the task of securing a reasonable spread of employment. This is recognized at Stafford where, it is reported, the Corporation Housing Committee, and representatives of the English Electric Co., the Ministries of Health, Labour and Supply and the Board of Trade held a conference to discuss the accommodation of 2,000 highly-skilled workers who would be going to Stafford in the next few years. The result seems to have been a promise by the Board of Trade to do everything possible to facilitate the Corporation's housing programme.

High Voltage Cables

ARNHEM was a name known to electrical engineers before it gained its heroic eminence. It was there that a 264-kV impregnated pressure cable was laid and joined in 1936 to give trouble-free service up to the time of the invasion of Holland. Of even greater importance, having regard to its duty, is the 132-kV cable, also described in this issue, which was put into commission for the Central Electricity Board during the war. Counterparts of these and other cables making up the 1,650 miles of 132-kV grid cables installed by B. I. Callenders alone are on view at Dorland Hall, W. Technical achievements are at present in advance of bulk requirements, but when further extensions are needed, the cables will be available.

Designers and Users

IN organizations set up for facilitating exchange of views between manufacturers and technically trained users of electrical apparatus, the former, it seems to us, gain more directly. While sales staffs can quite well explain to customers what their principals have to offer and why they should restrict their demands, as far as possible, to “off-the-shelf” products, the makers require data about actual performance. This implies the need to bring users into the closest contact with designers, if only in order that the expensive proportion of the factor of safety allowed by the designer that is sometimes called the “factor of ignorance” may be minimized. The more recondite reasons were given in the chairman's address of Mr. E. T. Norris to the I.E.E. North Western Centre, reported in last week's issue.

Potters' Mills

Changing Over to Electrical Operation

FOR thousands of years pottery-making methods changed scarcely at all; it was only a century or so ago that the availability of steam power introduced the possibilities of mechanization on a large scale. Now a new phase in the history of the industry has arrived—electrification, applied both to providing motive power and to kiln heating.

The adoption of electrical methods began several years ago but it is only comparatively recently that their advantages have come to be realized to any very great extent. The war has helped, by demonstrating the advantages of electricity in the pottery industry, as elsewhere, to overcome prejudice and conservatism and conversion to electricity has also in many cases been eventually brought about by the impossibility of repairing or replacing obsolescent steam plant as well as by the increased cost of coal. Probably, however, it is still not sufficiently appreciated in the pottery industry how uneconomical, expensive and inconvenient it is to continue to employ over-age steam plant needing constant maintenance, when electrically driven plant which requires virtually no attention is available.

With the present necessity for meeting an unprecedented demand for pottery both at home and abroad, the industry is more than ever anxious to employ up-to-date methods which will enable it to simplify production, increase output and reduce costs. In this article we propose to confine ourselves to describing how electricity is being applied to the all-important initial stage of production, the milling of the flint and stone. This specialist process, which is tending to become a sub-industry separated from the main business of pottery manufacture, does not, unlike later stages of pottery production, require steam. The provision of motive power being therefore the sole consideration, the argument in favour of using electricity is

overwhelmingly strong. Apart from the question of stoking and maintenance, steam plant cannot be switched off or run economically during slack periods; it is difficult to maintain at constant speed; and moreover, it takes up a very considerable amount of floor space which in the majority of mills we have visited would form a very welcome addition to the production area.

Although the basic process is the same in each case, namely the grinding of the flint (after calcining) and stone down to approximately 50 to 60 per cent of 0.01 mm. in size, to-day three distinct methods are employed—pan grinding, cylinder grinding and continuous grinding. At Stoke-on-Trent recently we were given the opportunity of inspecting typical installations of each type



Pan room at Furlong Mills

and comparing not only the merits of electrical operation over steam but also the advantages of each method.

Pan grinding, a well-tried method which was the accepted practice in the past, is still claimed by many of the more conservative potters to give the most satisfactory and consistent results. It has one advantage over the other form of batch grinding, cylinder grinding, namely that the material has not to be ground to finality, but it is gradually now being superseded by continuous grinding.

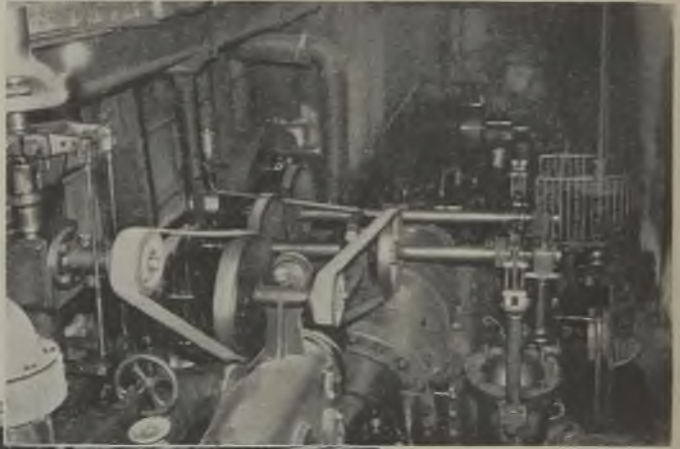
The pan grinder consists of a circular steel

shell (from 8ft to 14 ft across), paved with blocks of stone (each weighing about 1 cwt) and four arms at right angles driven from a central shaft. These arms push round at 10-15 r.p.m., large roughly hewn pieces of stone (known as "runners" which weigh anything from 18 to 25 cwt each) of similar material to the paving. After preliminary crushing to $\frac{3}{4}$ -1 in., the flint and stone are placed in the pan and water is added, the mixture being ground between pan bottom and runners for a period of from 8 to 12 hours. When ground the material is pumped or run into a washing tank and agitated with three or four times its weight of water. After agitation the particles are allowed to settle; the heavier falling to the bottom are returned to the grinding pan

for the stator side of the motor, fully interlocked with a liquid starter. The motor and starter are so designed that the motor is capable of providing the heavy starting torque required to start up the plant from rest.

A comparison of the relative merits of steam and electricity is admirably demonstrated at the Furlong and Longport Mills of which Mr. A. H. Riley is manager. At the former a 250-H.P. tandem compound condensing steam engine drives a centre cog wheel from which are taken two massive shafts 40 to 50 ft long, driving seven pans.

Right: 250-H.P. tandem compound condensing steam engine providing the main drive to the pan mill at Furlong Mills.
Below: Two individual electric drives to pans at Longport Mills



When the contemplated conversion to electricity is effected the pans will be individually driven by two 60-H.P. and five 40-H.P. motors. Apart from the question of maintenance, reliability and lower running costs, much space will be made available for proposed extension of the plant.

whilst the finer particles at the top are withdrawn to storage arks.

The selection of electrical equipment for the pan grinders requires special care in view of the heavy starting torque. Slip-ring motors are essential, and since the drive is usually through worm gearing from the floor below the grinding room, motors of the protected type are found to be suitable. A separate oil-immersed circuit breaker is normally provided

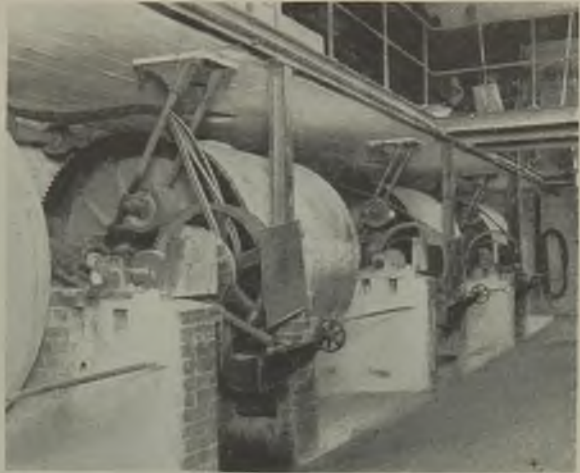
driving five pans through shafts and worm wheels has already been replaced by five separate 40-H.P. electric motors, each fitted with its own power-factor condenser. Situated on the floor below the pans, these motors drive through David Brown gears which reduce the speed from 970 to 62.5 r.p.m., gear wheels and pinions further lowering the speed to 11 to 15 r.p.m.

The pans at this particular mill are used

solely for flint, which after calcining (firing to a moderately high temperature) and before grinding is passed through a crusher driven by a 25-H.P. motor, capable of exerting $1\frac{1}{2}$ times full load torque at starting. Both this motor and the one driving an elevator which conveys the flints to the grinder are of the totally-enclosed type to withstand the extremely dusty atmosphere.

In the case of cylinder grinding a cylinder constructed of

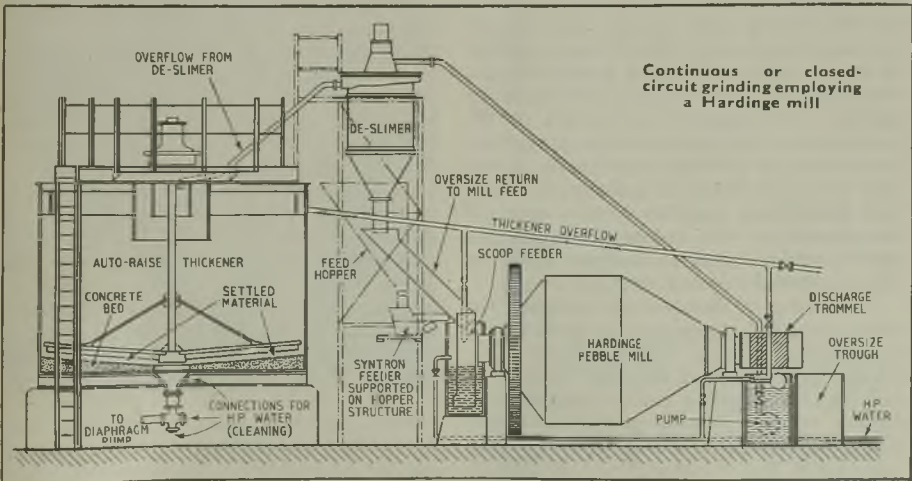
Cylinder grinders with V-belt drives and hand-wheel controls for individual clutches at Burslem Mills



boiler plate lined with stone blocks turns about a horizontal axis. The flint and stone together with water are fed in through an opening with a hand-cover on the periphery of the cylinder. The grinding medium usually comprises flint pebbles which are contained loose in the cylinder with the "charge" of material to be ground. The cylinder is provided with ring-gearing and driving pinion, the latter in turn usually being driven from the motor by moulded V-ropes. For this drive a protected-type slip-ring motor capable of exerting at least $1\frac{1}{4}$ times full load torque is necessary for the purpose of overcoming the "out of balance" load when the cylinder is started up.

The charge and pebbles lie in the bottom half of the cylinder when at rest, but as soon as the cylinder commences to rotate the

material tends to climb with the cylinder wall until it reaches such an angle that the pebbles cascade and roll upon the stone being crushed. Inching facilities are desirable on the starter to facilitate location of the opening in the cylinder accurately over the discharge run-way. Occasionally a friction clutch is fitted to the cylinder driving shaft in which case a protected squirrel-cage motor may be employed, equipped with an oil-immersed star-delta starter, inching being



Continuous or closed-circuit grinding employing a Hardinge mill

accomplished by manipulating the clutch.

The Burslem Mills are among those at which cylinder grinding is employed extensively. Here the flints are taken from the calcining kiln to crushers by conveyors and bucket elevators to hoppers from which they can be fed into any of the cylinders by means of 10-cwt skips. Dust-removal apparatus is found to be a great asset when charging. In the newer section of these mills there are two sets of four 30-cwt cylinders (7 ft in diameter), each set being driven through V-belts by a 100-H.P., 750-r.p.m. Crompton Parkinson motor with clutches for the individual cylinders. This is an economical arrangement since each cylinder alone would require 30 H.P. to overcome the heavy starting torque. The motors used are of the auto-synchronous type giving power factor control. As a rather coarse product is required, the cylinders are geared to run at 20 r.p.m. instead of the usual 18 r.p.m. and the charge is treated for only nine hours instead of about twelve.

The older section of the mills provides a contrast in that a 120-H.P. motor is arranged to drive through countershafting not only six cylinders, but also agitators and pumps, the latter being used to pass the material over electromagnets to remove stray particles of iron. The provision of a power-factor correction condenser for the 120-H.P. motor together with suitable adjustments to the excitation of the auto-synchronous motors has secured an over-all power factor of well over 0.9; a power-factor indicator is placed in a conspicuous position in the window of the substation. To reduce the maximum demand the cylinders are stopped while the crushing machines are in operation.

Continuous or closed-circuit grinding, the most up-to-date process, is a development of cylinder grinding which may possibly replace the two other methods referred to and may be described as the application of mining practice to the pottery industry. The continuous grinding plant is the Hardinge mill, which was introduced to this country

by Mr. J. C. Farrant, of the Hardinge Company, which was taken over by the International Combustion Co., Ltd., in 1921, so far as the Eastern hemisphere was concerned. In the succeeding twenty-five years several continuous wet grinding plants have been installed and at present a considerable number of schemes for change-over from pans and cylinders to the Hardinge system is in process or under consideration.

In grinding, the all-important factor is consistency and this can be most easily achieved by the better control possible with continuous grinding, and classification. This method of grinding has other notable advantages. One Hardinge mill, occupying about the same space as two pan grinders, has a larger output than four pans and it is much more convenient to be able to withdraw material continuously rather than wait until 95 per cent has been ground, as is the case with batch cylinder grinding.

A good indication of the amount of space saved by the installation of Hardinge mills is provided at the Dalehall Mills where two 10-tons-a-day units (one for flint and one for stone) have just replaced twelve pans of varying sizes. Mr. Podmore, the manager of the mills tells us that output will be considerably increased when all the necessary alterations have been completed and that with the removal of an old 350-350 H.P. compound tandem engine, boiler room, coal stock yard and cooling water pond, the area available for productive work has been increased by about one-third. Moreover, electric motors totalling 200 H.P. do the same amount of work as the old engine.

A brief description of the Hardinge plant at the Dalehall Mills will be of particular interest since it is the most recently installed and consequently incorporates all the latest refinements. Before treatment in the grinder, the stone or flint (after calcination) is crushed in two stages to $-\frac{3}{8}$ in. and conveyed to a hopper. From the latter, a "Syntron" electrically operated feeder with rheostat controls the rate of feed to the Hardinge mill, which

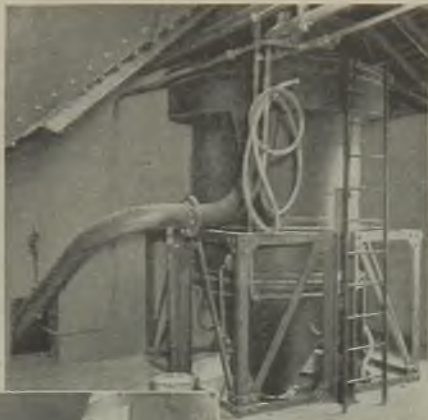


Thickener tank with pump, at Dalehall Mills

is conical in shape and is partly filled with hand-picked flint pebbles of 3-4 in. diameter, together with water. The conical design causes a partial segregation of the pebbles whereby the largest pebbles at the greatest diameter grind the incoming coarse feed, the discharge cone accelerating the flow of that material which is fine enough to be delivered to the classifier. The grinder motor is a 60-H.P., 735-r.p.m. Metrovick unit which drives the mill through its outer rim via a V-belt, shafts and pinion wheels.

The mill discharges continuously through a coarse trommel attached to the discharge spout of the mill, to permit stray oversize or broken pebbles to pass to the classifier. The pulp passing through the trommel is pumped by a "Vacseal" (4½-H.P. motor) to the classifier which maintains an overflow of finished product corresponding to the required surface factor, the oversize being automatically returned to the mill. The finished product

revolving arms driven by a 1-H.P. motor at the top of the tank assist the material to settle and when there is sufficient in the tank—a depth of 14 in.—a bell rings. The



Flint classifier at Dalehall Mills

Right: Hardinge flint cylinder showing vibratory feed, return chute from classifier and main drive, at Dalehall Mills.

Below: Hardinge stone cylinder showing "Vacseal" pump (taking ground material to classifier) in foreground, at Dalehall Mills



from the classifier flows by gravity to a thickener, a large storage tank, which discharges a thickened pulp to the arks. Slowly

overflow of excess water is returned to the grinding classifier circuit.

For assistance in preparing the article we should like to thank Capt. T. Lockett, general manager of the Stoke-on-Trent Electricity Department; Mr. L. Goodall, his distribution engineer, and Mr. H. McCartney his technical assistant; Mr. A. H. Riley, general manager of the Furlong and Longport Mills; Mr. T. H. Podmore, manager of the Dalehall Mills, Mr. E. V. Hammersley, manager of the Burslem Mills; and Mr. J. C. Farrant of the International Combustion Co., Ltd. Certain details relating to the electrical equipment of the pan and cylinder grinders were also taken from data in the *Metropolitan-Vickers Gazette* by Mr. N. A. Smith.

E.R.A. Published Reports

An Annotated List of Published Reports (up to October, 1945) of the British Electrical and Allied Industries Research Association has been issued and can be obtained from the secretary at 15, Savoy Street, W.C.2, price 5s. net. The new edition contains 112 pages and its contents are classified by subjects.

Views on the News

Reflections on Current Topics

NEW people can have much idea of the thought, time, skill and hard work which go into the making of a film. Last week I went to the Merton Park Studios where the Film Producers' Guild is making a "documentary" for the Central Electricity Board which will be in the nature of a history of the development of electricity supply in this country. A control room scene which was being "shot" at the time exemplified the harmless deception which on the screen looks exactly like the real thing. Of course the work is closely watched by members of the Central Board staff to guard against *gaffes* which more knowledgeable members of the public would spot. All the same I was impressed by the grasp of the technical detail displayed by the chairman of the Guild, Mr. E. P. L. Pelly and members of his staff. The film, which will run for about an hour, will not be seen until well into 1947.

* * *

An apt illustration of the need to avoid the use of the term "high-pressure" when one means "high-voltage" was furnished by Dr. L. G. Brazier's lecture at the B. I. Callender's exhibition, which forms a notable addendum to the "Britain Can Make It" exhibition elsewhere. Both pressure (in lb per sq in.) and voltage are critical factors in the design of cables of large MVA carrying capacity and any looseness of terminology easily leads to confusion. It is to be hoped that students in large numbers have been afforded an opportunity of gaining from the exhibition an introduction to the physics of high-voltage cable design which have underlain some eighteen years of research into this aspect of electrical transmission. They would further profit from Mr. D. T. Hollingsworth's demonstration of the final results in which joints and sealing ends receive their proper attention. From the overhead-line features on show one receives an obvious reminder that the word "tension" also should be used only in its mechanical sense and not as a substitute for "voltage."

* * *

There is nothing new in complaints by tenants of flats that their landlords are making excessive profits on the supply of electricity to their apartments, but hitherto there seems to have been no means of curbing this form of extortion. Now, however, the Rent Tribunals which have been set up appear to have power to deal with it. At a recent meeting of the Islington Tribunal tenants alleged that electricity which cost landlords 3½d. per kWh was being passed on to them at anything from 6d. to 9d. per kWh by

means of what were called "check," but are evidently prepayment, meters. The Tribunal directed that the meters should be adjusted to lower the charges. In three cases the Tribunal ordered that electricity should be supplied to the tenant at the price it cost the landlord.

* * *

The practice of sending electricity supply installation and repair personnel to work for a few weeks in the factories making the electrical apparatus they handle is not one which has yet been adopted to any very great extent. Mr. G. V. Harrap, borough electrical engineer of Gravesend, is, however, a strong advocate of this arrangement, the cost of which, he says, is rapidly recovered by the increasing speed and efficiency of the work resulting from the specialized training. The manufacturers on their part are most helpful and welcome the opportunity of ensuring that there are men who understand their products at the consumers' end.

* * *

Incidentally, when I visited Mr. Harrap's office a few days ago I noticed that, instead of having his fluorescent tubes installed in the centre of the ceiling, he had had them fitted above the windows. He finds it a definite advantage to have both daylight and artificial light from the same direction. The adoption of the same arrangement for the showroom windows also greatly facilitates the planning of displays which are suitable for day and night presentation. This is especially the case with the present restrictions on the use of electricity for advertising purposes, since the same tubes serve both to draw attention to the apparatus displayed and at the same time provide general illumination of the show-rooms.

* * *

Extensions of electricity supply to remote areas in this country are the subject of debate here; in Sweden such extensions are taken as a matter of course. I hear from a Swedish source that it is even proposed to take electricity to the Lapps, the nomads who roam the wilds of Northern Scandinavia. Before the war telephones were set up in the more permanent Lapp villages. Now the first Lapp *katas*, tent-like dwellings of a fairly substantial yet mobile type, are to have electric light by Christmas when a new h.v. line in the province of Härjedalen will be put into use. The length of this line is not given but it is to cost £70,000 and at some points will be 1,000 metres (3,280 ft) above sea level.—REFLECTOR.

Electrical Progress

Mr. V. Z. de Ferranti's Time-scale Forecast

IN his inaugural address in London on October 3rd as President of the Institution of Electrical Engineers, Mr. V. Z. DE FERRANTI recalled that when members first met in their present lecture theatre thirty-six years ago his father (the late Dr. S. Z. de Ferranti) had placed before them a scheme for the complete utilization (in the form of electricity) of the energy in all the coal available for home consumption. He considered that wherever coal and gas were used for the production of heat and power, everything for which they were used would be better done when electricity was the medium of application.

How far had they gone along the road marked out for them in 1910 towards the "all-electric" idea? It would appear from the series of graphs and statistical data presented by the President that the late Dr. Ferranti's target figures of coal utilized and saved might be reached within 25 years, depending upon the labour force available for manufacturing the plant required, the load factor, and the efficiency of conversion attained.

It was estimated that 150 million tons of coal would be needed for generating electricity in 1986, compared with the present 25 million tons per annum, representing 405,000 million kWh at an efficiency of 30 per cent, which would require 96 million kW of plant operating at never more than 60 per cent load factor. The present total of 12 million kW of installed plant (with insufficient 12 per cent spare capacity) generated 38,000 million kWh.

Over 9,000 kWh per Head

The energy sold to consumers since 1920 had been remarkably regular, indicating targets of 131,400 million kWh in 1959 and of 405,000 million kWh in 1986. Those totals meant respective yearly consumptions of 2,850 and 9,100 kWh per head of the population.

The smaller figure seemed very moderate to Mr. Ferranti, who for many years in his own home had been using 6,000 kWh per person per annum. If that rate of use became general, and he did not consider it by any means an extravagant rate, then 270,000 million kWh would be required yearly for domestic uses alone.

Those trends made it difficult to be satisfied with the suggestions made in the March, 1946, report of the Fuel and Power Advisory Council. Government Departments should have the best and most enlightened advice, since they would be responsible for large capital commitments in connection with housing and they were in a position to retard as well as to accelerate the achievement of a condition which otherwise would have been brought about by the public.

If the standard of living was to be raised to an extent which would give the mass of the people clean homes, properly heated and provided with labour-saving devices and constant hot water, then it followed that vastly more power must be used by each one of them in their factories to enable them to produce the great quantity of apparatus to meet the needs of the community.

Industrial Employment

Whatever might be thought of the time scale of the graphs exhibited, it was clear that a major development in the use of electricity was taking place in this country and, in turn, occupying a great labour force in making the necessary equipment. In April, 1946, there were 236,000 employed on manufacturing apparatus, 152,000 in electrical engineering and 64,000 on making instruments, being 74,000 more than in 1939 and 81,000 fewer than in 1945 when the industry was heavily involved in the production of warlike stores.

While the increasing efficiency of converting coal into electricity was very important, an even greater necessity was reduction of the capital cost of the equipment of utilization. At the moment the cost of fuel was nearly one-half the total cost of production, but it would fall back to one-quarter, either by the addition of new equipment at the present value of money, or by the return of money to its previous purchasing power. It was therefore of major importance to reduce the cost of equipment by improved design, greater turnover of one design in one factory, long life to reduce depreciation (balanced against obsolescence due to improved design) and low interest rates.

The electrical manufacturing industry could fairly claim to be a good employer in every

sense of that term. It behoved members of the I.E.E. to do all in their power to promote the orderly conduct of industry and to discourage those who took a narrow view of their responsibilities.

Opening Meeting

BEFORE the delivery of the presidential address, Dr. P. DUNSHEATH, the retiring President, said that the Council had decided to introduce a brief ceremony of welcome for new corporate members, and whilst welcoming them to call attention to the member's obligation to his colleagues in the profession and the community. The President welcomed the first members admitted under this procedure. The premiums awarded for papers read during last session were then presented.

Introducing his successor, Dr. Dunsheath said that Mr. Ferranti was well known to members for his many activities both inside and outside the Institution. He had a great reputation as an industrial leader and at all times had shown himself interested in every possible way in the activities of the Institution.

Mr. FERRANTI then delivered his address and afterwards SIR JOHNSTONE WRIGHT, proposing a vote of thanks, said that this was a very historic occasion, for it was the first time in the history of the Institution that son had followed father as President. Mr. Ferranti's father was President in 1910, and they all knew how much he had done for the Institution.

PROFESSOR E. B. MOULLIN, seconding the

vote of thanks, for an historic address, said it was good to see that at last we were turning to the future, away from war, and were trying to predict what we might come to as time went on.

SIR HARRY RAILING proposed a vote of thanks to the retiring President. He said that for many years Dr. Dunsheath had done outstanding work in connection with research, industry and education. He had been President for the first post-war year and therefore had been given the task of leading through that first year a community of 30,000 members. In all the Institution's multifarious activities Dr. Dunsheath had shown himself to be an able leader, and during his visits abroad he had proved himself to be an excellent ambassador.

Mr. PERCY GOOD, who seconded, agreed that during the past year there had been a masterly co-ordination of all the Institution's activities under the guidance of Dr. Dunsheath.

The vote of thanks was cordially given, and the retiring President's certificate was handed to Dr. Dunsheath by the President. Dr. DUNSHEATH, acknowledging the vote of thanks, said that, as he had anticipated, his year of office had been a full one. The first post-war year of an Institution such as this must necessarily be occupied in making up many of the arrears of the previous five or six years and he felt gratified that it was his good luck to be elected at that time. There had, of course, been many post-war problems and many difficulties to face but, on the other hand, there had been many compensations, and he had greatly enjoyed his year of office.

Fuel Technologists' Future

ADRESSING the North Western Fuel Luncheon Club on the subject of "Fuel Technologists and Nationalization" in Manchester on October 2nd, Sir John Dalton said that he thought it might be salutary if, for a change from the high-level discussions in which fuel technologists usually found themselves, they were to consider what might be the effect of a new political regime on themselves, their families and their homes. He referred particularly to the nationalization proposals affecting the coal, gas and electricity industries. He was not concerned with the rights or wrongs of the major policy of the present Government of nationalization. His own industry (electricity supply) had done extraordinarily well during the war, and had been thanked by the Government. Yet, only ten days earlier, Mr. Herbert Morrison had stated that what the industry needed was good engineers and good commercial men.

If the fuel industries were nationalized, boards of directors and municipal gas and electricity committees would disappear and for them would be substituted regional boards and then a National Board. These boards would have their masters, the civil servants of the

Ministry to which the industry was attached and then beyond them would be the Minister. So that the fuel technologists who to-day looked towards a board or committee would have four sets of bosses instead of one.

After pointing to the strong trade union representation on new Government-appointed bodies, Sir John said it had been stated in Parliament that the men who would control the vast nationalized industries would be paid on a commercial scale and not on a Treasury scale. He understood that the salary of a member of the National Coal Board was £5,000 a year because it could not be higher than that of a Cabinet Minister. Sir John drew the inference that the Treasury had indeed had a say even in the pay for these top jobs and he felt that it was going to have much more say in the grades and salaries of the great number of experienced and professional men who, willy nilly, would be embraced in these nationalized industries. Owing to the great weight of expert service which the Government had already got "on the cheap," it was not going to be easy for personnel of new nationalized industries to establish themselves on a higher level than obtained in the State offices at the moment.

Symmetrical Components

A Graphical Introduction

THE conceptions necessary for the treatment of balanced three-phase systems are well known. The treatment of unbalanced three-phase systems may often be

By **B. J. Prigmore, M.A., Graduate I.E.E.**

It may thus reasonably be supposed that any unbalanced system can be synthesized, as the above, by giving different values to the balanced positive and negative star impedances, and, conversely, that any unbalanced system can be resolved into those components from which it could be synthesized.

The resolution of a system which sums to zero, as the currents in a three-wire star, may be performed by retarding one of its vectors by 60 deg and adding it to its successor in the sequence. Thus, if I_x be turned clockwise through 60 deg its components a_p and a_n will also be turned clockwise through 60 deg. This will result in a_n being opposite to b_n , and a_p being 60 deg closer to b_p . If, now, I_x , retarded thus, be added to I_y , then the negative sequence components a_n and b_n will be cancelled, leaving a resultant due only to the equal positive sequence components a_p and b_p . Since these are now at 120 deg to each other, the resultant is $\sqrt{3}$ times either. Thus, $1/\sqrt{3}$ times the resultant of one of the unbalanced vectors retarded 60 deg and added to its successor gives a positive sequence component in magnitude, but 30 deg retarded in direction. These operations are shown in Fig. 3. If a vector be advanced 60 deg and added to its suc-

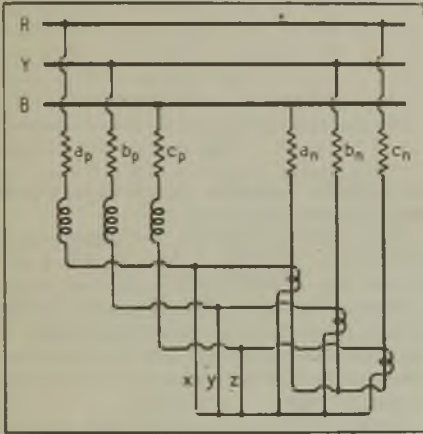


Fig. 1

simplified by their resolution into two balanced systems of opposite phase sequence.

The synthesis of an unbalanced system from two balanced systems of opposite phase sequence is demonstrated in Fig. 1. In this, the currents in the balanced star a_p, b_p, c_p are in positive phase sequence, a b c, lagging somewhat on the phase supply voltage. The currents in the balanced star a_n, b_n, c_n are in negative phase sequence, c b a, in phase with their phase supply voltage. Their vectors are shown in Fig. 2. The unbalanced system of currents in x, y and z is obtained by adding the negative to the positive sequence currents using the 1 : 1 current transformers as shown. The resultant currents I_x, I_y and I_z , obtained by adding a_p to a_n , etc., are also shown in Fig. 2; they form an unbalanced system.

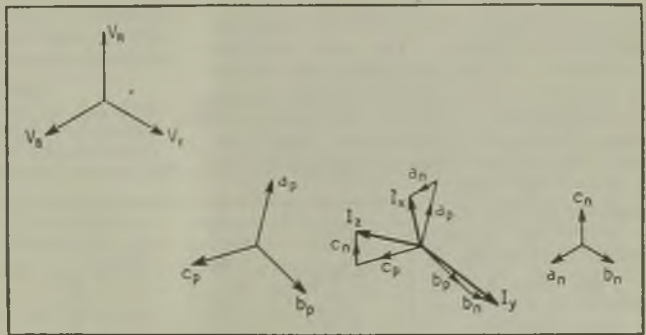


Fig. 2

cessor, the positive sequence components will be cancelled, leaving a resultant of $\sqrt{3}$ times the negative component, which is 30 deg retarded in direction.

The extension of this method of resolution to an unbalanced system which does not sum to zero (such as a four-wire three-phase current system) is now relatively easy. An unbalanced four-wire current system which does not sum to zero may be regarded as the sum of an unbalanced system which does sum to zero and a "residue," which residue represents the current in the neutral conductor.

This neutral current may be regarded as the sum of three equal line currents, giving, in effect, a single-phase system with three parallel phase conductors and one neutral conductor, as in Fig. 4. These line currents are the "zero-sequence" components and are each equal to $\frac{1}{3}$ of the residue. The residue being subtracted from the original unbalanced system, the remaining system, which sums to zero, may then be resolved into its positive and negative sequence components.

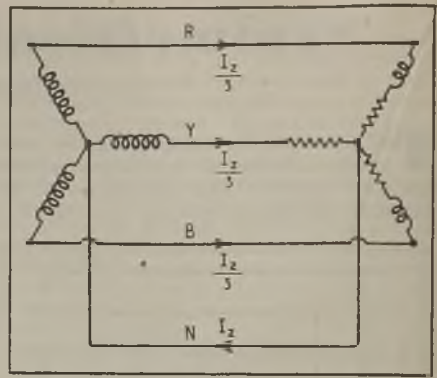


Fig. 4

the positive sequence components will be seen to sum to zero.

The negative sequence component a_n is obtained by retarding I_y by 120 deg and I_z by 240 deg, adding these to I_x , and taking $\frac{1}{3}$ of the resultant. The correctness of this is seen by performing similar operations on the corresponding components, when all but those of the negative sequence will be found to sum to zero.

Some comparison may be made between the positive, negative and zero sequence components of an unsymmetrical three-phase system which does not sum to zero, and the positive, negative and stationary rotational components into which may be resolved a pulsating magnetic field varying sinusoidally about its mean.

Although hitherto a vectorial view of the analysis has been retained, the above vector operations may all be performed by complex algebra, when the conventional symmetrical component formulæ would be obtained.

Short Bibliography

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An unbalanced system with a residue, of

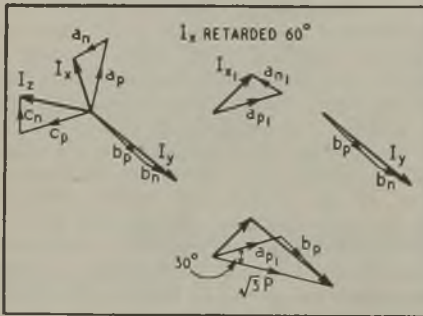


Fig. 3

which an example is given in Fig. 5, may be resolved as follows. The zero sequence component is $\frac{1}{3}$ the resultant of the vectors I_x , I_y and I_z . The correctness of this is seen by considering the sums of the positive and negative sequence components which are zero; only the zero sequence components have a sum. The positive sequence component a_p is found by advancing I_y by 120 deg, I_z by 240 deg, adding these to I_x , and taking $\frac{1}{3}$ of the resultant. If these operations are done on the components of I_y and I_z , and these are added to the corresponding components of I_x , all but

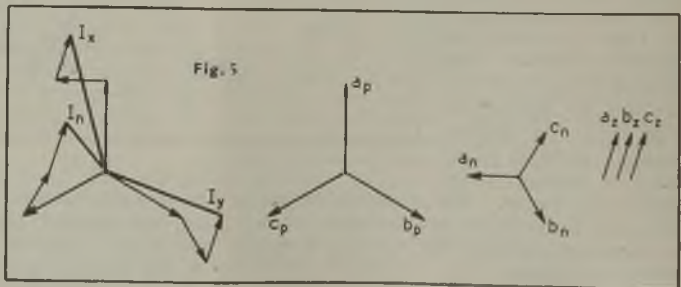


Fig. 5

CORRESPONDENCE

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

"Pluto" Relics

DURING the war a full scale trial operation of "Pluto" took place between Swansea and the Devon coast and a length of about 200 yd is still lying on the beach at Watermouth Bay, some four miles west of Ilfracombe. I would suggest that as a memento of the achievement pieces could be prepared as paper weights, ashtrays, etc., for sale to engineers associated with the cable industry and others. The proceeds from such a sale could be passed on to the E.I.B.A. or the I.E.E. "Home" Fund.

JAS. D. FINDLAY, A.M.I.E.E., M.Inst.F.

Birmingham.

The Time Factor

ONE frequently encounters in technical articles and even in British Standard Specifications reference to the R.M.S. value at a given instant of varying alternating current. This is quite indefensible, as any quantity given as a R.M.S. value implicitly includes a period of time.

I must admit that I have been unable to think of a concise alternative expression to which exception cannot be taken, but this of course does not render justifiable the one to which I refer.

Birmingham.

H. C. FOX.

Electricity Charges

THE figures given in your issue of September 27th relating to "all-electric" temporary houses are interesting. The average cost of electricity in an "all-electric" temporary house is given as 2s. 10d. per week and as I pay 8s. 6d. per week for similar conveniences I am prompted to raise the point of electricity charges in general. One can understand that in rural areas costs must necessarily be high and indeed sometimes so high that the unfortunate inhabitants are prohibited from using electricity for anything other than lighting.

I have, however, never been able to understand why costs should vary so much in towns and large cities—and they do vary considerably. I get my supply from the Clyde Valley Electrical Co., but if I could transport my house 800 yards I would be able to enjoy a cheaper rate from the Glasgow Corporation Electricity Department.

ct

I do not pay my electricity accounts unwillingly as obviously nothing can replace electricity satisfactorily for domestic use. I do, however, see lack of uniformity in charges, and cannot understand why so many supply authorities should be "out of step."

Glasgow.

ALEX. MILNE, SENR.

Defective Wiring

AFTER a lull, produced I think largely by my insistence that the contractors have themselves to blame for "unsafe installations," Mr. Milne has been "shocked" into declaring under the above new title that he "cannot understand the attitude of those responsible." Neither can I! The problem is capable of solution only if the contractors assume their proper responsibilities and refuse to accept the verdict of "the powers that be" (whoever they are).

I do not think that either the Wiring Rules Committee of the I.E.E. or the supply authorities are of the opinion "that there is no need for any special action in this matter," and it follows that the charge of apathy can only be laid at the contractors' own doors.

My previous argument that the contractors alone are responsible apparently proved so unanswerable that the recent correspondence lapsed. It only remains now to see what action they are prepared to take, with complete approval and full co-operation from the supply people.

Sheffield.

D. H. BRAID.

"Engineers"

WHEN will something be done to prevent the use of the description "engineer" by all and sundry? While there may be difficulty in getting its use made illegal by the unqualified, little if anything appears to be done to discourage the indiscriminate use of the word. We still see headlines announcing that thousands of engineers threaten to strike for an increase of wages. When building trade operatives propose to cease work for higher wages they are not described as "architects."

Have the professional engineers' institutions made any joint appeal to the lay press on this subject? If not, it should be tried.

First, however, we ought to put our own house in order. A number of electricity

supply undertakings, who ought to know better, have of late, for example, given the title "consumers' engineer" to people who could not by any stretch of imagination be regarded as engineers, and are doing work which does not entail any engineering knowledge. In this connection your personal column of September 27th indicates that a lady demonstrator, well qualified as such, but certainly not a trained engineer, took over the duties, during the war, of the consumers' engineer for one of the largest London undertakings. The consumers' engineer's job in many undertakings necessitates his being a trained engineer and rightly so if the position carries that title.

The present unsatisfactory state of affairs should be "cleaned up" as it brings the title "engineer" into disrepute. This is particularly so in the case of the real engineer who has been so unfortunate as to let himself acquire the title of consumers' engineer, which in many cases is a "dead end" job; although in many undertakings it rightly carries the responsibility under the management of the whole of the commercial development side, necessitating both engineering and commercial knowledge. The proper title for the position (more used by manufacturers but adopted by a few electricity undertakings) is, of course, "commercial engineer."

SINE DUBIO.

Power Generation

Western Centre Chairman's Address

SOME aspects of electricity generation were commented upon by Mr. R. W. BILES (Central Electricity Board, S.W. England Area) in his address this week in Bristol as chairman of the Western Centre of the Institution of Electrical Engineers. Mr. Biles began with a brief explanation of plant-loading programmes and load dispatching on the grid system, remarking that under normal conditions the permissible frequency variation was ± 0.1 cycle and that of system time ± 5 seconds.

The capacity at the end of 1945, with 142 selected stations interconnected in parallel, totalled 11.3 million kW. Customary day-to-day analysis of performance showed that at present average breakdowns of plant caused a continuous loss of about 7.5 per cent of the total capacity, overhaul 2.5 to 5 per cent in winter and 30 per cent in mid-summer, bad fuel about 5 per cent and other causes another 5 per cent.

Staff technical conferences on generation, initiated in the S.W. England and S. Wales area, started in 1940 and were now held twice yearly in all grid areas. Annual calculations involved in what were known as "Section 13" negotiations were yearly becoming more complicated and difficult; all parties would welcome some better alternative.

It would now appear to be possible to use voltages not exceeding 132 kV for transmitting energy to certain parts of Great Britain at a lower cost than that of transporting coal by rail to those areas. During the war fuel consumption in the United Kingdom stations rose to between 1.39 and 1.42 lb per kWh generated whereas that of United States stations fell to between 1.31 and 1.35 lb per kWh. The average revenue from 1939 to the present time had risen in the United Kingdom from 1.01 to 1.07d. per kWh sold, whereas in the United States it had fallen from 1.08 to 0.82d. per kWh sold. During the same period the price of coal in the

United Kingdom had risen from 215d. to 458d. per ton in 1945 whereas in the United States the rise had been from 103d. to about 150d. per ton. Coal price increases since 1935 had discriminated severely against power stations.

Owing to intermittent output, the River Severn barrage proposal would not wholly replace steam generating plant. Mr. Biles suggested that the £47 million, the estimated cost of that hydro-electric scheme, might with advantage be spent on intensive research to improve the overall thermal performance of steam generating plant.

It was not by any means certain that any major increase of plant capacity would be needed to permit electric domestic heating to be substituted for direct fuel consumption. Such plant increase would not be uneconomic, provided electric heating only was used in the household. Mr. Biles contended that electric heating to-day in the larger towns did not cost any more on the average than heating by direct fuel consumption.

Society of Inventors

AT a meeting of the Midland Branch of the Society held in the Chamber of Commerce, New Street, Birmingham, a good deal of information of interest to inventors was made available. The position regarding Licences of Right was discussed, and the Society's suggestion that certain inventions should become State patents under the custody of the Comptroller received considerable support from members. The winter programme of the Society is now well under way. For the present meetings are held on the fourth Thursday of the month, starting at 7 o'clock. Intending members should communicate with the secretary of the branch, Mr. B. T. Clark, 244, Stoney Lane, Birmingham, 25.

Fuel and Power

Ministry's Statistical Digest for 1945

RATHER long after the close of the year the Ministry of Fuel and Power has issued its Statistical Digest for 1945 (Cmd. 6920, Stationery Office, 2s.). For our readers the principal interest lies in the information relating to the supply of electricity during the past eight years embodied in thirteen of the tables (Nos. 66 to 78). This is a forerunner of the Electricity Commissioners' "Return of Engineering and Financial Statistics" and "Generation of Electricity in Great Britain" which are shortly to be made available again and will cover the war years.

The first of the tables (No. 66) relates to the generation of electricity by authorized undertakers and transport authorities—375 public authorities (against 378 in 1938) and 195 companies (213). The output is analysed according to the type of prime mover employed. Of the total of 38,611 million kWh in 1945 (25,708 million in 1938) steam plant produced 37,373 million (24,546 million). Water power accounted for 1,144 million (988 million), oil and gas engines for 46 million (60 million) and destructor and waste-heat plant, etc., for 48 million (114 million).

Public supply authorities accounted for 20,702 million kWh (13,143 in 1938) and companies for 16,582 million (11,229 million). Transport undertakings generated the balance (1,327 million, against 1,336 million).

In producing this energy 23.5 million tons of coal was used as compared with 14.9 million tons in 1938; coke and coal breeze was used to the extent of 0.3 million tons (0.2 million); and oil consumption was 20 million tons, the same as in 1938.

Table 78 gives an idea (though not a complete one) of the extent of private generation by

per annum class. These 38 stations produced 31.54 per cent of the total power. Fifteen stations of the 500–1,000 million kWh class accounted for 27.91 per cent of the total energy and six with outputs of over 1,000 million kWh for 23.75 per cent of the total. The largest percentage of stations (12.43) was the under 50,000 kWh class; these 43 stations generated only 780 million kWh. Different grouping is employed (Table 68) to show the sales of energy. About 42 per cent of the total was sold by 23 undertakings (14 companies) disposing of more than 300 million kWh per annum.

It is seen from Table 70 that the capacity of generating plant installed at the end of the year rose from 9,368 MW in 1938 to 12,297 MW in 1945; the aggregate of individual maximum loads from 8,041 MW to 10,660 MW; and the load factor from 34.6 to 39.9 per cent (it was 42.1 per cent in 1942).

An estimated analysis of sales in millions of kWh by type of consumer given in Table 71, shows the following rises and falls: Domestic and farm premises from 5,360 in 1938 to 8,848 in 1945; shops, offices and other commercial premises from 3,114 to 3,497; factories and other industrial premises from 10,311 to 17,692 (20,524 in 1943); public lighting (decrease) from 367 to 142; traction (decrease) from 1,249 to 1,220; total from 20,401 to 31,399. The 1945 figures are subject to revision.

Three tables (Nos. 72–74) set out financial results, giving sales of electricity by various classes, the revenue from each class and the average revenue per kWh for all authorized undertakings (including the Central Electricity Board), public authorities (excluding the Board) and companies. The following table is compiled from the figures given:—

SALES AND AVERAGE REVENUE PER kWh IN 1944–45

Class of load	All undertakings		Public authorities		Companies	
	Million kWh	Average revenue, pence	Million kWh	Average revenue pence	Million kWh	Average revenue pence
Lighting, heating and cooking	11,223	1.588	7,664	1.386	3,560	1.927
Power	20,044	0.803	10,837	0.792	9,207	0.815
Public lighting	35	2.462	30	2.107	4	4.956
Traction	1,171	0.807	527	0.908	464	0.729
Totals	32,473	1.066	19,058	1.036	13,235	1.112

industry. Of the total of 5,938 million kWh, coal mines are credited with 1,555 million, chemical and allied trades with 1,442 million and the iron and steel industries (excluding electricity generated at coke ovens) with 1,120 million.

Table 67 shows that the 10.98 per cent of the stations were in the 200–500 million kWh

Table 75 gives, in total, capital expenditure of all authorized undertakings (including the Central Board), revenue, expenses, surplus and appropriation. The following are salient points:— Total capital expenditure rose from £648.47 million in 1938–39 to £746.46 million in 1942–43, the total revenue from £98.62 to £134.55 million and the gross surplus from £47.58 to

£55.44 million. While other items of appropriation remained fairly steady, income tax increased from £1.59 to £5.84 million. Fuel costs rose from £14.83 to £35.11 million due largely to an increase in the price of coal and coke (including handling) from 20s. 4d. to 33s. 6d. per ton. Salaries and wages went up from £2.27 to £3.42 million and repairs and maintenance, oil, water and stores from £2.44 to £4.25 million. These working expenses exclude amounts attributed to generation under the directions of the C.E.B. The increase in local rates was very moderate—from £7.21 to £8.55 million.

In the case of public authority undertakings, excluding the Central Board (Table 76) capital expenditure increased from £351.15 million in 1938-39 to £400.38 million in 1942-43. Gross surplus rose from £24.24 to £25.05 million; generation expenses from £0.91 to £1.04 million; interest charges from £6.93 to £7.16 million; loan repayments, etc., from £11.60 to £13.24 million; and income tax from £1.25 to £2.55 million. Net contributions to rate relief fell from £0.64 to £0.08 million.

The total capital expenditure of company undertakings (Table 77) increased from £240.54 million in 1938 to £281.04 million in 1942 and the total capital from £183.36 to £191.34 million. The gross surplus rose from £20.47 to £26.01 million. The total paid out in interest and dividends declined from £11.08 to £11.07 million and generation expenses from £0.95 to £0.65 million.

Table 69 shows a considerable decrease in the number of persons employed by authorized undertakings—from 120,731 (7,111 females) at March 31st, 1939, to 89,944 (14,182 females) at January 1st, 1944. These figures exclude Central Board employees.

Among the many tables dealing with the production and distribution of coal is one (No. 90) showing the amounts of coal of various grades and from various regions supplied to electricity undertakings in 1945. The total is given as 22.8 million tons of which 13.7 million tons was dry slacks and smalls and 4.9 million tons washed slacks and smalls. Only 2.1 million tons of graded coal was supplied.

According to Table 27 the proportion of mines at which coal-cutting machines were in use rose from 50 per cent in 1938 to 59 per cent in 1945. Of the total number of machines—7,729 in 1938 and 8,292 in 1945—5,106 and 5,926 respectively were electrically operated.

Later Statistics

According to the September *Monthly Digest of Statistics*, the total amount of energy generated by authorized undertakings and transport authorities during the first eight months of this year was 26,092 million kWh. The coal consumption of these authorities was about 16.4 million tons. The weekly average total coal stocks in August amounted to 1.8 million tons as compared with 3.0 million tons in August last year.

Forthcoming Events

Monday, October 14th.—LONDON.—At the Institution of Electrical Engineers, 5.30 p.m. Institute of Transport. Inaugural address by the President, R. Stuart Pilcher, "Road Passenger Transport."

MANCHESTER.—Milton Hall, Deansgate, 7 p.m. Institution of Heating and Ventilating Engineers (Manchester and District Branch). "District Heating," by L. C. Grant.

ST. ALBANS.—Peahen Hotel, 3.30 p.m. Association of Supervising Electrical Engineers (St. Albans Branch). "Fractional H.P. Motors," by A. N. D. Kerr.

NEWCASTLE-ON-TYNE.—Neville Hall, Westgate Road, 6.15 p.m. I.E.E. North Eastern Centre. Chairman's address by T. M. Ayres.

Tuesday, October 15th.—LONDON.—L.C.C. South-East London Technical Institute, 8 p.m. Electrical Engineering Society. "Sir Ambrose Fleming. His Life, and Professional Work," by Prof. MacGregor Morris.

MANCHESTER.—Engineers' Club, Albert Square, 6 p.m. I.E.E. North Western Centre. "The Control of Electrical Installation," by W. R. Watson.

DERBY.—I.E.E. East Midland Sub-Centre. "Three-Phase Distribution and Electric Welding and Furnace Loads," by A. Langley Morris.

Wednesday, October 16th.—LONDON.—Institution of Electrical Engineers, 5.30 p.m. I.E.E. Transmission Section. Inaugural address by the chairman, J. Andrew Lee.

Technical College, Acton, W.3, 7.30 p.m. Institute of Welding (North London Branch). "Development of the Modern Electrode," by Dr. J. H. Paterson.

Thursday, October 17th.—LONDON.—Institution of Electrical Engineers, 5.30 p.m. I.E.E. Installations Section. Inaugural address by the chairman, J. F. Shipley.

BIRMINGHAM.—Imperial Hotel, 6.30 p.m. Institution of Heating and Ventilating Engineers (Birmingham and District Branch). "Trends of American Heating Practice," by G. Napier Adlam. To be read by R. E. Otter.

Friday, October 18th.—NEWCASTLE-ON-TYNE.—Lecture Theatre, King's College, 6.30 p.m. I.E.E. (North Eastern Students' Section). "Reactance and the Performance of Barrel Rotor Alternators," by J. G. Henderson.

Monday, October 21st.—LONDON.—At the Institution of Electrical Engineers, 7 p.m. I.E.E. London Students' Section. Chairman's address, "The Power Transformer," by R. V. Darton.

BIRMINGHAM.—Grand Hotel, 6 p.m. I.E.E. South Midland Centre. Chairman's address by C. F. Partridge. Short address by the President, V. Z. de Ferranti.

Tuesday, October 22nd.—LEEDS.—Corporation Electricity Department, Whitehall Road, 6 p.m. I.E.E. North Midland Centre (Installations Group). Inaugural address by J. G. Craven.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE appointment is announced of **Mr. S. E. Goodall** as chief engineer of **W. T. Henley's Telegraph Works Co., Ltd.**, in succession to **Dr. P. Dunsheath, O.B.E., M.A.**, who, as we recently reported, has relinquished his appointment as chief engineer and becomes consulting engineer to the company. **Mr. Goodall** has been deputy chief engineer since July, 1945. He joined the company in January, 1944, having previously served in the Research Department of the Metropolitan - Vickers Electrical Co. **Mr. Goodall** received his professional education at **Queen Mary College, University of London**, and holds the degree of **M.Sc.(Eng.)**. He is a member of the Institution of Electrical Engineers and has served on the Council (1941-44), and he is also a member of several I.E.E. Committees.



Mr. S. E. Goodall

Mr. A. D. Culling, who joined the **Sun Electrical Co., Ltd.**, in 1925 as a technical sales engineer, has recently obtained his release from the Ministry of Supply after serving in various technical and administrative capacities during the war years, and has now returned to the company as manager of the Motor and Plant Department at the head office. For four years **Mr. Culling** was the Ministry of Supply representative on the I.E.E. Wiring Regulations Committee.

Mr. R. W. Devereux, deputy electrical engineer and manager at **Ealing**, was recently presented with a fitted writing case by the staff and employees of the Electricity Department on leaving to take up the position of engineer and manager of the **Ulverston, Lancs, Electricity Department**. The presentation was made by **Mr. R. Birt**, the borough electrical engineer.

The South Eastern Branch of the Association of Supervising Electrical Engineers held its annual theatre visit on September 28th, arranged by the social section under the leadership of the secretary, **Mr. J. Southern**, when a visit was paid to the **London Palladium** to see "High Time." About fifty members formed the party, which included **Mr. A. Brammer**, general secretary of the Association. After the show supper was taken at **Franks Restaurant, Jermyn Street**, at which **Mr. A. D. Culling** (branch chairman) welcomed the guests and thanked the social committee for an enjoyable evening. **Mr.**

Southern announced that the fifth annual branch party would be held at the **Embassy Rooms, Welling, Kent**, on **January 25th**. Applications for tickets should be made to him at **16, Chastilian Road, Dartford, Kent**.

On **September 30th** presentations were made to **Mr. E. C. Williams**, assistant accountant of the **Shropshire, Worcestershire and Staffordshire Electric Power Co.**, on his retirement after fifty years' service. A cheque from the company was presented by **Mr. D. H. Kendon**, general manager, who expressed his appreciation and that of the directors of **Mr. Williams'** valuable service. Gifts from the staff of a silver cigarette case and a silver lighter were presented by **Mr. A. B. Hodson**, chief accountant.

Mr. E. W. Abbott has retired from the technical staff of the **Leeds branch of the Crompton Parkinson organization** after fifty-five years' service. **Mr. Abbott**, who joined **Crompton & Co.** in 1891, was due to retire in 1939, but with the outbreak of war he volunteered to carry on with his duties. **Mr. E. J. Arnold**, for many years **Leeds branch manager of the supplies division of Crompton Parkinson, Ltd.**, is also retiring at the end of the year. He will be succeeded by **Mr. J. Sewell**, recently returned from the forces, who took up his duties with the branch on **October 1st**. Before entering the army in 1941, **Mr. Sewell** was manager of **Crompton Parkinson's Liverpool branch**, after having spent many years with them in **London**.

Mr. J. Robertson Finnicome, M.Eng. (Zürich), M.Inst.C.E., M.I.Mech.E., has been appointed chief technical engineer to **Daniel Adamson & Co., Ltd.**

Mr. F. Hopps, telephne manager in the **Middlesbrough area**, has taken up his new duties as telephone manager in the **Newcastle-on-Tyne area** in succession to **Mr. A. E. Ryland**.

Mr. C. F. Hatton, mains engineer with the **Bolton Corporation Electricity Department**, has retired after forty years' service.

Mr. J. C. Fairchild, electrical engineer and transport manager to **Lytham St. Anne's Town Council**, has reached the retiring age but his period of service has been extended until **August 31st, 1947**. As he desired to relinquish the duties of transport manager, **Mr. Wm. Ashton** has been appointed to the position.

A dance was held at the **Berkeley Rooms, Bristol**, on **October 4th**, by the **Bristol Electric Club**, in co-operation with the **Bristol Branch of the Electrical Association for Women**, the proceeds being in aid of the **Electrical Industries Benevolent Association**. Over 200 people attended and among those present were **Mr.**

Walter Riggs, president of the E.I.B.A., Mr. H. S. Fothergill, the secretary of the Association, and Mr. C. L. Fuller, chairman of the Bristol Electric Club. A number of prizes, including electric fires, toasters, irons and kettles, were distributed during the evening. Mr. W. C. Bowler acted as M.C.

Mr. J. R. Keir and Mr. W. E. Hillyard, for many years members of the editorial staff of the *Electrical Times*, recently retired. Both are very well known in the electrical industry.

Mr. W. J. Jefferson, consumers' engineer and mains superintendent with the Chesterfield Corporation Electricity Department since June, 1944, has been appointed deputy electrical engineer and manager to Leyton Borough Council, Essex. He takes up his new post at the beginning of November.

Lt. Col. S. E. Monkhouse was welcomed as a member of the N.E.S.C.O.E. Association on his retirement from the managing directorship of the North-Eastern Electric Supply Co. at a dinner held at Newcastle-on-Tyne on October 2nd. In the absence of the president of the Association, Mr. R. P. Sloan, the chair was taken by Mr. J. R. Beard. A tribute paid by the chairman to Col. Monkhouse was supported by Mr. G. E. Moore, who spoke of the great assistance he had given to Whitleyism. Col. Monkhouse responded with his usual vigour. The hon. secretary, Mr. W. G. Bass, thanked Mr. L. E. Mold for making local arrangements for the function, the idea of which, the chairman stated, was due to Mr. E. J. Edgar.

Leon Gaster Memorial Premiums have been awarded by the Illuminating Engineering Society to Dr. J. N. Aldington for his paper on "Bright Light Sources" and to Mr. G. T. Winch for his paper on "Photometry and Colorimetry of Fluorescent and Other Electric Discharge Lamps." No award of premium was made in respect of 1944.

The telephone number of Mr. E. W. Krebs was incorrectly given in our last issue. It is Uplands 0789.

Appointments Vacant.—Among the vacant positions advertised in this issue are the following:—Borough electrical engineer for Stoke Newington (£831-£978); chief electrical engineer and manager for Winchester (£824, plus £60); electrical engineer and manager for Pontypridd (£797, plus £60); electrical engineer for Whitworth (scale salary); deputy borough electrical engineer for Barking (£823, plus £72); deputy chief engineer and manager for Croydon (£1,350 plus £60, plus £400); resident engineer for Manchester (£839 and house); generation engineer for Bulawayo, Southern Rhodesia (£750, plus cost of living allowance); mains engineer for Bolton (£662); station superintendent, Sierra Leone (£500 plus allowances); consumers' engineer and meter superintendent for Chesterfield (£640); and civil engineering designer for West Midlands J.E.A. (£684).

Obituary

Mr. A. E. L. Chorlton.—We learn with regret of the death of Mr. Alan Ernest Leofric Chorlton who, until last year, was chairman of Lancashire Dynamo & Crypto, Ltd. Mr. Chorlton was born in 1874 at Audenshaw, Lancs, and was educated at the Manchester College of Technology and Victoria University. He was with Mather & Platt, Ltd., for twenty-two years beginning as an apprentice and subsequently becoming a director. From 1913 to 1918 he was with Ruston & Proctor, Ltd., and then, until 1929, with Wm. Beardmore & Co., Ltd. Apart from his connection with Lancashire Dynamo, Mr. Chorlton had been a director of Trinidad Leaseholds, Ltd., Smethwick Forgings, and other companies. He was a Member of Parliament for fourteen years, first for Plating and then for Bury; he was a member of the three leading engineering institutions. Mr. Chorlton was awarded the C.B.E. in 1917 for his services during the 1914-18 war.

Mr. F. Viner.—It is with regret that we have to announce the sudden death of Mr. Frank Viner, of the Publicity Department of the British Thomson-Houston Co., Ltd., while on holiday in Devon. Mr. Viner, who had been forty years with the company, was born in London in 1880 and educated at Merchant Taylor's School and Finsbury Technical College under Professor Silvanus P. Thompson. He received workshop training at the Sandycroft Foundry Co. and Engine Works, near Chester, and at the L.M.S. Marine Department at Holyhead. He joined the B.T.H. Co. at Rugby in 1906, and after some time in the drawing office and Testing Department, joined the Export Department, being transferred to the Publicity Department in 1912. From then onwards he was responsible for the preparation and publication of many booklets and pamphlets mainly concerned with the heavy products of the company, in particular, turbine work. During the 1914-18 war he received a commission in the Royal Engineers, and served in France from 1915 until 1919. On the lighter side, Mr. Viner will be remembered for the interest he took in the Gilbert and Sullivan operas produced by the B.T.H. Operatic Society.

Sir Frank Heath.—We regret to record the death on October 5th, at the age of eighty-two, of Sir Frank Heath, G.B.E., K.C.B., the first head of the Department of Scientific and Industrial Research.

Mr. L. C. Benton.—Information has just reached us of the death, which occurred earlier this year, of Mr. L. C. Benton, A.M.I.E.E., who was for forty-six years associated with the British Westinghouse Co. and its successor, the Metropolitan-Vickers Electrical Co., Ltd. Throughout his service with the company Mr. Benton was concerned with the work of the Instrument and Meter Department. He was superintendent of the manufacturing depart-

ment from 1919 to 1922, when he returned to the engineering side to develop automatic and supervisory control gear. From 1930 onwards he occupied the position of special sales engineer, representing the company on many B.E.A. M.A. and B.S.I. Committees.

Mr. B. Vedenyer.—The death occurred recently, at the age of sixty-one, of Mr. Boris Vedenyer, chief engineer of the Dnieper hydro-electric works. Mr. Vedenyer had been concerned with water-power development for many years and was connected with the construction of the Dnieper Dam in its earlier stages and with the building of the Lenin station, Volkhov. His work during the war, as Deputy People's Commissioner for the Power Stations, was to ensure the co-ordination and maintenance of electricity supply over wide regions of Russia.

Mr. C. H. Stagg.—The death has occurred suddenly at Normanby (Yorks) of Mr. Charles Henry Stagg, former electrical engineer with Eston (Yorks) Urban District Council. He had been with the undertaking many years before his retirement toward the end of the war.

Mr. M. J. Chapman.—The funeral recently took place of Mr. Martyn J. Chapman who was the founder of the Electric Installation Co., Wimbledon. He had been an electrical contractor since 1900, and the business is now being conducted by his son, Mr. K. M. Chapman.

Wills.—**Mr. T. Pogson**, electrical contractor, director of Bell Bros. & Co. (London), Ltd., Camomile Street, E.C., left £9,065 (net personally £8,861).

Mr. Robinett Scruby, chartered electrical engineer, left £3,167 (net personally £2,792).

Municipal Reports

Watford.—Except that m.d. consumers are paying additional amounts based on the higher price of coal, there have been no material increases in electricity charges during the past seven years. Actually, the net average price obtained per kWh sold in 1945-46 was 0.917d. compared with 0.86d. in 1937-38. The chief engineer and general manager, Mr. A. W. Barham, points out that this increase of only 6.6 per cent has been maintained in spite of a 91 per cent rise in the price of coal and an increase of approximately 30 per cent in wages and salaries. The average cost of coal per kWh sold last year was 0.518d. against 0.262d. seven years ago. Nevertheless, for domestic electricity supplies under the Norwich tariff the net average price obtained last year was only 0.53d., which was lower than the 1938-39 figure (0.56d.). Under this tariff sales last year established a new record at 27.7 million kWh, an increase of 3.1 million over the previous year.

Total sales for the year were 3.6 million kWh up at 112.6 million, although power requirements declined somewhat. The Department itself generated 26.7 million kWh, the increase of

11.1 million over the previous year being made possible by the recommissioning on December 31st last of No. 6 turbo-alternator the blading, rotors and stators of which were wrecked by a fire in September, 1943.

Gross revenue amounted to £450,756 (£427,206) and working expenses were £386,797 (£351,545), the net surplus for the year being £4,541 (£17,152).

Leigh.—A decrease of 6.3 per cent in industrial power sales during 1945-46 is recorded in the annual report of the borough electrical engineer and manager (Mr. T. S. Parkinson). This was practically balanced by increases under other tariffs and the total sales of 26.2 million kWh were only 0.5 per cent less than in the previous year. Income, at £116,377, was £2,798 higher on the year while working costs rose by £6,682 to £101,692. After meeting loan charges, etc., there was a net profit of £1,551 (£3,463).

Scottish Board's Charges

THE North of Scotland Hydro-Electric Board (Charges) Regulations, 1946, made by the Secretary of State for Scotland after consultation with the Electricity Commissioners (S.R. & O. 1946 No. 1555/S.58, Stationery Office, 1d.), stipulate the methods of charging to be adopted by the Board. It is provided that over an "approved term of years" the Board's revenue and expenses shall balance so far as is possible. The prices to ordinary consumers (i.e., not authorized undertakers or large power users) are to be at such a rate that the average shall not exceed 6d. per kWh, although a minimum charge of 10s. per annum may be made. The Board is required to fix a block tariff or tariffs and it may fix alternative flat-rate, two-part or other tariffs for different classes of supply to ordinary consumers.

Although it is stipulated that tariffs shall be uniform throughout the North of Scotland District, the Board may vary them if the circumstances in the area of any distribution scheme justify such action. The Board is also given power to charge rents for meters, "lines," fittings and apparatus. Costs and revenue in relation to supplies to authorized undertakings and to large power users, respectively, must also balance as nearly as possible.

Electrical Industries Ball

A MOST attractive programme has been arranged for Friday, November 8th, at Grosvenor House, Park Lane, when the Electrical Industries Ball is being held in aid of the Electrical Industries Benevolent Association. Debroy Somers and his band will provide the music and there will be a cabaret of well-known radio and television stars. Owing to the fact that accommodation will be strictly limited a ballot for tickets and table positions will be held on October 18th.

District Heating

Interim Memorandum of the Building Research Board

FOR the purpose of investigating "the desirability of developing in this country schemes for the supply of heat for various purposes by means of steam or hot water from central sources," a sub-committee of the Heating and Ventilation (Reconstruction) Committee of the Building Research Board was appointed in October, 1942. Its chairman is Sir A. Egerton and its fourteen members include Mr. S. B. Donkin, Dr. O. Faber, Mr. A. C. Pallot, Sir Leonard Pearce, Mr. W. M. Selvey and Sir Johnstone Wright, all with electrical associations.

A large hypothetical thermal-electric scheme is under consideration, with a view to elucidating various problems and to providing a "yardstick" for the assessment of other schemes. It may be several months before this work is completed, so the Sub-Committee has issued an Interim Memorandum. In this it is stated that only limited use has been made of district heating in Great Britain for domestic purposes (e.g., at Dundee), although at Liverpool and Leicester, for example, steam is supplied from electric power stations for specific industrial processes, but heat-distribution systems have not been provided. The largest installation possibly anywhere in the world, in which steam for process or space heating is combined with electricity generation is that of the Imperial Chemical Industries at Billingham-on-Tees, where over 600,000 lb of steam per hour is used.

Foreign Schemes Assessed

In the United States, the total length of the distribution systems of the nine largest undertakings is only 211 miles and the number of consumers is 6,409. In the ten cities of the U.S.S.R. with most district heating, the mileage in 1939 was 1,354, the number of consumers 1,063. A similar number of undertakings in Germany have 90 miles of mains and 1,693 consumers. In all three countries the heat is supplied to large buildings, although in the United States and also in Sweden some success has been achieved in serving small housing estates. Experience gained in the United States and the U.S.S.R. is not regarded as directly applicable to Britain. In the United States, heat and electricity are usually supplied from separate sources on account of the economic difficulty due to fluctuations in the two services which are caused by different rates of growth, seasonal or diurnal variations and the effect on heat sales of competition from alternative sources.

In the U.S.S.R. the main development has been in new self-contained townships where the buildings have been constructed to use district heating without option. Thermal-electric stations have been designed to burn very

inferior local fuel, thus conserving oil and avoiding long hauls of good coal from the Don Basin to such distant cities as Leningrad and Moscow, which have the largest electric heating schemes. In Germany the severity of the winters and the desire to use brown coal have been important factors.

Temperatures of from 200 to 275 deg F or higher are requisite at the power station to give satisfactory district heating service. As condenser cooling water is discharged at from 70 to 75 deg F, it could not serve the purpose. The cost of adapting existing turbine plants to thermal-electric operation would be prohibitive and would incidentally reduce the electrical output. New turbines of the pass-out type would require further boiler capacity. No reduction in electrical output could be contemplated. The higher capital cost of thermal-electric stations would be enhanced by the probability of having to use smaller and more numerous generating sets. This increased expenditure might be justified if a substantial saving of coal resulted, but this would depend upon the securing of a close balance between heat and electricity services. Lack of coincidence in the two loads might, however, be compensated for by means of the grid or by storing heat in water accumulators (as is done in Germany but not in the U.S.S.R.).

A thermal-electric station should be near the heat load, whereas long-distance transmission from a riverside site might be necessary and operating economy and the requisite additional railway facilities and cooling towers would introduce difficulties in built-up areas.

The Memorandum concludes with an appreciation of the admitted benefits that would accrue from district heating such as adequate hot-water supplies, better standards of warmth, reduction of atmospheric pollution and elimination of much road traffic concerned with retail distribution of coal and ash removal. It is suggested that thermal-electric schemes might be tried in urban areas scheduled for reconstruction, in large residential neighbourhoods or in small housing estates.

Trade Mission to China

TWO Transport Command aircraft, one equipped as a "flying office" and the other as a repair shop, left Northolt last week carrying the United Kingdom trade mission to China, led by Sir Leslie Boyce. The aircraft, a York and a Lancastrian, have been specially fitted out to make the mission self-sufficient. One carries engineers, spare parts and repair equipment while the other has an office which the secretariat will use for the collection of material for the compilation of the mission's report.

Impregnated Pressure Cable

Limitation of Working Stress

WHEN transmission voltages were raised to the values (approaching 33 kV) at which it became apparent that cable dielectric must be subjected only to radial fields, each core was screened in order to eliminate tangential stress. A further design problem was met at the next stage, i.e. 66 kV. That was the need to limit the working stress with paper insulation to 50 kV per cm in order to suppress destructive ionization in the voids formed during expansion and contraction under varying loads. It was found that operating stresses of more than 100 kV per cm would be feasible when the dielectric was subjected to pressures above the atmospheric.

The method adopted for the impregnated-pressure cable, developed by B.I. Callender's,

advantages follow. The reduction in wall thickness decreases the size of cable, enabling one three-core cable to be made in place of three singles and also by lowering the thermal resistance allows of higher current ratings. A third gain is that, since the effect of heat cycles on the insulation characteristic is controlled by the pressure, the conductor temperature can be raised to 85 deg C, as against 70 deg with the solid cable; this further improves the current rating.

As an example the wall thickness of a 0.3 sq in. 66-kV pressure cable at 100 kV per cm is 0.20 in. and of a solid cable at 50 kV per cm 0.65 sq. in.; at 132 kV the figure for a 0.4 sq in. cable is 0.5 in. and would reach impracticable dimensions with the lower stressed dielectric. The overall diameter of a three-core pressure cable carrying 40,000 kVA at 66 kV is $3\frac{3}{8}$ in. compared with $5\frac{1}{2}$ in. of a solid cable with three separate cores.

The economic value of the use of gas under pressure is indicated by representative



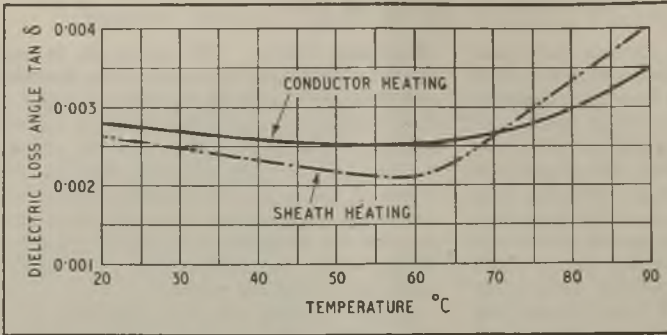
Joining 132-kV three-core 0.4 sq in. (120 MVA) impregnated pressure cable. Above is seen step formation of the cable dielectric after jointing with flush ferrules, with temporary spreaders maintaining core positions and temporary snuggers preventing disturbance of paper tapes. The right-hand illustration shows the three cores complete, tapered sections covered with lead-wire screen, internal pilot cable jointed and automatic pressure switch in position; gas communication pipes terminated on both sides near the top; lead sleeve partly pulled forward for placing in position and (on right-hand side) copper sleeve attached to travelling cradle

is to introduce nitrogen at 200 lb per sq in. direct to the dielectric, enabling a stress of about 160 kV per cm to be employed, which is claimed to prevent ionization up to at least 4½ times working voltage. Three main

figures of capital cost per 1,000 kVA per mile of 0.4 sq in. cable, laid, including joints, accessories and pilot, but excluding excavation and reinstatement. This is given by the makers as £14 5s. for 132 kV and £18 6s. for

66 kV, compared with £28 3s. for the latter voltage only for solid cable. As a guide to material economy, the weight of lead required

stant with no evidence of deterioration. Power factor measurements taken on the dielectric up to more than five times working voltage indicated only a slight rise in power factor, which was attributed to the characteristics of the



Power-factor values at different conductor temperatures as under service conditions.

per 1,000 yd, is stated to be 9,040 lb for the direct pressure cable and 18,970 lb for the solid cable with lead membrane.

The nitrogen is admitted into the cable after installation and, in the three-core type, passes through a lead pipe, which is included in one of the dummy spaces, into each joint. Thence it traverses the annular space between the dielectric and the lead sheath. The mass-impregnated paper dielectric is enclosed within a lead sheath reinforced with tapes of copper for single-core and steel for three-core construction. Round the reinforcement is a series of uncured rubber and bitumen tapes as a safeguard against corrosion. The power factor of the dielectric is approximately 0.25 per cent over the whole conductor temperature range up to working voltage.

A length of impregnated pressure cable with a normal working

General view of the h.v. cable exhibition at Dorland Hall. An example of a straight joint in a 264 kV single-core impregnated pressure cable is seen in the foreground



stress of 93 kV per cm with two sealing ends has been subjected to heating cycles to a conductor temperature of 95 deg C and a voltage equivalent to a stress of 175 kV per cm. The voltage was increased in frequent steps until 250 kV per cm was attained. During the whole test the power factor of the dielectric remained con-

stant with no evidence of deterioration. Power factor measurements taken on the dielectric up to more than five times working voltage indicated only a slight rise in power factor, which was attributed to the characteristics of the dielectric and not to ionization. Although the installation is gastight, as a precaution against loss of pressure in the event of external damage, e.g. by a pick, three cylinders of gas are normally permanently connected through a reducing valve to maintain the pressure for at least twenty hours or, by adding temporary cylinders, for longer periods. Immediate indication of mechanical damage is given at the control point, so that repairs can be undertaken before an electrical fault develops and, since ingress of moisture is prevented by gas leakage, the area of damage is localized.

Two methods have been devised for locating gas leaks. In one, which can be used while the cable is in service, the pressure is maintained by the admission of dry air from one end as far as the point of leakage,

which is determined by the volume of the air; fault location has proved accurate to within 5 yd on a mile run. In the second method pressure-operated switches are included in each joint and connected by a

characteristic resistance to a two-core pilot in the filler space of the cable. At the control point, the pilot is connected to an automatic Wheatstone bridge. When gas leakage occurs, the gas supply is cut off temporarily and the pressure switch in the nearest joint to the fault is the first to operate, giving automatic indication of the point of leakage to within one cable section length.

Each joint box consists of an outer copper sleeve to act as the pressure housing with an inner laid sleeve, the space between being filled with a viscous bitumastic sealing compound. Cast plumbs make hermetic seals between joint sleeves and cable and anchor the reinforcement tapes. The joint itself is filled with nitrogen at 200 lb per sq in., not with compound; pneumatic pressure tests can be carried out on the joint before it is completed. The split ferrule fits flush with

the outer surface of the conductor, which avoids longitudinal stress at the ends of the former and facilitates the application of the paper tapes; the outer screen of the cable is carried continuously across the joint.

Of a number of installations in which impregnated pressure cables have been installed from 33 kV upwards, the most notable are a 100 yd run of single-core 264-V cable, which was laid for K.E.M.A., Holland, in 1936 and 1,900 yd of 132-kV (the first to be installed anywhere as a three-core cable) which was inserted in an overhead line of the Central Electricity Board near an aerodrome site in May, 1944.

The three-core cable has an overall diameter of 4.84 in. compared with 2.67 for each single-core cable of the same type, conductor size (61/093) and voltage supplied for other installations.

European Power Supply

Report of Emergency Economic Committee

IN a report by the Secretary-General of the Emergency Economic Committee for Europe, published by the Stationery Office (price 6d.), the work of the various sub-committees and panels—including the Public Utilities Panel—is briefly described. This last-named panel took over the functions of the Public Utilities Section of S.H.A.E.F. when the latter was dissolved, and numbers among its members representatives of the control authorities in Germany and Austria, as well as of many of the Allied and neutral powers. It is in close touch also with the European Coal Organisation (E.C.O.) a liaison which is clearly essential.

Besides co-ordinating the network of electricity supplies in most of North-Western Europe, through the International Council of Load Dispatchers in the British Zone of Germany, the Panel is concerned also with reconstruction of lines for export of power from Germany to her neighbours. Thus, a line was re-opened from Germany to supply power to both Belgium and Holland in October, 1945; and estimates for overall German production, home requirements and balance for export, have been under constant examination. By the end of 1945 there was sufficient installed capacity to meet the needs of all members, though actual output was still limited by the amount of coal available.

Work already sponsored by the Panel includes construction of a line from Germany to Holland. A direct line to Luxembourg has also been considered, but it was decided that power could be more economically provided over the existing lines to France and Belgium. Closer integration between Luxembourg and the French network is under consideration.

Though concerned mainly with electric power the Panel includes gas supply within its scope, and is assisting in the construction of a pipe-line from Germany to Holland. Some difficulty was met in getting necessary material but eventually the project was begun and should be completed by this autumn. Monthly statistics showing the position in each country with respect to production, consumption, export and import of electricity and gas are issued and discussed at each meeting.

Swiss representation on the Panel was invited at an early stage of its proceedings and has been effective since May, 1946. It has proved particularly welcome, in view of the increasing importance of hydro-electric power, and the need for maintaining a fair allocation of coal by the E.C.O. as between those countries with large supplies of such power and those with little or none.

The Panel is considering the possibility of developing in Europe an integrated power system such that international distribution of hydro and thermal power may be so regulated as to counteract seasonal and local variations and ensure a fair and stable supply to all countries throughout the year, consistent with the most economic use of Europe's fuel and power resources.

A small working party has been set up for the purpose of examining existing organizations, and the most effective means of planning and co-ordination both in the immediate future and as a long-term policy. This may involve some permanent body as part of any machinery for effective economic co-operation among the European countries.

International Technical Congress

Summary of Engineering Proceedings

DURING the Paris meeting of the International Technical Congress 130 papers were presented by delegates from fourteen of the thirty participating nations, and discussed.

The work of the Congress was classified into four sections as follows:—Technical problems of reconstruction and economic development of war-devastated countries; atomic energy; the present state of technical and engineering progress; and the organization, social responsibilities and training of engineers. A resumé has already been given of a selection of some of the sixteen papers given by British delegates in the *Electrical Review* of September 20th.

Reports were rendered by delegates from countries devastated during the war, including Czechoslovakia, France, Hungary, Luxemburg, Poland and Roumania. One of two films from Hungary showed the rapid rebuilding of the Francis-Joseph Bridge spanning the Danube and linking Buda and Pest according to the original design, with the aid of two 100-ton floating cranes.

River Rhone Scheme

A paper by a French delegate, Monsieur R. Giguet, dealt with the harnessing of the River Rhône—an important part of the French plans for extended industrialization. The scheme includes, in addition to increasing the navigability of the river, the erection of a barrage and hydro-electric station at Genissiat and construction of transmission lines linking the station with the high-voltage network centred on Paris. A film was shown of the restarting of the constructional work at Genissiat which was commenced in 1938. The first stage of the plant (280,000 kVA) is expected to be in operation by the end of 1947. Other barrages on the Haut Rhône are also projected.

Atomic Power

In the session devoted to Atomic Energy, Mr. Lee, an American delegate, presented a report by Mr. H. A. Winne, vice-president of the General Electric Company, who was one of the five members of the Lillenthal Commission set up by the State Department to advise on the problems of nuclear energy from the international point of view. Monsieur Gueron, one of the principal collaborators in France with Monsieur Joliot-Curie, Haut Commissaire à l'Energie Atomique, took part in the discussion. Mr. Winne's paper reviewed the enormous complexity of the technical and economic problems involved in the construction of a plant that could make nuclear energy available for industrial and domestic use. It discounted the many extravagant prophecies that had been made concerning the near

approach of an "atomic age," and emphasized that engineering and economic factors would largely determine possible applications.

Many years of research would be required before a power station could be built that would be capable of transforming a source of atomic energy into electricity. The problems related to the media to transfer the heat energy to turbo-generators, the temperatures involved, the resistance of construction materials and protection against dangerous radiations. Little data was available on economic factors, but for some time the production costs of atomic energy applied to industrial uses would be considerably in excess of those of other forms of energy. Among possible future applications was ship-propulsion, which would permit a sea-going vessel to cover many thousands of miles without refuelling.

Papers submitted on the present state of engineering progress were primarily concerned with the generation and utilization of power, industrialization, mechanization of agriculture, housing and town-planning, communications and transport.

Visits were paid by electrical engineer delegates to the central control room of the distribution network of the French Union d'Electricité and also to the Arrighi power station at Vitry, where four 55,000-kW generating sets and pulverized-coal automatic boilers are installed.

Among countries submitting reports on telecommunications were America, France and Portugal.

A number of papers were given on the organization and training of engineers in various countries including China, France, Great Britain and the United States.

Colour Television in America

A recent demonstration of colour television in New York by the Columbia Broadcasting System was described by the company's president as "more than measuring up to our most optimistic hopes." The demonstration included radio singers, paintings, and a boxing match, and viewers stated that no blurring was evident throughout.

Distributors of RCA Victor television sets have promised limited delivery of two new models early in October. The company has also produced a large-screen projection type receiver, which has an image the size of a newspaper page, and incorporates normal and frequency modulation radio reception. The company is concentrating on setting up antennae installations for dealers, as well as instituting a plan whereby purchasers of sets will receive antennae, installations, operating instructions and a year's service and maintenance for an inclusive charge.—*Reuter's Trade Service.*

COMMERCE and INDUSTRY

Domestic Oven Cooking Tests. Appliance Production Expands.

HOLDING that actual working tests at present provide the only satisfactory basis for assessing the performance of domestic electric cookers, the British Standards Institution has issued B.S. 1315 (Pt.1) with a view to aiding supply undertakings and others in the selection of ovens. In this a wide variety of cooking operations is prescribed with specified ingredients for each.

The tests have been selected to give results that have a minimum dependence on the skill of the cook and on such extraneous factors as air temperature and quality of ingredients, but they can only effectively be carried out by skilled cooks. The materials have been selected for uniformity and not necessarily for quality or palatability.

The tests prescribed are for scones (high-temperature), small cakes and sponge sandwich (heat-distribution), rich fruit cake (low-temperature long-period) and a complete dinner (full-load test). A bread-baking test is optional. An appendix gives some plainer recipes for use when the standard ingredients are not obtainable. As the reaction of these to variations in cooking conditions is less critical than that of the standard, the latter should be used whenever possible. Copies of B.S. 1315 can be obtained from the British Standards Institution at 2s. each net.

Electrical Appliance Production

Figures appearing in the September *Monthly Digest of Statistics* show that the monthly production of electric fires during the second quarter of this year was 225,000, of which 199,900 were for the home "civilian" market. This compares with an average of 28,500 in April-June, 1945, of which 22,700 were for the home market. Electric irons averaged 302,700 per month (241,700 for the home market), compared with 40,400 (37,900) in April-June last year. The monthly production of vacuum cleaners rose from 6,400 (6,300 for home market) in the second quarter of 1945 to 52,200 (42,900) in April-June this year and the monthly output of kettles from 11,400 (11,100) to 48,200 (37,200).

Shorts' Rochester Factory

The Board of Trade announces that three major allocations have been made covering almost half of the available factory space in Shorts' premises at Rochester. These cover a large part of both the seaplane works and the airport factory, in all nearly 350,000 sq ft. At the airport factory B. & P. Swift, Ltd., will employ about 450 men on the manufacture of automatic scales, gears, hydraulic pumps, etc., and Elliott Brothers (London), Ltd., will employ 500 men on all types of electrical and mechanical precision instruments. C.A.V., Ltd., will take shops at the seaplane works in which they will manufacture fuel injection pumps, electrical equipment, etc., employing 1,200 persons, at least two-thirds of whom will be men. It is anticipated that the remaining factory space

will be allocated by the end of the year. The release of the premises will not, however, be completed until towards the end of next year.

P.O. Engineers and 40-Hour Week

A claim for acceptance of the principle of the 40-hour, five-day week has been made by the Post Office Engineering Union. The Union has asked that a joint committee should be set up to work out the details and that during the transitional period the working week should be 43 hours to operate at once. It has been made plain by the Union that it wants an actual reduction in working hours, and not merely an arrangement that would involve increasing the proportion of overtime.

Glasgow Underground Railway Lighting

Some months ago "Osram" fluorescent lamps were installed in an experimental Underground coach of the London Passenger Transport Board. These were operated from a



Glasgow Underground coaches lighted by "Osram" fluorescent lamps

1,200-cycle a.c. source supplied by a suitable motor alternator which was driven by a motor running off the 600-V traction supply. Recently, a similar experiment has been carried out on the Glasgow underground railway by the City Transport Department. Here it was possible to use standard "Osram" fluorescent lamps without the necessity of producing special equipment to provide the current.

The installation was carried out by engineers of the Glasgow Transport Department, under the direction of Mr. E. R. L. Fitzpayne, and in consultation with the Glasgow branch of the G.E.C. The complete scheme involved the fitting of two coaches (a power coach and a trailer coach) with twenty-eight 4-ft fluorescent lamps of the daylight type, each mounted in the standard G.E.C. fitting. Each side of the two coaches is fitted with seven lamps mounted

about 6 ft 6 in. from the floor. The total lamp wattage per coach is 560 and the lighting intensity provided is approximately 22 lumens per sq ft.

Battery Vehicles for Local Delivery

The suitability of battery electric vehicles for local delivery work was emphasized last week by Mr. R. C. Hawkins, assistant secretary of the Electric Vehicle Association of Great Britain, Ltd., in a paper presented at the Soft Drinks Industry Protection Association's convention held at the Connaught Rooms, London. Among the special features stressed by Mr. Hawkins were their simple construction, low maintenance and running costs, low depreciation, safety, cleanliness, silence, easy starting and reliability. Typical costs for a 200-mile week with a 10-cwt payload were £2 16s. 1d. for an electric vehicle and £3 16s. 8d. for a petrol vehicle. For a 1-ton payload the corresponding costs were £3 9s. 8d. and £5 0s. 1d. respectively.

Following the paper there was a parade of representative electric vehicles in Lincoln's Inn Fields in which six manufacturers demonstrated their latest models. A "pony" three-wheeler was shown by the Brush Electrical Engineering Co., Ltd., together with a standard 18/22-cwt model. Crompton Parkinson had a 2-ton flat deck, while Midland Vehicles, Ltd., exhibited a 12/15-cwt open-sided milk van. One of a fleet of 208 1-ton vehicles being manufactured for a firm of mineral water manufacturers was chosen for display by Northern Coachbuilders, Ltd., and typical of the heavier types was a Tilling-Stevens 4/5-ton

metal reclamation, ship breaking and salvaging, airfield construction, and the production of midget submarines, all came within the scope of the company and its associates and the way in which this work was carried out, often whilst under enemy aerial bombardment, makes interesting reading.

National Chamber of Trade Conference

Among subjects to be discussed at the autumn Conference of the National Chamber of Trade to be held at the Assembly Hall, Tunbridge Wells, on October 23rd and 24th, are improvements in the method for dealing with Class C releases from the Forces, the adoption of a uniform method of calculating and showing purchase tax on invoices, and the investigation into the increase in delegated legislation. Sir Walter Womersley will preside at the conference and the opening session will be addressed by Mr. J. W. Belcher, M.P., Parliamentary Secretary to the Board of Trade.

Transformers for Yugoslavia and China

Gresham Transformers, Ltd., has received contracts for the supply of sixty-six power distribution transformers for voltages up to 30 kV for Yugoslavia and sixty-four 13-kV distribution transformers for shipment to China.

Bradford Light and Colour Exhibition

Following the very successful Light and Colour Exhibitions organized by the Cotton Board in Manchester and the Hosiery Working Party at the Wolsey Mills in Leicester, the



Display of electric vehicles arranged in connection with the Soft Drinks Industry Protection Association's convention

lorry with a hinged side. In addition to a Graisley works truck and a milk pram shown by Diamond Motors, Ltd., there was a third Graisley 2-ton vehicle used by Partridge Wilson & Co., Ltd., as a stand for displaying specimens of their charging equipment, including the first of a redesigned series of "Davenset" units intended particularly for electric vehicle work.

Thos. W. Ward's War Activities

In common with the majority of engineering concerns, the greater part of the activities of Thos. W. Ward & Co., Ltd., and its associated companies were switched over to the prosecution of the war. The important part played by the company and its associates, and some of the many difficulties which were overcome are told in "End of a Chapter" which the company has just published. Such diverse tasks as scrap

Leeds office of the Lighting Service Bureau has co-operated in organizing another exhibition on similar lines at Try Mills, Bradford. This was recently opened by the Lord Mayor of Bradford (Alderman Mrs. Kathleen Chambers) in the presence of local M.P.s and leaders of the textile trade representing employers and unions.

The exhibition, which is being held under the auspices of the Wool (and Allied) Textile Employers' Council, demonstrates to the whole trade the transformation that can be brought about in the ordinary mill in order to provide an environment likely to attract labour and improve the conditions of the operatives. An old warehouse used as an air-raid shelter has been converted into a cheerful canteen and rest-room, and two floors of the mill made a pattern for the correct application of lighting and colour. Mr. F. Harrison, managing

director of the Thornton Spinning Co. in whose premises the exhibition is being held, anticipates that his production will be increased by at least 10 per cent under the improved conditions.

Large Stator for Hull

The General Electric Co., Ltd., Witton, has this week despatched one of its biggest loads by road to Hull. It is the 95-ton stator of a 37,500-kVA, 22-kV, 3,000-r.p.m. turbo-alternator for the Sculcoates generating station. The turbine has been made at the Fraser and Chalmers Works, Erith. The 20-ton trailer which has been used is propelled by two 240-H.P. tractors, one at the front and one at the back of it. As the load was so heavy the Ministry of Transport would not authorize a direct route and it has had to go via Wolverhampton, Newcastle-under-Lyme, Bradford, Manchester, Huddersfield and York.

Developing Aircraft Radio

The space restrictions in aircraft necessitate careful attention in the design of airborne radio equipment if the maximum convenience is to be obtained for installation, operation and maintenance. To keep these factors well in the minds of its engineers Standard Telephones and Cables, Ltd., has purchased a Dakota fuselage for use as an aircraft radio laboratory. The Dakota has been delivered to the company's New Southgate Works where it is now being fitted out for its novel application.

Patent Restoration Application

The Utility Electric Corporation has applied for the restoration of Patent No. 534,088, dated October 24th, 1938, for "Combined multi-light incandescent lamp and switch." This patent lapsed on October 24th, 1945, owing to non-payment of the renewal fee. Notice of opposition (Patents Form No. 17) may be lodged at the Patent Office, 25, Southampton Buildings, London, W.C.2, on or before November 18th.

Reports on German Industry

The latest list of reports by investigating teams on various branches of German industry include the following:—B.I.O.S. 572, "Investigation into Manufacture and Use of Carbon Black and Lamp Blacks in Germany" (10s. 6d.); B.I.O.S. 600, "German Heavy Electrical Industry. Motors and Power Transformers" (3s.); B.I.O.S. 708, "German Alkaline Accumulator Industry" (1s. 6d.); F.I.A.T. 292, "The Manufacture of Laboratory Apparatus, Instruments and Equipment" (1s. 6d.).

Music in Factories

The Performing Right Society, which represents the interests of composers, authors and music publishers in the public performance of their copyright music, states that over six months have passed since the agreement between the Government and the Society, by which the performance of copyright music in factories and industrial canteens was sanctioned without fee to the individual manufacturer, came to an end. While many factories and canteens, including those of Government Departments, have already obtained from the Society the individual

licences which are now necessary, there are still many which have not. The Society therefore points out that it is essential that all owners of factories and canteens should obtain from the Society without delay the licence now necessary if "Music While You Work" and other copyright music is to be enjoyed without danger of infringement of copyright or liability to legal proceedings. The cost of the licence is assessed on the basis of a penny a year per employee for half-an-hour's music daily throughout the year, with a minimum fee of £2 2s. per annum.

Australian Overseas Trade

Electrical imports into Australia during the twelve months ended June last totalled £5,281,000 in value, compared with £6,446,000 during the preceding year. Details were as follows:—

Class of goods	1944-45 £ 000	1945-46 £ 000
Batteries and accumulators . .	202	84
Cable and wire, covered	662	610
Dynamo-electric machines . .	778	1,076
Lamps, filament	108	169
Telegraph and telephone switchboards	1,380	1,116
Electrical machinery and appliances	3,316	2,226

Australian exports of electrical appliances and equipment in 1945-46 were valued at £537,000, against £350,000 in 1944-45.

London J.E.A. Consumers

In our report of Alderman Shaw's remarks at the luncheon of the London and Home Counties J.E.A. (*Electrical Review*, October 4th) the number of consumers supplied by the Authority was given as 132,000; it should have been 138,000.

Substation Battery

An Alton battery with a capacity of 5,280 Ah, has been installed at the Fisher Street substation of the Metropolitan Electric Supply Co. This battery, like two other Alton batteries, rated at 6,400 and 5,200 Ah respectively, installed at the same substation, will be used to deal with peak loads and limit the maximum demand on the substation. The new battery replaced an old battery which was last replaced by the Alton Battery Co. in 1930.

Television Stimulates Production

During the war efforts were made to boost production by talks by members of the Forces, etc., to factory workers, bringing home the vital need for their particular manufactures. In particular this applied to makers of small component parts. With the return to peace most factories complain of the same things—a tired feeling (not entirely unexpected after six years of war) and a lack of interest. With the object of combating these depressions, the Telegraph Condenser Co., Ltd., North Acton, recently staged a television exhibition in conjunction with its Works Television Society. Several well-known types of television receivers were exhibited together with some made by members of the Society. Other sets were dismantled to show the "works." These were of special

interest to the workers of this particular factory because even the smallest receiver contains at least fifty different types of fixed condensers. Afternoon tea breaks were arranged so that workers could see the television programmes being broadcast.

Sale of Radio Sets

Ilford Corporation recently decided to approve the sale of radio sets by the Electricity Committee and now the borough electrical engineer has reported to the Committee that he has placed an order for the purchase of 50 sets at the agreed total cost of £696 for sale on a cash basis to the public. There are three types. He reported that the question of fixing a retail price for such sets was under discussion by the joint committee of local authorities on radio and television and that the matter would be the subject of report in due course. A letter has been received from the local Chamber of Trade protesting against the scheme.

"Britain Can Make It" Lighting

Thorn Electrical Industries, Ltd., ask us to mention that in addition to the "Atlas" coloured tubes provided by them for various parts of the "Britain Can Make It" Exhibition, they also supplied a considerable number of standard translucent lighting units with warm-white tubes for the illumination of the various furnished rooms.

United Nations Radio Network

The United States State Department last week announced a proposal for the creation of a world-wide United Nations radio network, estimated to cost £62,500,000. The proposal was made to Mr. James F. Byrnes, Secretary of State, by the official advisers assigned to shaping American policy on the United Nations educational work.—*Reuter*.

Northampton Electrical Association

The annual general meeting of the Northampton and District Electrical Association was held at the College of Technology, Northampton, on September 25th, when a large number of members attended. Mr. O. F. Bailey, B.Sc., A.M.I.E.E., was elected president. After the business, films of general interest were shown. The programme for the 1946-1947 session opened with a lecture-demonstration on "Telephones" by Mr. E. J. Bagnell on October 9th.

American G.E. in Turkey

Under an agreement with the Turkish Government the American General Electric Co. is to establish factories in Turkey for the production of electric lamps.—*Reuter*.

Trade Publications

Sunvic Controls, Ltd., Stanhope House, Kean Street, Kingsway, London, W.C.2.—Illustrated leaflet (TD.10a) describing with the aid of circuit diagrams adjustable time-delay switches housed in bakelite mouldings.

Mullard Wireless Service Co., Ltd., Century House, Shaftesbury Avenue, London, W.C.2.—Radio valve and service guide (for use of the trade only) with diagrammatic representation

of base connections, tabulated operating data and list of replacement and substitution types.

Dawe Instruments, Ltd., Harlequin Avenue, Great West Road, Brentford, Middlesex.—Illustrated loose-leaf catalogue of electrical, electronic and radio measuring and testing instruments for laboratories and factories.

Churchill Machine Tool Co., Ltd., Broadheath, Manchester.—A 28-page illustrated brochure dealing with heavy plain grinding machines.

Fraser & Chalmers Engineering Works (G.E.C.), Erith, Kent.—Technical brochure (No. 9915) describing with the aid of diagrammatic illustrations the separation of ores by flotation.

[Applicants for copies of these publications should write on their firms' business notepaper.]

Iron and Steel Board

The offices of the Iron and Steel Board have been established in Bush House, Strand, London, W.C.2.

Trade Announcements

From November 18th distribution of Philco radio and television receivers (car radio excepted) in Southern England, south of a line approximately mid-Wales to the Wash, will be on a "direct to dealer" basis. The rest of England, Scotland, and Northern Ireland will be covered by distributors, who will have sole distributing rights in the areas for which they will be appointed. The Philco service scheme, as originally announced, is to be allowed to lapse and will be incorporated in the Philco accredited dealer scheme.

Marconi Instruments, Ltd., has established a Southern Area office and London showroom at 109, Eaton Square, London, S.W.1 (telephone: Sloane 8615). The representative in charge is Mr. R. J. Bailey.

Macrome, Ltd., Alcester, Warwickshire, have been appointed sole overseas agents (except for Australia) for the products of E. C. Hopkins, Birmingham.

Alliance Wholesale, Ltd., has again extended its Bute Street, Luton, premises.

TRADE MARKS

THE following applications have been made for the registration of trade marks. Objections may be entered within a month from October 2nd:—

TRONIA. No. 641,892, Class 7. Electrical hair waving appliances.—G. Briggs and W. Fletcher, 5, Rampayne Street, London, S.W.1.

SCONA. No. 639,785, Class 9. Electrical apparatus and instruments included in Class 9; scientific, cinematographic, optical, weighing, measuring, etc., apparatus and instruments; talking machines; and parts (not included in other classes).—General Aniline & Film Corporation, 230, Park Avenue, New York. Address for service: c/o McKenna & Co., 12, Whitehall, London, S.W.1.

PENETRAY (design). No. 638,060, Class 11. Electric drying and heating lamps and electric incandescent lamps.—Verd-a-ray Corporation, 615, Front Street, Toledo, Ohio, U.S.A. Address for service: c/o Frank B. Dehn & Co., Kingsway House, 103, Kingsway, London, W.C.2.

Plug-in Fire Call System

First Peacetime Installation

By S. A. Daines, A.M.I.E.E.



Fireman's alarm relay and calling bell in carrying case

either be at home or at work when their assistance is needed, and consequently it is necessary to consider the manner of informing them by the quickest yet simplest means.

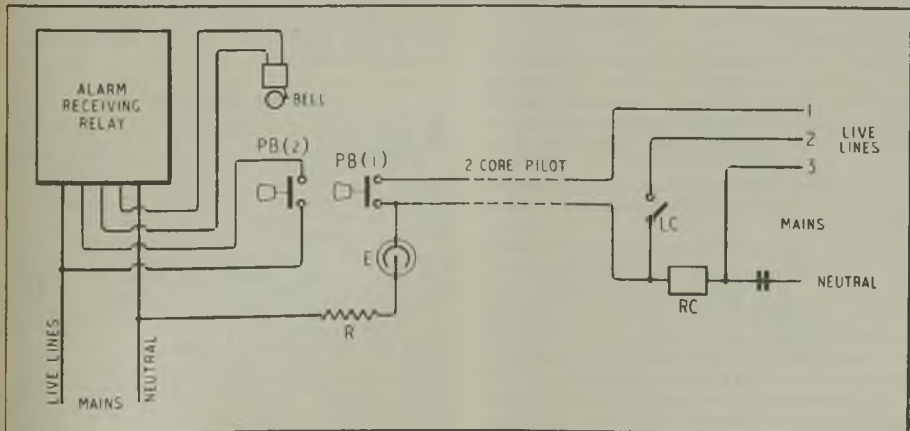
A new and somewhat happier lease of life has been given to the 4-H.P. air raid sirens in this connection, especially in rural and small urban districts. The siren is usually fitted near the fire or police station; its original contactor and a modified time controller, usually giving a half-minute "all-clear" blast, can be connected and the whole equipment set in motion by the momentary pressing of a push-button.

Some small areas are geographically suited to this device, whereas in large towns necessitating several sirens placed at points chosen according to prevailing winds its advantage is

doubtful in view of the disturbance occasioned to a greater number of the public. To the part-time fireman working, say, in a noisy engineering factory the siren would be useless, for its note might not penetrate to his workshop.

But when there is a central superimposed current control system, a "Rythmatic"

THE end of the war has reduced the number of fire brigade calls to peacetime proportions and has inevitably resulted in the reduction of the number of full-time firemen. But the unknown factors of time, duration, and proportions of outbreaks of fire render a stand-by "pool" of firemen vitally necessary. These part-time men will



Circuit diagram of alarm transmitter at central fire brigade station

receiving relay and alarm bell neatly installed in a small attaché case is an answer to the problem. This unit can be plugged into any socket outlet from the public electricity supply system at home, in the factory or office. A small switch on the relay cover is provided for silencing the bell after a call has been received and the device is then automatically re-set for its next operation. By using such portable relay alarms a squad of firemen are simultaneously warned for duty within 20 to 30 seconds of the call button being pressed at the central fire station.

This prompt and efficient method, utilizing a small control box fixed at the fire station headquarters, is connected by two pilot wires to the transmitting equipment at the power station. A diagram of the internal connections of the control box is reproduced on the preceding page.

Push-button PB (1) is momentarily pressed, remote control relay RC locks contacts LC and the neon lamp E glows to give visual indication that the signal has been received at the transmitter. If for any reason another signal is being sent out, the neon lamp will continue to glow until the "fire call" is

being transmitted, this being finally confirmed by the relay picking up the superimposed radio-frequency signal from the power mains network and, in turn, ringing the bell as a check back to the fire station control room. After receipt of the check-back the bell is stopped by pressing push-button PB (2). Automatically RC is shunted down by the live line (3).

With the parallel method of injection, if the fire call signal at 800 c/s (0.54 rhythm) is not held up by another signal (say, street lighting) then the fire station bell is set ringing within 20 seconds of the button being pressed. The maximum possible delay is 1.25 minutes, but the chances of such a delay are very remote. The system could well be extended with the availability of additional signalling channels and the initiating push-button could be duplicated at the power station as a reserve in case of temporary failure of the pilot cables or fire station control gear.

Acknowledgment is made to Mr. P. G. Camping, chief engineer and general manager, Bedford Electricity Department, for agreeing to the above information being published.

Intrinsically Safe Apparatus

Avoidance of Firedamp Ignition

ONE aspect of rendering the sparking that accompanies the breaking of a circuit incapable of igniting firedamp is dealt with in a new Safety in Mines Research Board Paper No. 104 (Stationery Office, 6d. net). The scope of "intrinsic safety" is limited to low-power apparatus, such as bells, signalling and shot-firing systems.

Tests are, however, still only empirical. They pass as safe apparatus when, on repeated trial, "break" sparks fail to ignite mixtures of firedamp and air, but the margins of safety in different circumstances are unknown. This and the increasing elaboration in electrical apparatus and circuits have called for a quantitative study of the problem in order to create a scientific basis.

The Paper gives the relationship between the inductance in a circuit and the minimum current that can ignite firedamp when the circuit is rapidly broken between a pointed platinum electrode and a wire. The effects of two methods of increasing the minimum igniting current have been measured. These are the introduction into the circuit of a shunting resistance or a condenser. They can be of considerable value when the inductance is high and the current correspondingly low, but the value is

much less when the working current exceeds about 1 A or, in a case of a shunting condenser, when the break of the circuit is slow or irregular. The results reported in this Paper and others to follow it will be used by the testing authorities in the examination of mining electrical apparatus submitted by the makers for approval. The subject was commented on in the *Electrical Review* of October 4th.

Cable Jointing

A series of booklets under the title "Electrical Knowledge as an Aid to Craftsmanship in Cable Jointing" is under preparation by Dussek Bitumen & Taroleum, Ltd. They are intended to provide instruction in elementary theory for the "joiner of to-morrow" and to serve as "refreshers" for young jointers who have recently been released from the Forces. The first number, which can be obtained free from the company by engineers of supply undertakings, explains, among other things (with the aid of seven diagrams), why a small blob of solder left on the ferrule connecting two cables on an a.c. system may cause a breakdown. This entails considerations of dielectric strength, magnetic fields, density of charge and kindred matters which are discussed in simple language that could hardly fail to enhance the interest of his work to the intelligent craftsman.

ELECTRICITY SUPPLY

Development at Bolton. Large Liverpool Rate Contribution.

Battersea.—CHANGE OVER.—The Electricity Committee is to erect a substation in the Falcon Road district and change over the supply in part of the area at a cost of £33,416.

Birkenhead.—OIL FUEL NOT FAVOURED.—After considering whether the new £7,000,000 generating station at Bromborough should be run on oil fuel or coal, the Electricity Committee has recommended the installation of pulverized fuel boilers.

Blackburn.—MILL SUPPLIES.—Supplying electricity to the Canton Mill and giving an increased supply to the Star Works, Hart Street, will cost £3,138.

Blackpool.—EIGHT-YEAR SCHEME.—The Electricity Committee has approved in principle an eight-year scheme of extension costing £270,000 and is applying for sanction to borrow £143,767 to cover the first stage of the scheme.

Bolton.—ANNUAL INSPECTION OF UNDERTAKING.—The chairman of the Electricity Committee, Councillor Longworth, at the annual inspection of the electricity undertaking last week, said that during the war an extension scheme had been completed by the Electricity Department's own staff under the chief engineer, Mr. H. E. Annett—a creditable performance seeing that in a space occupied by a 7,600-kW unit they now had a 62,500-kW set. Factory consumption had risen from 65½ million kWh to 87 million, while the consumption as a whole had risen by 30 per cent. Since the war 1,112 new consumers had been connected and there were 616 others awaiting connection, apart from supplies to housing estates. The Committee had plans for a big transformer scheme for the south side of the town, costing £144,635, and for new showrooms. During this year there had been an increase of 15 per cent over last year in consumption and they expected a very large load this winter. During the last eleven years the difference between the grid tariff price and that which Bolton actually paid to the Central Electricity Board was £224,000. For 1944 the difference was actually £52,000. That year the Department made a profit of £20,000 so if it had been paying the grid tariff, it would have lost £30,000. Reserves stood at £212,226 and carry forward at £225,232. If they could keep these under nationalization it would be a good gift to the rates.

Bradford.—EXTENSIONS.—The Electricity Committee is to extend mains and erect a substation in Ingleby Road at a cost of £10,688. An additional supply is to be provided to Barkerend Mills Co., Ltd. (£12,734). The distribution system is to be extended to the Cow Close district, Wyke (£1,410) and to Woodhouse Hill and Greenfield Lane, Bierley (£1,403).

MUNICIPAL CONTRACTING.—The borough electrical engineer has been instructed to make arrangements for the establishment of an electrical contracting section.

STREET LIGHTING.—Electric street lighting is to be provided at Eccleshill estate (£2,037), Buttershaw (£2,060) and Clayton (£1,746).

Cardiff.—COOKERS FOR STEEL HOUSES.—The Housing Committee has decided to provide 250 of the 500 B.I.S.F. houses with electric cookers.

Chester.—SUPPLY TO LEAD WORKS.—Sanction has been obtained by the Electricity Committee to borrow £2,400 for the provision of a supply to the lead works of Walkers, Parker & Co., Ltd.

Chesterfield.—NEW SUBSTATION.—A substation at Stonegravel, the first of several to be built in accordance with the undertaking's improvement scheme, was opened by the chairman of the Electricity Committee during the annual inspection of the undertaking by the Committee.

Clyde Valley.—DEARER ELECTRICITY.—For the first time since 1935 the Clyde Valley Electrical Power Co. and its associate, the Strathclyde Electric Supply Co., have been compelled to increase their charges. In the case of domestic consumers the advance, which has been sanctioned by the Minister of Fuel and Power, will take effect from the accounts rendered after January 1st, 1947. Consumers under the residential and non-residential street lighting, etc., tariffs and also the power tariffs are affected. In the case of the first class of consumer the addition will be 15 per cent, while in the case of consumers subject to a coal clause the increase will be 5 per cent on the basic rates but excluding the coal clause.

Conway.—LOWER CHARGES.—The price of electricity is to be reduced by ¼d. per kWh on the rateable value tariff, which will now be 12½ per cent of the rateable value and ¾d. per kWh consumed. About 3,000 consumers will benefit. There will also be an all-round reduction of ¼d. per kWh to prepayment consumers. The total reductions in a full year are estimated at approximately £3,600, including the cost of discontinuing meter rents.

Coventry.—SUPPLY EXTENSIONS.—The Electricity Committee has approved the provision of supplies to the Keresley and Binley colliery villages.

Derby.—POWER STATION SITE.—The Electricity Committee recommends that an option shall be obtained to purchase a site at Swankestone for a generating station.

Epsom.—REWIRING OF ASYLUM.—The re-wiring of the electrical installation at Horton Asylum is to be completed by the London County Council at a cost of £7,000.

Liverpool.—£50,000 RATE CONTRIBUTION.—The Electric Supply Department reports that on the working of the undertaking for the year to March 31st last there was a surplus of £79,317, of which it is proposed that £50,000 shall be transferred to the general rate account. The final reckoning is much better than had been anticipated, owing partly to greater sales.

At last week's meeting of the City Council the recommendation to transfer £50,000 to the rates was opposed by Councillor J. Johnstone.

He said that it was the wrong moment to put the profits to the relief of the rates when the city electrical engineer had reported that, owing to increasing costs, further increases in charges to consumers would appear to be inevitable.

Alderman A. Critchley, chairman of the Electricity Committee, replied that they were in the position of having to do their best with the undertaking in the short time at their disposal. The Committee could spare £50,000 for the relief of rates and they took the view that they must think of Liverpool as a whole. Personally he would not have been opposed to devoting the whole £80,000 to the rates, because there was no question about it that in negotiating with the Government on taking over the undertaking they would not get one penny piece consideration for that £80,000. The reference back was defeated by 60 votes to 41.

COAL WAGONS.—The Electric Power and Lighting Committee has obtained sanction to borrow £25,450 for the purchase of fifty 20-ton steel hopper coal wagons.

Llandudno.—**UNDERTAKING'S FINANCES.**—The Council's electricity undertaking showed a loss of £3,847 for the year ended March 31st last. Capital expenditure for extensions of mains, changing the system of voltage, and new developments during the next two years is estimated at nearly £20,000.

London.—**PUMPING PLANT.**—The London County Council is to reorganize the pumping plant at the Southern Outfall works at a cost of £180,000, and the Health Committee proposes to install four electrically driven pumps in place of the existing steam driven pumps. It is anticipated that this will result in a saving in maintenance costs of £15,000 a year, mainly in respect of coal and oil fuel.

Manchester.—**LOAD DEVELOPMENT IN SOUTHERN AREA.**—To meet load development in South Manchester the transformer capacity at the Moss Side substation, between the 33- and 6.6-kV systems, is to be increased. It is proposed to install a 10,000-kVA transformer and carry out various modifications to enable the station to be remotely controlled from the central control room. The estimated cost is £14,500.

Midhurst.—**CHEAPER ELECTRICITY.**—At a meeting of the Rural District Council it was reported that the Mid-Southern Utility Co. proposed to make a reduction in electricity charges as from the reading of the meters for the current quarter. The war increase of 10 per cent was to be abolished and the differential flat lighting rate in the outer areas reduced by $\frac{1}{4}$ d. per kWh. After the publication of the company's accounts for 1946 negotiations would be continued for further reductions.

Newcastle (Staffs).—**SUPPLY TO BRICKWORKS.**—The Electricity Committee is applying for consent to the borrowing of £1,060 for supplying electricity to the Apedale Brickworks of T. W. Ward, Ltd.

Pontardawe.—**STANDARDIZED FIXED CHARGES.**—It is interesting to learn from Mr. Russell M. Jenkins, electrical engineer and manager, that the Rural District Council has decided to standardize the fixed charge component of the two-part tariff. The following charges will be made:—Small business premises (schools,

hotels, farms, offices, ambulance centres and workshops), 15s. a quarter. Large business premises and public buildings, 25s. a quarter. Domestic premises: From 10s. a quarter for the smallest premises to 14s. a quarter for the largest. The running charge is being reduced by 25 per cent as from October 1st.

Preston.—**EXTENSIONS.**—The Electricity Committee proposes to extend mains to Calder Vale, Back Lane, Garstang, etc.

Richmond (Yorks).—**REBATE.**—A 20 per cent rebate has been given to electricity consumers for the quarter ended September 30th.

Salford.—**DOMESTIC APPARATUS.**—The Light, Heat and Power Committee is seeking sanction to borrow £10,000 for domestic electrical appliances.

Stafford.—**HIGHER CHARGES.**—Increased charges for electricity as from the last reading of the meters for the December quarter were adopted by the Town Council last week, subject to the approval of the Electricity Commissioners. Alderman C. H. Merrey, presenting the report, said that "all-in" tariff consumers had been getting electricity at less than its cost to the Corporation, and that position must be remedied.

Swindon.—**ECONOMY APPEAL.**—The Town Council decided at its October meeting to appeal to the Great Western Railway Company to exercise strict economy in the use of electricity at the locomotive and carriage works at Swindon. An appeal to economize as much as possible was also made to the general public. Figures given showed that the present load is distributed as follows:—Domestic and industrial lighting, 21 per cent; heating and cooking, 53 per cent; industrial power, 25 per cent; and public street lighting, 33 per cent.

Wolverhampton.—**SYSTEM DEVELOPMENTS.**—For cable and switchgear extensions on the north-west side of the town the Electricity Committee proposes to apply for permission to borrow £90,693. It also recommends that negotiations shall be entered into with the West Midlands J.E.A. for a third primary substation, probably at Codsall, and that approval be given in principle to the establishment of a 33-kV system.

TRANSPORT

Darlington.—**DOUBLE-DECK TROLLEY-BUSES.**—The Town Council is being recommended to order six double-deck trolley-buses. The Council at present uses only single deckers and if double deckers are used generally, it will be necessary to lower the roadway under certain bridges to make room for the vehicles.

Newcastle-on-Tyne.—**NEW SERVICE.**—The City Council proposes to institute a trolley-bus service to the new headquarters of the Ministry of National Insurance at Benton. The Gosforth Urban District Council has approved the City Council's plans for a trolley-bus turning point at Henry Street, but has suggested an alternative site for the turning point in Hollywood Avenue.

New Zealand.—**CONVERSION TO TROLLEY-BUSES.**—The City Council has adopted proposals to convert the tramways to trolley-bus operation. The total cost, including road restoration, is put at £739,780.

Lamp Publicity—III

Attractive New Sales Aids

■ ANY new items have been added to the existing lamp display material of E. K. Cole, Ltd. Main poster sites throughout the country are again carrying the "Ekco" lamp

artist, are also available, as well as large and small window stickers, streamers, price lists and dummy lamp cartons for general display purposes. Assisted advertising in local newspapers will still be considered by the company for aiding dealers, while coloured cinema slides complete with the dealer's name may be obtained on request. An information service for answering dealers' technical inquiries is proving very popular. The recently opened "Ekco" London office at 5, Vigo Street, W.1, carries its own lighting division staff, with Mr. E. S. Evans, southern area lighting sales manager, and Mr. F. L. Cator, lighting engineer.

The "Ediswan" lamp publicity of the Edison Swan Electric Co., Ltd., includes several attractive window displays. The standard display, "Decorate with Light," features a well-lighted building, printed in colours. Other displays invite the passer-by to "Get all the light you pay for" and to "Make the most of your Royal 'Ediswan' Lamps." The same theme runs through the national and electrical press advertising, with such additional hints on good lighting as "If that lamp were lower down you would not need to peer and frown," "If that lamp were overhead you'd get more light to read in bed," and "Homework started? What a pity the lamp's too far from George and Kitty." The familiar "Ediswan" lamp road signs and bus streamers are being continued, with the addition of a 16-sheet poster on sites at Underground stations.

Several new designs take their place in the



Eleven-colour "Ekco" lamp cut-out

slogans. Sales-aids now available include among other items a 22 in. by 15½ in. eleven-colour cut-out with an attractive girl as the main feature, two nine-colour cut-outs 12½ in. by 10½ in. (one featuring a "Schoolboy" design and the other a "School-girl"), and two varieties of the "Mr. Bright" cut-out measuring 13 in. by 10 in. for use with dummy lamp cartons. A particularly attractive cut-out is the "Ekco"

name unit, a concertina type display piece with six panels opening to 22½ in. by 7½ in. New posters, including a five-colour "crown" by Bruce Angrave, the well known commercial

range of dealer aids of Ensign Lamps, Ltd., for the new lighting season. A particularly bright ten-colour centre piece cut-out measuring 29½ in. by 19 in. featuring the "Ensign" is one of the



Standard "Ediswan" window display

main display items. For counter or window use a smaller six-colour cut-out has been devised in four planes which can be extended concertina



Ensign centrepiece cut-out

fashion to 9½ in. deep by 11 in. wide and fixed by a simple slot arrangement. Window bills include a four-colour 12 in. by 8 in. design with gummed face. There is also a striking new crown poster in five colours. Cinema slides incorporating the dealer's name and address are also available.

The lamp campaign of Philips Lamps Ltd. will follow the same pattern as that for 1945-46 in view of the successful results derived therefrom. Country-wide newspaper coverage, centred on the areas of greatest population density, will ensure that practically every section of the public will see these advertisements continuously throughout the lighting season. Advertisements will also appear in the trade press and popular magazines. The advertise-

ments themselves stress the fact that Philips have been making good lamps for over fifty years. A lamp is shown in halves with a big query mark between them. The "copy" asks "What's inside?" and the answer given is "Over half a century's experience." Other layouts show variations on the same theme.

Relaxation, in part, of paper control makes possible the introduction of an entirely new poster design to replace the flag poster which served so well during the war. It will appear throughout the London Underground system in 16-sheet size for wall display opposite platforms, 60 in. by 40 in. for special positions and in 22½ in. by 16½ in. size for escalator panels. For dealer and sales aids a wide range of display pieces has been designed. Window centre-



Philips counter showcard

pieces, pelmets, showcards, counter cut-outs, a new counter "merchandiser" and a new general lamp catalogue will be available.

Selfridge's Electrical Exhibition

AN excellent display of modern domestic electrical equipment has been got together by Selfridges, Ltd., at its Oxford Street establishment. The company says that its object in arranging the exhibition was twofold:—To demonstrate how successfully British manufacturers are reconvertng their industry to meet peacetime needs, and to show the company's determination to provide the public only with safe appliances of the highest quality.

The exhibition has been arranged in sections devoted respectively to cooking equipment, room heating appliances, refrigerators, washing machines, water heaters, lighting fittings and small appliances. Many of the leading manufacturers are represented by equipment which

does them credit. A few examples of commercial apparatus are to be seen and in this section is displayed a clever model of a 30,000-kW English Electric turbo-generator set and auxiliaries installed at the Little Barford station.

Miss Caroline Haslett, C.B.E., in opening the exhibition on October 2nd, praised the manufacturers for producing such high quality goods and the company for its enterprise in organizing such a good and representative display. Mr. E. G. Batt, thanking Miss Haslett, expressed appreciation of Selfridge's policy of dealing only in sound and reliable apparatus. The exhibition is to remain open to the public throughout October.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Telephone Rentals, Ltd.—Dealing with the accounts in his address at the annual meeting, Mr. F. T. Jackson (chairman and joint managing director) referred to the inauguration of a profits participation scheme for employees. He said that the broad basis of the scheme they had put into force was that, subject to certain specific conditions, an employee's salary would be considered to be his or her investment in the company and would entitle the participant to receive a dividend on that amount, less tax, at the same rate as dividends to shareholders. A notional increase would be added to the capital sum every three years of continuous service to provide an incentive to employees to make their careers with the company. The cost on the accounts amounted to £17,824.

Giving details of the company's progress, the chairman said that the percentage increase in new business in the twelve months ended September 30th, 1946, over 1938 was 212 and compared with 1945 the increase was 193 per cent. These figures indicated that the company was progressing at a great rate and could look forward to a successful future. The chief difficulty lay in the lack of equipment; their manufacturers were in some instances nine to twelve months behind in deliveries.

The proposals submitted at the previous annual meeting for the merging of nearly all the subsidiary companies had been carried through successfully and the new organization was already proving more efficient.

The Engineering and Lighting Equipment Co., Ltd., held its annual meeting on September 30th, Mr. S. A. Marples presiding. The chairman, in his statement circulated with the accounts, said that in regard to naval requirements there had been delay in formulating new type equipment since the war ended and a certain hiatus had therefore supervened in this major department of the company's manufacturing business. The demand for street lighting equipment remained to a great extent dependent on the fuel situation, but very large quantities of fittings were on order for housing schemes and new installations for trunk roads. Addressing the meeting the chairman said that while the prospects were good the labour and materials position was against them. With an increased supply of materials and the labour situation settled down they should be able to get near their wartime position.

The Ransome & Marles Bearing Co., Ltd., records a net profit for the year to June 30th of £127,371, as compared with £123,227 for 1944-45. General reserve receives £50,000 and the dividend for the year is maintained at 20 per cent by the final payment of 12½ per cent. The balance carried forward is £83,361 (against £83,365 brought in).

The Jerusalem Electric & Public Service Corporation, Ltd., records a net profit, after tax, for the year ended March 31st last of £P63,719, compared with £51,605 for the previous year.

The capital amortization fund receives £5,477 (same), plant renewal and depreciation account £30,000 (£22,500), and contingency account £5,000 (£2,500). The dividend on the ordinary shares is 6 per cent (against 5 per cent) and £20,408 (£13,291) is carried forward.

Rawlings Bros., Ltd.—The net profit for the year ended March 31st last, including a profit of £2,280 on realization of investment, was £9,648, as compared with £7,261 for the previous year. The ordinary dividend for the year is unchanged at 7½ per cent and the balance carried forward is £5,438, as compared with £4,348 brought in.

J. & F. Stone Lighting & Radio, Ltd., reports profits, before taxation, of £265,669 for 1945-46, as compared with £132,692 for the preceding year. The final dividend is 30 per cent, making 40 per cent for the year (against 15 per cent for 1944-45).

The Watford Electric & Manufacturing Co., Ltd., is again paying an interim dividend of 5 per cent.

The British Electric Transformer Co., Ltd., has raised its interim ordinary dividend from 10 to 40 per cent.

The Calcutta Tramways Co., Ltd., has declared a dividend of 10 per cent for 1945, as compared with 7½ per cent for 1944.

Pinchin, Johnson & Co., Ltd., are raising their interim dividend from 2½ per cent to 5 per cent.

New Companies

Diamond Bros. (Manchester), Ltd.—Registered September 25th. Capital, £2,500. To acquire the business of manufacturers of electrical equipment and household fittings, carried on by W. & H. Diamond as Diamond Bros. at 50, Thomas Street, Manchester, 4. Directors: W. Diamond and H. Diamond. Regd. office: 50, Thomas Street, Manchester, 4.

Modern Electrical Industries (Export), Ltd.—Registered September 11th. Capital, £100. Manufacturers and repairers of, and dealers in, electrical and mechanical appliances and accessories, etc. Directors: W. J. Read, A. Read, J. D. Macnee and D. G. Jones. Regd. office: 9, Hatherley Road, Sidcup, Kent.

P. A. Robinson (Electrical) Co., Ltd.—Registered September 23rd. Capital, £2,000. Electricians, electrical and mechanical engineers, welders, radio engineers, etc. Subscribers: J. Bowman and J. Campbell. Solicitors: Morris J. Hart Leverton, 65, Bishopsgate, E.C.2.

Wakeling Electrical Co., Ltd.—Registered September 19th. Capital, £1,000. Manufacturers of, and dealers in, electrical and allied apparatus, etc. Subscribers: G. L. Quirk, 68, Priestland Park Road, Sidcup, and J. D. Vanstone, 15, Arnos Grove, N.14. Secretary: J. D. Vanstone.

Seagull & Brown, Ltd.—Registered September 10th. Capital, £1,000. To acquire the business of a radio and electrical engineer, etc., carried on by Jesse H. Seagull at Cuxton Road, Strood,

Rochester, Kent. Permanent directors: J. H. Seagull and M. A. Brown. Regd. office: 35, High Street, Chatham.

Eltham Electrics, Ltd.—Registered September 10th. Capital, £1,000. Manufacturers of, and dealers in, electrical apparatus, radio and television equipment, etc. Directors: C. F. Broucher, J. W. T. Hartnell and E. W. Reynolds. Secretary: C. W. Chivers. Regd. office: 112, Westmount Road, Eltham, S.E.9.

Edinburgh Factors (Electric), Ltd.—Registered in Edinburgh September 21st. Capital, £5,000. Fittings and spare parts and all electrical and mechanical equipment and accessories for motor and other vehicles. Directors: A. Pratt and M. Pratt. Regd. office: 37/39, St. Patrick Square, Edinburgh.

H. J. & S. Products, Ltd.—Registered October 1st. Capital, £1,000. Manufacturers of, and dealers in, domestic, household and general electrical and other equipment and appliances, including washing and cleaning machines, etc. Subscribers: G. C. Humphreys and P. H. Johnson. Regd. office: 14, Wright Street, Oldham.

Southall Electrical Engineers, Ltd.—Registered September 20th. Capital, £100. Manufacturers of, and dealers in, electrical and mechanical apparatus and accessories, wireless, etc. Directors: J. H. Thomas, R. F. S. Howell and Alice Thomas. Regd. office: 47, King Street, Southall.

William Henry Smith & Son (Grays), Ltd.—Registered September 20th. Capital, £1,000. Electrical and wireless engineers, etc. Directors: W. H. Smith and Mrs. Q. D. Moriarty. Regd. office: 1, Kingston Parade, Hathaway Road, Grays, Essex.

Electro Mains (Hertfordshire) Ltd.—Registered September 26th. Capital, £1,000. Electrical and radio engineers, etc. Directors: T. H. Rice, K. W. J. Rice and W. G. B. Younger. Regd. office: 411, St. Albans Road, Watford.

E. H. Bullock & Son, Ltd.—Registered September 26th. Capital, £1,000. To acquire the business of an electrical engineer carried on by E. H. Bullock at 73, East Street, Farnham. E. H. Bullock is the first director. Regd. office: 73, East Street, Farnham.

Itonia Co., Ltd.—Registered September 26th. Capital, £1,000. Electrical engineers and contractors, etc. Directors: G. E. Bilantz and O. E. Bond. Regd. office: 72, Brondesbury Park, N.W.2.

Neon (Portsmouth) Ltd.—Registered September 16th. Capital, £1,000. Manufacturers of, and dealers in, neon signs, advertising and other signs, etc. Directors: A. P. A. Mortimer and A. J. Smith. Regd. office: 43, Ophir Road, Portsmouth.

Baths Batteries & Autocessories, Ltd.—Registered September 11th. Capital, £1,000. Buyers and sellers, repairers and manufacturers of, and agents for the sale of, electrical and other goods, etc. Directors: C. N. Bath, I. J. Fraser and F. E. Langridge. Regd. office: 3a, Hellington Parade, Chislehurst, Kent.

Clayton & Shepherd, Ltd.—Registered September 11th. Capital, £1,000. Dealers in, and manufacturers of, wireless transmitting and

receiving sets, engineers, etc. Directors: C. V. H. Clayton and J. W. Shepherd. Secretary: J. W. Shepherd. Regd. office: 77, Shirley Road, Croydon.

Creed & Southern (Electric Signs), Ltd.—Registered September 19th. Capital, £100. Manufacturers and repairers of, and dealers in, neon advertising and lighting signs, equipment, etc. Directors: F. J. Creed and F. J. Southern. Regd. office: de Burgh Works, Station Road, West Drayton, Middlesex.

E.M.P. Electric, Ltd.—Registered September 20th. Capital, £2,000. Manufacturers of, and dealers in, electrical apparatus, etc. Directors: A. H. Harrison and I. E. Humphreys. Regd. office: Bartholomew Works, Kentish Town, N.W.5.

Chingford Electrical Co., Ltd.—Registered September 27th. Capital, £500. To carry on the business indicated by the title. Directors: J. J. Barry and A. E. Johnson. Regd. office: 94a, Station Road, Chingford, E.4.

W. & H. Electrical Co., Ltd.—Registered September 10th. Capital, £1,000. Electrical engineers and contractors, etc. First directors: M. M. A. Wise and H. T. F. Harrison. Regd. offices: 337, Kenton Road, Kenton, Middlesex.

Companies Struck Off the Register

The names of the following companies have been struck off the Register and they are thereby dissolved:—British Automatic Telephone Installation Co., Ltd.; Neon Lights, Ltd.; "Sel-Ezi" Wireless Supply Co., Ltd.; Vacuum Light & Power Ltd.; Vacuum Power Ltd.

Liquidations

Contraflo Engineering Co., Ltd.—Meeting October 29th, at the offices of G. & J. Weir, Ltd., Holm Foundry, Cathcart, Glasgow, S.4, to receive an account of the winding-up by the liquidator, Mr. J. Davidson.

Bankruptcies

A. J. Barlow, 9, Brunswick Place, City Road, London, electrical and general engineer (trading as Barlow Brothers).—Application for discharge to be heard on October 17th at Bankruptcy Buildings, Carey Street, London, W.C.2.

J. Eisner, J. Sunshine, B. Rome and T. Otaki, trading in partnership under the style of the Lloyd Electric Lamp Co., 8, Rangoon Street, London, E.C.3, and lately of 4, Lloyd's Avenue, London, E.C., wholesale electrical accessories dealers. (Separate application of J. Eisner).—Application for discharge to be heard on October 15th at Bankruptcy Buildings, Carey Street, London, W.C.2.

W. S. Poole, electrician, residing and carrying on business at High Street, Queensbury, near Halifax.—First and final dividend of 20s. in the £, and 4 per cent statutory interest, payable October 16th at 71, Manningham Lane, Bradford.

S. Hancock, electrical engineer, carrying on business as S. Hancock & Co., at Clyde Street, Holt Town, Manchester.—Application for discharge to be heard on October 28th at The Court House, Quay Street, Manchester.

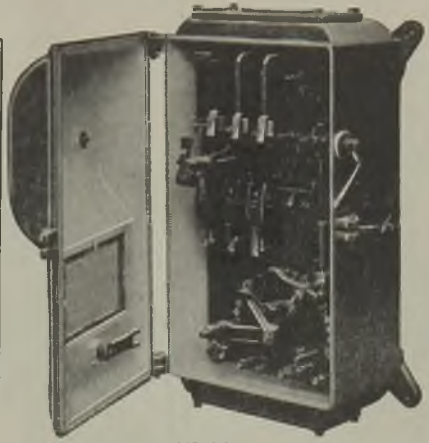
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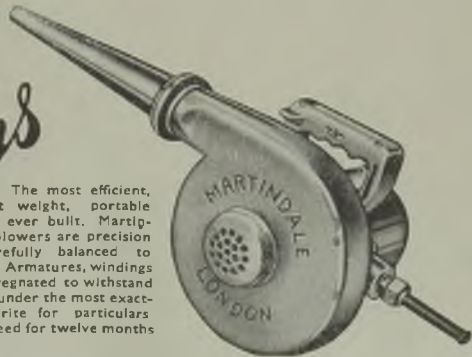
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STOCKS AND SHARES

GILT-EDGED securities have maintained a firm front during the past week, but in the industrial and more speculative markets many prices lost further ground before the appearance of effective resistance to the drift which began a month ago. The moral effect of Wall Street's relapse is still an influence. Markets reflect also some pre-occupation with the possibility of a coal shortage serious enough to hamper production over a wide field.

Signs of returning confidence are encouraged by the underlying support of the cheap money policy, which keeps gilt-edged stocks firmly maintained on a $2\frac{1}{2}$ per cent yield basis, and by a succession of good reports and dividends.

Conspicuous in the dull conditions prevailing in most sections of the industrial markets has been the firmness of electricity supply companies' shares and those in other industries earmarked for nationalization. Railway stocks are inclined upwards, and coal shares hold their ground firmly. Various considerations lend their support to prices. Yields are relatively generous. On electricity supply shares the average is about $4\frac{1}{2}$ per cent. Dividends are considered likely to be at least maintained while the companies remain in private hands, and may even be improved.

Market Valuation

At current share prices the assets of many of the companies on the nationalization list are capitalized in the market at figures which look moderate in relation to the terms which could be expected under reasonably just compensation schemes. Further, with the span of private ownership perhaps limited, according to official intentions, to the life of the present Parliament, shareholders are less concerned with the long-term considerations which exercise minds in other sections of the industrial markets. After another difficult week there is scarcely a change worthy of mention in the price list of electricity supply shares. Cable and Wireless stocks are steady, while in the Home Railway market Southern preferred, at $71\frac{1}{2}$, and the 5 per cent preference, at $110\frac{1}{2}$, are each a point to the good.

Equipment and Manufacturing

Despite a late rally, the week's losses in electrical equipment quotations have again been numerous and of some substance. Among the market leaders, General Electrics have dropped 1s. 9d. to 94s. 6d. English Electrics at 59s. 6d. and Crompton Parkinsons at 29s. 6d. have lost 1s. each, but Associated Electricals are steady at 66s. 6d. Enfield Cables shed 2s. to 54s. 6d. and Johnson & Phillips 1s. to 79s. E.M.I. shares eased further to 28s. 6d. in advance of the dividend due this month. Radio & Television are lower at 9s. and A.C. Cossors have eased to 31s. 6d. Vactrics are no better than 13s. after falling another 3s. 3d. British Vacuum Cleaner are down to 25s. 3d. and Crabtree Electrical

to 46s. 3d. Other weak features are Reyrolles at 75s. and Revo at 52s. Dividend news contrasts cheerfully with the state of markets. British Electric Transformer, controlled by Crompton Parkinson, have raised their interim dividend from 10 to 40 per cent. J. & F. Stone, the lighting and radio retailers, are paying a total of 40 per cent for the year, against 15 per cent for the previous period.

Shares on Offer

In the electrical equipment market a line of Telephone Manufacturing 5s. ordinary shares is on offer at 13s. 6d. On the dividends of 9 per cent paid consistently for many years the yield works out at £3 6s. 8d. per cent. E.P.T. relief should be of substantial benefit to the company; last year this tax took more than half of the trading profit of £411,000. A return of £4 17s. 3d. per cent is offered on Newman Industries 2s. ordinary shares, which are in the market at 9s. 3d. Distributions of $22\frac{1}{2}$ per cent have been made for the last two years, following a long succession of 20 per cent payments. An increase of capital is intended. Peto Scott Electrical Instruments 2s. ordinary shares are offered at 11s. to yield £4 11s. per cent on the 25 per cent dividend paid in each of the last two years. Lancashire Dynamo £1 shares can be bought at 112s. 6d. to provide a round 4 per cent on the money.

Radio Dividends

Decca Records' financial year ended in March. The interim dividend was maintained at $33\frac{1}{2}$ per cent; the final is due. Last year's total distribution came to $112\frac{1}{2}$ per cent. Apart from dividend anticipations, dealings in the 1s. shares have lately been enlivened by reports of an American subsidiary to be formed for the operation of the Decca Navigator system in that country. On this news the price of the shares advanced by as much as 6s. 3d. to 60s. in the course of a day, but most of the improvement was subsequently lost. At 55s. the yield on last year's distribution is only 2 per cent.

Preference Shares

The shortage of good debenture and preference investments has become accentuated by the uncertainties. In the electrical equipment market, British Insulated Callenders $5\frac{1}{2}$ per cent preference shares are on offer at 30s., to yield £3 13s. 3d. per cent, and the senior 6 per cent issue at 33s. 3d. to yield 1s. per cent less. A small line of Henley's $4\frac{1}{2}$ per cent preference is available at 26s., the yield being just under $3\frac{1}{2}$ per cent. English Electric $3\frac{3}{4}$ per cent preference at 23s. and General Electric $4\frac{1}{4}$ per cent preference at 25s. 3d. can be bought to pay about $3\frac{1}{4}$ per cent on the money, and demonstrate the persistent popularity of the lower-priced shares. Among electricity supply shares, Yorkshire Electric and North Metropolitan 6 per cent preference give a yield of $4\frac{1}{4}$ per cent at the offered price of 28s. 6d.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

K. BAUMANN and Metropolitan-Vickers Electrical Co., Ltd.—“Turbines, turbine type compressors and like rotating machines.” 5954. May 7th, 1941. (580805.)

Belling & Lee, Ltd., and C. W. Heath.—“Electric cartridge-type fuses or resistances.” 21770. November 6th, 1944. (580759.)

Bendix Aviation Corporation.—“Electrical means for reproducing motion.” 144/44. August 25th, 1942. (580850.)

K. E. Beswick.—“Cartridge fuses.” 7768. March 27th, 1945. (580719.)

British Insulated Cables, Ltd., G. W. Robb, J. Holland and C. Fletcher.—“Electric current collectors.” 21720. November 6th, 1944. (580717.)

British Thomson-Houston Co., Ltd.—“Radio frequency transformers.” 13904/44. July 21st, 1943. (580782.) “Fusion welding.” 17014/44. September 13th, 1943. (580794.) “Electric discharge lamps.” 19849/45. March 26th, 1942. (Divided out of 580406.) (580839.)

British Thomson-Houston Co., Ltd. (General Electric Co.).—“Gaseous discharge devices.” 5387. March 22nd, 1944. (580765.)

British Thomson-Houston Co., Ltd., and D. S. Morfe.—“Cam mechanisms.” 9137. May 12th, 1944. (580770.)

British Thomson-Houston Co., Ltd., and J. E. Stanworth.—“Soft glass compositions.” 6856. March 19th, 1945. (580873.)

L. F. Broadway.—“Cathode-ray tubes and circuit arrangements embodying such tubes.” 4448. March 9th, 1944. (580860.)

H. B. Brown, C. M. Sayer and Metropolitan-Vickers Electrical Co., Ltd.—“Braking equipment for rotatable members.” 4529. March 10th, 1944. (580861.)

Cambridge Instrument Co., Ltd., and M. C. Marsh.—“Instrument suspension systems.” 9471. July 25th, 1941. (580680.)

J. Collard.—“High frequency impedance transformers.” Cognate applications 16164/43 and 21250/43. October 1st, 1943. (580810.)

H. Davies.—“Sound recording.” 12524. June 30th, 1944. (580697.) “Sound recording and reproducing apparatus.” 12525. June 30th, 1944. (580698.)

C. T. Drummond, Ltd., C. T. Drummond and A. L. Orchard.—“Washing and cleaning machines.” 21382. December 21st, 1943. (580749.)

Dunlop Rubber Co., Ltd., and H. W. Trevaskis.—“Electric connection device of the plug and socket type.” 6224. April 4th, 1944. (580821.)

B. J. Edwards and Pye, Ltd.—“Radio-locating apparatus.” 13133. August 13th, 1943. (580687.)

Electric Panels, Ltd., W. N. Mann and O. W. Minshall.—“Electric heating systems for buildings.” 13858. July 19th, 1944. (580709.)

English Electric Co., Ltd., G. Chadwick and

J. E. Salthouse.—“Systems for supplying electric current impulses suitable for welding.” 1028. January 19th, 1944. (580854.)

A. F. Fekete.—“Electrical accessories.” 3605. February 26th, 1944. (580693.)

G. S. P. Freeman.—“Electron discharge and like devices including members disposed within closed housings.” 13625. August 30th, 1940. (580803.)

General Electric Co., Ltd., and L. C. Jesty.—“Arrangements comprising cathode-ray tubes.” 12968. September 14th, 1942. (580730.)

General Electric Co., Ltd., D. E. Jones, C. E. Ransley, J. W. Ryde and S. V. Williams.—“Crystal contacts of which one element is silicon.” 3375/43. May 6th, 1942. (Divided out of 6118/42.) (Addition to 577181.) (580683.)

J. S. Gerber and W. D. Redfern.—“Apparatus for electrically stirring or circulating electrically-conducting molten or liquid materials.” 1666/7. January 28th, 1944. (580852/3.)

A. A. Griffith.—“Compressor, turbine and like blades.” 6533. May 21st, 1941. (580806.)

M. E. Haine and Metropolitan-Vickers Electrical Co., Ltd.—“Means for the generation of recurrent square waveform voltages of short duration.” 432. January 8th, 1943. (580844.)

W. T. Henley's Telegraph Works Co., Ltd., H. A. Tunstall and W. F. O. Pollett.—“Manufacture and use of plastic compositions.” 1538. February 5th, 1942. (580729.)

O. E. H. Klemperer.—“Electron discharge devices having means for generating an electron beam of elongated cross-section.” 2927. February 16th, 1944. (580762.)

Landis & Gyr. Soc. Anon.—“Electromagnetically operated electric switch.” 13721/44. September 28th, 1943. (580703.)

J. Lucas, Ltd., C. H. Allen and H. E. Lardge.—“Electrical welding machines.” 6952. March 20th, 1945. (580835.)

Marconi's Wireless Telegraph Co., Ltd.—“Radio antennae.” 1587/44. January 27th, 1943. (580750.) “Piezo-electric crystal discriminator circuits.” 2854/44. February 16th, 1943. (580815.)

Marconi's Wireless Telegraph Co., Ltd., and G. L. Grisdale.—“Electric oscillation generators.” 8706. May 8th, 1944. (580824.)

M-O Valve Co., Ltd., and C. E. Ransley.—“Manufacture of wire consisting mainly of nickel.” 16501. October 8th, 1943. (580744.)

H. N. Negretti, P. E. Negretti and H. S. Gregory.—“Measuring device applying radio-meter action.” 14006. July 21st, 1944. (580784.)

T. Nelson.—“Stud welding machine.” 13709. July 18th, 1944. (580702.)

D. A. Oliver and W. Jessop & Sons, Ltd.—“Permanent magnets for the control of electric oscillating systems.” 17059/40. December 24th, 1941. (580840.)

W. Sharp.—“Snap-action electric switches.” 13687. July 18th, 1944. (580701.)

Siemens Bros. & Co., Ltd., and D. P. Long.—“Automatic telephone systems.” 19077. October 5th, 1944. (580828.)

D. M. Smith and Metropolitan-Vickers

Electrical Co., Ltd.—“Gas compressors.” 5955. May 7th, 1941. (580841.)

Standard Telephones & Cables, Ltd.—“Fluorescent screens for cathode-ray tubes.” 2136/44. February 10th, 1943. (580856.)

Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—“Electric wave generators.” 10684. June 2nd, 1944. (580773.)

Standard Telephones & Cables, Ltd., and W. A. Beatty.—“Generation of short electric pulses.” 3621. February 27th, 1940. (580801.)

Standard Telephones & Cables, Ltd. (trading as Stanelco Products), and J. Handley.—“Electric soldering apparatus.” 14303. July 26th, 1944. (580790.)

Standard Telephones & Cables, Ltd., and C. T. Scully.—“Signal transmission system employing phase or frequency modulation.” 6589. April 23rd, 1943. (580738.)

Standard Telephones & Cables, Ltd., and J. D. Weston.—“Radio altimeters.” 5207. March 20th, 1944. (580752.)

Standard Telephones & Cables, Ltd., and E. O. Willoughby.—“Arrangements for coupling wide frequency band antennae to trans-

mission lines.” 20396. December 6th, 1943. (580812.)

Standard Telephones & Cables, Ltd., P. K. Chatterjea and L. W. Houghton.—“Secrecy communication systems.” 16378. December 18th, 1941. (580843.)

Standard Telephones & Cables, Ltd., P. K. Chatterjea and C. T. Scully.—“Pulse signalling systems.” 8300. May 2nd, 1944. (580769.)

Standard Telephones & Cables, Ltd., J. R. Hunt and F. Abbott.—“Sealing electric conductors through a glass envelope and to electric conductors for such purpose.” 19173. November 17th, 1943. (580776.)

L. Tronstad.—“Method for the electrolytic preparation or concentration of heavy water.” 14350. July 27th, 1944. (580791.)

G. Turnock, Ltd., E. D. Jackson and W. E. Taylor.—“Electrical plug connectors having cable grips.” 11187. June 12th, 1944. (580775.)

Western Electric Co., Inc.—“Sound recording systems.” 9348/44. May 21st, 1943. (580695.)

S. J. Wimsett and Record Electrical Co., Ltd.—“Electrical earth leakage devices for electrical apparatus.” 14178. July 25th, 1944. (580787.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

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

Australia.—VICTORIA.—State Electricity Commission. November 20th. Six water-tube boilers for Yallourn, Spec. 46-47/11.

December 4th. Conductors for 264-kV transmission lines, Spec. 46-47/35.

January 22nd. Two 50,000-kW steam turbo-generators, with condensing, feed-water heating and evaporating plant, Spec. 46-47/11.

Batley.—October 31st. Corporation. L.v. armoured cables. (See this issue.)

London.—Metropolitan Water Board. Diesel driven alternator plant. (October 4th.)

New Zealand.—November 29th. Trolley-bus chassis, and/or bodies; town clerk, Dunedin.

Plymouth.—November 2nd. Electricity Department. Meters, time switches, underground joint boxes, underground disconnecting boxes and two 6-kV outdoor transformers. (See this issue.)

Pudsey.—October 15th. Electricity Department. Paper-insulated cables. (September 27th.)

Southend-on-Sea.—November 11th. Electricity Department. 11-kV metalclad switchgear, and e.h.v. and l.v. cable. (See this issue.)

Southport.—October 14th. Electricity Department. Eighty cast-iron short street lighting standards. (September 27th.)

October 26th. Corporation. Electric lighting installation, Floral Hall. (September 27th.)

Stalybridge.—October 14th. Town Council. Electric lighting equipment in Victoria Market Hall. Borough surveyor. Town Hall (deposit: 10s. 6d., returnable).

Orders Placed

Australia.—QUEENSLAND.—Generating plant for regional power boards. Wide Bay: Two turbo-alternators.—General Electric Co., England. Capricornia and Townsville: Six boilers for each.—Babcock & Wilcox. Three turbo-alternators for each.—Metropolitan-Vickers.

NEW SOUTH WALES.—N.S.W. Railways. 33-kV switchgear, Spec. 1,135 (£82,748).—British General Electric Co. Pty. 33-kV outdoor circuit breakers, tank lowering devices and spares, Spec. 1,142 (£15,235).—English Electric Co.—Tenders (Melbourne.)

Blackpool.—Housing Committee. Accepted. Electrical installations in 32 houses and 32 flats, Grange Park estate.—R. Darbyshire & Co.

Bolton.—Health Committee. Accepted. Fourteen electrically heated food conveyors.—Hotlock Products.

Bradford.—Electricity Committee. Accepted. Meters.—1,500 25-A.—Sangamo Weston; 500 5-A.—Measurement. Switchgear for Four Lane Ends substation.—A. Reyrolle & Co.

Housing Committee. Accepted. Electrical installations in 268 houses, Thornton and Eccleshill estates.—J. Carter & Sons (Bradford).

Cardiff.—Transport Committee. Accepted for trolley-bus substations. Transformers and rectifiers (£9,989).—G.E.C. Rectifier and feeder panels (£8,182).—Hewittic Electric Co.

Worthing.—Water Committee. Accepted. Electric pumping plant at Broadwater pumping station (£5,999).—Sulzer Bros.

Electricity Committee. Accepted. Two 500-kVA transformers (£900 each).—G.E.C. Switchgear.—English Electric Co. (£401) and Crompton Parkinson (£1,482).

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Angus.—Houses (26), at Friockheim; master of works, County Buildings, Forfar.

Beaconsfield.—Cottages (80), on Candlemas Mead site; Burgess, Holden & Watson, architects, Penn Road.

Bolton.—Houses (29), Lever Edge Lane (£24,481); W. Gaskell & Son, builders, 6, High Street.

Bridport.—Block of 36 flats and ancillary buildings, West Allington; Lambert & Oliver, architects, 21, West Street.

Brixton.—Flats (178), Tulse Hill estate (£178,960); W. J. Simms, Sons, & Cooke, Ltd.

Cardiff.—Houses (206), Tonyrpywen estate (£234,840); Walker Building Co. (Cardiff), Ltd. Houses (100), for key workers, Caerau Park and Rumney; city architect.

Cheltenham.—Houses (30) for R.D.C.; Rainger & Rogers, architects, 29, Rodney Road.

Clacton.—Houses (88), Bull Hill housing estate; W. Aiston, engineer and surveyor to the Council, Town Hall.

Consett (Co. Durham).—Houses (94) for U.D.C.; J. F. Eltringham, Derwent Street, Blackhill, Co. Durham.

Coventry.—Temporary Council offices, Earl Street (£11,400); city engineer.

Deptford.—Houses (21), Millmark Grove; Aney Bros.

Doncaster.—New factory; Kalee, Ltd., 60/66, Wardour Street, London, W.1.

Durham.—Houses (50), Sunderland Road estate; city engineer.

Edinburgh.—Factory for Toffolo, Jackson & Co., Ltd., tile and marble works, Glasgow; manager.

Exeter.—Temporary shops (54) on blitzed sites (£33,000); borough engineer.

Felton (Northumberland).—Houses (40) for Alnwick R.D.C.; G. Reavell, Lloyd's Bank Chambers, Alnwick.

Gateshead.—Factory for H. Leverton & Co., Ltd.; North-Eastern Trading Estates, Ltd., Low Fell.

Hammersmith.—Flats (56), Riverside Gardens (£85,593); borough engineer.

Hereford.—Houses (68), Whitecross; city architect.

Hetton-le-Hole (Co. Durham).—Houses (74), Prospect Avenue site; A. H. Fennell & Co., Bridge End Chambers, Chester-le-Street.

Hull.—Reconstruction of City Hall; city architect.

Lambeth.—Houses (72), and flats (48), Portobello estate (£153,182); W. H. Gaze & Sons, Ltd., builders, Kingston-on-Thames.

Leeds.—New factory; Hepton & Co. (Clothiers), Ltd., Sovereign Street, Swinegate.

Llanfyllin.—Permanent houses (32) for the Borough Council; W. B. Bond, quantity surveyor, 3, Newhall Street; Birmingham, 3.

Liverpool.—New factory, Kirby trading estate; Blakemore & Webster, Ltd.

Long Eaton.—Houses (140), Welbeck Road; H. Raven, engineer, Town Hall.

Manchester.—Extensions, high school for boys, primary school, Crossacres, and junior art school; city architect.

Meriden.—Houses (20), Marston Green, for R.D.C. (£25,184); R. J. Whitehead, builder, Nether Whitacre, Warwickshire.

Middlesbrough.—Aluminium houses (144); A. Robinson, Linthorpe Road.

Newcastle-on-Tyne.—Factory, Northern Furnishing Co., 215-229, Scotswood Road; C. Solomon, 3, St. Mary's Place.

Houses (350), on the Blackett-Ord estate; city engineer.

Rebuilding of Cremona Confectionery Works, Benton Road; T. E. Ridley, 7, Moor Crescent, Gosforth.

Norbury.—Houses (22), Norwood Station estate; B. G. Utting & Co., Ltd., 10, Gracefield Gardens, S.W.16.

Northfleet.—Houses (90), New House Farm estate (£109,982); R. Hopkins & Sons, builders, Central Station Approach, Gravesend.

Salford.—Extensions, X-ray department, Hope Hospital (£6,050); city engineer.

Selkirk.—Houses (120) for Town Council; town clerk.

Skipton.—Houses (30), Horse Close estate; W. & J. Glossop, Ltd., builders, Hipperholme, Halifax.

South Shields.—Six new schools and five branch clinics for Education Committee (£500,000); T. A. Page, Son & Hill, 75, King Street.

Spennorth.—Houses (200), Windy Bank estate (£222,446); Yorkshire Builders, Ltd., Leeds Road, Otley.

Thornton Heath.—Factory, London Road; C. W. Goddard, 456, Brighton Road, South Croydon.

Wakefield.—Cinema, Batley Road; Parkrow Cinemas, Ltd.

Wallsend.—Houses (36), on the Sunholm estate; W. Leech, builder, 2, Clayton Street, Newcastle-on-Tyne.

Factory extension for Victor Products, Ltd.; R. T. James & Partners, civil engineers, St. Nicholas Buildings, Newcastle-on-Tyne.

Whaley Bridge.—Houses (24), Elnor Lane for U.D.C.; H. J. Fletcher, builder, High Street, Disley, Cheshire.

Woodford.—Flats (42), in seven blocks, Eastern Avenue, Wanstead; Tooley & Foster, Midland Bank Chambers, Buckhurst Hill, Essex.

Woolwich.—Flats (289), Barnfield Gardens (£303,303); Spiers, Ltd., Westminster. Dwellings (72), Woodlands estate (£75,270); borough engineer.

Worsop.—Houses (70), Pelham Street and Shrewsbury Road, Manton; borough engineer, Park House.

Worsborough (Yorks).—Houses (78), Elm House estate (£93,990); Rawson Porter and Sons, builders, Vernon Road, Worsborough Bridge.

*Stands up to
Polluted
Atmosphere
and Fog*

TO overcome these insidious enemies of High Tension System operation calls for long and intimate experience of the problems involved. It entails intensive tests and trials carried out in laboratories equipped with the most modern plant and facilities.

This insulator incorporates the very latest developments in design for combating foul air and fog — and like all Bullers products, stands up to its job.

Whatever your insulating problems, bring them to Bullers.

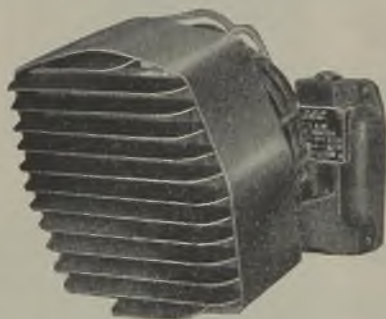
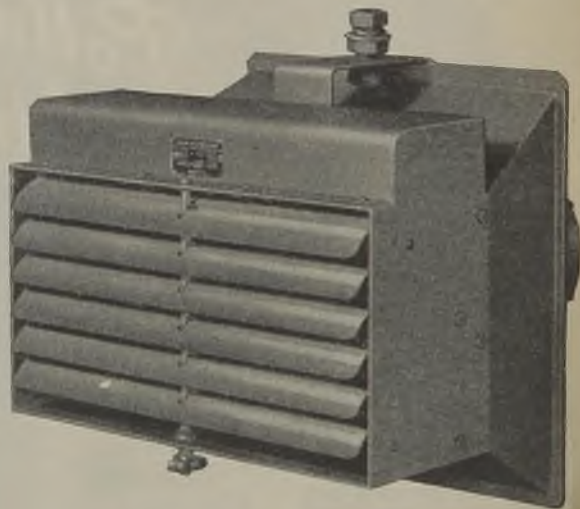
Bullers

BULLERS LTD., 6, Laurence Pountney Hill, London, E.C.4. Phone: Mansion House 9971 (3 lines)
 Telegrams: "Bullers, Cannon, London"

G.E.C.

ELECTRIC UNIT HEATERS

A
wartime
development
which has
come to
stay



The 2½ kW UNIT

just as simple to install, easily adjustable for direction of warm air flow. Runs almost noiselessly. Size approx. 9" × 11¼". Finished metallic bronze cellulose.

5 to 20 kW IN THIS TYPE

Numerous works and factories have been comfortably, conveniently and economically heated with these units.

They need no floor space, no boiler house, no fuel, no labour.

In relation to heat output they are of the smallest size and use the least metal.

Lowest capital cost.

Low operating costs.

Each unit can be worked independently with or without thermostatic control.

CLASSIFIED ADVERTISEMENTS

ADVERTISEMENTS for insertion in the following Friday's issue are accepted up to **First Post on Monday**, at Dorset House, Stamford Street, London, S.E.1.

THE CHARGE for advertisements in this section is 2/- per line (approx. 7 words) per insertion; **ONLY OFFICIAL AND GOVERNMENT ANNOUNCEMENTS CAN NOW BE DISPLAYED**—30/- per inch. Where the advertisement includes a Box Number this counts as six words and there is an additional charge of 6d. for postage of replies.

SITUATIONS WANTED.—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

Original testimonials should not be sent with applications for employment.

OFFICIAL NOTICES, TENDERS, ETC.

COUNTY COUNCIL OF MIDDLESEX

Building and Engineering Works

A PPLICATIONS are invited from contractors for the inclusion of their names in the County Council's approved list of contractors for building and engineering works, e.g., building, redecorations and repairs, structural steel, roads, bridges, sewers, land works, tarpaving and tarmac, electric lighting and power installations, X-ray apparatus, refrigerators, electric lifts, cooking equipment, laundry equipment, sterilizing and disinfectant plants, swimming pool filtration and treatment plant, water softeners, boiler house, pumping and calorifier equipment, heating and domestic hot water installations and gas services, library and laboratory joinery, etc.

No application will be granted unless the Council is satisfied as to the capacity and standing of the applicant and as to the conditions under which labour is employed by the applicant. Otherwise, the granting of applications will be at the complete discretion of the Council and the reasons for the refusal of any application will not be given.

The inclusion of any name in the list will not impose any obligation upon the Council to invite tenders from the contractor or to accept any tender of his which may subsequently be submitted, and the Council will be entitled, at any time, to remove the contractor's name from the list without indicating to him its reasons.

Applications must be made on the appropriate form, which may be obtained by sending a stamped addressed envelope to the undersigned (reference C/GP/G). Completed applications should be returned as soon as possible before the 4th November, 1946.

C. W. RADCLIFFE,

Clerk of the County Council.

Guildhall,
Westminster, S.W.1.
1st October, 1946.

2942

BOROUGH OF BATLEY

THE Batley Corporation invite tenders for the supply and delivery of Low Tension Paper Insulated Lead Sheathed Steel Tape Armoured Cables of various sizes. Specification and form of tender may be obtained from the Borough Electrical Engineer, Electricity Works, George Street, Batley.

Tenders should be sent to the undersigned in plain sealed envelopes, bearing no mark to indicate the sender, endorsed "Tender for L.T. Cables," and are to be delivered not later than noon on Thursday, October 31st, 1946. The Corporation does not bind itself to accept the lowest or any tender.

L. O. BOTTOMLEY,

Town Clerk. 2918

Town Hall, Batley.
10th October, 1946.

CITY OF PLYMOUTH ELECTRICITY DEPT.

THE Plymouth Corporation invite tenders for the supply of (a) Meters; (b) Time Switches; (c) Underground Joint Boxes; (d) Underground Disconnecting Boxes; (e) Two 5 MVA, 33.6, 6-kV Outdoor Transformers.

Applications for specifications and forms of tender should be addressed to the City Electrical Engineer, Armada Street, Plymouth. Completed tenders must reach the undersigned not later than noon on 2nd November, 1946.

COLIN CAMPBELL, Town Clerk. 2987

October, 1946.

REPLIES TO advertisements published under a Box Number if not to be delivered to any particular firm or individual should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Letters of applicants in such cases cannot be returned to them. The name of an advertiser using a Box Number will not be disclosed. All replies to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1. Cheques and Postal Orders should be made payable to ELECTRICAL REVIEW LTD. and crossed.

COUNTY BOROUGH OF SOUTHEND-ON-SEA ELECTRICITY DEPARTMENT

TENDERS are invited for the supply and delivery of the following: (a) 11,000-volt, 150 MVA Metalclad Switchgear; (b) E.H.T. Cable (11 kV); (c) L.T. Cable.

Specifications, conditions and forms of tender may be obtained from the Borough Electrical Engineer, Electric House, London Road, Southend-on-Sea.

Tenders must be submitted on the forms provided, enclosed in plain envelopes (which shall not bear any name or mark indicating the sender), sealed and endorsed as follows: (a) "Tenders for Switchgear"; (b) "Tenders for E.H.T. Cable"; (c) "Tenders for L.T. Cable."

Tenders must be delivered to the Town Clerk, Municipal Buildings, Southend-on-Sea, not later than the first post on Monday, November 11th, 1946. Tenders which do not comply with these instructions will not be considered. The Corporation does not bind itself to accept the lowest or any tender.

R. C. GOLDING,

Borough Electrical Engineer.

Electric House,
London Road, Southend-on-Sea.
5th October, 1946.

2860

SITUATIONS VACANT

BOROUGH OF EALING ELECTRICITY SUPPLY DEPARTMENT

Appointment of Assistant Consumers' Engineer

A PPLICATIONS are invited for the above appointment from persons who have had a sound theoretical and practical training in electrical engineering. Candidates must possess a knowledge of tariffs, wiring installations and electrical apparatus, including application to hot water systems. Preference will be given to candidates with recognised technical qualifications.

Salary and conditions of service will be in accordance with the agreement relating to Salary and Conditions of Employment of the National Joint Board, Class F, Grade 8, at present £464 2s. per annum.

The successful candidate will be required to pass a medical examination, and the appointment will be subject to the Local Government Superannuation Act, 1937. Canvassing will be a disqualification and applicants should disclose whether to their knowledge they are related to any members or chief officers of the Local Authority.

Applications, endorsed "Assistant Consumers' Engineer," giving age, technical training, qualifications, etc., together with copies of three recent testimonials, should be addressed to the undersigned so as to be received not later than first post, Monday, October 21st, 1946.

RONALD BIRT,

Borough Electrical Engineer
and Manager. 2917

Electricity House,
Ealing, W.5.

METROPOLITAN BOROUGH OF STOKE NEWINGTON ELECTRICITY DEPARTMENT

A PPLICATIONS are invited from qualified persons for the post of Meter Repairer at J.I.C. rate of pay, at present 45 18s. 8d. per week of 47 hours. Applicants must be familiar with A.C. and D.C. meters, both of quarterly and prepayment types, and should have had experience in reconditioning meters removed from circuit.

Applications in candidates' own writing (no special form), giving particulars of training and experience, should be addressed to the Borough Electrical Engineer, Electricity Offices, Edward's Lane, N.16. 2912

BOROUGH OF LEYTON ELECTRICITY DEPT.

A PPLICATIONS are invited for the appointment of a Distribution Draughtsman at a salary in accordance with the National Joint Board Schedule, Grade 9, Class F, plus 5% London Area (at present £375 18s. rising to £391 13s. p.a.), and applicants should have a sound experience in the design and erection of substation buildings, the layout of distribution networks, and the keeping of records connected therewith. It should be noted that at the present rate of growth of load the undertaking is likely to transfer to Class G in the near future.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to satisfy the Council's Medical Officer of Health as to his medical fitness. Applicants must not be more than 40 years of age at date of appointment, and it will be a condition of appointment that the successful candidate must be a member of a trade union.

Applications in the candidate's own handwriting, stating age, qualifications, experience, particulars as to membership of a trade union, and when able to take up duties, accompanied by copies of not more than three recent testimonials, to be sent to the Borough Electrical Engineer and Manager, Electricity Offices, Cathall Road, Leytonstone, E.11, not later than first post on Saturday, 26th October, 1946. Canvassing in any form will be a disqualification.

D. J. OSBORNE,

Town Hall, Leyton, E.10. Town Clerk. 2945

BOROUGH OF LEIGH ELECTRICITY DEPT.

Appointment of Junior Mains Assistant

A PPLICATIONS are invited for the appointment of Junior Mains Assistant in the above Department. The salary will be in accordance with the N.J.B. Schedule, Grade 9a, Class E, at present £317 per annum, rising to £324 per annum in four years.

Applicants must, as a minimum of qualifications, possess the Higher National Certificate in Electrical Engineering, be a Graduate of the Institution of Electrical Engineers, practical experience in the installation and maintenance of E.H.T. and L.T. switchgear and an underground distribution system, together with mains records.

The appointment, which will be subject to the provisions of the Local Government Superannuation Act, 1937, and the selected candidate passing satisfactorily a medical examination, to be conducted by the Council's Medical Officer of Health, will be determinable by one month's notice on either side.

Applications, endorsed "Junior Mains Assistant," stating age and containing particulars of education, qualifications and experience, accompanied by copies of not more than three recent testimonials, must be delivered to T. S. Parkinson, Esq., A.M.I.E.E., Borough Electrical Engineer and Manager, Electricity Offices, Charles Street, Leigh (Lancs.), not later than October 28th, 1946.

ALBERT JONES, Town Clerk.

Town Hall, Leigh. 2925

BOROUGH OF LEYTON ELECTRICITY DEPT.

A PPLICATIONS are invited for the appointment of a Chief Demonstrator (Female) from persons who have had a good general education, hold a Diploma in Cooking and/or Electrical Housecraft, and have a thorough knowledge of electrical domestic apparatus.

In the absence of a recognised scale for this class of appointment, the salary will be £350 p.a., plus cost-of-living bonus, at present £48 5s. p.a.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to satisfy the Council's Medical Officer of Health as to her medical fitness. Applicants must not be more than 40 years of age at date of appointment, and it will be a condition of appointment that the successful candidate must be a member of a trade union.

Applications in the candidate's own handwriting, stating age, qualifications, experience, particulars as to membership of a trade union, and when able to take up duties, accompanied by copies of not more than three recent testimonials, to be sent to the Borough Electrical Engineer and Manager, Electricity Offices, Cathall Road, Leytonstone, E.11, not later than first post, Saturday, 26th October, 1946. Canvassing in any form will be a disqualification.

D. J. OSBORNE,

Town Hall, Leyton, E.10. Town Clerk. 2944

BOROUGH OF LEYTON ELECTRICITY DEPT.

A PPLICATIONS are invited for the appointment of a Substation Attendant at a salary in accordance with the National Joint Board Schedule, Grade 9, Class F, plus 5% London Area (at present £375 18s. p.a. rising to £391 13s. p.a.).

Candidates should have had suitable technical training and experience in the control of high and low tension switchboards in a main substation receiving a bulk supply. Experience with rotary plant and glass bulb rectifiers will be an added advantage.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to satisfy the Council's Medical Officer of Health as to his medical fitness. Applicants must not be more than 40 years of age at date of appointment, and it will be a condition of appointment that the successful candidate must be a member of a trade union.

Applications in the candidate's own handwriting, stating age, qualifications, experience, particulars as to membership of a trade union, and when able to take up duties, accompanied by copies of not more than three recent testimonials, to be sent to the Borough Electrical Engineer and Manager, Electricity Offices, Cathall Road, Leytonstone, E.11, not later than first post on Saturday, 26th October, 1946. Canvassing in any form will be a disqualification.

D. J. OSBORNE,

Town Hall, Leyton, E.10. Town Clerk. 2943

CITY OF BATH

Appointment of Lady Demonstrator

A PPLICATIONS are invited from persons holding the E.A.W. Diploma or equivalent to instruct consumers in the use of cookers and other electrical appliances. The successful applicant will be required to lecture and to give practical demonstrations to small audiences at the showroom and to visit consumers at home demonstrations. She will be required to keep appropriate records and arrange showroom displays.

The salary offered is £240 per annum, plus war bonus at the rate of £48 2s. per annum. The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Applications, giving particulars of age, training and experience, together with copy testimonials, should be addressed to the City Electrical Engineer, The Old Bridge, Bath, so as to reach him on or before 21st October, 1946.

J. BASIL OGDEN, Town Clerk. 2867

BOROUGH OF FULHAM ELECTRICITY DEPT.

THE Council invites applications from candidates not over 40 years of age for the following positions:—
STRUCTURAL AND ENGINEERING DRAUGHTSMAN. Salary: Minimum £4 per week (age 21 years) to £10 per week, dependent upon age and qualifications, plus cost-of-living bonus.
MECHANICAL DRAUGHTSMAN. Ditto.
ARCHITECTURAL DRAUGHTSMAN. Ditto.

Form of application and general conditions of the appointments may be had on sending stamped addressed foolscap envelope to me. Completed applications must be posted to reach me not later than 12 noon on Monday, 28th October, 1946.

CYRIL F. THATCHER,

Town Hall, Fulham, S.W.6. Town Clerk. 2841
September, 1946.

HEBDEN ROYD URBAN DISTRICT COUNCIL

Substation Assistant

A PPLICATIONS are invited for the appointment of Substation Assistant. The salary and conditions of service will be in accordance with N.J.B. Scale, Class 4, Grade 8b, at present £300 per annum, with an expected increase in the near future when the undertaking becomes scheduled in Class B.

Applications, stating age, qualifications, particulars of training and experience, together with copies of not more than two recent testimonials, to be delivered to the undersigned not later than October 22nd, 1946.

R. ASHWORTH,

Council Offices, Hebdon Bridge, Clerk of the Council.
4th October, 1946. 2885

CROWN AGENTS FOR THE COLONIES

Colonial Government Appointments

APPPLICATIONS from qualified candidates are invited for the following post: Workshop Foreman (Electrical) required by the Nigerian Government Railway for one tour of 18 to 24 months, with prospect of permanency. Commencing salary according to age and war service in the scale £400 rising to £560 a year. On salary of £400 there is a local allowance of £60 a year, and for married men a separation allowance between £84 to £204 according to number of dependants. Outfit allowance £60. Free passage and quarters.

Candidates, not over 40 years of age must have served an apprenticeship as an electrician and had at least seven years' subsequent experience in a British railway or locomotive builder's workshop. They must be fully conversant with repairs to electric motors, driving machine tool equipment, overhead cranes and their control gear and wiring systems (both A.C. and D.C.), including armature winding. Experience of generating station rotary converters an advantage.

Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience, to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M/N/15136, on both letter and envelope. 2908

CITY OF MANCHESTER ELECTRICITY DEPT.

APPPLICATIONS are invited for the position of Resident Engineer at Barton Power Station, at a salary in accordance with Class K, Grade 3, of the N.J.B. Schedule (£839 p.a. rising by two biennial increments to £877 p.a.), together with the free tenancy of a house from December, 1947.

Applicants must have had a good engineering training, followed by experience in the operation and maintenance of plant in large Selected Stations. They should be under 45 years of age, possess administrative ability, and be Corporate Members of either the Institution of Electrical Engineers or the Institution of Mechanical Engineers.

The appointment will be subject to the City Council Superannuation Scheme, and the successful candidate will be required to pass a medical examination.

Applications, on a form to be obtained from Mr. R. A. S. Thwaites, Chief Engineer and Manager, together with copies of recent testimonials, should be endorsed "Resident Engineer," and addressed to the Chairman of the Electricity Committee, Town Hall, Manchester, 2, not later than 10 a.m. on Monday, 21st October, 1946. Canvassing, directly or indirectly, will disqualify.

Town Hall, Manchester, 2, 25th September, 1946. PHILIP B. DINGLE, Town Clerk. 2774

CITY OF BULAWAYO, SOUTHERN RHODESIA, ELECTRICITY DEPARTMENT

Generation Engineer

APPPLICATIONS are invited for the above appointment from Chartered Mechanical Engineers with power station experience at six hundred pounds pressure or more, to take charge of the Council's two power stations.

The salary will be £700 rising by increments of £25 to £850, plus cost of living allowance. A house will be provided at £8 monthly rent. Contract for not less than three years under usual service conditions.

Applications, by air mail, giving full details of experience, accompanied by an unmounted photograph, should be received by the undersigned not later than October 20th, 1946. The successful applicant's passage money will be refunded and salary paid from date of leaving England.

H. J. COOK, Town Clerk. 2831

WHITWORTH U.D.C. ELECTRICITY DEPARTMENT

ELECTRICAL Engineer required to take charge of and manage the Council's Undertaking. The Council purchases in bulk from Rochdale Corporation. The person appointed will be required to submit to a medical examination and if appointed to contribute to the Superannuation Scheme. The salary offered will be commensurate with the recommendations of the National Agreement. Candidates should be Corporate Members of the Institute of Electrical Engineers or possess equivalent technical qualifications. Applications, marked "Electrical Engineer," to be delivered to the undersigned by 19th October, 1946.

HARRY HOYLE, Clerk of the Council. 2792
Council Offices, Whitworth, nr. Rochdale.

MANCHESTER CORPORATION ELECTRICITY DEPT.

WANTED for duties in power station: **ONE COMBUSTION ENGINEER**, at a salary in accordance with Class J, Grade 9, of the N.J.B. Schedule, which is equivalent to £425, rising by two biennial increments to £445 per annum. Applicants must have had previous experience in power station operation and in efficient combustion of low grade fuel in water tube boilers fitted with mechanical stokers.

ONE CONTROL ROOM ASSISTANT ENGINEER, at a salary in accordance with Class J, Grade 10a, which is equivalent to £335, rising by two biennial increments to £350 per annum.

Candidates for both positions must have served a workshop apprenticeship and have the Higher National Certificate in Electrical Engineering, or equivalent. Applicants without these qualifications because of service in H.M. Forces will be considered.

The appointments are subject to the City Council Superannuation Scheme, and the successful candidates will be required to pass a medical examination.

Applications, giving full particulars of age, technical training and experience, together with copies of recent testimonials, should be endorsed "Combustion Engineer" or "Assistant Engineer, Control Room," and addressed to Mr. R. A. S. Thwaites, Chief Engineer and Manager, Electricity Department, Town Hall, Manchester, 2, not later than Monday, 25th October, 1946. Canvassing, directly or indirectly, will disqualify.

PHILIP B. DINGLE, Town Clerk. 2862
Town Hall, Manchester, 2, October, 1946.

PONTYPRIDD URBAN DISTRICT COUNCIL

Appointment of Electrical Engineer and Manager

APPPLICATIONS are invited from suitably qualified persons for the above appointment. The salary, in accordance with the agreement dated the 9th July, 1941, made between the National Joint Council for Local Authorities and Chief Electrical Engineers, based on the output, is at present £797 per annum. The amount of salary, however, for the first and second years (see Clause 10 of the agreement) to be determined according to the experience and qualifications of the successful applicant. A cost-of-living bonus, at present £59 16s. per annum, will be paid in addition.

Recent experience in the management of electricity supply undertakings is essential, and applicants must have a sound knowledge of both alternating current and direct current supplies. Experience in the operation of a small power station, especially one operated in conjunction with a refuse destructor, will be an advantage. The appointment will be subject to the Local Government Superannuation Act, 1937, and to a satisfactory medical examination.

Applications must be sent to the undersigned, together with three recent testimonials, so as to be received not later than Saturday, the 19th day of October, 1946, in envelopes endorsed "Electrical Engineer."

H. LEONARD PORCHER, Clerk of the Council. 2898
Municipal Buildings, Pontypridd, 30th September, 1946.

COUNTY BOROUGH OF BOLTON ELECTRICITY DEPARTMENT

Appointment of Mains Engineer

APPPLICATIONS are invited for the position of Mains Engineer from engineers who are Corporate Members of the Institution of Electrical Engineers and who have had considerable experience in the organisation of the distributing system of an electricity supply undertaking, and in the design and layout of three-phase, E.H.T. and L.T. networks, including transformer substations.

The salary and conditions will be in accordance with Grade 3, Class H, of the N.J.B. Schedule, at a commencing basic salary of £662 per annum. The appointment is subject to the provisions of the Local Government Superannuation Acts, and the successful candidate will be required to pass a medical examination.

Forms of application may be obtained from the Engineer and Manager, Back o' th' Bank Generating Station, Bolton, and when completed must be returned to him in envelopes endorsed "Mains Engineer" not later than 24th October, 1946. Relationship to any member of the Council or senior officer of the Corporation must be disclosed and canvassing will be a disqualification.

PHILIP S. RENNISON, Town Clerk. 2802
Town Hall, Bolton.

CROWN AGENTS FOR THE COLONIES

Colonial Government Appointments

A PPLICATIONS from qualified candidates are invited for the following post: Station Superintendent required for Sierra Leone Government Public Works Dept. for one tour of 18-24 months in first instance.

Salary £500 rising to £600 a year. On salary of £500 cost-of-living allowance for single men of £40 a year and for married men separation allowance of between £84 and £204, according to number of dependants. Free passages and quarters. Outfit allowance £60.

Candidates, not over 40 years of age, must have served a mechanical or electrical engineering apprenticeship and have a sound knowledge of the running and maintenance of Diesel engines in generating stations. Knowledge of methods of distribution of electricity also necessary and experience of steam turbines an advantage.

Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience, to the Crown Agents for the Colonies, 4, Milbank, London, S.W.1, quoting M/N/14576 on both letter and envelope. 2843

CITY OF BIRMINGHAM ELECTRIC SUPPLY DEPT.

Engineering Draughtsman

A PPLICATIONS are invited for the position of Engineering Draughtsman, age 26/30, in the Undertaking's Constructional Department from Corporate Members of the Institution of Mechanical Engineers, or others with equivalent qualifications, experienced in power station plant layout, including turbo-alternators, boilers, or H.P. steam and water pipework, etc.

The salary will be on the N.J.E. Schedule, according to experience, between Grade N.11 (£358 per annum) and Grade N.10a (£436 per annum).

The appointment will be subject to the Local Government Superannuation Act, 1937, and to the passing of a medical examination.

Applications, stating age and giving full particulars of training, qualifications and experience, to be delivered to the undersigned in an envelope endorsed "Draughtsman" not later than 24th October, 1946.

F. W. LAWTON, M.I.Mech.E., M.I.E.E.,

14, Dale End, Chief Engineer and Manager. 2861
Birmingham, 4.

METROPOLITAN BOROUGH OF FULHAM
ELECTRICITY DEPARTMENT

THE Council invites applications from candidates under 35 years of age for the following positions at the commencing salaries stated:—

ASSISTANT INSTRUMENT ENGINEER, with practical experience in the manufacture, servicing and calibrating of analytical, temperature and flow instruments for gas, water and steam. Class L, Grade 10b, of N.J.B. Schedule, £374 17s. per annum.

ASSISTANT CONTRACT ENGINEERS (two) for supervision of electrical installation work, capable of measuring up, etc., for estimating department data. Class G, Grade 9a, of N.J.B. Schedule, £360 3s. per annum.

Forms of application and general conditions of the appointments may be obtained on sending stamped addressed foolscap envelope to me. Completed applications must be despatched to reach me not later than 12 noon on Monday, 23rd October, 1946.

CYRIL F. THATCHER,

Town Hall, Town Clerk. 2842
Fulham, S.W.6.

METROPOLITAN BOROUGH OF BETHNAL GREEN
ELECTRICITY DEPARTMENT

Appointment of Electrical Fitter

THE Council invites applications for the appointment of an Electrical Fitter for maintenance and constructional work in static transformer substations; the rate of pay to be that prescribed by the Electricity Supply Industry (District Council No. 10), Greater London Area, at present 2s. 8d. per hour (£6 5s. 4d. per 47-hour week). The appointment will be temporary in the first instance, with a view to permanency if satisfactory.

Applications in writing must be made to the Borough Electrical Engineer and Manager at the Town Hall, Bethnal Green, E.2, and must reach him by 10 a.m. on Monday, 21st October, 1946. Canvassing will disqualify.

S. P. FERDINANDO, Town Clerk. 2866

COUNTY BOROUGH OF CROYDON
ELECTRICITY DEPARTMENTDeputy Chief Engineer and Manager
(Amended Advertisement)

A PPLICATIONS are invited for this appointment from men who are Corporate Members of the Institution of Electrical Engineers experienced in the management and administration of a large electricity undertaking.

Salary £1,350 per annum, plus bonus (at present £59 16s. per annum). Subject to his executing an agreement with the Corporation for certain work connected with the proposed new generating station, the person appointed will also receive a payment—not subject to superannuation—of approximately £400 per annum until December, 1949. Other payments may be made after that date as further sections of the new station are put in hand.

Terms and conditions of appointment may be obtained from the Chief Engineer and General Manager, Electric House, Wellesley Road, Croydon, and should be returned to him completed by Monday, 21st October, 1946. Previous applications need not be renewed. Canvassing will disqualify.

E. TABERNER, Town Clerk.

Town Hall, Croydon. 2870

BOROUGH OF BARKING ELECTRICITY DEPT.

A PPLICATIONS are invited for the position of Deputy Borough Electrical Engineer and Manager at a salary in accordance with Class F, Grade 1, of the National Joint Board Schedule of Salaries, commencing at £825 per annum, plus car allowance of £72 per annum.

Applicants must be Corporate Members of the Institution of Electrical Engineers, or equivalent standard, and have had a sound technical education, and technical, administrative and commercial experience of a progressive electricity undertaking. The appointment will be subject to the Local Government Superannuation Act, 1937, and a satisfactory medical report.

Applications must be submitted in the appropriate form, which may be obtained from the undersigned, and should be returned, together with three recent testimonials, by Monday, the 28th October, 1946. Canvassing, either directly or indirectly, will be deemed a disqualification.

E. R. FARR.

Town Hall, Barking, Essex. Town Clerk. 2849
26th September, 1946.

CITY OF WORCESTER ELECTRICITY DEPT.

Appointment of Lady Demonstrator

A PPLICATIONS are invited for the above appointment. Applicants must hold a diploma of domestic science or other approved certificate and have had previous experience in an electricity showroom.

The salary offered is in accordance with the National Joint Council Scale, £252 to £288 per annum, plus cost-of-living bonus, at present £48 2s. per annum.

The appointment will be subject to the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Applications, stating age, experience and copy testimonials, endorsed "Demonstrator," to be forwarded to the City Electrical Engineer, Electricity Works, Worcester, not later than 19th October, 1946.

C. H. DIGBY-SEYMOUR.

Guildhall, Worcester. Town Clerk. 2887

MILFORD HAVEN URBAN DISTRICT COUNCIL
ELECTRICITY UNDERTAKING

Meter and Test Superintendent

A PPLICATIONS are invited for the above appointment from candidates who are capable of taking complete charge of a Type A Non-Polyphase Testing Station as covered by Grade 6, Class B, of the N.J.B. Schedule (present salary £402-£417).

Applicants must have had experience in the use of Potentiometer equipment and be familiar with the requirements of the Electricity Supply (Meters) Act, and must be capable of repairing and calibrating all types of meters and instruments required in an undertaking supplying both D.C. and A.C.

Forms of application and details of duties are obtainable from the undersigned, to whom the completed forms must be returned by November 1st, 1946.

A. J. DALTON, A.M.I.E.E.,

Town Hall, Electrical Engineer and Manager. 2900
Milford Haven.

**COUNTY BOROUGH OF GREAT YARMOUTH
ELECTRICITY DEPARTMENT**

Appointment of Draughtsman

A PPLICATIONS are invited for the position of Senior Draughtsman at a salary of £315 per annum, rising by annual increments of £15 to £360 per annum, plus cost of living bonus (at present £39 16s.).

Applicants must be fully-qualified draughtsmen, familiar with building and structural engineering as applied to substations, etc. A sound knowledge of modern drawing office practice and general mains records is necessary and the successful candidate will supervise a small staff engaged on mains records, photoprining, building-erection and maintenance. The successful applicant will be required to pass a medical examination and the appointment is subject to the Local Government Superannuation Act, 1937.

Applications, stating age, particulars of qualifications and experience, accompanied by copies of three recent testimonials, should be addressed to G. T. Alcock, Esq., Chief Engineer and Manager, Electric House, Great Yarmouth, not later than the 17th October, 1946, endorsed "Draughtsman." Canvassing, directly or indirectly, will be deemed a disqualification, and candidates must disclose in writing whether to their knowledge they are related to any member or holder of any senior office in the Council. A candidate who fails to do this will be disqualified or, if appointed, will be liable to dismissal without notice.

FARRA CONWAY,

Town Hall, Great Yarmouth, Town Clerk,
5th October, 1946. 2935

THURROCK URBAN DISTRICT COUNCIL

Grays Electricity Undertaking

Appointment of Meter Inspector and Tester

A PPLICATIONS are invited from persons having the necessary experience for the post of permanent Meter Inspector and Tester in the Grays Electricity Undertaking of the Thurrock Urban District Council.

The conditions of employment will be in accordance with the agreement of the District Joint Industrial Council (No. 10 Area) for the Electricity Supply Industry, the present rate of pay being 2/5.49d. per hour (including bonus) for a 47 hour week.

The appointment will be subject to the terms of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Applications, stating age and experience, together with copies of not more than three recent testimonials, to be in the hands of the undersigned not later than the 1st November, 1946. Canvassing will disqualify, and applicants must state, in writing, any relationship to any member or official of the Council.

A. E. POOLE,
Clerk of the Council.

Council Offices,
Whitehall Lane, Grays,
2nd October, 1946. 2936

BOROUGH OF CHESTERFIELD ELECTRICITY DEPT.

A PPLICATIONS are invited for the position of Consumers' Engineer and Meter Superintendent in the Borough of Chesterfield Electricity Department. The salary scale for the position will be that of Grade 3, Class F, as prescribed by the National Joint Board for the Electricity Supply Industry and will commence at £640 per annum.

Candidates (preferably Corporate Members of the Institution of Electrical Engineers) must have had considerable experience in the industrial and domestic use of electricity, and also be capable of supervising the operation of a Class A Polyphase Meter Testing Station. Some experience in change-over work is also desirable. The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Forms of application may be obtained from the Electrical Engineer and Manager, W. W. Grimes, Esq., A.M.I.E.E., A.M.I.Mech.E., M.Inst.F., 1/2, Chatsworth Road, Chesterfield, and should be returned to the undersigned not later than 10 a.m. on Friday, 1st November, 1946, in envelopes marked "Consumers' Engineer and Meter Supt."

RICHARD CLEGG,

Town Hall, Chesterfield, Town Clerk,
2927

METROPOLITAN BOROUGH OF STOKE NEWINGTON

Appointment of Borough Electrical Engineer

A PPLICATIONS are invited for the Appointment of Borough Electrical Engineer of the Council's Electricity undertaking from persons experienced in the management and administration of such undertakings.

The salary will be in accordance with the agreement made by the National Joint Committee of Local Authorities and Chief Electrical Engineers dated 9th July, 1941, but in pursuance of clause 10 of this agreement 85% of the salary will be paid in the first year and 92½% in the second year, the full salary being paid in the third and subsequent years. On the present unit assessment of the undertaking this will be £831, £905, and £978 per annum respectively.

Applicants must be Corporate Members of the Institute of Electrical Engineers.

Recent experience in Electricity Supply undertaking is essential and applicants must have a thorough knowledge of design and operation of 11 kV and 17 kV underground distribution networks and A.C. and D.C. substations. Applicants must also be thoroughly conversant with the Management of Showrooms, Hire and Hire Purchase, Assisted Wiring Schemes, and the General Administration of an Electricity Department. The appointment will be terminable by three months notice in writing on either side, and will be subject to the Council's Superannuation Act and to a satisfactory medical examination.

Applications, on forms to be obtained from the Town Clerk and accompanied by copies of three recent testimonials, must be delivered to the undersigned by 1st November, 1946. Canvassing directly or indirectly will disqualify, and any relationship to Officers or Members of the Council must be disclosed.

C. KENT WRIGHT,

Town Clerk,
Stoke Newington Church Street, N.16. 2916

SHEFFIELD CORPORATION ELECTRICITY DEPT.

Appointment of Clerk of Works

A PPLICATIONS are invited for the position of Clerk of Works on the building and civil engineering work in connection with the extensions at Neepsend Generating Station. Applicants must have a thorough knowledge and experience of building and heavy construction work, including reinforced concrete and steel construction and plant foundations, and be capable of setting out, fixing levels, and making records and reports.

The appointment is temporary, the anticipated duration of the work being at least three years. The remuneration will be up to £11 11s. per week according to qualifications.

Applications must be submitted on the appropriate form which may be obtained from the undersigned, and must be returned together with copies of not more than three recent testimonials not later than Monday, 28th October, 1946.

JOHN R. STRUTHERS,

Commercial Street, General Manager and Engineer,
Sheffield, 1,
1 October, 1946. 2938

CITY OF OXFORD ELECTRICITY SUPPLY DEPT.

Appointment of Assistant Meter Engineer

A PPLICATIONS are invited for the position of Assistant Meter Engineer in the Meter Testing Department of the Electricity Undertaking, which is a Type A Testing Station. Candidates must have sound technical training, and be thoroughly conversant with the construction and operation of single and polyphase metering and meter testing equipment.

The salary will be in accordance with Grade 8b, Class G, of the National Joint Board Schedule, commencing at £408 per annum. The appointment is subject to the provisions of the Local Government Superannuation Act, 1937, and the selected candidate will be required to pass a medical examination prior to appointment.

Applications, marked "Assistant Meter Engineer," should be addressed to the City Electrical Engineer and Manager, City of Oxford Electricity Supply Department, 37, George Street, Oxford, and received not later than Monday, the 28th October, 1946.

HARRY PLOWMAN,

Town Hall, Oxford, Town Clerk,
3rd October, 1946. 2905

CITY OF WINCHESTER

Appointment of Chief Electrical Engineer and Manager

APPPLICATIONS are invited from qualified Electrical Engineers for the position of Engineer and Manager of the City Council's Electricity Undertaking.

The salary and conditions of appointment will be in accordance with the agreement made by the National Joint Committee of Local Authorities and Chief Electrical Engineers dated 9th July, 1941, but in accordance with Clause 10 of that Agreement the Council reserves to itself the option to pay 85% of the salary for the first year and 92½% for the second year, the full salary being payable in the third and subsequent years. On the unit assessment for the last complete year, the full salary is at present £524 per annum. A cost-of-living bonus will also be payable at the rate of £59 16s. per annum.

Applicants must be Members or Associate Members of the Institution of Electrical Engineers.

The person appointed will be responsible to the Electricity Committee and the City Council for the control and management of the undertaking, and he will be required to devote his whole time to the duties of the office and will not be allowed to engage, either directly or indirectly, in private work of any kind. He must live within the city.

The appointment, which will be terminable by 3 months' notice in writing on either side, will be subject to the Local Government Superannuation Act, 1937, and the person appointed will be required to pass a medical examination to the satisfaction of the Council's Medical Officer.

Applications, stating age, previous experience and present position, and accompanied by not more than three recent testimonials, should be delivered to me not later than Thursday, October 31st, 1946. Envelopes should be endorsed "Chief Electrical Engineer and Manager." Applicants are required to state in their applications whether to their knowledge they are related to any member of the Council or to the holder of any senior office under the Council. Failure to disclose this information will disqualify the candidate for the appointment. Canvassing members of the Council, either directly or indirectly, will be a disqualification.

F. W. KEMPTON,

The Guildhall, Winchester.
4th October, 1946.

Town Clerk.
2931

STALYBRIDGE, HYDE, MOSSLEY AND DUKINFIELD
TRANSPORT AND ELECTRICITY BOARD

Two Overhead Power Linesmen

APPPLICATIONS are invited for the position of Linesmen. Applicants must have had a wide experience in the construction, erection and maintenance of E.H.T. and L.T. overhead lines and services, and the erection of street lamp standards and lanterns.

Conditions of service and rate will be in accordance with the D.J.I.C. Schedule No. 3, North-Western Area, Zone A, at present 25.97 pence per hour. The selected applicants will be required to undergo a medical examination and, if approved, will be required to join the Board's Superannuation Scheme.

Applications, stating age, details of experience and present employment, together with copies of two recent testimonials, should be sent to the undersigned.

J. HARWOOD LUMSDEN,

Electricity Offices, Tame Valley, Stalybridge.
M.I.Mech.E., A.M.I.E.E.,
Chief Engineer.
2914

WEST MIDLANDS JOINT ELECTRICITY
AUTHORITY

Appointment of Civil Engineering Designer

THE above-named Authority desire to appoint a Civil Engineering Designer in connection with the design and layout of important generating station extensions. Applicants must have had wide experience in similar work and must be Corporate Members of the Institution of Civil Engineers or possess an equivalent qualification. The appointment will be for the duration of the contract, which will be approximately three years.

The salary will be £884 per annum, subject to adjustments for future variations in the cost of living.

Application must be made on the prescribed form, which may be obtained from the address below, and should reach me not later than the 21st October, 1946.

H. F. CARPENTER,

Phœnix Buildings, Dudley Road, Wolverhampton.
28th September, 1946. 2871

Clerk and Manager.

COUNTY BOROUGH OF OLDHAM ELECTRICITY
DEPARTMENT

Appointment of Junior Charge Engineer

APPPLICATIONS for the above appointment are invited. Applicants must possess the Higher National Certificate in either Mechanical or Electrical Engineering, or equivalent qualification, with sound practical experience. Salary in accordance with N.J.B. Schedule, Class H, Grade 9, at present £402-£417 per annum.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937. The successful applicant will be required to pass a medical examination and to comply with the conditions as to residence to which appointments under the Corporation are subject. Canvassing will be a disqualification.

The age limit for new entrants to the Local Government Service is 45 years unless a transfer value in respect of superannuation is payable. For the purpose of this application, the age of applicants who are serving or have served in H.M. Forces will be regarded as being reduced by the number of years of their war service.

Applications, endorsed "Junior Charge Engineer," stating age, full details or education, training and experience with copies of not more than three testimonials, to be forwarded to the Chief Engineer and Manager, Corporation Electricity Department, Greenhill Offices, Oldham, not later than Monday, the 21st October, 1946.

THOMAS ALKER,

Town Hall, Oldham.
10th October, 1946. 2930

Town Clerk.

CAPE TECHNICAL COLLEGE, CAPE TOWN

Lecturer in Electrical Engineering

APPPLICATIONS are invited for the following vacant Lectureship in the Department of Engineering at this College:—

This post entails instruction in both day and evening classes to apprentices preparing for the National and Advanced Technical Certificates of the Union Department of Education. An engineering degree and practical experience in modern engineering plant is desirable.

Salary according to the scale £350 × £20-550 × 20-650 × 25-700. Commencing salary may be at a higher notch than the initial notch of the scale according to experience and qualifications. Cost of living allowances are paid according to the Public Service rates, at present £119 per annum for married men and £34 per annum for single men. There are also substantial Provident Fund and Insurance benefits attaching to the post. An allowance of £65 travelling expenses will be made and half pay (substantive) during the voyage.

The successful applicant will be required to assume duty by the 1st February, 1947, or nearest date, depending on shipping accommodation.

Applications, which should be accompanied by certified copies of testimonials, should be submitted by November 20th. Application forms and conditions of service may be obtained from J. A. Ewing & Co. (London) Ltd., Finsbury Court, Finsbury Pavement, London, E.C.2, the representatives of the Cape Technical College in London. 2939

BOROUGH POLYTECHNIC, BOROUGH ROAD, S.E.1

Full-Time Lecturer in the Department of Electrical
Engineering

THE Governors invite applications for the above-named post. Candidates should be qualified to teach Electrical Engineering to degree standard for the Higher National Certificate. Salary, Burnham Scale. Forms of application and conditions of appointment may be obtained by sending a stamped addressed envelope to the undersigned.

DOUGLAS H. INGALL,

Principal.
2915

APPPLICATIONS are invited for the position of Designer for A.C. motors up to 250 h.p. Should be top-line man capable of taking complete charge of design at works of a large manufacturer in the North of England. Applicants should be between 30 and 45 years of age and possess knowledge of all types of induction motors, both single and polyphase. Excellent prospects and permanency for the right man. Please state age, details of education, training, experience and salary expected.—Box 2773, c/o The Electrical Review.

ARMATURE Winder for repair shop.—Boys Ltd., 187, Goswell Road, E.C.1. 2920

APPPLICATIONS are invited by a supply company for the vacancy of Assistant Sales Engineer. Candidates should have a wide experience on the commercial side of an undertaking, particularly in relation to industrial power supplies. Salary in accordance with qualifications. Apply, stating full particulars of age, training and experience, to—Box 2892, c/o The Electrical Review.

APPPLICATIONS are invited from Transformer Designing Engineers (Senior and Junior) for employment with the Metropolitan-Vickers Electrical Co. Ltd., Trafford Park, Manchester. Applicants should state age, full particulars of education, general and technical, apprenticeship, practical training and design experience (the latter not essential for Junior applicants). Apply in writing to—The Personnel Manager, Metropolitan-Vickers Electrical Co. Ltd., Trafford Park, Manchester. 2762

ARMATURE Winder Foreman for repair shop, also armature winder & improvers.—W. H. Sugden & Co. Ltd., Glenny Rd., Barking. 2934

ARMATURE Winder or good Improver required, used to all types of motors. Knowledge of dismantling and assembly of motors a good advantage. Apply to Messrs. Charles H. Harwood & Co. Ltd., 32, Meyrick Road, Willesden, N.W.10. 114

ARMATURE Winders and Improvers required, A.C. and D.C. top rates, good working conditions.—Electrical Power Repairs (Gillingham) Ltd., Strover Street, Gillingham, Kent. 9664

ARMATURE Winders and Improvers urgently required. Top rates and good conditions.—Box 113, c/o The Electrical Review.

ARMATURE Winders wanted, experienced on A.C. and D.C. repair work.—The Midland Electric Installation Co. Ltd., Cyprus Works, Upper Villiers Street, Wolverhampton. 2749

ASSISTANT Electrical Engineer, large paperboard mill, load 8,000-10,000 kW. Must have had practical experience of design, distribution problems, switchgear and various types of electric drives. Knowledge of paper mill work an advantage, but not essential. Age limit 40. Qualifications must be of high standard. Apply—St. Anne's Board Mill Co. Ltd., Bristol, 4. 2885

ASSIST. Electrical Engineer (35/40) for large modern industrial works in Birmingham. Good technical ability; must be qualified practically in the installation and maintenance of industrial electrical plant, including all types of A.C. and D.C. motors, switchgear, furnaces, plating, distribution layouts, cabling, wiring, modern lighting schemes, etc. Good disciplinarian and able to efficiently plan work and control labour. Excellent prospects for a good man. Full details of experience, training and salary required to—Box 2854, c/o The Electrical Review.

ASSISTANT Foreman for winding department. A.C. D.C. Motors, fractional to 500 h.p. Permanent progressive position to suitable applicant.—Higgs Motors, Witton, Birmingham. 106

ASSISTANT Saleswoman required in electrical contractors' showroom (London).—Box 2783, c/o The Electrical Review.

CABLE Estimator required in sales dept., London. Preferably with knowledge of export business. State age, experience and salary required. Applications in confidence.—Edison Swan Cables Ltd., 155, Charing Cross Road, London, W.C.2. 9698

CLERICAL Assistant required for stores office. Must have good knowledge of electrical material.—London Electrical Co., 92, Blackfriars Road, S.E.1. 104

CLERK required for electrical department of well-known London builders' merchants. Must be experienced in wholesale handling of lighting fittings, fuses and accessories, cable, etc. Good permanent position with increasing prospects. Five-day week. Write, stating age, experience and salary required, to—R. F. W. N. Froy & Sons Ltd., Brunswick Works, Hammersmith, W.6. 2730

CRAFTSMEN in Industrial Power urgently required. Apply to—Premier Electric Services, Friar Works, Willow Street, Leicester. 2630

DRAKE & Gorham Wholesale Ltd. require a Sales Manager for Manchester and district. Must have experience in handling general wholesale business, including water heaters. Apply in writing, stating salary expected, to—Manager, 29, Piccadilly, Manchester. 2901

DRAUGHTSMAN-Estimator with experience in mains and substation work, preferably with a distribution company in a rural area; also Wayleave Officer to operate in Norfolk. Apply, with full details, to—E.A.E.S. Co. (L.R.S.) Fimborough Hall, Stowmarket. 2839

DRAUGHTSMEN required by switchgear engineers. Experienced in contract work, protective gear diagrams or design. Applications in writing, with full particulars, to—Ferguson, Pailin Ltd., Manchester, 11. 86

DRAUGHTSMAN, Assistant, London, W.C.1, for work on audio-frequency equipment and associated high-grade light engineering products, progressive salary for young applicant with some technical training. State age, experience, salary required.—Box 2800, c/o The Electrical Review.

DRAUGHTSMAN, to take senior position in small office, London, must have completed sound works training, instruments or light electro-mechanical design, electrical knowledge an advantage. State full details, age, salary required.—Box 2801, c/o The Electrical Review.

DRAUGHTSMEN, preferably with telecommunications experience, required by large firm in the Midlands. Maximum salary £350 plus cost of living bonus. Write, giving details of experience, age, and salary required.—Box 11, c/o The Electrical Review.

DRAUGHTSMEN required for large Mid-Type electrical engineering company, experienced draughtsmen capable of handling customers' orders for switchgear, control boards, etc., and of preparing circuit diagrams. Apply, stating age, experience, qualifications, and salary required, to—Box 2926, c/o The Electrical Review.

DRAUGHTSMEN (Senior) required for large A.C. and D.C. machines, including turbo and waterwheel alternators, also for medium type A.C. and D.C. machines. Applications from men with suitable technical qualifications and good general mechanical drawing office experience will be considered. Salary dependent upon qualifications and experience. Apply, giving full details of the qualifications, experience, age and salary required, to—Chief Draughtsman, Engineering Drawing Office, The General Electric Co. Ltd., Witton, Birmingham, 6. 2661

DRAUGHTSMEN, Senior and Juniors, over 22, required for power transformers, by a large Birmingham firm. Electrical experience desirable but not essential.—Box 2893, c/o The Electrical Review.

DRAUGHTSMEN with experience in cable layouts required. Salaries in accordance with experience, plus 25% war bonus, plus staff bonus. Apply in writing, giving age and full particulars, not later than 15th October next, to—The Associated Portland Cement Manufacturers Ltd., Works Dept., 192, Ashley Gardens, London, S.W.1. 2756

FASCO Electrical Ltd. have vacancies for (a) Production Assistant, capable of laying out and supervising assembly of electrical equipment, must possess full electrical and technical knowledge L.F. and H.F. circuits and rectifying equipment; (b) Toolmaker, for sheet metal section, to design and make own jigs and tools and supervise same. Both positions are permanent and progressive. Apply in writing.—Brighton Terrace, Brixton, S.W.9. 2742

ELECTRIC lamp factory requires Maintenance Engineer, should have knowledge of all electrical and mechanical problems relating to repetition machines and general factory maintenance. Applicants should state salary required and previous experience.—Box 9665, c/o The Electrical Review.

ELECTRIC Motor Fitters required, dismantling and assembling motors in repair shop.—The Midland Electric Installation Co. Ltd., Cyprus Works, Upper Villiers Street, Wolverhampton. 2750

ELECTRICAL Draughtsman required (Wolverhampton district), used to designing and laying out factory electrical installation. Good mechanical and electrical knowledge and experience necessary.—Box 2868, c/o The Electrical Review.

ELECTRICAL Engineer, age about 30 years, with drawing office, estimating and sales experience, wanted for Malaya, good salary, three years agreement with first class passage out and home. Apply—Paterson, Simons & Co. Ltd., London House, Crutched Friars, London, E.C.3. 2941

ELECTRICAL Engineer required by large oil company for service in Middle East. Applicants must possess university degree, A.M.I.E.E. or equivalent qualification, and have had extensive practical experience in the installation, operation and maintenance of Diesel engine alternator sets up to 300 kVA, L.T. overhead and underground mains, internal wiring installations for houses, etc., and of the electrical apparatus used therein, control of labour, and some experience in drawing office work, estimating and general administrative routine. Age limit 34, preferably single. Married applicants only considered if prepared to live singly for at least first three years. Salary not less than £800 per annum, plus free quarters/messing, medical attention and allowances between the range of £120 for the bachelor (or married man without children) to £288 for the married man with three children under the age of eighteen. Provident and (subject to stated age limit) non-contributory pension fund. Replies, quoting Reference EXPL 15/2, to—Box 1351, c/o Charles Barker & Sons Ltd., 31, Budge Row, London, E.C.4. 2913

ELECTRICAL Engineer or Electronic Physicist required, capable of original calculations and design work on electronic equipment, wave propagation problems and similar work. Degree or equivalent and some research or design experience essential. Approximate age 25-30. Salary £400 approx. Apply—Staff Officer, British Insulated Callender's Cables Ltd., Erith Works, Belvedere, Kent. Ref. SR.8. 2907

ELECTRICAL Testing and Inspection. Man wanted with good electrical background and experience to take charge of testing and inspection of electrical appliances. Age 30/40. Give full details and salary required.—Box 2877, c/o The Electrical Review.

ELECTRICIAN required, good all-round man, maintenance, breakdowns, installations and repairs. State age and experience.—Box 9710, c/o The Electrical Review.

ENGINEERS and Draughtsmen are invited to apply to a large electrical engineering firm in the Midlands which has vacancies in the switchgear department for Technical Sales, Contract, Costing and Design Engineers; also experienced Technical Engineers capable of handling large projects for generation, transmission and distribution. Vacancies also exist for Draughtsmen for circuit diagram and general work.—Box 69, c/o The Electrical Review.

EXPERIENCED and qualified Assistant Electrical Engineers required for research section of electric cable makers in South England. Write in confidence to—Box 2883, c/o The Electrical Review.

EXPERIENCED Designer to take charge of electric motor designs. Applicants should have held similar position elsewhere. Generous salary will be paid to applicants having the necessary qualifications.—Box 2906, c/o The Electrical Review.

EXPERIENCED Lady Clerk required in electrical contractors' office (London).—Box 2782, c/o The Electrical Review.

FOREMAN for armature and motor winding dept., good wage and commission, and Foreman for general car electrical equipment dept. Applicants must be fully experienced men, able to repair and rebuild all types of equipment. Also Electricians used to car electrical equipment and wiring.—C. G. Hyde, Electrical Specialist, 213a, Queen Mary's Road, Foleshill, Coventry (Tel. 88908). 2909

FOREMAN required to take charge of winding shop in Bristol. Must have sound knowledge of A.C. and D.C. motors and ability to control labour.—Box E.C., Glovers Advertising, Mark Lane, Bristol, 1. 2894

IMMEDIATELY: Ex-M.M. (E)'s please note. Electrical Engineer with some experience in mechanical and civil engineering to take complete charge of contracts for small hydro-electric schemes and other electrical contracts in Scotland. Full particulars of experience, age and salary required to—Box 2899, c/o The Electrical Review.

INSULATION Testing. Large London factory manufacturing insulating varnishes, components, etc., has vacancy for Assistant in their Insulating Laboratory. Applicants should be conversant with physical and electrical testing to standard specifications and the use of up-to-date testing equipment. The position will be permanent and pensionable. Reply, stating age, qualifications and salary required, to—Box 2872, c/o The Electrical Review.

JUNIOR Engineer required for the laboratory of a London firm of radio component makers. Degree or equivalent essential. Salary £400 upwards according to qualifications.—Box 2711, c/o The Electrical Review.

JUNIOR Engineer required, preferably with some estimating experience, particularly on overhead line extension costs. Applications giving full details of experience and stating salary required, to—West Cambrian Power Co. Ltd., Electric House, Norton, Tenby. 8723

LEADING engineering organisation requires Sales Manager for battery electric vehicles. Engineering education to degree standard and subsequent industrial experience are essential. Ability required to organise and control sales and service, undertake market research and sales campaigns. Exceptional prospects.—Box 2723, c/o The Electrical Review.

LIBRARIAN to take charge of the Reference and Lending Libraries of the Institution of Electrical Engineers. Candidates must have had an electrical engineering education and training and a practical knowledge of the conduct of a large collection of scientific books. Languages and knowledge of decimal classifications also desirable. Apply by letter only, stating salary required, to—The Secretary, Institution of Electrical Engineers, Savoy Place, London, W.C.2. 2869

MANAGER required for electric cable works. Must have had experience in manufacture and selling. Applicants should give fullest particulars of experience and should state age and remuneration expected.—Box K.437, W. H. Smith & Son Ltd., Manchester, 3. 9708

LIVE Travellers, all areas U.K., in electrical household goods. Write to—Briscoe Plating Co. Ltd., 3-5, Maddox Street, W.1. 2884

MANAGER or Management of good appearance and personality required for high-class electrical and radio retail and art goods business, 30 miles from London. Must be thoroughly capable and able to take full control. Write with particulars, stating age, experience and salary required.—Box 115, c/o The Electrical Review.

MANUFACTURERS and factors of electric fires and domestic appliances require first-class Travellers with car and connection, for London, Home Counties and Provinces. Write fully.—M. F. & Co. Ltd., 37, Aylmer Parade, East Finchley, N.2. 2886

MICA Products Ltd., 1, Downs Park Road, London, E.8. require Two Representatives for London and the Home Counties with connection amongst leading engineering, electrical and radio firms, to sell mica, mica-ite, laminated tubes and sheets, all types of machined plastics, injection and compression mouldings. Letters only, marked S.M., giving experience and salary required. 2886

OLD-established manufacturers (Birmingham), worldwide connection and available capacity, offer unique opportunity for Electrical Engineer with completed designs and ideas to start electrical department. Small switchgear or domestic appliances, suitable quantity production. Excellent prospects.—Box 2844, c/o The Electrical Review.

PLUMBER-Jointer required for L.T. and H.T. mains. N.J.C. rates paid (Area No. 9).—Farnham Gas & Electricity Co., East Street, Farnham, Surrey. 2659

PLUMBER/Joiners required for experimental and development work in research laboratories in West London. Joiners experienced in E.H.T. cable work preferred, but suitable probationary joiners would be considered. Write, giving details of age, qualifications and experience, to—Box 2908, c/o White's Ltd., 72, Fleet Street, London, E.C.4. 2888

PRODUCTION Superintendent required by leading engineering organisation to take full control of department producing medium electrical equipment. Education to degree standard and experience in works management are essential. Exceptional prospects available for man with vigorous personality and successful record.—Box 2724, c/o The Electrical Review.

PROGRESSIVE manufacturing co. of domestic electric appliances require Representatives for London and Home Counties. Fullest backing and co-operation guaranteed. Salary, commission and expenses. Car essential. Write in first instance, giving full details of experience, present connections in this trade, and past earnings, all in the fullest confidence, to—Box 178, Phillips Advertising Ltd., 15, Wilton Road, London, S.W.1. 2837

QUALIFIED Engineer for electrical design work in connection with high voltage equipment. Age 25-35. B.Sc. or equivalent, with ability in application of mathematics to design problems. Write, giving full details of training, experience and salary required, to Staff Officer, British Insulated Callender's Cables Ltd., Erith, Kent. Ref. SR/7. 2754

REPRESENTATIVE calling on provincial houses required to handle high-class wrought iron fittings and lampshades for well-known London manufacturer. Write—Box PP4585, Samson Clark, 57/61 Mortimer St. W.11. 2794

REPRESENTATIVES for high-class lampshades and domestic heaters wanted, to call on wholesalers and stores, for the following districts: Cheshire, Lancs., Norfolk, Suffolk, Northampton, Shropshire, Hants and whole of West of England.—Box 2743, c/o The Electrical Review.

REQUIRED, for extensive development programme. Electrical Draughtsmen with experience in steelworks H.T. and L.T. distribution schemes, substation design and layout, A.C. and D.C. heavy industrial control gear. Draughtsmen with similar experience in other industries would be considered. Apply by letter, stating age, experience and salary required, to—Chief Draughtsman, Dorman Long & Co. Ltd., Central Engineering Dept., Britannia Works, Middlesbrough. 41

REQUIRED. Manager to take complete charge of factory employing 100 people mainly engaged on assembly work (light electrical engineering). Applicant must have thorough mechanical knowledge and must also be able to control buying and development work. Commencing salary £780 per year, plus bonus. Only applicants who can show thorough and lengthy experience in similar positions need apply to—Box 2847, c/o The Electrical Review.

SENIOR Draughtsman conversant with machinery for electric lamp and valve industry, also all other glass-working machinery.—Box 9705, c/o The Electrical Review.

SENIOR Engineer required for the laboratory of a London firm of radio component makers. Degree or equivalent with industrial experience essential. Salary £500 upwards according to qualifications.—Box 2712, c/o The Electrical Review.

SENIOR Draughtsman with sound production experience and tooling required in design drawing office. Some knowledge of light domestic appliances desirable but not essential. Position offers wide scope and good salary to an experienced man. Apply in writing to—Morphy-Richards Ltd., St. Mary Cray, Kent. 2891

SHORTHAND Typist, previous experience in electric supply industry. Good salary and prospects. Apply—Wessex Electricity Co., Oxford Road, Newbury. 9702

SHORTHAND-Typist required for electrical contractors' office, filing and telephone. Good prospects for smart young lady.—Rogers, 7/9, Bloomsbury St., W.C.1. 2634

STOREKEEPER Assistant, must be experienced in all accessories, cable, etc. Wholesaler, West End, London.—Box 2846, c/o The Electrical Review.

SUPERINTENDENT of Test Gear Section required by London firm of radio component makers. The responsibility involves design and maintenance of electronic test equipment. Degree or equivalent with industrial experience essential. Salary £500 upwards according to qualifications.—Box 2710, c/o The Electrical Review.

THE Central Electricity Board (South-East England District), Aldwych House, Aldwych, W.C.2, has vacancies for 2 (Female) Shorthand Typists. Age 18-25. Graded salary scale. Superannuation scheme. Hours 9.30-5.30. Applications in writing to Manager. 2848

THE Civil Service Commissioners invite applications for two posts of Principal Scientific Officer and three posts of Senior Experimental Officer at the Guided Projectiles Establishment of the Ministry of Supply. Candidates should be British subjects, born on or before 1st August, 1915, and under 50 years of age on 1st September, 1946. Candidates for appointment as Principal Scientific Officer should possess First or Second Class Honours Degree or equivalent qualification in Physics or Mechanical or Electrical Engineering, with knowledge and practical experience of either (a) Thermo-dynamics, processes of combustion and design of aero engines, accessories and gas turbines, or (b) Radar, television equipment and accessories. For Senior Experimental Officer they must (a) Be qualified mechanical engineers with a knowledge and experience of I.C. engines, gas turbines and accessories and of mass production methods, including fabrication of light alloy components, or (b) Be qualified in light electrical engineering or physics, with experience of radar, general electronics, radio and television, or (c) Have a wide knowledge and experience of the principles and scientific application of photography and the designing of photographic instruments and recording devices. The appointments are permanent and those for Principal Scientific Officer carry superannuation benefits under the Federated Superannuation System for Universities and salary on the provincial scale, £750 x £30 to £1,020, plus consolidation addition ranging from £90 at the minimum to £107 at the maximum. The posts for Senior Experimental Officers carry superannuation benefits under the Superannuation Acts and salary on the provincial scale, £570 x £25 to £750, plus a consolidation addition of £90 throughout the scale. Forms of application are obtainable from the Civil Service Commission, 6, Burlington Gardens, London, W.1, quoting No. 1646, to whom completed applications must be returned not later than 14th November, 1946. 2852

THE Vulcan Boiler & General Insurance Co. Ltd. have a vacancy in Wakefield for an additional Electrical Inspector. Applicants must have sound technical training and practical experience with electrical plant and machinery. Age not exceeding 32 years. Commencing salary £365 per annum, rising by annual increments to £525 per annum. Applications to—67, King Street, Manchester, 2. 2864

TRANSFORMER Design Engineer, experienced in all types up to 500 kVA and capable of developing special types. Progressive position. Write, stating age, experience, salary.—Brentford Transformers Ltd., Windmill Road, Brentford, Middx. 2946

TRANSFORMER Designer (Junior) required for all types of transformers up to 3,000 kVA, 33 kV. Reply, stating age, experience and salary required.—Warks Manager, Transformers & Welders Ltd., Sandown Road, Watford. 2741

TRANSFORMER manufacturer requires the services of an expert Transformer Designer with commercial experience and wide knowledge of application of all types of transformers and chokes for radio and electronic industries. Excellent salary and good prospects. Fullest particulars in first instance will be treated with strictest confidence.—Micramatic Ltd., Meico Works, Congleton, Cheshire. 2911

TWO Winders for a North-East iron and steel works to deal with A.C. and D.C. motor repairs. This is a permanent position attached to the electrical department of a large works. State age and experience to—Box 2859, c/o The Electrical Review.

UNIVERSITY of London, King's College, requires an Assistant Lecturer in Electrical Engineering. Candidates should have a good honours degree and have had practical experience in the field of electrical power or electrical machinery. Salary £400 p.a. Particulars and forms of application from the Secretary, King's College Strand, W.C.2, whom final applications must reach by November 9th, 1946. 2910

WANTED for a Research Establishment at Elstree:—2 Designer Draughtsmen, experienced in the development of mechanical and electrical precision mechanisms. Good knowledge of electrics an advantage. 2 Junior Draughtsmen, capable of detailing from development drawings of mechanical and electrical precision mechanisms. Opportunity for advancement to up-graded positions. Draughtsman experienced in the preparation of factory maintenance drawings, and who is capable of detailing. Apply, stating age, experience and salary required to—Box 2799, c/o The Electrical Review.

WANTED for London Merchant House trading with Malaya, young Electrical and Mechanical Engineer with technical and commercial training to assist buyer. Apply, stating age, training and salary required, to—Box 2940, c/o The Electrical Review.

WORKS Manager required for A.C. and D.C. motor repair works, Birmingham area. Good technical qualifications essential. Apply stating age and salary required.—Box 2865, c/o The Electrical Review.

WORKS Manager (British) of established electric cable factory in the East requires an Assistant possessing practical experience and theoretical knowledge of V.I.E. and P.V.C. cable manufacture, embracing wire drawing, turning, stranding, rubber compounding, tape spreading, longitudinal covering, armouring and testing. Knowledge of wire enamelling an advantage but not essential. Excellent opportunity for the right man. Free furnished quarters, free medical attendance and participation in provident fund. Three years' agreement (with probationary clause) and option of renewal. Passage paid out and home to selected applicant. Apply giving following particulars: (1) Qualifications; (2) Position held past ten years; (3) Age; (4) Married or single; (5) If married, state if desirous of family accompanying; (6) Names of two referees as to ability; (7) Salary required.—Box 2655, c/o The Electrical Review.

WORKS Manager required for large electrical manufacturers and engineers. Must be experienced production man, high-grade executive capable of taking full charge of all production departments. Only energetic man with modern ideas as to works management should apply, with fullest particulars.—Box 2838, c/o The Electrical Review.

WORKSHOP Manager wanted urgently for electric element production in the Midlands. Applicants should have good technical background and experience of production control with mixed labour. Good opportunity for keen man age 25-35.—Box 2878, c/o The Electrical Review.

YOUNG Electrical Engineer required by Electrical Motor Manufacturers, to assist in the Estimating and Design Department, S.E. London area.—Write, stating age, experience, and salary required.—Box 2692, c/o The Electrical Review.

APPOINTMENTS FILLED

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

BOROUGH of Maidenhead—Lady Demonstrator and Asst. Mains Engineer; Metropolitan Electric Supply Co. Ltd.—Substation Shift Engineer; Milford Haven U.D.C.—Distribution Assistant. All applicants thanked.

SITUATIONS WANTED

A.M.I.E.E. requires senior and responsible position. Wide technical and commercial experience, contracting, power, illumination, sales management, trade journalism, etc. Fully accustomed to all management and executive work. Knowledge of Canadian methods and markets. Very adaptable.—Box 9695, c/o The Electrical Review.

A.M.I.E.E., wide experience, age 34 years, now on demob. leave (major R.E.), requires progressive position in any business with engineering background.—Box 9696, c/o The Electrical Review.

CHIEF Electrician (34) seeks change. Works apprenticeship, service engineering, 10 years seagoing, mill or factory maintenance. Anything with prospects.—Box 9703, c/o The Electrical Review.

CHIEF Storekeeper requires situation with live electrical firm, 14 years' experience, age 30. Thorough knowledge of all electrical accessories, and clerical work, future opportunity becoming a buyer.—Box 9724, c/o The Electrical Review.

CHIEF Electrical Engineer of large steelworks, successful and wide experience, previously 18 years with electrical plant manufacturers, giving satisfaction to present principals but desires change to South or S.W. England. Technical representation required where executive ability is called for.—Box 8661, c/o The Electrical Review.

COOKERY Sales Demonstration. Young man (33), with E.D.A. certificate, offers services to a go-ahead Electricity Showroom or Manufacturer.—Box 8651, c/o The Electrical Review.

ELECTRIC Lamps. Production Specialist with knowledge of all types requires executive or managerial post.—Box 8689, c/o The Electrical Review.

ELECTRICAL Engineer requires change; seeks responsible progressive position; 17 years' experience in general and marine electrical engineering, including installation, manufacture and maintenance.—Box 9685, c/o The Electrical Review.

ELECTRICAL Engineer (26), D.F.H. (hons.), Grad. I.E.E., major in R.E.M.E., desires administrative position with responsibility and scope. Technical sales experience, excellent organisation ability and used to handling personnel. Highest references available.—Box 9691, c/o The Electrical Review.

ENGINEER, age 38, with 16 years' experience in administrative posts, desires situation as Works Manager. Wide experience in all classes of engineering, planning and rate fixing. Special study made of mass production methods jigs and tools. General electrical knowledge. London area preferred.—Box 9693, c/o The Electrical Review.

ENGINEER, with Elect.Mech. University degree, seeks position of responsibility commanding four figure salary. 10 yrs. exp. in servos, production test gear, electronics. London area.—Box 9728, c/o The Electrical Review.

EX-Branch Manager of electrical wholesalers seeks post, buying, managing, orders; 4 years with Superlamp Ltd., age 37, married, ex-R.A.F. Commence at once. Office, or travelling considered. Over 20 years' experience.—J. Banks, 63, Confield Av., New Malden, Surrey. 8635

EX-Squadron Leader R.A.F. (25), B.Sc. (Electrical Engineering), First Class Honours, seeks progressive post in or near London with prospects in Technical Sales or Production side of light electrical engineering company. Technical, organisational and executive experience in R.A.F. Radar work. Widely travelled. Willing to undergo period of training.—Box 9683, c/o The Electrical Review.

EXPORT Engineer (35), conversant with foreign specialisations, Continental Engineering Degree (British national), A.M.I.E.E., excellent linguist, ex-Admiralty Interpreter, registered Disabled Person (no visible disability) after R.N.V.R. service (Electrical Branch), seeks responsible position with Technical Export organization.—Box 8662, c/o The Electrical Review.

FOREMAN Electrician (50), just completed large contracts, seeks similar situation, used to control planning, estimating; 34 years' experience all classes of work.—Abraham, 9, Dale Road, Crayford, Kent. 8655

HONOURS Graduate (Mechanical Sciences Tripos) A.M.I.E.E., seeks a position offering good prospects and opportunity to use 16 years' experience in design and application of Motor Control and Protective Apparatus.—Box 8648, c/o The Electrical Review.

INSTRUMENT Maker desires change, 29 yrs.' experience in electro-mechanical apparatus, jigs, tools, gauges, development, experimental, servicing. London or N.W. Kent preferred.—Box 9714, c/o The Electrical Review.

MAN with 30 years' experience London wholesale trade, dealing with orders and assisting buying, would be glad to hear from interested houses in London and Home Counties area.—Box 9686, c/o The Electrical Review.

STORKEEPER (Chargehand), 18 years' experience of the electrical trade, desires situation with prospects. Willing to take situation outside London.—Box 8636, c/o The Electrical Review.

STORKEEPER-Buyer, conscientious and fully trained in modern systems, desires post within 200 miles Manchester. Qualified to take complete charge, ex. refs., age 34. Salary not as important as an appointment with scope.—Box 9701, c/o The Electrical Review.

TECHNICAL Assistant (33), requires position in agricultural dept. of supply company, interviewing, estimating and supervising, good practical and technical experience.—Box 9716, c/o The Electrical Review.

VACUUM Flasks. Production Engineer, experienced in big scale output England and Continent, seeks post.—Box 9700, c/o The Electrical Review.

YOUNG Lady, Economics Graduate, desires progressive position. Knowledge of French and typing. Capable, energetic and willing to learn.—Box 9704, c/o The Electrical Review.

AUCTION NOTICES

G. R.

By direction of the Ministry of Supply.

FULLER, HORSEY, SONS & CASSELL

are instructed to offer for Sale by Auction in lots at Woolwich Arsenal, London, S.E., on Tuesday, October 22nd, and day following, at 11 o'clock precisely each day:

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including: 105 Electric Exhaust Fans, 650 Grindstones, 75 Hand Trucks, 2,300 Pigeon Baskets, 120 Vices, 90 Anvils and Swage Blocks, 1,750 Trays, 40 Engine-driven Foam Generators, 250 Grease Guns, 30 tons Bolts and Nuts, 100 Engines, 250 Electric Motors, 700 Pumps, 350 Pressure Gauges, 650 Sledge Hammers, 600 Mattocks, 2,100 Wire Cutters, 4,500 Lamps, 1,000 Sheave Blocks, 500 Drawing Boards, 4,000 Leather Straps, 2 tons Emery Cloth, Physical and Chemical Laboratory Equipment, and a wide range of other Stores and Equipment.

Catalogues (6d. each) may be had when ready from Fuller, Horsey, Sons & Cassell, Industrial Auctioneers, 10, Billiter Sq., E.C.3 (Telephone No. ROYAL 4861). 2589

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

CITY OF YORK ELECTRICITY DEPARTMENT

Quarterly and Prepayment Meters

THIS Department has for disposal 614 A.C. and 169 D.C. Meters of various makes, types and sizes ranging from 2½ amps. to 100 amps. A complete list of meters available can be obtained from the undersigned.

W. A. CROCKER, A.M.I.E.E.,
City Electrical Engineer,
Electricity Offices, City Electrical Engineer,
Clifford Street, York. 2919

A Cookley & Co. Ltd. offer large selection of used Electric Motors, A.C. and D.C. Write—21/25, Tabernacle Street, London, E.C.2 (Monarch 3357/58). 46

A large quantity of V.I.R. Cable made to C.M.A. specification W/E.4101, by such companies as General Electric Co. Ltd., Pirelli's, Johnson & Phillips Ltd., Overseas Cable Co. Ltd., Simplex Co., Hackbridge Cable Co. Ltd., to be sold at cut prices. Brand new condition. Apply—B.S.D./I., General Trade Clearings Ltd., 82-94, Seymour Place, London, W.1 (Pad. 3456). 2904

A number of portable Alternating Lighting Sets, fully guaranteed, for quick delivery, 1½-3 kVA, 230/1150.—The Electroplant Co., Wembley, Middx. 2897

A number of unused portable petrol-driven Welding Sets, suitable for use with electrodes, sizes 6 to 12.—Fyle Wilson & Co. Ltd., Bishop's Stortford. 2921

ABOUT 300,000 yards 3/029 red and black and 100,000 yards 3/036 red and black V.I.R. Cable, brand new, C.M.A. manufacture, ex stock. Prices and further details—Box 2025, G.T.C.C. 82-94, Seymour Place, London, W.1. Paddington 3456. 2890

A C. and D.C. House Service Meters, all sizes, quarterly and prepayment, reconditioned, guaranteed one year. Repairs and recalibrations.—The Victra Electrical Co., 47, Battersea High Street, S.W.11. Tel. Battersea 0780. 19

A C. and D.C. Motors, all sizes, large stocks, fully guaranteed.—Milo Engineering Works, Milo Road, East Dulwich, S.E.22 (Forest Hill 2278-9). 102

A C./D.C. 5-valve Superheterodyne Sensitive 3-wave Band Receiver. Excellent tone. Attractive modern cabinets in "Plasteel" or polished wood, 416 16s. Usual trade terms and facilities. Early delivery. Trade only.—Morgan, Osborne & Co. Ltd., Southview Road, Warringham, Surrey. 110

A C. Motors, 1/75th h.p. to 5 h.p., all voltages. Also A.D.G.—The Johnson Engineering Co., 319, Kennington Road, London, S.E.11. Telephones, Reliance 1412/3. 57

ALTERNATING Sets, comprising 6-cyl. vert. Diesel coupled to 30-kVA Alternator, 400/3/50, 1,000 r.p.m., brand new. Several ex Govt. surplus.—Box 2895, c/o The Electrical Review.

ATTRACTIVE Lampshades, exclusive designs available for the Christmas trade. Prompt deliveries.—The British Bright Light Co. Ltd., 266-268, Battersea Park Road, S.W.11. 2734

AUDAX Ltd. now have available an extensive range of new season's designs of high-class Lamp Shades in Plastics and Parchment, together with a range of Table Lamps. Prompt delivery available to all parts of the country. Enquiries particularly invited from wholesalers and electrical factors.—84, Preston Road, Brighton (Tel. Preston 5565). 9583

ATTRACTIVE Weekly Offers from The Electroplant Co., Wembley, Middx.: (a) 750-kw Belliss Morcom Siemens Steam Generating Set, 440 v., 3-ph., 50 per. triple expansion, 185 lb. steam superheat, 250 r.p.m., complete with surface condenser and all auxiliaries; (b) 300-kw Belliss-Morcom Phoenix Steam Generating Set, 500 v., 3-ph., 50 per., triple expansion, 160/220 lb. steam, 300 r.p.m., complete with surface condenser and all auxiliaries, 400 kW at 440 v.; (c) 350-kw Mirreles-Westinghouse Diesel Generating Set, 415 v., 3-ph., 50 per., air blast injection, 4 cyl., 200 r.p.m., cold start, complete with all accessories, switchboard and gantry. 2996

B & W. Water Tube Boilers for disposal. Two 50,000 lbs. evaporation, 310 lbs. w.p.; two 50,000 lbs. evaporation, 220 lbs. w.p.; one 20,000 lbs. evaporation, 175 lbs. w.p.; one 12,000 lbs. evaporation, 200 lbs. w.p.; two 16,000 lbs. evaporation, 190 lbs. w.p.; one 9/10,000 lbs. evaporation, 200 lbs. w.p. We install complete, including brickwork. Economisers, Pumps, Piping, Valves, Generating Sets and Motors in stock. Please send us your enquiries; we can give immediate delivery.—Burford, Taylor & Co. Ltd., Boiler Specialists, Middlesbrough, Telephone, Middlesbrough 2622. 32

BATTERY Chargers for home and export, 4 models, 2-6-12 v., 1, 2 or 4 amp. D.C., any mains voltage. Generous trade terms. Write for catalogue.—The Banner Electric Co. Ltd., Hoddesdon, Herts. Tel.: Hoddesdon 2659. 97

BEENATEE Festoon Striplight Holders, made of X20 Bakelite, for use with 7/029 T.T.R. cable, require no tools or screws for wiring. Immediate delivery of any quantity. Passed by the fire authorities. Used by corporations and supply companies all over the world. Large quantities of British made Electric Lamps and Cable always in stock.—The Beentee Illuminations (London) Ltd., Temporary Address, 6, Upper Street, Islington, London, N.1 (Phone, Canonbury 4555). 71

BELT Grinders or Sanders, 4" wide belt, £6; 6" wide belt, £14 15s.—John E. R. Steel, Clyde Mills, Bingley, Phone 1066. 52

BT.A. A comprehensive service is now available for all classes of tools and equipment for the accumulator trade.—B.T.A., 246, Cavendish Road, London, S.W.12. Tel.: Balham 6691/2. 92

BT.H. 8.5 h.p., 980 r.p.m., 400/460-volt shunt wound, D.C., £65 16s., and Bruce Peebles 6-h.p., 1,100-r.p.m., 400/460-volt, shunt wound, D.C., £49 10s.—M.G. Electrical Service, 28, Crouch Street, Colchester. 9692

BRASS Strip, 0.65" x .020" (in coils) and 2½" x .058" (in lengths of about 3'), for prompt delivery from stock. Wide range of sizes in strip and rod always in stock. Enquiries invited.—Box 2874, c/o The Electrical Review. 10

D.C. Motors, new, 200/230 volts, 1,400 r.p.m.: 8 to 31½ h.p., also 110 volts, D.C., 21 h.p., several available with starters.—Stewart Thomson & Sons (L'pool) Ltd., Fort Road, Seaford, Liverpool, 21 (Telephone Number, Bootle 2697 or 28, Victoria Street, Westminster, London, S.W.1 (Telephone Number, Abbey 2101). 90

DYNAMOS, 100 v., 15 kw. compound, ball bearings—15, Kingsley Grove, Audenshaw, Manchester. 2689

ELECTRIC Lamps, Flashlights, Flashlight Bubs, Portable Fires, Accessories. Prompt delivery.—Suplex Lamps Ltd., 50, Gray's Inn Road, London, W.C.1. Holborn 0225. 116

ELECTRIC Motors, 1/3 h.p., 3,000 r.p.m., D.C., 110 volts. Also 220 volts. Stock delivery, £6 each.—John Steel, Clyde Mills, Bingley, Yorks. 84

ELECTRIC Motors and Dynamos. We hold one of the largest stocks of new and secondhand motors. Secondhand machines are thoroughly overhauled. Inspection and tests can be made at our works. For sale or hire. Send your enquiries to—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, City Road, London, N.1 (Phone, 5512-3 Clerkenwell). 13

ELECTRIC Welding Plant, Engine and Electric, A.C. driven, 300 amps. output, complete with weather proof covers.—Box 34, c/o The Electrical Review. 10

ELECTRICAL Fittings, Ironclad Bells, 110 and 220 v. D.C. Handlamps, Industrial Shades, Floodlights, etc., all new. Special prices quoted for quantities.—James McKenzie Ltd., Oxtou Road, Birkenhead. 2790

ELISON Circuit Breaker, 733 amp., T.P., I.C., 440 v., 50 cycles, Serial No. 363087, complete with 200-ft. cable; Ellison Circuit Breaker, 300 amp., T.P., I.C., 440 v., 50 cycles, Serial No. 372213; Ellison Oil Circuit Breaker, 60 amp., D.P., Serial No. 367475; Secondhand Cable, 124 yards (in two equal lengths), low tension 4-core, 4.4 x .04 sq. in., impregnated paper insulated, lead covered, compounded paper taped, compounded jute served, single ply armoured and compounded jute served cable with shaped conductors, 650 volts class. All lying at Dundee.—Surrey Rubber Co. Ltd., 675, Mitcham Rd., Croydon. 2672

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—Be-Be Engineering, 3, Retreat Close, Kenton, Middx. (Wordsworth 4928). 42

FLUORESCENT Chokes, 80 watt. Low noise level, for satisfied users; long life, for low replacement costs; characteristics matched with lamp, for rated lamp life and light output. Prompt deliveries. Micramatic Ltd., Meico Works, Congleton, Cheshire. 73

FLUORESCENT Lighting. Constead Units for sale. Dispenses with all starter gear and gives instantaneous lighting, prevents maintenance worries, each unit guaranteed. Apply—Scemco Ltd., 6/7, Soho Street, London, W.1 (Tel. GER. 2034). 117

FLUORESCENT Lighting. Special offer, wholesalers only: Fittings without tubes. Minimum order, 12 of each type; 20-gauge stove enamelled white, fitted Constead or ballast unit control gear, Industrial Trough Unit, £5 15s. each nett; ditto, Built-in Flush to Ceiling Unit, £5 10s. each nett. Immediate delivery.—Scemco Ltd., 6/7, Soho Street, London, W.1 (Tel. Ger. 2034). 120

FLUORESCENT Lighting: 18"-15 w., 24"-25 w. and 36"-45 w. Fittings, complete with tubes. Colours: White, Warm White, Daylight and Pink.—Scemco Ltd., 6/7, Soho Street, London, W.1 (Tel. GER. 2034). 118

FLUORESCENT Lighting Fittings. Extensive range, including Trough and Flush type, fitted with "All in One" Constead Unit." Delivery 7 days, with tubes. Write—Scemco Ltd., 6/7, Soho Street, London, W.1. Phone, GER. 2034. 100

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HEAVY duty Arc Welding Plants, 200 amps. Price £36 10s. complete. Also Spot Welders, £47 10s.—John E. R. Steel, Clyde Mills, Bingley, Phone 1066. 50

HEWITT Rectifier and Transformer, input 6,300/3/50, output 50 kW, 230/460, new 1940. Hackbridge Pole Type Transformer, input 6,300/3/50, output 230/400, new 1942. National Diesel Set, 50 kW, 800 r.p.m., 460 volts, new 1934. Switchboard, 16-panel, D.C., by G.F.C., new 1932.—Borth & Ynyslas Electric Supply Co. Ltd., Borth, Cardiganshire. 2641

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INSTALLATION Tester, 500 v. Record Minor. 211. From stock.—Robins Electric, 222 & 222B, West End Lane, N.W.6. 83

IRON Elements, Universal, Pure Mica, 24s. 9d. doz. (3 doz. 23s. 9d.), 1,000-w. Spirals, nickel nichrome, 19s. 6d. (3 doz. 18s. 6d.), immediate delivery.—Horton Electrical, 15, Palmerston Road, Sutton, Surrey. 9725

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LEAD-Covered Cable, 1/044 single, var. can, insulated, App. 4,000 yds., various lengths, not been used, 4d. rd.—Wilkes, Derby Rd., Stapleford, Nottingham, 8660

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

MAY we send our Engineers' Stethoscope on approval (without obligation)? Particulars on request.—Capac Ltd., 2, Cliswater Road, London, S.W.13. 78

MOTOR Generator Sets and Convertors, all sizes and voltages from $\frac{1}{2}$ kW up to 500 kW in stock.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walks, City Road, London, N.1. Telephone, Clerkenwell 5512, 5513 & 5514. 28

MOTOR-Alternators (four), 230-v., 50-c/s., 3-h.p. motor, auto starters s-ph., 150-v., 500-c/s., 14-kW alternator, excitation 110 v., 2.5 a., from 230-v. trans. and selenium rectifier, mounted as one unit. As new, £55 each. 107, Commercial Road, Southampton, Phone 4407, 9720

MOTORISED $\frac{1}{2}$ " Bench Drilling Machine, 13 speeds, £15 5s.—John E. R. Steel, Clyde Mills, Bingley, Phone 1066. 51

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

NEW 18-c. Gold Chronographic Wrist Stop Watch, split second timekeeper, calibrated 1/1,000 sec. flyback, etc., etc. (cost 125 guineas), superb looks and performance, guaranteed, £65; Eversharp (U.S.A.) 14-c. Gold Streamline Model Fountain Pen, £12 10s.; ditto Pencil, £8 10s.—B. W. Thomas, 40, Kensington Park Gardens, London, W.11. 8646

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PEIROL Electric Generating Sets, from 120 w to 1.5 kW, new designs, good deliveries.—Arthur Lyon & Co. (Engs.) Ltd., Africa House, Kingsway, W.C.2. 70

PHONE 93 Staines, 90-kW Ruston Diesel Set, 110 v. D.C.; 25-kW Mirrless ditto, 110 v.; 7/9-kW Ruston ditto, 110 v.; 5-kVA Ruston ditto, 400/1/50; Weir Feed Pump, 8 $\frac{1}{2}$ " \times 6" \times 13".—Harry H. Gardam & Co. Ltd., Staines. 60

PHOTO Copying (Blue Print) Machine, 35" feed, together with Electric Washer and Dryer, 46" wide, both by Precision Photo Printing Plant Ltd., complete with electric equipment for 240-volt D.C. Inspection invited.—Box 2833, c/o The Electrical Review.

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QUANTITY of Double Roller Chain 11" wide, $\frac{1}{2}$ pitch $\frac{1}{2}$ " rollers.—15, Kingsley Grove, Audenshaw, Manchester. 2690

REBUILT Motors and Generators. Long deliveries can often be avoided by purchasing rebuilt secondhand plant. We can redesign or replace surplus plant of any size. Send us your enquiries. Over 1,000 ratings actually in stock here.—Dynamo & Motor Repairs Ltd., Wembley Park, Middlesex (Telephone, Wembley 3121, 4 lines); also at Phoenix Works, Belgrave Terrace, Soho Road, Handsworth, Birmingham (Telephone, Northern 0298). 26

RECONDITIONED Sectional, Nissen Huts and other ex-Government buildings for sale. Several available ex stock, Nissens, 36' \times 16', £65-£73, delivered. No licence required. Write for further details or call to view prototype erected at—J. Thorn & Sons Ltd., Box 80, Brampton Road, Bexleyheath, Kent. 47

ROTARY Convertors, 200-kW, 6,600/3/50 input, 230 volts, 2-wire D.C. output, complete with Transformer and switchgear, seen running in Liverpool, 2,000-kW, 6,600/3/50 input, 41S/462 volts, three-wire D.C. output, complete with transformers, starting panels, D.C. machine panels. First-class condition. Two sets available.—Stewart Thomson & Sons (Liverpool) Ltd., Fort Road, Seaforth, Liverpool, 21 (Boothle 2697); or 28, Victoria Street, London, S.W.1 (Abbey 2101). 72

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

SACKS and Bags in excellent condition for all commodities, as low as 4d. each. Write—John Braydon Ltd., 230, Tottenham Court Road, W.1. Tel. No. Museum 6972. 79

SELF-Priming Electric Pumps, 300 g.p.h., £14 5s.—John E. R. Steel, Clyde Mills, Bingley, Phone 1066. 53

SPIRAL Elements for electric fires, boiling rings, and other appliances, supplied to order.—Electrothermal Engineering Ltd., 270, Neville Road, London, E.7. 54

SPIRALS, first quality, 500, 600, 750 and 1,000 watt, all voltages, for immediate delivery.—Box 59, c/o The Electrical Review.

SPIRALS, 230 50 volt, 1,000 watts, 106s.; 750 watts, 50s.; 600 watts, 60s. per gross, carriage paid.—Box 9675, c/o The Electrical Review.

SLAFF Time Checking and Job Costing Time Recorders (all makes) for quick cash sale. Exceptional condition. Write—Box 528, Smiths, 100, Fleet Street, London, E.C.4. 31

STEAM Generating Plant. The following is a selection of sets available in our comprehensive stock: 2,000-kW B.T.H. Turbo-Alternator, 6,600/3/50, 150/210 lbs. pressure, complete with surface condenser and all auxiliaries, seen running. 1,250-kW Brush Ljungstrom Turbo-Alternator, 400/3/50, 200 lbs. pressure, complete with surface condenser and all auxiliaries, seen running. 750-kW Adamson/Mather & Platt High-pressure Pass-out Turbo-Generator, 200-lbs. initial steam pressure, passing out 25,000 lbs. per hour at 80-lbs. pressure, 500 volts, three-wire D.C., with balancer, complete with surface condenser and all auxiliaries. First-class condition. Full particulars from—Stewart Thomson & Sons (Liverpool) Ltd., Fort Road, Seaforth, Liverpool, 21 (Tele. No. Boothle 2697); or 28, Victoria Street, Westminster, London, S.W.1 (Tele. No. Abbey 2101). 98

SUPERIOR Type Builders' Ladders now in production; also Steps, Trestles and Extension Ladders. Phone—Shafesbury Ladders Ltd., 453, Katherine Road, E.7. 15

TWO 20-kW, 120-v., D.C. Steam Turbo Sets and panels, Dynamo, 7.8 kW, 250 v., 550 r.p.m. comp.; 20-h.p. A.C. Motor, 200 1/50, S.R. 725 r.p.m.; 5-h.p. Peter Diesel Set, 200 220 v. A.C. on bed; various D.C. switchboards, Volt and Ammeters, Circuit Breakers and Cut-outs, 150-kW Alternator, 440 v., 3-ph.—E. Binns, 156a, Palsgrave Road, Scarborough. 977

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VERY good secondhand Ruston & Hornsby water-cooled, four-cylinder, totally enclosed, vertical Diesel Engine, set, 4, Class V50 No. 194748, 27 h.p., radiator-cooled, direct coupled to Lancashire Dynamo and Crypto 17-kW, 480/240 volts, 35.5 amps., open protected continuous rated Generator, running at 1,000 r.p.m., size D.38 No. 142516, dated 1938; complete with switchboard, fuel tank exhaust pipe, etc. Fowler Sanders vertical 6-cylinder enclosed Diesel Engine, type 6 B.H. No. 2143, 75 h.p., direct coupled on combined bedplates, Crompton Parkinson screen protected, compound wound Generator, 50-kW, 480-volts D.C. or 220-volts D.C. oil-cooled Static Balancer, back of board shunt field regulator mounted on cast iron bedplate, etc., cooling tank, exhaust silencer, push-button starter with 12-volt, 100-amp. hour battery. These sets are little used and are 95% new.—Tros. W. Ward Limited, Brettenham House, Strand, London, W.C.2. Telephone number, Temple Bar 9631. 2609

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2 Reconditioned Kango Electric Hammers, 200/250 v. in perfect working order. Price £20 each.—City Electrical & Engineers' Supply Co., 77, Minories, E.C.3. 2740

14-h.p. A.C. Motor, Crypto, 950 r.p.m., slipping type, protected, ring oil bearing, with starter, and 15-h.p. A.C. Motor, Brook, 940 r.p.m., slipping, ball bearing, with starter, both 200/220 volts, single-phase, 50 cycles. Best offer.—Tucker Bros. Electrical Engineers (Essex) Ltd., Hornechurch, Essex. 2945

5 kW and 2½ kW, 230/250-volt D.C. Generating Sets, complete with 4-cylinder, 10-h.p. Austin Engines, with petrol tanks, radiators, fans and switchboards. Large number available.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 103

15 kW portable Diesel-driven Generating Set, comprised of vertical 4-cylinder Dorman Diesel Engine, 1,000 r.p.m., coupled to 15-kW Alternator, 400/3/50, complete with Switchboard Radiator and all accessories (3 available). Full details—B.C.S. (Engineers & Contractors) Ltd., Central Offices, Taffs Well, Cardiff. Tel. Taffs Well 296. 2826

20 h.p. G.E.C. 380-v., 3-ph., 50-per., 960-revs. A.C. protected type, sleeve heating S.C. Induction Motor, with hand-operated star/delta starter.—Winwick Street Tannery Ltd., Warrington. 9709

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250 kW Rotary Converters (2), with transformers and switchgear, input 6,600 volts, 3-phase, 50 cycles, output 420/210 volts; also A.C. and D.C. Motors, Switchgear, Generating Sets, Welders, etc.—Midland Counties Electrical Engineering Co. Ltd., Grice Street, Spon Lane, West Bromwich. 46

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

500 only, strong returnable Cases, inside measure 16" x 8" x 13" deep, ¾" and 1" thickness, no battens, blind handles for lifting, lids secured with counter-sunk wing nuts to 3/16" bolts. No licence required. Price to clear, 2s. 6d. each, delivered nearest station 150 miles radius London.—Home Produced Boxboards Ltd., 10, Arthur Street, London, E.C.4 (Mansion House 0779). 2873

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5,000 good strong Crates, inside measurements 29" x 94" x 94", ¾" thick, battened all round, at 1s. 9d. each, ex works.—K. Goldser & Sons, 14a, Rectory Square, London, E.1 (Tel. Stepney Green 2550). 75

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WANTED, Kohler Lighting Plant, 110 v., 1,500 w., good s/hand, off service, reasonable, dynamo 3 kW, 110 v. comp., 600 r.p.m., 54 cells, 150/300 ah.—Box 9718, c/o The Electrical Review.

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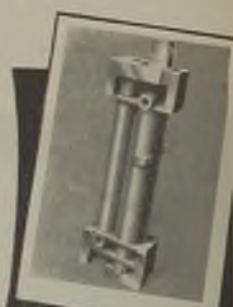
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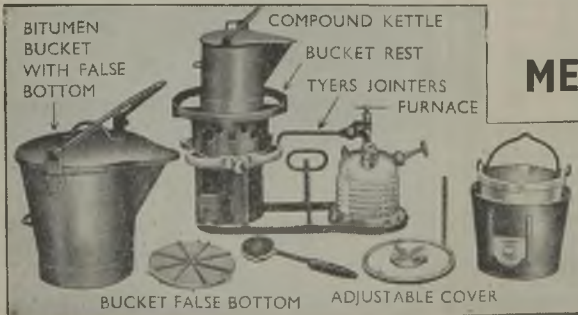
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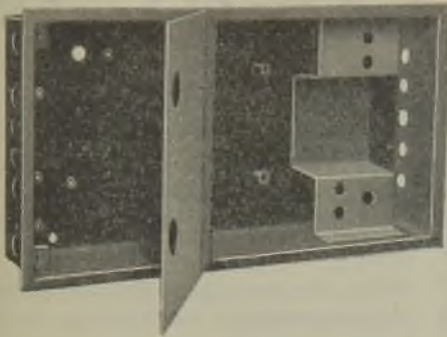
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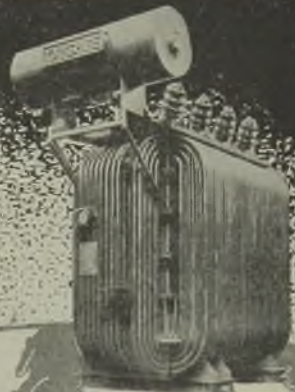
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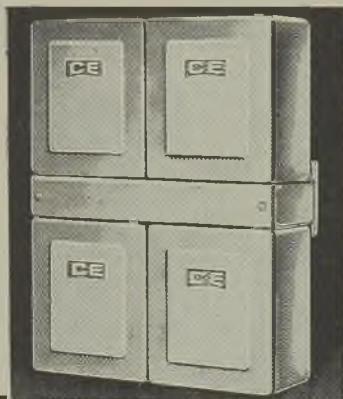
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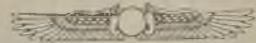
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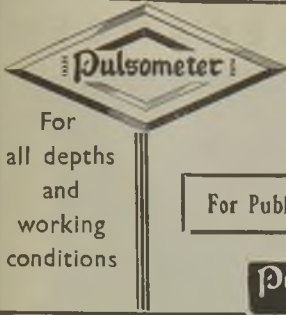
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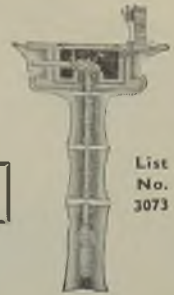
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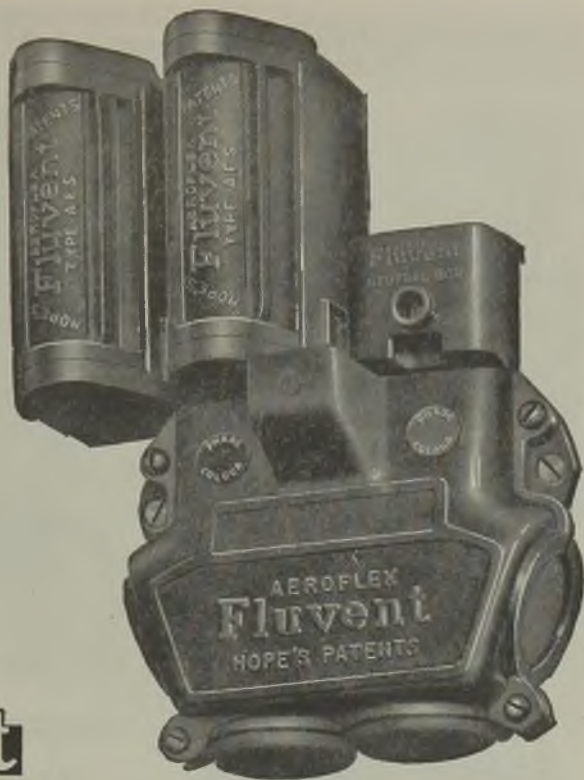
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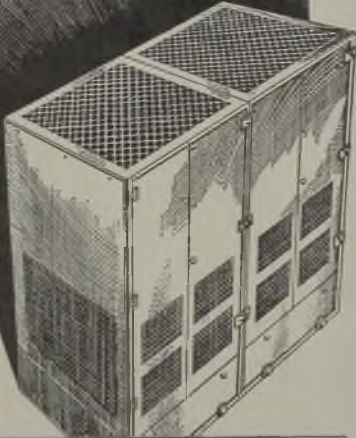
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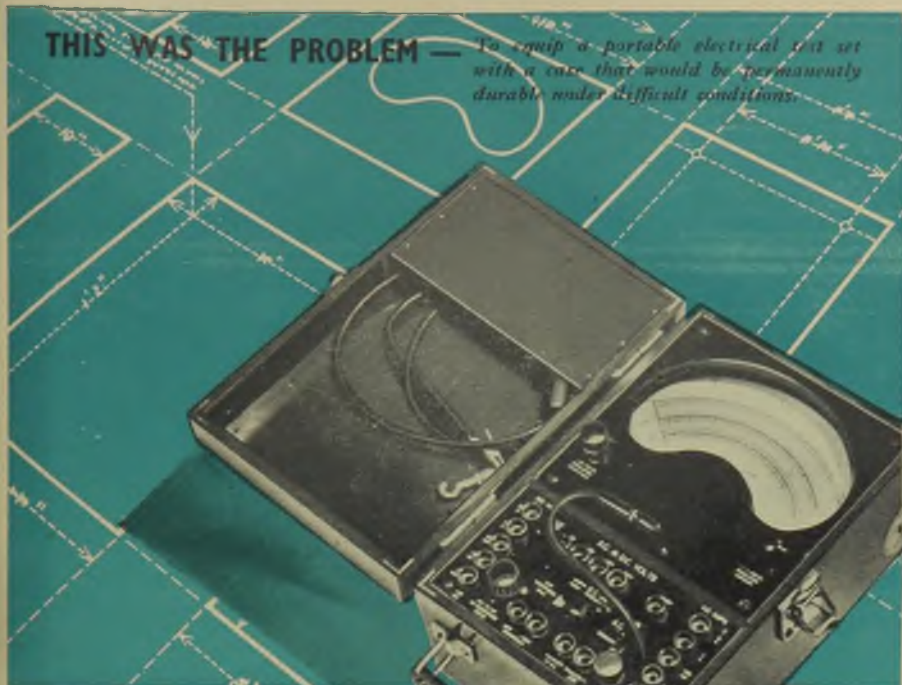
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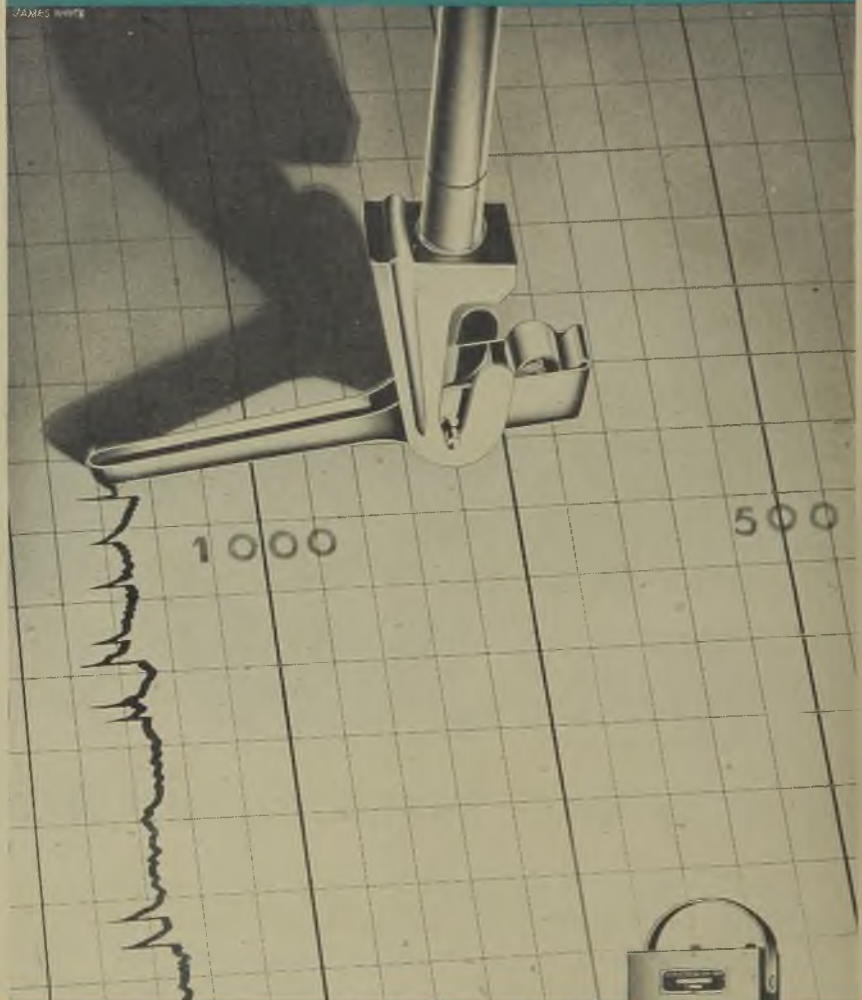
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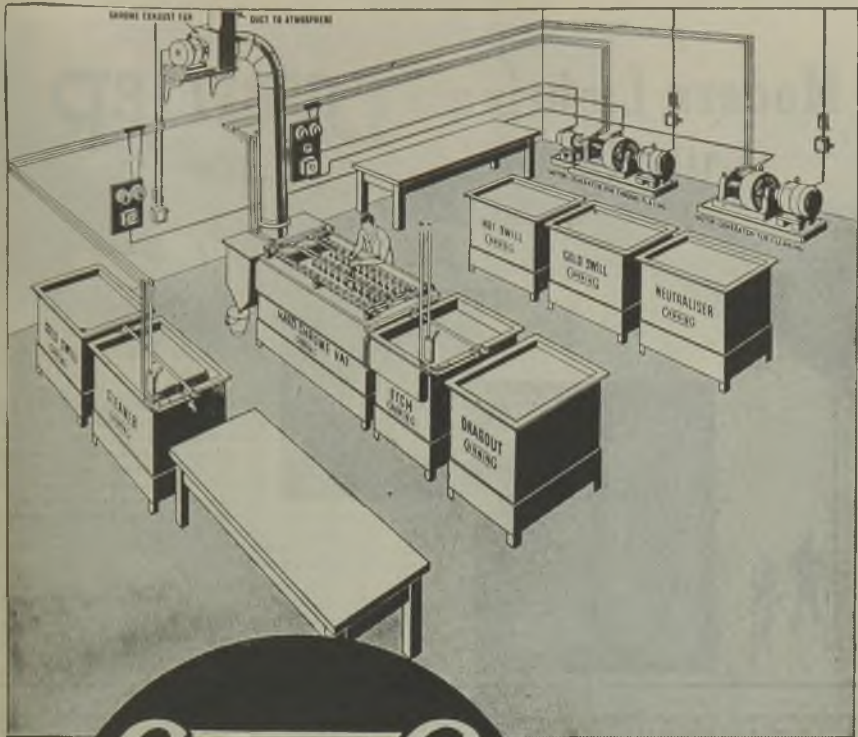
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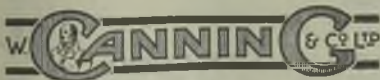


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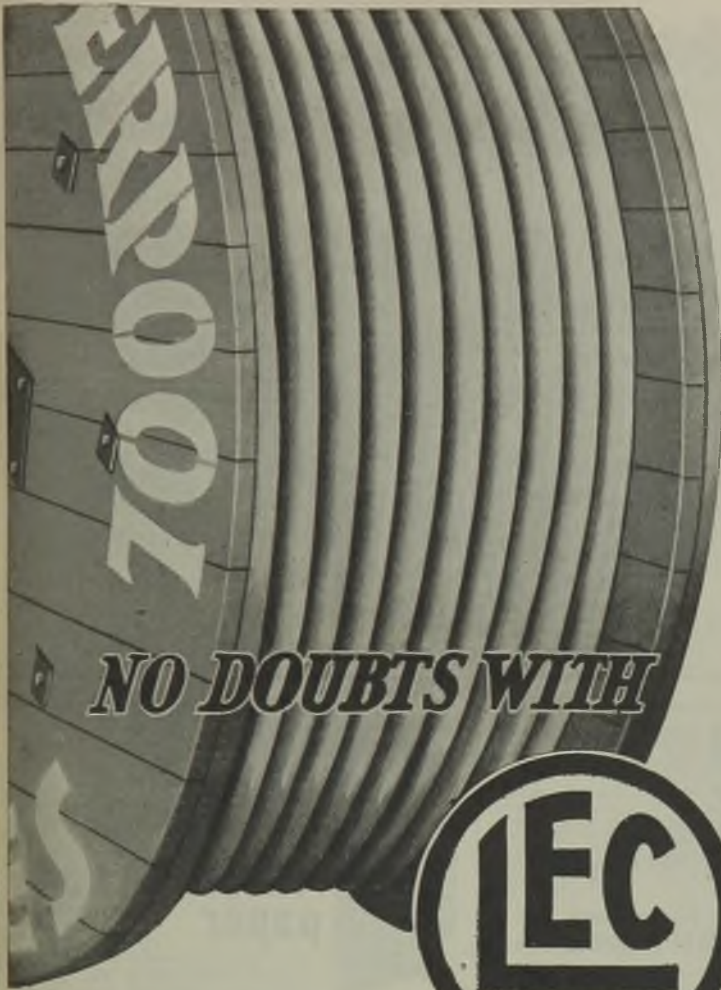
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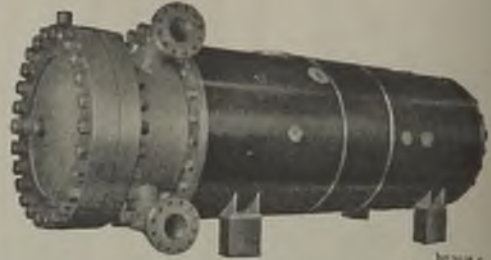
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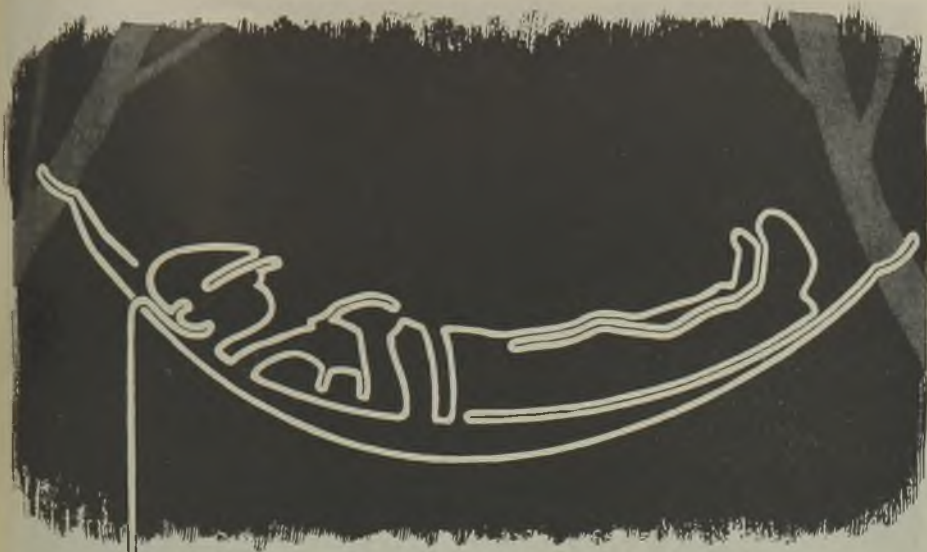
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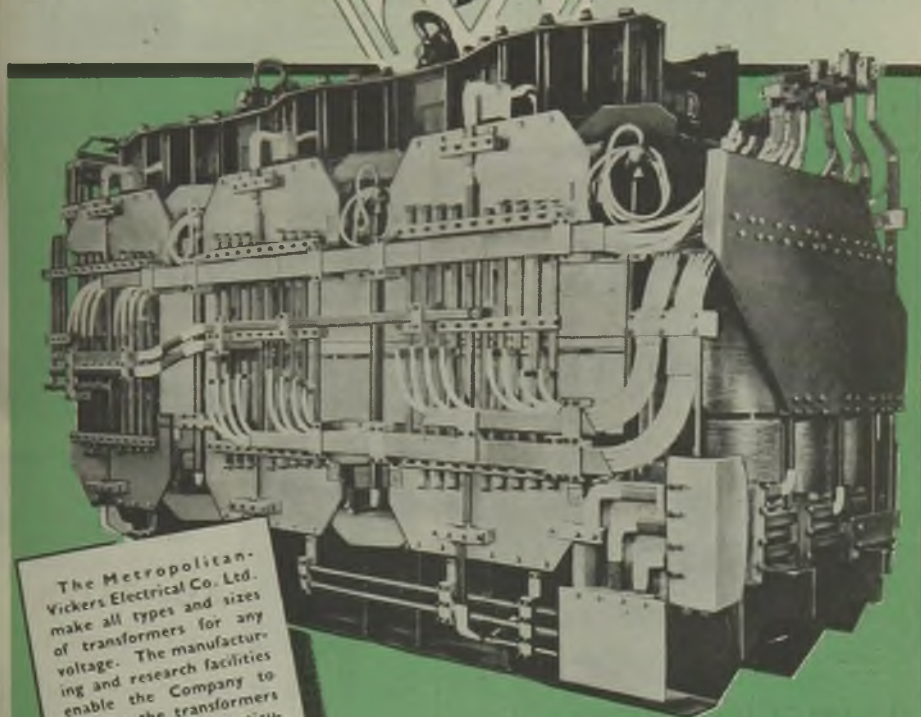
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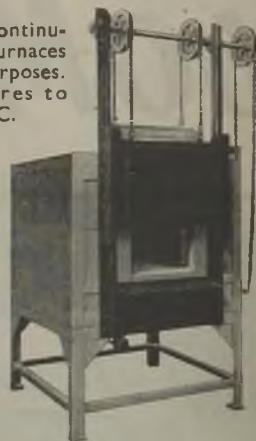
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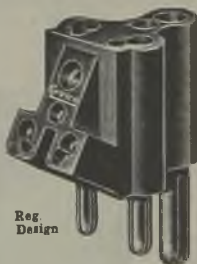
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Magnesium	Mg	0.8	-	0.36	-	1.09	-
Sodium	Na	0.46	0.23	1.0	0.31	1.66	0.44
Total		4.46	0.23	10.76	0.31	13.45	0.44
Anions							
Carbonate	CO ₃	4.2	0.24	12.4	0.29	10.5	0.57
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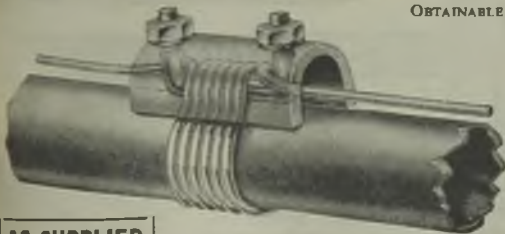
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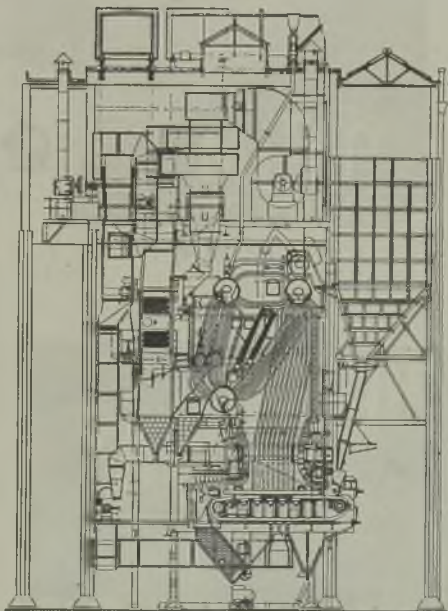
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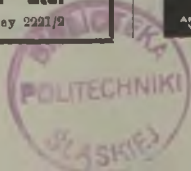
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