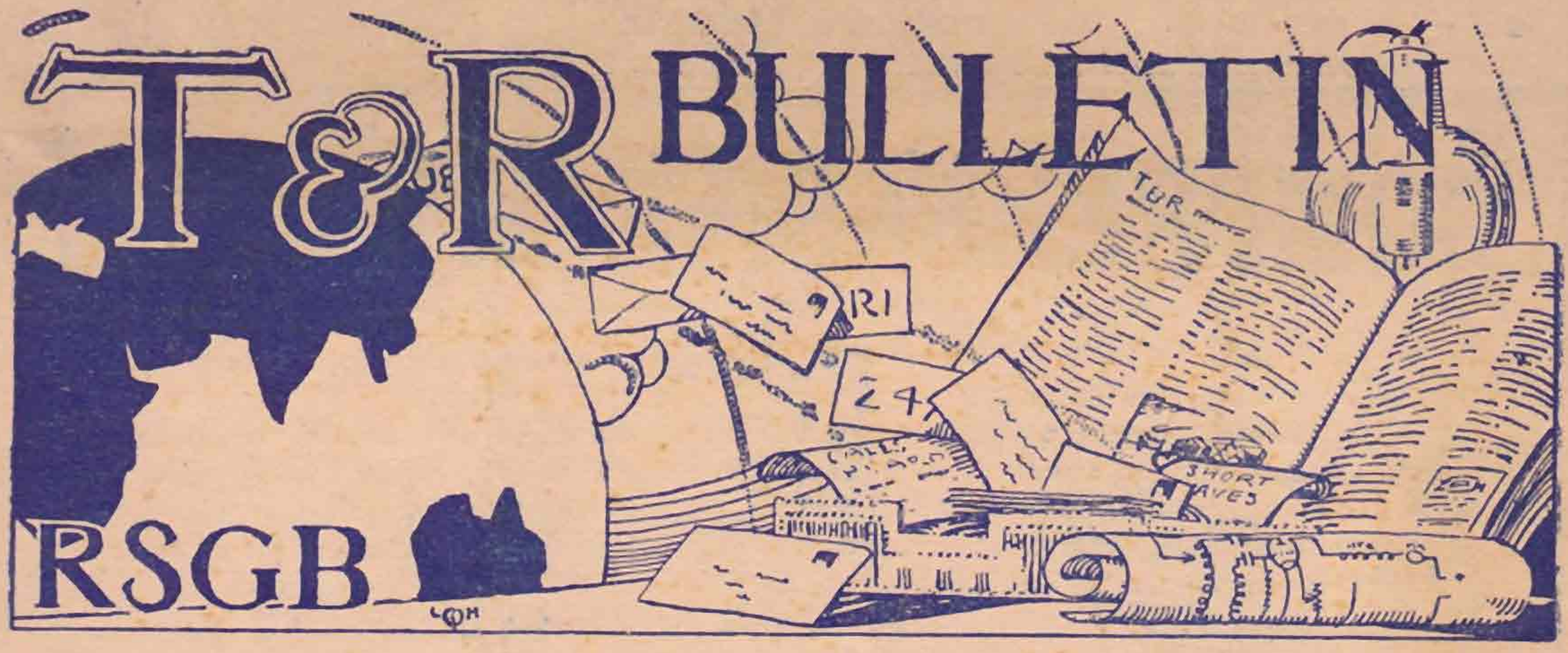

No. 8. March, 1926. Price 1/-

IONIZATION OF THE ATMOSPHERE

By G. G. BLAKE, M.I.E.E.—See page 4

Reasons for the great efficiency of Burndept Dull Emitter Valves

WHEN drawing up the programme for the manufacture of Burndept Super Valves it was decided that the 60 milliamp. filament valve was unsatisfactory for several reasons. First, the fragility of the filament prevented any form of tension being put upon it with the consequence that the filament sagged, giving widely different characteristics amongst the same type of valve. Secondly, nearly all valves of the class were exceedingly microphonic, even the slightest mechanical movement giving rise to loud ringing noises in the loud speaker.

Burndept, therefore, decided to overcome these difficulties before offering a low consumption valve to the public, and the H.310 and H.L.310 are the result of the experiments successfully concluded. Both types have similar filaments and constructional features and are absolutely silent under the most adverse conditions. They are used successfully under conditions where the mechanical jarring and noise is excessive.

TYPE H.310

CHARACTERISTICS

Fil. Volts	2.8—3.0
Fil. Current	.10 amp.
Amplification Factor	15
Anode Impedance ..	77,000
Total Emission ..	6.0 milliamps.

(Taken at 40 plate volts.)

OPERATION

The chief function of this valve is as an amplifier using the resistance-capacity coupling. 100,000 ohms is a suitable value for the resistance, and the value of the coupling condenser will depend on whether the valve is a high or low frequency amplifier.

As a detector, the "anode bend" method of rectification should be employed, i.e., no grid condenser or leak is needed. This gives silence of operation, and is particularly applicable to the first detector of super-heterodyne sets, or the detector of short wave sets.

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TYPE HL.310

CHARACTERISTICS

Fil. Volts	2.8—3.0
Fil. Current	0.1 amps.
Amplification Factor ..	6.0
Anode Impedance ..	19,000
Total Emission ..	7.0 milliamps.

(Taken at 70 plate volts.)

OPERATION

This is a general-purpose dull-emitter capable of functioning as an H.F. amplifier, detector, or L.F. amplifier.

On the high-frequency side, tuned anode or transformer coupling may be used, the detector working with grid leak and condenser rectification. For low frequency amplification, a 4 : 1 ratio transformer is suitable, and if the grid bias is suitably adjusted to the plate voltage, excellent volume and purity of tone is obtained.

PRICE .. 16s. 6d.

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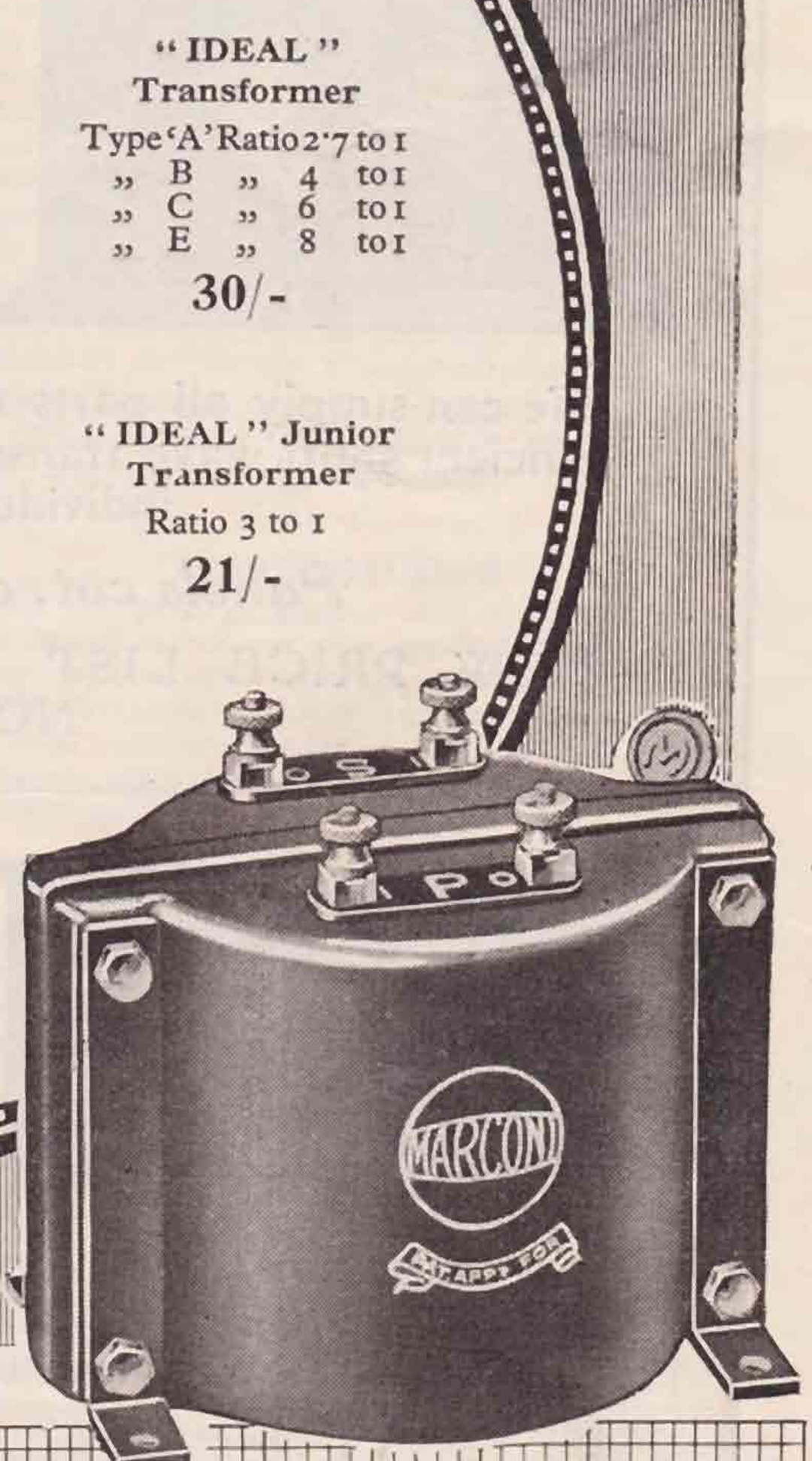

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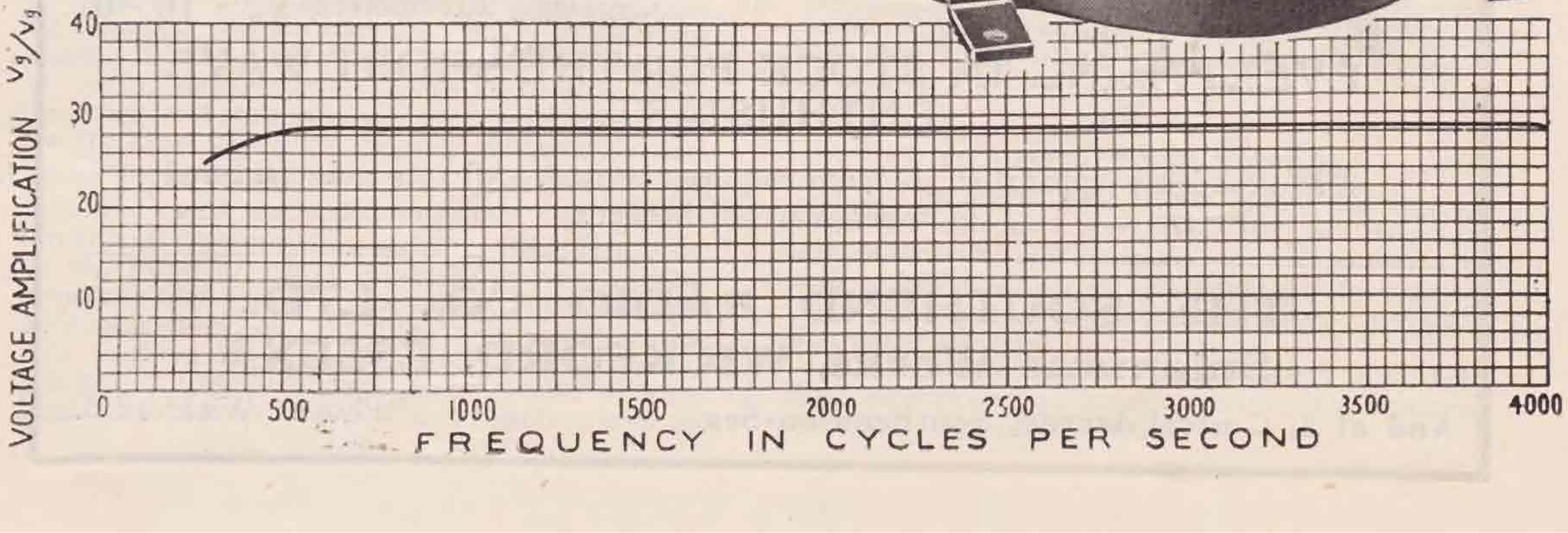

T. & R. Bulletin

Devoted to the Interests of the Transmitting Amateur

— The Official Organ of —

THE TRANSMITTER AND RELAY SECTION

of

THE RADIO SOCIETY OF GREAT BRITAIN,

53, Victoria Street, S.W.1

The EDITOR will be glad to receive articles and illustrations within the scope of the BULLETIN. The illustrations should preferably be double size and should be original. Contributions should be addressed to 53, *Victoria Street, S.W.1., and marked EDITORIAL, ADVERTISEMENTS, Etc.*

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T. & R. BULLETIN

The only British Wireless Journal Written and Published by Amateurs

MARCH, 1926. No. 8.

EDITORIAL

Q.R.A. & Q.S.L. Section R.S.G.B.

THE above-mentioned Section has come into existence owing to the fact that many members have felt that the need for it exists. The direct cause of its creation was the letter of Mr. Jamblin, of Bury St. Edmunds, which was reproduced in our February issue, and Mr. Jamblin has kindly signified that he is prepared, with the collaboration of our Editorial Department, to be responsible for the organisation and execution of the duties involved in the working of a Section which we think will be as useful and as important as any which we have as yet attempted. Members will realise, after a few moments thought, what a useful acquisition this Section will eventually become. To the transmitter the facilities which it offers are invaluable and are alone worth the small amount charged per annum for membership. We think and hope that it will be the means of securing a membership far greater than we have at present, although even now our strength is increasing quite satisfactorily. Our print of the BULLETIN for last month was only just sufficient for our requirements and we have not a single spare copy, even though we might be offered £5 for it!

The manner in which this Section is operating is as follows:—If you have a card for a foreign station whose address you do not know, you merely address it to the station by call sign, sufficiently stamped to reach its destination, and enclose it in a sealed envelope addressed to the "Q.R.A. and Q.S.L. Section," 82, York Road, Bury St. Edmunds, Suffolk. If you have a number of cards you treat these in the same manner, and Mr. Jamblin will see that they get into the right hands. We hope that ultimately we shall be able to make arrangements to do this with other countries, and thus save you postage expenses, but for the time being we are only prepared to deal with French and Belgian cards in this manner.

Similar cards received from France and Belgium for British transmitters, or from other countries, by Mr. Jamblin, will be forwarded to you by him, providing that you keep him supplied with stamped addressed envelopes. Another point is that we are only working for "T. & R." members, so that if you have a friend who is having difficulty with his cards and postage, and is not a member, it is up to you to see that he becomes one, so that he is able to avail himself of these facilities.

To ensure that the usefulness of the Section be maintained, we ask that all members will help us by forwarding any new QRA's they hear of, not already published, and also notify the Section immediately of any change of address. These will be published in the BULLETIN, as also will lists of cards held for delivery upon application.

We would again remind you that stamped addressed envelopes, or cards, must accompany all inquiries to the Section where replies are asked for.

Communications should be addressed:—Q.R.A. and Q.S.L. Section (T. & R.), R.S.G.B., 82, York Road, Bury St. Edmunds, Suffolk.

CORRESPONDENCE.

You will perhaps realise that our mail bag is fairly heavy, since our average post bag per week (reception) is about 70 letters, without the business side of our organisation! In consequence, it will help us if members would send stamped addressed envelopes when they require a reply to a communication.

CONTRIBUTORS.

We have now a number of regular contributors, to whom we extend our heartfelt thanks for their kindness. We would like, however, to ask that when sketches are submitted, great care be taken with the details, so that they are perfectly clear to the draughtsman. Also articles should be kept reasonably short and, together with illustrations, should not occupy more than two pages if possible.

"CALLS HEARD."

Many members regularly send lists of "Calls Heard." It would assist us if the scheme used by us in print were adhered to by these contributors and that "Calls Heard" should be DX as much as possible.

TO DISTRICT SUB-EDITORS.

Those members who are so kindly assisting us with the collection of reports, etc., are asked to see that their contributions do not exceed one and a half columns at the most and to exercise their discretion in "weeding out" when they have too much material.

In conclusion, we thank everybody for their kind support and assistance in making the BULLETIN such a successful proposition.

Ionization of the Atmosphere.

PAPER READ BEFORE THE T.& R. SECTION, LONDON, JANUARY 8, 1926, BY G. G. BLAKE, M.I.E.E.

THE pressure of the atmosphere is about 15lbs. per square inch at the surface of the earth, and the atmosphere is a very good insulator from the earth's surface to a height of 35 miles. At this height a state of rarefaction is reached about equivalent to the condition of the gas in a soft X-ray tube. The molecules of air are now comparatively few and far between, and if given a charge can travel with relatively few collisions.

In this state the atmosphere, or what is left of it, suddenly becomes very conductive, and a little higher still it has a conductivity to H.F. currents, equal, according to Sir J. J. Thompson, to a 25 per cent. solution of sulphuric acid. A thickness of half an inch only at this height would be so conductive that it would act to electric waves like a metallic reflector and completely stop their passage. As we go still higher, the air again loses its conductivity and it becomes so rarefied that there are insufficient molecules to carry any currents. At about 80 miles height if has a resistance equal to a very hard X-ray tube, and after this it becomes less and less conductive until at last it is a practically perfect dielectric in which few, if any, molecules exist, and we have left the earth and are in the ether of inter-planetary space.

The conductive stratum of the atmosphere is termed the Heaviside layer, after Oliver Heaviside.

I wish Dr. Eccles was here to-night. He could probably tell us as much about it, and its effects in reflecting waves, as anybody. In his "Handbook of Wireless Telegraphy," Dr. Erskine Murray tells us that "the non-conductive shell which surrounds the earth is only 35 miles thick, less than a hundredth of its radius; it is bounded below by the earth which has a resistance of about 6,600 ohms. per c.c., or the sea having a resistance of 373 ohms. per c.c., and above by a layer having a resistance of not more than 10 ohms. per c.c." As he points out, the upper shell conducts 660 times as well as damp earth or 40 times as well as the sea. We have said that this 35 miles shell is a good non-conductor; this is so on the whole; but is subjected to regular and irregular changes in its conductivity. The regular changes are due, according to one theory, to streams of electrified particles which are ejected from the sun and which during the day impinge on the outer borders of our atmosphere and ionize it, forming the Heaviside layer. These changes recur daily as the earth revolves.

Senatore Marconi, in 1911, was the first to point out that signals would travel vastly further by night than day. In other words, they travel best when the air is in its most non-conductive condition. He also pointed out that the worst time for signalling (when the greatest dissipation of energy occurs) is at mid-day when the air is most conductive. Marconi attributed the phenomena to sunlight.

Admiral Sir Henry Jackson has pointed out the strange variations which take place in the ranges of wireless transmissions in apparently fine weather altogether independent of the day and night effects referred to.

He showed that a distance of 65 miles might suddenly be reduced to 22 miles. He also observed that similar changes are generally observable when the barometer is falling and a storm brewing. Dust and damp have also been shown to have appreciable effect on signalling in the reduction of signal strength.

Positive and negative ions are always present in the atmosphere to a greater or lesser degree, and there is always a small vertical electric current passing between the upper atmosphere and the earth. In fine weather the potential of the air is, as a rule, higher than that of the earth. During rain the potential gradient alternates between positive and negative, and in thunder storms at each lightning flash a sudden change of potential is observed. In fogs the potential gradient is high. Many observations have been taken at Greenwich, Kew and Eskdalemuir, in Scotland. At Kew the maxima occur in the evening and late morning hours, while the minima occur in the early morning and early afternoon. The potential gradient is lower in the summer than winter.

The first 35 miles of air nearest to the earth is the dielectric, which mainly affects our wireless transmissions. It is undergoing constant changes in its conductivity. Some more or less regular and others absolutely irregular owing to ionization.

In 1912, Dr. Eccles, in a paper on the "Diurnal variation of electric waves and their propagation round the earth," showed that in ionized air the velocity of waves may be increased, and owing to this increased velocity as they travel through the Heaviside layer they are bent down or defracted. Both Eccles and Fleming have pointed out that the decreasing density of the atmosphere should produce a certain amount of refraction independent of the ionic refraction.

The most important change in the conductivity of the atmosphere is the diurnal variation which takes place in step with the daily variation of atmospheric electrification.

The maxima at the surface of the earth occur in the morning between 8 and 10 o'clock, and between 10 p.m. and 1 a.m., and the minima between 2 p.m. and 4 a.m. Air even in closed vessels is subjected to the same variations. There is a progressive delay in the occurrence of the sunset minimum with increase of wave-length. This makes it extremely difficult to compare and draw conclusions from curves showing diurnal changes of potential gradient with curves showing diurnal variations of received signal strength. Again, practically all the potential gradient curves available have been taken at comparatively low altitudes.

Those of you who are interested and wish to carry a study of these matters further, will find most valuable data and information in the "Report on measurements made on signal strength at great distances during 1922 and 1923 by an expedition sent to Australia." The paper referred to is by Captain Round, Captain Eckersley, and Messrs. Tremellen Lunnon (see the Journal of the I.E.E., Vol. 63, October, 1925).

In addition to the cosmical ionization there is another cause of atmospheric ionization. Elster and Geitel, as far back as 1901 or 1902, observed that the air in caves and cellars was almost always abnormally radio-active.

In 1901 both Geitel and C. T. E. Wilson independently showed that a charged conductor placed inside a vessel gradually lost its charge due to ionization, whereas out in the open air it lost its charge much more rapidly, according to its locality and the atmospheric condition prevailing. It occurred to Elster and Geitel that this ionization might be due to the presence of radio-active matter in the atmosphere.

Their first experiment consisted in charging a cylinder of wire netting to 600 volts for several hours in the open air. It was then removed and placed in a large bell jar in which was an electroscope, and the rate of discharge of the latter was perceptibly increased. Next, they employed a wire 20 metres in length, and this, after a few hours' exposure under similar conditions discharged the electroscope many times faster. No increase was observed if the wire was charged positively. It was both anticipated and discovered that the wire had become radio-active. The radio-active deposit could be removed by rubbing with a piece of leather moistened with ammonia. The leather then exhibited radio-activity instead of the wire. The radio-activity faded out after a few hours, and was quite independent of the metal employed. Lead, iron and copper wires all gave the same result.

In 1902, Sir E. Rutherford repeated these experiments and found that the radio-activity decayed to half value in 45 minutes. Velocity of wind does not appear to affect the amount of active matter collected on a wire.

The conclusion arrived at by these and many other experiments was that emanations of radium and thorium are everywhere present in the lower strata of the atmosphere. Wilson has shownHH strata of the atmosphere.

Wilson has shown that freshly fallen rain is radio-active.

McLennan found that the activity collected by a wire at the foot of the Niagara Falls equals only one-fifth of the activity obtainable at Toronto City. The greater part of the activity matter was evidently removed by the spray which was found to carry a negative charge of some 7,500 volts.

The Effect of Meteorological Conditions.

Elster and Geitel found that the amount collected was subjected to great variations. More could be collected if the temperature was low. A lowering of barometric pressure increased the amount collected as would be expected, for if the emanations came from the soil with a low pressure, more air would be drawn up through the soil into the atmosphere.

In the higher parts of the atmosphere there is, it is believed, only one maximum at 12 a.m. and one minimum at 5 daily.

Sir J. J. Thompson has pointed out that the greatest loss of energy should take place where there is the greatest amount of electrical energy (near the transmitting aerial) and that it should increase with the wave-length. (Murray's book.)

The conductivity of the earth may to some extent be influenced by the sun's rays, but it is certain that the conductivity of the air is influenced to a far greater extent.

In 1896, Birkeland, of the Norwegian Polaris expedition, suggested that the Aurora was caused by electrical radiation emitted from the sun corresponding to cathode rays in a Crooke's tube.

It is now, I think, accepted as a fact of science that streams of B particles are emitted from the sun, and these arrive with the sun's light during day time and penetrate into the atmosphere, both electrifying it and ionizing it. When this side of the earth is turned away from the sun the equilibrium is gradually restored amongst the molecules of the atmosphere which again gradually resumes its non-conductive condition.

It has been pointed out that the zone between darkness and light acts as a barrier to long waves. The angle of refraction is altered at this zone. As the sun's rays pass over the dividing line between lightness and darkness their ionizing effect is removed from the previously illuminated zone so that the electrical resistance of this part of the atmosphere is increased. The daylight layer gradually disappears and merges into the night layer. During the period of transition an increase in local absorption occurs.

E. V. Appleton and A. F. Barnett* recently carried out measurements of signal strength during a solar eclipse, and showed that the same effects occurred as at sunset.

Simpson, experimenting in Norway, showed that the amount collected on a wire was about the same in winter, when there was no sun, as in summer in sunshine. Elster and Geitel, in Germany, showed that frost and snow on the ground made no difference. There is much less activity to be collected over the sea than over the earth.

Sir J. J. Thompson has shown that air bubbled through tap water exhibits increased conductivity.

At this point I will make two suggestions :—

(1) Flame produces violent ionization of the atmosphere, and I suggest that it would certainly be interesting to note if directional fading occurs should a big fire intervene between two moderately close communicating stations.

(2) If Sir J. J. Thompson is right in saying that the greatest ionization losses occur in the vicinity of the transmitting stations, it might be possible to attract away the ions from the aerials by means of an adjacent electro-static field. Say, two highly charged wires somewhere in the neighbourhood of the aerials.

It has been known for some years that if an electroscope is completely shielded by lead, it still exhibits a leakage effect. This has been attributed to the presence of Gamma radiations from radio-active emanations in its vicinity. In 1922 Dr. R. A. Millikan commenced a series of investigations† as to the cause of this leakage, and recently, at the National Academy of Science, Wisconsin, U.S.A., he claimed that he had discovered the presence of a Cosmic radiation hitherto unknown, and of far shorter wave-length than the Gamma rays of radium (50 times shorter).

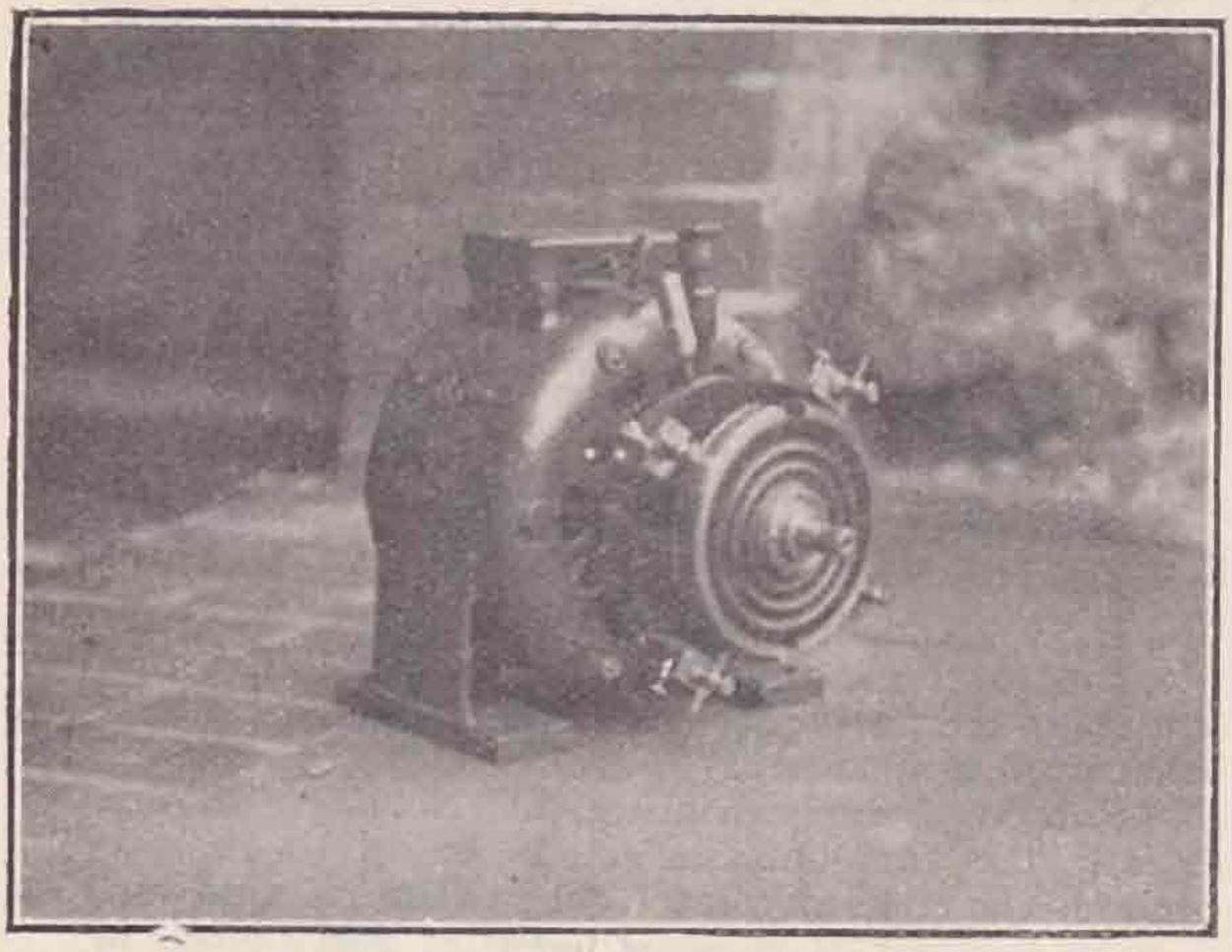
He placed a recording electroscope heavily shielded with lead in a balloon, and contrary to expectation he found that at a high altitude it discharged many times more rapidly than at the earth's surface.

This was surprising, for at the earth's surface its discharge might be due to the presence of Gamma radiations from radio-activity in its vicinity, but at a high altitude the earth's radiations should be negligible. (*Concluded on page* 9.)

* Proc. 22. Cambridge Phil Soc., Aug., 1925.
† *Discovery*, Vol. 7, No. 73, Jany .. 1926.

A Synchronous Rectifier.

By Basil Davis, Grad. I.E.E., 2 BZ.



THERE are many rectifiers more or less suitable for the H.T. supply to transmitting plant. They all have advantages, one over the others, which are nearly always counteracted by some serious disadvantage.

Take, for instance, the much used and abused electrolytic rectifier. The popular "grouse" that it is unreliable and messy is nearly always due to the fact that it is made much too small for its job, with the result that it tries to boil when its owner tries to reach the Antipodes and generally makes itself a nuisance. If made really large enough, in the writer's opinion there is little to beat it, but it takes up a lot of valuable room. The thermionic rectifier, of course, is more or less perfect until its filament breaks, and then it is a source of regret.

We have (some of us) enough to pay for big valves without this extra expense. Of course there are S tubes—there really are S tubes—somewhere.

But a rectifier that never seems to get the attention that it deserves is the synchronous commutator, or sink, as "hams" call it. After all, what is against it? It cannot break down, it is not messy, it will, if properly designed, stand really high voltages, and for transmitting purposes unlimited current, and will wear for years. But a synchronous self-starting motor is expensive to obtain. The writer will endeavour to explain how he made one for the cost (plus labour) of 30s. or under which will handle an output of 900 watts and is very satisfactory. The only things necessary were a ¼ h.p. squirrel cage motor, some scrap ebonite, and scrap brass such as every experimenter has by him, and last, but by no means least, access to a lathe and a slight knowledge of turning. The motor was obtained from a London "junk" dealer known to many readers, was 4 pole, did 1,500 revs. per minute, was ¼ h.p., and cost £1. The rotar was drawn out of the frame and the end rings of copper unsoldered and removed carefully from it. (These rings, which are on the rotor of every squirrel cage motor, will be found at each side of the rotor laminations. They serve to short-circuit the conductor bars which are passed through holes in the laminations and are soldered into holes in the end rings). Having removed the rings, the copper bars were withdrawn from their holes and the locknuts loosened and taken off, thus dismantling the whole rotar. The laminations were found to be cut from circular discs, leaving a periphery about ⅛in. wide held to the centre by three "spoke" pieces, as sketch 1. Each lamination was then cut, as sketch 2, four triangular pieces being snipped out with metal shears, each cut being about ⅛in. deep, or making the point of the V about 3-16in. from the inner edge of the periphery of the lamination. This will leave the lamination more or less in the form of a cross.

The rotar was then reassembled, excepting the copper, and was held in the vice and trimmed up with a file. Then the bars were put back through their holes and the end rings soldered on again. The bars were also put through the end rings and across the spaces where the iron had been cut out. This left the rotar of much the same appearance as before dismantling. Then it was attempted to replace the rotar into the frame between the poles. Of course, though it came out, it would not go in, and had to be slightly skimmed or trued up in the lathe before it would spin satisfactorily. The motor, which had a separate starting winding, was then switched on. Rather to the surprise of the writer, it at once started up. Owing to the shape of the rotar, if it ran at all it must then be synchronous, and such it was found to be doing, exactly one revolution for two cycles.

The next thing was the commutator, and for this a disc was turned about ½in. thick and 4in. diameter out of ebonite. As it will be seen later, ebonite is good enough, as the brushes do not touch it at any time. On the ½in. wide circumference of this disc are fitted strips of copper or brass; they are bent to fit and secured by screws (well countersunk), and the whole skimmed true in the lathe. The distance between the ends of the brass strips should be at least ½in., and if the brass is not very thick the ebonite between should be cut away, leaving at least ½in. depth from the circumference. Next, one of the bosses which hold the bearings on the motor was turned so as to make it true and smooth outside instead of rough casting. Another disc of ½in. ebonite was then turned, this time at least 6in. in diameter. It was also bored to fit on the turned boss of the motor and a hole drilled from the edge to the centre bore, a long screw being fitted in this hole to secure the rocker disc in any position. Note, that as the rocker has to be adjusted under load, it is advisable to fit an ebonite handle on the securing long screw. The large disc is then drilled at four equi-distant positions on its edge, of course at right angles to its plane, and four large terminals fitted. As these are to hold the brushes they should be of the kind with holes through them and a small screw on top for securing the cable (in this case the brush). The brushes were made of wire gauze rolled up tightly and pushed through the holes in the terminals until they just touched the commutator.

A high tension A.C. was applied to two *opposite* brushes, and on suitably adjusting the rocker a

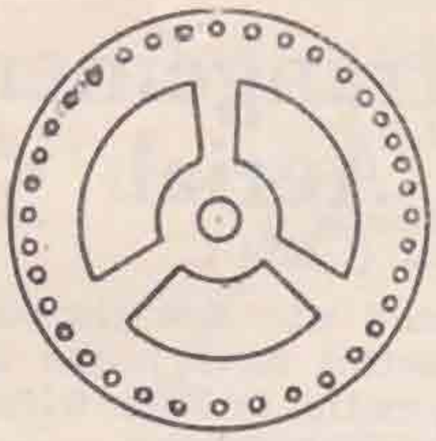


FIG 1

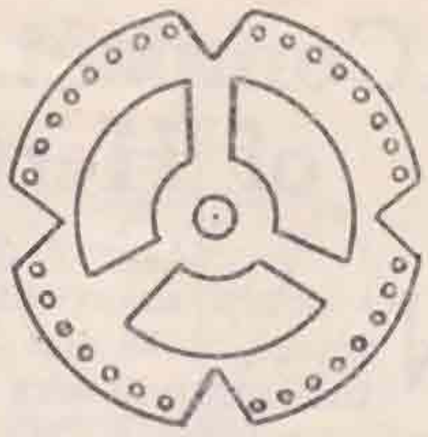


FIG 2

D.C. could be drawn from the other two. It was found that the sparkless position on load was slightly different to on no load, therefore the valve should be alight before switching on the H.T.

The output can easily be smoothed by any of the usual filters, taking care, however, that a choke is connected in one lead, it matters not which, before any condenser connection. This is important as it prevents the condenser discharging suddenly when the commutator "makes." Of course the motor has to be switched off for receiving, and a reversing switch should be connected in the H.T. transformer primary, as one never knows with which polarity the rectifier happens to start. The writer will be happy to give any further particulars to anyone who requires them and will write to him (see amateur directory).

The Attitude of Mind in America to the Amateur and His Work.

By W. M. BAKEWELL.

THERE is in the States a very good feeling existing between the amateur and the professional. It is admitted over there that although the amateur is a nuisance he has done some really fine work, especially in times of emergency. As an example of this take the case of the recent earthquake at Santa Barbara. All the cables were destroyed, but within an hour of the disaster the outside world knew what had happened by means of amateur radio. One can find dozens of similar cases.

Dr. Taylor, in charge of the naval research laboratory at NKF, told me that if it had not been for amateur co-operation a lot of their work would never have been accomplished. Then you have the example of NRRL, WNP, WAP, all of whom can't speak too highly of the assistance the amateurs have given them. A good many of us amateurs are members of the Naval Reserve, and those that are not are all good operators; look what it means in case of war—the U.S. has got 10,000 trained operators, who know code and how to handle their apparatus, ready at once for service.

I am dealing with the amateur position in these articles. But a word as to American commercial radio. She is well in advance of us in low power short wave commercial operation; in aircraft radio she leaves us standing still, and the whole reason for that is due solely and simply to researches that have been made by the amateur.

I know full well a good many people will challenge that last remark as to the amateurs, nevertheless, as far as America is concerned, it is a fact. The amateur was given the low waves to keep him out of the way of commercial stations; he developed them, studied them and found their usefulness, so that when the commercials and the navy got on to the job they went to the amateur for advice and help—as witness Reinartz on the McMillan expedition, Schnell on the U.S.S. "Seattle." There are hundreds of amateurs employed by commercials who are working on the low waves.

America encourages her young men, and especially in radio; she realises just how much it means, and so she gets a lot of radio research done gratis. Yet the American ham is, in general, a traffic handler, "a brass pounder." There are probably only about 10 per cent. of the whole who are experimentalists in the sense we mean, yet when you have some 10,000 and over of amateurs, that 10 per cent. represents an immense amount of research.

It is all very well for some of our technical men to say "the amateur is of little use until he becomes a professional," but the fact remains that the more you have engaged on a research, either in a professional or amateur capacity, the quicker you get results. Hence the superiority of commercial short wave in America. Give the commercial people their due, they admit their indebtedness to the amateur, and what is more they back him up.

Before leaving commercial radio, I should like to mention broadcasting in the States as compared to our own. Their stations are more numerous and more powerful, but their modulation and the class of music they broadcast is inferior to ours. They were very good to me, I saw a great many broadcasting stations, and heard dozens; but the B.B.C. can congratulate themselves on their work; one does not realise how excellent their concerts are until you have listened to American stations for a few months.

In fairness to American broadcast, I want to point out that in every case their stations are private enterprise, there is no licence for receiving, and the only return the stations get is from the advertising of the firm who owns the station.

As to the work of the amateur in the States he has many things to his credit, such as the transcontinental experiments of Reinartz on 40 and 20 metres, the transmission of pictures by radio, to quote his latest achievements. They are now working hard on the Hertzian aerial system or Hertzian oscillator. QST are publishing in the near future some work on this system. Also, some good spade work has been done on 5 metres and ¾ metre wavelengths, but little has been published yet because they have got very few real results: their best recent work has undoubtedly been the work on 20-40 metres.

The American amateur ought to do good work. He has all the facilities he wants, and yet this country still holds the records for good DX. There are a few of our amateurs who have got special privileges who do some wonderful work. One would think the authorities would see from that what could be done by the English amateur if he only had the facilities.

In conclusion, the American ham realises the difficulties we work under; because of that he has a lot of sympathy with us and a great admiration for the work our hams have done under the circumstances.

G2OD.

Rumour says that 2OD works in a bank. We are somewhat inclined to think that he works on the key. If he works in a bank when does he sleep?

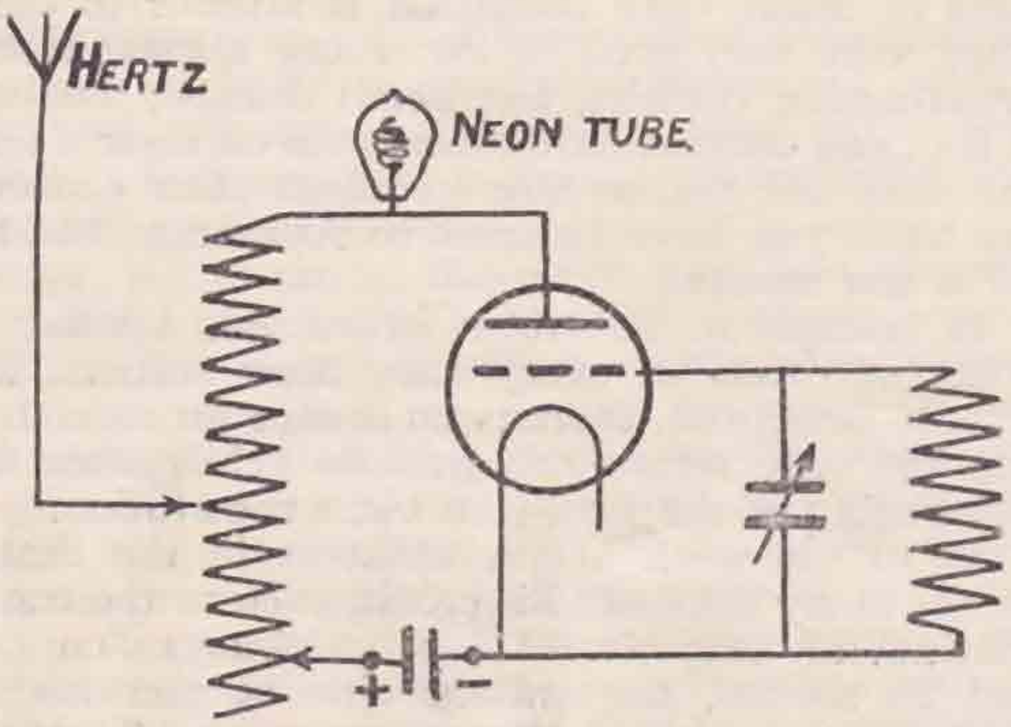
Tuning of Low Power Transmitters Using Hertz Antennae.

By 6YV.

THE greatest objection to the use of the Hertz antennæ with low powers is undoubtedly the difficulty of tuning the transmitter when the potential gradient at the nodal point is not sufficient to light a lamp, and so give an indication of resonance. When the Hertz was first tried at 6YV, very indifferent results were obtained owing to the impossibility of tuning the transmitter accurately. A neon tube method is now employed, and gives greatly improved results. (*See sketch*).

As it is well known, when one electrode of a neon tube is placed in contact with the high potential end of the anode coil it glows, the intensity of the glow being roughly proportional to the voltage at the point of contact.

The aerial is first tightly coupled to the receiver by tapping it directly on to the grid coil. By adjusting the tapping, the receiver can be made to go out of oscillation, and by noting the point at which oscillation ceases, the receiver may be roughly tuned into resonance with the aerial. The transmitter is then tuned so that maximum glow of neon tube is obtained on the point of resonance as roughly indicated by the receiver. The aerial is then



tapped on to the anode coil, and on making a few minor adjustments, two points of maximum glow are obtained with a sharply defined minimum point between them. This minimum point is the point where the aerial is putting the greatest load on the transmitter, i.e., where the two are in resonance. The transmitter is then carefully tuned to this minimum point.

The tuning will be found to be very sharp, at 6YV. 1 metre either side producing a very considerable increase in glow. It is important to get aerial coupling at the most efficient value. If coupling is too tight (i.e., aerial tap too near high potential end of anode coil), the glow will disappear. If it is too loose, the minimum point is not at all well defined. The best results seem to be obtained when, although there is a marked diminution, the glow still remains quite bright. It is desirable to adjust the anode tap so that the two points of maximum glow are approximately equal in intensity, thereby indicating that the optimum tuning adjustment lies midway between them, i.e., on the resonance point of the Hertz.

Although this may seem a rather clumsy method, the writer has found it in practice to give surprisingly consistent and exact results, and it appears to be the only method of tuning the Hertz aerial on low power.

A Compact Arrangement of Hertz Aerial.

By R. Pollock (G5KU).

NO doubt many amateurs who use the short waves of 45 and 23 metres have found that the length of wire (22½ metres or 73 ft. 0 ins.) is much too large to accommodate, in the space at their disposal, in the form of a straight wire Hertz aerial. This article is intended to show how a very effective aerial can be arranged almost on the same lines as any ordinary aerial and counterpoise system, and perhaps will lead to many amateurs converting their present 3rd harmonic systems to the more effective Hertz system, with the beneficial steadying of wave-length and simplification of the transmitting apparatus.

When the writer started on the air about 45 metres, a single wire of 14 S.W.G. 35 ft. high and 25 ft. horizontal inverted L aerial was used with a 30-ft. single wire counterpoise and used on the 3rd harmonic method by loading up to 135 metres with a 22-turn coil and .002 mfd. in parallel!! This apparently inefficient system seemed to radiate fairly well, and BV J was worked on several occasions using 3 watts input and being received R5 (BV J: R.N. College, Dartmouth) with this input: B.G.I.F.K. were worked, but in the least wind and with the loosest coupling the note was reported unsteady, and then after a very bad attack of swinging the 22-turn coil was gently removed, also the parallel condenser, and the aerial and counterpoise firmly connected together, and with the circuit Fig. 1 it was found to work as a Hertz.

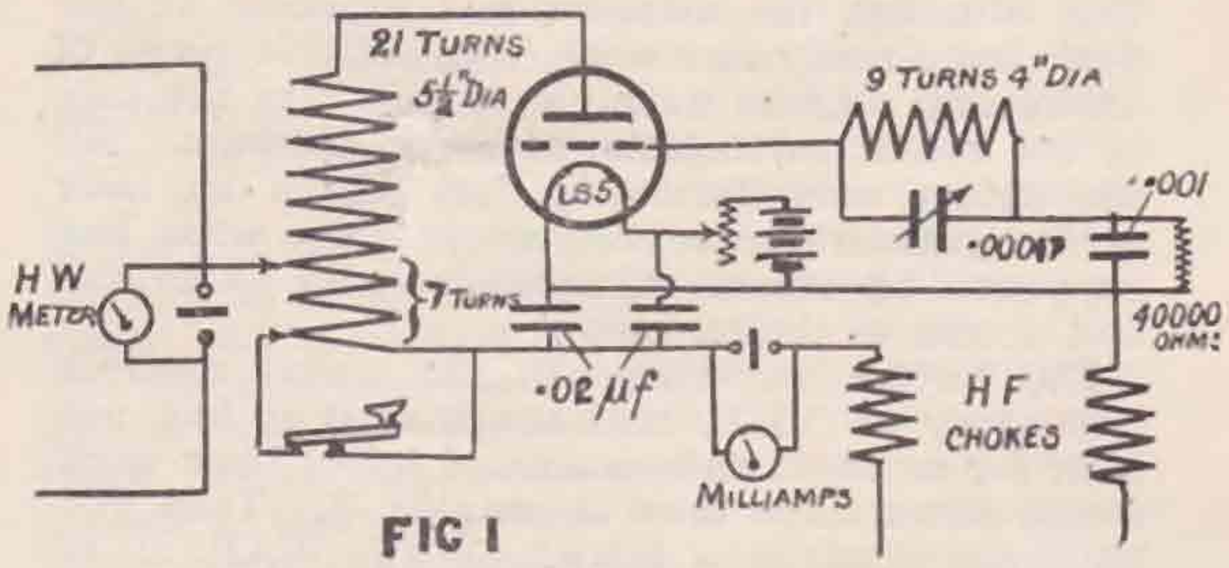
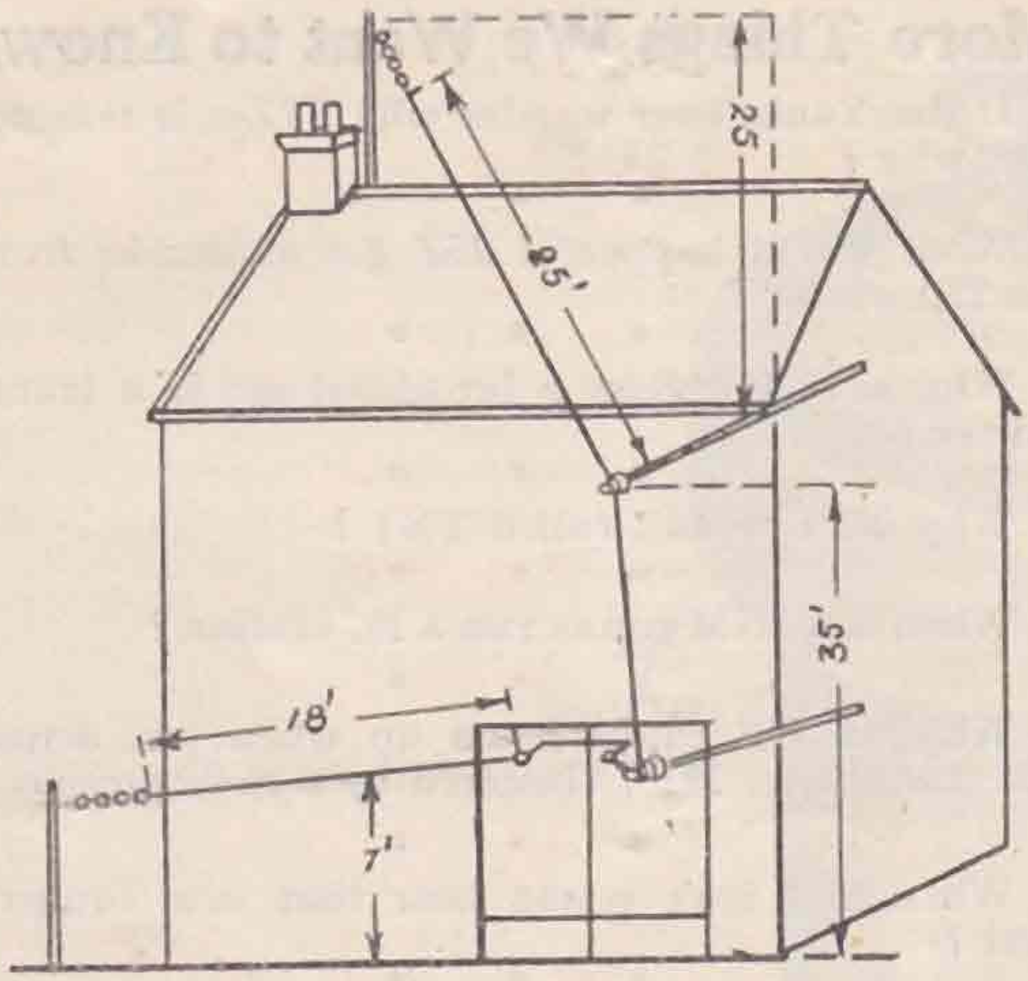


FIG 1

Of course, with the longer length of wire (90 ft.) the wave-length was much too high, and so various lengths were snipped off the old counterpoise until it worked on 45 metres. Even then the length was about 2 ft. above the 73 ft. 10 ins., but this may have been due to a wrong measurement of the wire forming the aerial above the house which is depicted in Fig. 2. When the system was found to "Hertz" O.K. the hot-wire meter was left in where the old aerial and counterpoise were joined together to enable adjustments to be made. And I should advise all low-power transmitters to adjust a Hertz with a meter at first, as with 10 watts it was found that not enough power was available to light a lamp tapped across the right-angle bends, except just a faint glow, and also it was found that there was another resonance point at about 52 metres where the system was working as a two-wire fan aerial, and in this case there was a current of about .2 amps. in the feed wire. Of course when returned to 45 metres and working as a Hertz there is no current in the feed wire, though there



FIC 2

may be a small current if this feed wire is too long (at this station it is about 4 ft.). After the transmitter was set to resonance with the Hertz the H.W. meter was cut out, as it is not required, for a Hertz is very definite about the way it resonates and it will only do it on the one wave (or on a wave a fraction of the fundamental). If the tuning of the transmitter is upset it will stop oscillating—and then the usual hot-plate phenomenon, though easily retuned by watching the plate milliamps.

The tapping on the plate coil by the feed wire does not alter the wave length, it only controls the amount of power supplied to the aerial, about a third of the way along from the plug H.T. end (in series feed circuits) or a third along from the — L.T. end for parallel feed circuit.

The improvement in wave steadying and effectiveness was remarkable from the first call using the Hertz. F8HU asked me if I was using crystal control, and said I was like NKF — — hi! also reporting R8—9 d7ZM was worked R8 and fb steady.

It appears that the aerial is very much more effective when tuned dead, though this dead tuning may easily be missed by using a H.W. meter or by watching plate milliamps. It is best done by an actual test with another station. For instance, when working bH6 I was reported R8 spacing wave as R7—6 marking wave. Keying was done by unshorting about one-third turn of the plate coil, the waves being separate about .3 to .4 metres. When qrh was raised the required amount—marking wave R8 ok. no change of Ae amps., Plate amps., etc., noticeable. It is usually said that the feed point should be at ¼ the length of the aerial from one end. This, however, has not been found necessary. As long as the tapping on the plate coil was fixed the feed point has been shifted from anywhere between 7 ft. from the lower end and 2 ft. below the centre of the Hertz, and in every case the same plate amps. were taken by the transmitter and no other adjustments were required. So if you want to try this "Double Right Angle Hertz" when your "Den" is on the second floor of the house, just hook on the feed wire where you can get a nice short run from transmitter to Hertz and it'll simply drag you on to 45 metres (if you clip off the 77 ft. right). Of course, you'll do all the preliminary swishing about on QRP, as apart from causing QRM around, you may get a few fireworks from transmitter.

Ionization of the Atmosphere—(*Concluded from page* 5).

He then submerged an electroscope to a depth of 68ft. beneath melted snow water in a lake on a mountain top 12,000 feet above sea level, and found that it still discharged. This depth of water was equivalent to a thickness of 6ft. of solid lead.

I thought that these results would probably be of interest.

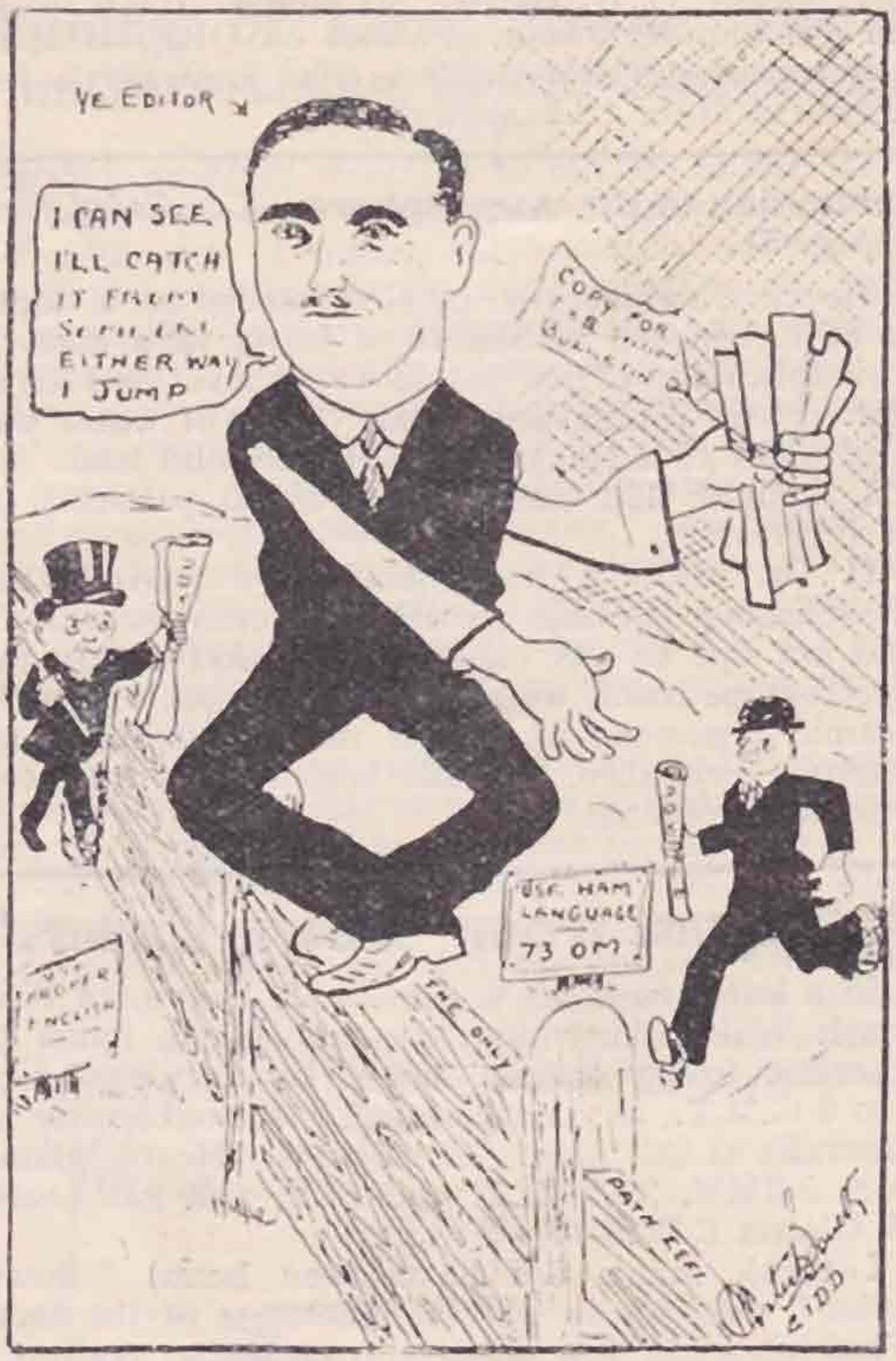
If Dr. Millikan has conclusively proved that these leakage readings are due to external radiations, and not due to any cause to be found within the electroscope itself, we are up against yet one more Cosmic phenomenon, which may have its share (though, probably, a small one) in our unsolved wireless problems.

A Request from "Down Under."

In a letter to G-2XY, Mr. T. H. Harris, of New South Wales, Australia, asks all British hams to transmit freely during the early mornings, i.e., 6 to 8 G.M.T., as statis is much less troublesome in Australia at this hour. He reports: Heard 'phone from 9-2MM, 2SZ, 2LZ, and 5LF, and has heard 25 G's on C.W.

I think many G's have been heard "down under" who are in blissful ignorance of the fact. What about a few reports from those regions?

S. R. W.



! ! !

Things We Want to Know.

When the Continental stations are coming off the 35 *m.* band with raw AC ?

* * *

When some G stations are going to stop blazing at a DX man calling and even working a definite G station ?

* * *

Why some of the Hertz aerial stations are so strong on their double WL ?

* * *

When are we going to have and keep to international wave bands ?

* * *

How many universal wave-length licences exist ?

* * *

Why a DX schedule is so difficult to keep ?

* * *

If a transmitter's life is all a bed of roses ?

* * *

What the next P.O. kick is goi: g to be ?

* * *

If any short wave hams ever listen on 440 on Sundays, and what they think about it ?

* * *

When pinching call signs is going to stop ?

* * *

What on earth would happen if we all had to use 10 watts again for six months, and if it wouldn't do us all good ?

6TD.

More Things We Want to Know.

If the Yanks ever wonder who 5TZee is teasing, and why ?

* * *

What would happen if 2SZ got sunstroke from his 250 watter ?

* * *

Why a BCL thinks a broadcast set is a transmitter ?

* * *

Why NTT wasn't called TNT ?

* * *

When is a 2NM gonna run a BC station ?

* * *

Why an RF choke heats up when put across the transmitter HT ? (Inspired by sore experience.)

* * *

When 6LJ isn't gonna hear that new country first ?

* * *

Why we had to wait for 2SZ to do it before we could work U6's ?

* * *

Why your Y.L. won't operate at the stn. ?

* * *

When will all the gang (and the BCL's too), realise that the *Bulletin* is England's best radio paper ?

2BMM.

2ZC is anxious to get into touch with experimenters who will co-operate with him in observations on local fading conditions, on the 45 metre band, especially in the following districts :— London, N.E., England and East of Scotland.— QRA, O.M., Houston Fergus, La Cotte, La Moye, Jersey, C.I.

Mid-Britain Notes.

Prepared by G6JV.

REPORTS are not as numerous as they ought to be, and in spite of my appeal to those counties who have, as yet, no office of their own, I have no new ones to announce this month. There must be plenty of keen hams in most, if not all, of those counties not represented. Now, will you all (yes, *you* who read this !) just turn up the February BULLETIN and take a look at that list of counties for which we want offices—and, by the way, do it *now*, before you read another word.

If you brass-pound in any of them I want to hear from you—and I want volunteers ! Now, "fer luv o' Mike," go to it, O.M.S., and let's put this thing through if you want your BULLETIN to help you (and other people, by the way).

Excuse me, but I'm out to rub this thing in. Take one county at random, say Herts. I am credibly informed that the following stations are located therein :—5GX, 6KU, 5ZU, 6VP, 5BC, 5XC, 5VX. Seven of 'em, and not a word from Herts ! Howcum, O.M.S. ? There are four more counties in the same boat, too.

The BULLETIN was a bit late this time, and perhaps there is some excuse that you have not had time to fire a letter at me, so 'nuf said this time, but I shan't be happy, and I shan't give up bullying until every county is represented !

So far as our Editor can spare the space I intend to encourage each county to make its own report, which will be printed in full. This time Cambridge and Stafford reports are so treated.

Cambridgeshire. By 2XV.

5YK has started collecting "wallpaper" from the "Yanks," of which he has raised one or two with the aid of a new 40 watt "Mullard" bottle, which he only feeds with about 8 watts—it must feel hungry. There are rumours that he has rebuilt his rectifier and put another 2 mfd. across his input—let's hope so, then we might hear some foneom.

2XV has been conducting some experiments as to the efficiency (or otherwise) of gas fires as a heating medium (for bodily warmth, not heating filaments), but has not met with much success, as the input "meter" shows enormous "plate current," but there's not much "radiation"—hic ! ! ! However, he has found time to work a few Yanks and some new European countries, also G.H.A. (Malta) reports weak telephony and C.W. R6.

2ANO, of Cambridge, is at present confined to the reception side only, as he is experiencing some little difficulty in convincing the P.M.G. that he really does know what F.B.-om-cuagn, and 73's mean. Meanwhile he carries on listening and sending cards to most of the stations ; he hears more than 5,000 miles away ; he *has* heard some, too—you should see his wallpaper, O.M. ! ! !

A newcomer to transmitting has turned up in Cambridge with the call 5RT. Good luck, O.M., and best DX, and let us hear what's doing.

Now you Cambs. "hams," let me have your reports and any articles of amateur interest before the 10th of each month, please, so we can let the rest of the "gang" know what enthusiastic "hams" we are.

Stafford. By 2KK.

With this, my first report, I hope that all the Stafford gang will flood me out as it were, with DX reports from month to month (to time writing reports are very low).

We must make new members and arrange tests, etc., and let the rest see that the Staffords are not lacking.

6UZ, Stoke-on-Trent, continues to work all European stations quite easily, having been heard by Belgian S2, R2, etc., French, Italian, and won't be long before QSO with a few A's, Z's ; he also forwards a fine list of calls heard, including South Africans and several Zeddom.

5FH, I understand, has been off the air for a few weeks, and is saving the coppers for a M. Gen. (let's hope the Salvation Army don't call).

Please forward reports by 7th of month latest.

Shropshire.

5SI (Shrewsbury) says very little has been done owing to "dud" conditions. He then goes on to say that India has been worked again (in the afternoon this time), also four Yanks and one 2nd district Canadian. This doesn't seem too bad, O.M. !

Northampton.

2VJ has found that bed of his more effective as an aerial than he had expected. He has been visited by an angry B.C.L., who stated that he wouldn't hear a thing from 5XX (12 miles away) when 2VJ was pumping 4 watts into his bed. What about "miles per watt" now, O.M. ?

Rutland.

6NO (Oakham) has put in some real hard work scouring the countryside for hams, but no one else seems to have heard of waves below 300 metres yet. He is bucking to himself about having a "soft job" in Rutland, but perhaps we shall have to find him a job with another county as well if those other fellows *won't* come forward!

Norfolk.

6JV (Norwich) has been busy with his new short wave superhet, which promises well. Readers may hear more about this some time (if the Editor can bear it!). In between visits to the workshop he has worked several European countries and has managed to raise a few Yanks as well. But wait until that "super" is finished!

Southern Notes.

Prepared by G-2LZ.

JUST when we were all getting fed up with DX work on the 40-metre band and thinking of migrating back to 100 metres, conditions changed as if by magic. Since the beginning of February that unknown medium which pushes our sigs "across" seems to have been kind to us, and regular two-way working with practically anywhere is now the order of the day again. The improved conditions are general everywhere, and it is very interesting to notice how the DX sigs start coming through from the East and within a few hours pass right across the world.

Several more British stations are experimenting on telephony. There seems to be a certain amount of controversy amongst amateurs in various parts of the country as to whether telephony should be allowed within our narrow band of waves around 45 metres. It certainly spreads over the waveband somewhat, but I do not think that it gives rise to the amount of interference that some experimenters are inclined to make out. After all, there is far more research work to be done in telephony than in telegraphy, and it is up to the British amateurs to lead the way in this direction, which I think we are doing. I shall be pleased to have more reports on telephony DX. It is extraordinary to note the results which can be obtained with even very low powers, and there are still numerous DX records to be broken in the way of two-way telephony.

Another point I should like to raise is the question of the effect of weather conditions on DX work. Personally, I do not think the weather has anything at all to do with it. Weather conditions are only local, whereas good or bad DX conditions seem to be the same all over the world at the same time. The only way to get at it is to fix up regular schedules and get weather reports from stations in other parts of the world; reliable data can then be compiled which will prove if the weather has any real influence on DX work.

DX Reports.

2WJ has been doing good work of late. His last month's report, which was omitted from the last issue, includes two-way working with India 2BG and HBK. A-3BQ, 3BD; Z-2AC, IAO, 4AS, Bz-IBD, C-3XI, and several Americans. He is now on telephony and has got his speech across to U-8ALY, HBK, D-7QF, K-18, F-8RIP, and S-2ND.

6QB is struggling with 12 watts, and although he is received R8 all over Europe, he says he had been unable to get a Yank yet. No doubt he has managed it by now as conditions are much better.

5HS has managed to get across to U-IAIU at last, although he has worked two Australians and Fi-8QQ, some time ago.

6JO has started doing a little on low power. I understand he is casting anxious glances at a well-known firm's list of motor generators, so we may hear more of him in the future. He has done excellent work on the receiving side and has logged 160 U's and C's last month, as well as stations in practically every other country.

6US has come to life again and has had QSO with all U districts, except 6th and 7th, also Malta, Egypt, and Palestine.

5XW has been doing some low power 'phone work, using an ordinary receiving valve on the transmitter. His speech has been received in Scotland and Belgium with about 5 watts input.

2DQ has recently reappeared with a new transmitter on 44 metres and has done some real good low power work on a Hertz aerial. His sigs with 10 watts input are reported R4 by two U's and Newfoundland. He has had two-way working with practically all Europe, and Yugo-Slavia reports R9 with this power and R5 with one watt input only. He has worked British stations at 250 miles with only one-half watt. He is using dry cells for H.T. supply, and attributes his success to a pure D.C. note. He is anxious to receive reports on transmissions.

5HA has worked all the European countries and Palestine on an input of 8 watts, using the mains for H.T. He has been heard in India and Morocco. With 48 watts he has worked A-3XO.

5HJ has got across to Sweden on one-half watt, and has worked most of the Continental stations on 2.4 watts.

2GO is using a M.L. converter, and has had two-way working with most of the European stations. He has been heard in India with 12 watts.

2NM seems to have forsaken the key altogether now. He is doing some good 'phone work, and has carried out some interesting tests in the relaying of 2LO on 45 metres. I think he has lost count of the number of valves he is using when performing this feat. We don't hear quite so much of him as we used to, as I think most of his spare time is occupied in recharging batteries. I understand he had a rude shock when he received his last quarter's electric light bill.

2SZ has not reported this month, but from what I have heard of him on the air he has been doing good work. That crystal-controlled note of his is surely the goods for DX work. I think he still holds the laurels for having the only crystal-controlled set in this country.

2OD reports working NAJD U.S.S. "Black Prince" at Manila on 'phone, and has done some good work with the South Africans.

2OF has got going with a power of 12 watts. His best DX report so far is Cairo, sigs received there R8.

2LZ is working regular schedules with Pi-IHR in an easterly direction, and with U-ICAL in a westerly, for the purpose of making a comparison between the weather conditions and signal strength. The best bit of DX work was done on February 7 when Pi-IHR, Fi-8QQ, Z-2BX, EGEC, A-3EF,

O-A6N, C-2BG, and U-ICAL were worked within six hours.

6BT is greatly excited, as he has worked his first American. He tells me he rigged up the 5SI circuit, described in the last issue of the "Bull," and his first call brought a reply from PR-4SA. Power, 15 watts.

5RZ is once more on the air with plenty of power on the 45-metre band. He is tired of DX records, and has settled down to serious experimental work on schedule with u2JN. They have kept it up for some time now, and arrangements are being made for daylight work on 45 and 23 metres on Sundays.

Schedules are fb o.m. and well worth establishing. The "Bedside" habit is still going strong, and is also well worth establishing. Hi. Consistent reports from a distance would be welcomed, i.e., nightly reports on signal strength, weather, baro., wind, temp., etc. 5RZ and u2JN are QSO every night at midnight. 5RZ is now on 46 metres. Never mind about 2JN's wave. He is only using 19 watts, and the less receivers on his wave the better. Hi.

Northern Notes.

Prepared by 2DR.

FEBRUARY has been a very good month for DX, if one can form an opinion from the reports of this area. I have had the 'phones on quite a few hours this month, and reception has been almost uniformly good. Sunday evenings are a pandemonium on 45 metres, and it is useless for anyone using low power to compete with the ear-splitting signs and 'phone coming through. I put some of them through a O-V-2 set and loud-speaker the other Sunday, and they were easily audible 150 yards away and readable at 25 yards. Moral: Go to bed!

More reports required from Newcastle way. Are you hams doing anything up there?

5KZ (KEIGHLEY) has worked 75 stations in two months, which speaks well for his LS5 valve. With an input of 15 watts he has worked 6YX (Bir Salem, Palestine) and 7XX (Yugo Slavia), both giving him R6. EAR23 was also worked on the low power of 9½ watts. 5KZ has troubles with BCL's like most of us.

5US (ILKLEY) is now working again after a long rest of over a year. He is also using an LS5 valve and an input of only 5 watts and Hertz aerial. This latter gives f.b. results. Most European countries have been worked with this modest power and R5 sigs reported from Morocco IZA f.b. O.M. London and Bath have been worked on 'phone with the same input, and speech reported from Bordeaux. Total stations worked since Christmas 40.

6TW (WILLASTON, NEAR NANTWICH) has just completed a new 45-metre transmitter, and has put some real low loss components (home made) into it. With an input of 25-30 watts, strong sigs were reported from India and Porto Rica after the first week's test. Fone has also been worked and heard R8 in most parts of England. He is now busy with a Hertz, and is disappointed with the reading on the ammeter! (Put it higher up the feed wire, O.M., and use a telescope!) A battery-driven rotary converter is in use here. Glad to have your reports, O.M. Send more, please.

5DA (BERWICK-ON-TWEED) sent his report just too late for the last issue. He reports receiving C-6AR at 1945 G.M.T. on January 11. He is running a schedule with G-6OK on fone with a power of 10-12 watts, and is Q.S.O. most of Europe. 5DA reports excellent conditions for reception between January 10 and 13 after 2200 G.M.T.

2IH (KEIGHLEY) has, like myself, had no luck with the Hertz, and after a month's trial reverted to 3rd harmonic again. He had one report from New York during the whole month. During the first tests with the harmonic system he worked four U's and PR, 4SA and 4TE with an input of 30 watts from his Newton alternator. 2IH is always swearing that he will build a really neat station (!!), but from my knowledge of him, extending over many years now, the experimental bug has bitten him very much too deeply for him to be satisfied with a set for more than three days at the most!

5XY (BURNLEY) is very annoyed because he has no reports from brother hams to send me this month. It is a case of the coal hammer, O.M.! 5XY has been QSO in India and has worked C-8AR at 21.00 G.M.T. He also reports reception of A-6AG at 1500 G.M.T. 5XY suffers from domestic QRM owing to generator noise. What about the coal-house, O.M.?

6YR (FOLLIFOOT, NEAR HARROGATE) is our star optimist of the Northern Area. He uses a loose-coupled Colpitt's circuit on 45 metres and the maximum input is 2.5 watts. With this he has worked not a few G's, F's, B's, and O's, to say nothing of being QSO in Algiers and U.S.A. This is really f.b., O.M., and it needs a heap of patience. He reports the night of January 24 as a good one for DX, and logged over 100 U's, as well as a few others, during the night. Who is URS?

2XY (LEEDS) has been twice QSO in Australia, but owing to his "DX baby" being away for new filament has not worked as many stations as usual this month.

Using 6 watts input, GHA (MALTA) and E-GEH (CAIRO), the latter giving him R6. He would like to have QRA's of U-5UW, U-6BHZ, and U-7DF. Will anyone oblige? These were logged Feb. 6-7, when apparently there was a DX benefit, stations all over the globe rolling in good style.

2DR (SHIPLEY) has been quite busy this month, and finds the tuned grid circuit by far the best tried so far for 45 metres. Stations worked, 30, including E-GEH (Cairo), one 3rd district, and two 8th district U's. During a quick search round of less than twenty minutes' duration early one morning U's of every district were picked up, all coming in at remarkable strength, especially two 9th district stations. 48 watts input used during this month.

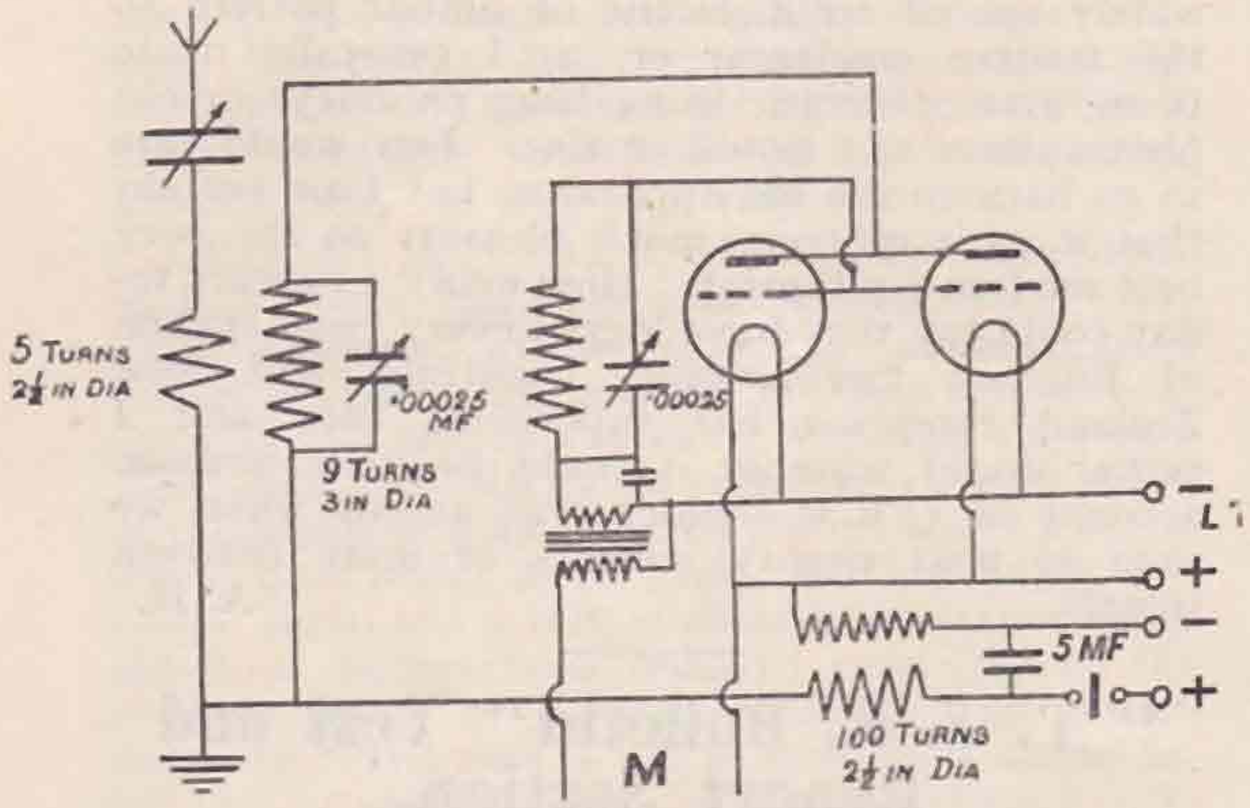
5SZ (MORECAMBE) has been working on 20 watts during the early part of the month, but has now installed a 200-watt Mortley Sprague generator driven by a ¾ H.P. A.C. motor. This outfit is now giving very satisfactory results. The following stations have been worked, some on low power, in addition to the usual Europeans:—Four 1st, one 2nd, one 8th, and two 9th district U's, also C-1AR. 5SZ has also worked NZ-2AC, although he has been heard over there several times previously.

(*Concluded on page* 18).

Easy 45-Metre Telephony.

By W. M. Bakewell.

Some time ago Mr. Ashton, of 5CW, and myself built ourselves a 10-watt grid control telephony transmitter simply for having little chats on 440 m. on Sunday mornings. No special gadgets were introduced—as a matter of fact the set was more like a broadcast receiver than ham transmitter.



It had a Pianco 2-coil holder, the grid and aerial coils being respectively a Burndept 75 and S4 ; the chokes in the high tension leads being Burndept 300 coils. With this set, using a Mullard 040 with 400 volts on the plate at 30NA, 5DC, 70 miles away, reported us R7 modulation excellent on 0-V-0.

The other Sunday I thought it would be rather interesting to see if telephony on 45 could be got out of the same set, so using a 6-turn coil for the grid and 9 for the plate, I found that it would oscillate quite nicely on 45, both grid and plate coils were tuned with .00025 condensers. The aerial coupling was by means of a 5-turn coil of 24 DCC on 2½ in. former. The other coils were both open wound coils supported by small strips of ebonite and were 3 ins. in diameter. A single 0-20 was used, but as this heated up rather badly two were used in parallel. On this set, using 410 volts at 60 MA I was reported R5 in Ireland, R6 at Glasgow, and R4 in Paris—in each case modulation clear and signals steady. There did not appear to be any capacity effects when the microphone was handled. The key was in the positive HT lead. The circuit used is given with the values of chokes, etc., for 45 metres.

"X.73."

What a queer fellow is BYZ. Many of us have no doubt listened to his recent transmissions in conjunction with " DA." Either he has a profound sense of humour, or his text matter for transmission tests is chosen without the slightest regard for the fitness of things.

On January 2, the following sentences formed part of one of his tests :—

" While England is sleeping, the Fleet (?)
keep faithful watch.
So, again, here's good luck in the ale that
is Scotch.—X73."

Be-eautiful sentiment ! !

I wonder if any of you " hams " have ever encountered that particular " ale that is Scotch—X73 " ?

If you have not, it is perhaps just as well, judging by its dire effect when applied internally to poor BYZ.

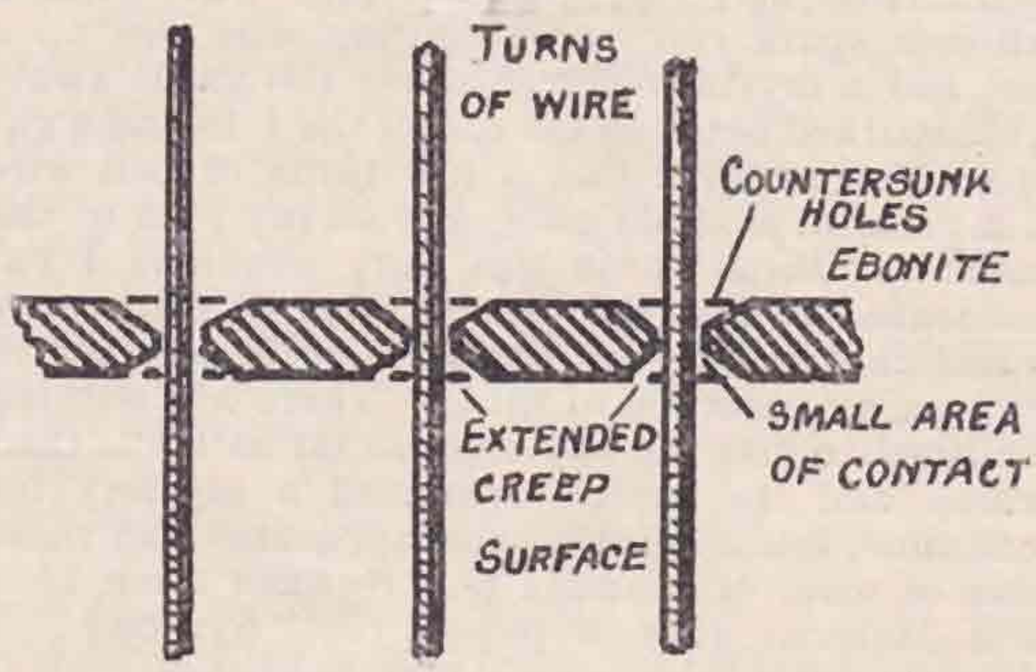
On Sunday, January 17, BYZ, in the course of a test with " DA" dilated at great length on " The Treatment and Cure of Inebriates," and whether it was the direct result of over-application of the aforesaid " X73," or whether he assumed that " DA," from the nature of his (DA's) transmissions was still celebrating via X73, I do not profess to know, but, fellows, I ask you ! ! !

J. Wyllie.—(G.5YG).

About those "Lo-Loss" Coils.

By G. A. Jeapes (2XV).

It may interest many to know how it is possibla to make the type of coil which we build by winding through holes in ebonite strip even more lo-loss than by just drilling holes through which to thread the wire.



If, after drilling, the holes are deeply countersunk on each side, the area of contact with the wire is reduced by about ⅔ and the creep surface between the turns is made much greater. (*See rough sketch.*) —2XV.

COMING MEETINGS.

This is the only intimation of forthcoming meetings which members will receive.—Ed. Note.

March 19—Debate arranged by Maurice Child, Esq., at Messrs. Selfridge's Palm Court.

April 23—Cinema Show by Percy Harris, Esq., on " Radio in America." I.E.E.

May 7—" My Experiences Among American Hams," by W. M. Bakewell, Esq. I.E.E.

June 11—J. A. Whitehouse, Esq., of the B.B.C. Title not yet selected. I.E.E.

Note.—There will be no meeting on April 16.

Early Radio.

By 2QN.

I HAVE been asked to write on early amateur radio work. Well, I will do my best. Methods employed then were of no use at the present time. In some respects they were really the good old days. No permit required, no restrictions of wave-length or power, *no broadcasting*. On the other hand there was no one to work to, for we were doing well if 10 or 12 miles were covered with the apparatus available to most of us, and we were few and far between. Of course crystal reception was used (I came into the ranks just after crystal superseded the coherer, which latter, I believe, taxed one's patience heavily), and the question generally was, how to prevent the spark transmitter knocking out the crystal. It was nothing unusual to have to reset the crystal every time one changed over, and it was practically impossible to use a very sensitive adjustment. The only crystal that I found to give fairly reliable working under this condition was carborundum. All sorts of short circuiting devices were tried to protect the crystal, but the only really effective method was to open circuit both terminals of the crystal close up! My first attempt was with a half-inch spark coil, some lighting wire run up a tree, and a crystal receiver about 100 yards away. I just sparked between the end of the 1-18 and a gas pipe. The receiver had a few turns of bell wire on a piece of scaffold pole, and as my idea of the reason for these turns was very nebulous I experimented to find the best number of turns, only to find that results did not seem to be affected in any way by variation of turns. There was nothing published to give me any clue (as far as I was then aware), and the matter remained a mystery for some time, but as professional apparatus had these turns of wire, of course I had to have some, too! Then Marconi gave a paper, on "Syntony" I think the title was, which was published, and I began to see daylight, and about that time F.L. commenced broadcasting weather reports, which I succeeded in receiving. These reports averaged a speed of about six words per minute, and practically taught me the Morse Code. Soon afterwards the P.M.G. intimated that it would be necessary to take out a licence for wireless experiments, and stated definitely that no annual charge would be made and that every consideration would be shown to the experimenter, the object of the regulations being to bring "wireless" under control *pro bono publico*. Later war broke out and amateur wireless was suspended. When we were allowed to resume, everything had changed. The old Fleming two-electrode valve, the only advantage of which over a crystal was that it did not need setting, had grown another electrode. What for? No one seemed really to know. But presently information began to be available, and most experimenters can carry on from that point from their own experience. The present generation of experimenters do not, I think, realise what can be done in the way of reception on a crystal. Before I started using valves for reception I used to regularly get Moscow (M.S.K.) on 5,000 metres, sending propaganda news in English. The aerial leading inductance was gigantic, being 12 inches long by 10 inches diameter wound with 20 S.W.G. wire. This was in series with the primary of a large loose coupler, the crystal being across the finer winding of the secondary. A very energetic discussion took place for some time between the thick and thin wire enthusiast, and I think the net result was that heavy gauge wire gave the best tuning, but very thin wire and correspondingly smaller coils gave just as good or better signals. In those days we used to have to manufacture everything ourselves. Condensers were either widely spaced air dielectric of similar pattern to the modern condenser or, as I generally made them, glass dielectric using lamp chimneys or old photo plates and tinfoil or zinc. Few would care to go back to the old apparatus, but I am certain that it gave quite as much pleasure as the very best modern equivalent. How many amateurs today could say they have logged every coast station of England and France? Australia and New Zealand reception has superseded this, and I rather doubt whether it could be done now on account of Q.R.M.—which was absent when we used to wait twenty minutes or more between signals.

A. H.

"T. & R. Bulletin" Test and Report Section.

AN EXCELLENT CONDENSER.

We have received from Messrs. Francis Mfg. Co.* a sample of a new variable condenser which is about to be put on the market by them. The samples consist of a .0005 and a .00025 mfd. variable "Square Law," and these are some of the best products of British manufacture which we have yet seen. The condensers are of the "grounded rotor" type with a positive pig-tail connection to the rotor vanes, these latter being of heavy gauge brass.

The metal frame is an aluminium casting of substantial dimensions and is fitted with fixing holes for vertical or parallel mounting. There is a minimum of solid dielectric material used in the construction and the general execution of the job is excellent, the spacing of the vanes being very regular, these being pressed into the supports.

On test the condensers showed decided low loss characteristics and has a low minimum capacity. In our opinion it is eminently suitable for low and medium power transmission.

PRIZES FOR ARTICLES.

The Editor will award a prize of an all-British low loss variable condenser suitable for transmitting purposes (2,000 volts) to the member who sends in what is considered by the committee to be the most useful technical article used in the next BULLETIN.

PRIZE FOR INCREASING MEMBERSHIP.

Mr. Bland Flagg will award a Sifan measuring instrument to the member who introduces the most new members during the year 1926. The instrument will be a milliammeter.

*The address of this company is 84, Clerkenwell Road, E.C.1.

Australian Pen Sketches.

By B. J. Masters
(*Hon. General Secretary, Victoria Division*).

3BQ.—Mr. Maxwell Howden, Hill Street, Box Hill, Victoria, uses two T250's in parallel in a modified Colpitts circuit, but is having great trouble in finding a grid condenser that will stand up at high frequencies. Aerial system consists of a vertical ¾in. copper pipe, 35ft high, with 6in. copper ball at the top, and a single wire counterpoise about 30ft. long. The H.T. is A.C., supplied from a 3,000-volt transformer, and rectified by eight "S" tubes in bridge formation. Smoothed with a hefty choke and about 6 mfs, the note is a very fine one.

3BD.—Mr. E. H. Cox, 5, Gisborne Street, Elsternwick, Victoria, has been heard in practically every country throughout the world, but at present is off the air as three of his bottles have been draped with crape in the last two weeks. Normally he uses a T250 with two MR1's as rectifiers. His input is in the region of ½ kw., and he pumps about 3 amps. into a pipe aerial 35 ft. high. With a single wire indoor aerial and a 15ft. counterpoise, draped along the floor, he has been reported very QSA in the Eastern States of U.S.A. NTB for over 10,000 miles, hi? His note is not as good as it might be, but this is not surprising when one sees the fireworks and sparks that he draws from the set when it is in action.

3BM.—Mr. H. K. Love, Ferncroft Avenue, East Malvern, Victoria, also uses a T250 with two MR1's, but at present he is using 25 cycle stuff as one of his rectifiers recently quit working suddenly. We will all be very glad when he manages to snare a second, as his note at the present time reminds one of a couple of ghosts doing a clog-dance on a tin roof. 3BM also uses a drain pipe aerial with a 15ft. counterpoise, and has received cards from practically all over the world.

3ZN.—Mr. M. Israel, Dandenong Road, Malvern, Victoria, is our 5-metre expert. So far he has not been heard over any great distance, but a few weeks ago he and 3BQ carried out some very interesting communication on 8.5 metres over a distance of quite some miles. At the present time he is only using a UV202, but as soon as he gets over being married he intends to acquire a bigger bottle, and hopes that some of the gang in England will be able to hear him.

3YX.—Mr. B. Hardie, Missouri Avenue, Gardenvale, Victoria, is one of our lesser lights. Using a Paillips Z2B, with 1,500 volts (electrolitic rectifier), he has worked over 80 American stations, as well as others in China and the various Pacific Islands. He says he will not be quite happy until he has been QSO the "Old Country," so hope some of your gang will attend to him before long. He happens to be treasurer of our funds, and his present state of mind is not too good for his work. 3YX is one of our few DX stations that still uses a hefty sky wire because he is too darned lazy to pull it down and try a small one.

3LM.—Mr. B. Jermyn Masters, 16, Sutherland Road, Armadale, Victoria, was one of the first of the local gang to discard all panels in the transmitter. He has only just lately dropped down from the 80-metre band, and has already worked several American, Japanese and English stations. The aerial is a vertical 6-wire cage 35ft. high, with a single wire counterpoise 15ft. long. The tube is a Phillips Z3 in a modified Colpitts circuit, and with an input of 80 watts, the indicated aerial radiation is .75 amps., yet this station is consistently reported R5-6 in America. A very pure note is obtained by the use of a 20 Henry choke with a variable air gap, four "S" tubes in Bridge and oil immersed condensers to the value of about 4 mfs.

My Christmas Morning.

Contributed by 6JM.

SUDDENLY deciding to accept my old friend's invitation to spend what she called an English Christmas in her villa situated in a heavenly spot on the shore of the Mediterranean, South of France. I started off from Victoria on December 21 with the intention of stopping two days in Paris on my way (incidentally a little shopping being in the back of my head). Arriving in Paris, it was raining, and it never ceased all the time I was there. I left on Thursday, arrived on Friday (Christmas morning), where the worst mistral I have ever experienced was raging; it was tearing the branches off the mimosa trees and scattering the rose petals into the air.

What a wonderful blue the sea was, and the sun a ball of flame, rose and scarlet.

I arrived at Villa Qui sait Santo (a lovely name) so early that the servants, who had been keeping Revillon not wisely but too well, had not started their work, and I had to knock them up. Having travelled half the day and all night on the train I was tired, and thinking, perhaps, I had rather a hefty time in front of me, I decided to get some sleep and wake up in time to put up an aerial and rig up some sort of instrument with a few parts I had managed to bring with me, so that my hostess could hear "Big Ben" usher in the time as a preliminary to the Christmas dinner

I did wake up, and started to get that aerial up, and what fun it was. I can't climb—I must admit it, I am getting horribly old—so I got a young man, an electrician he called himself, who said he would do what I told him, but knew nothing about T.S.F., and was not at all interested in it, and did not want to be.

This seemed a good beginning!!!

I started by asking a neighbour to allow me to hang a rope from his villa; it had on its roof a very high and imposing-looking sort of minaret, of no particular use so far as I could see, also very inaccessible, but I suppose considered ornamental. The neighbour was nervous, very nervous. He did not want to be unneighbourly, but he had telegraph and 'phone wires near his house, and he feared "the noise created by this conglomeration of wires, and the other sounds that the aerial might catch, would be dreadful and he would not be able to sleep." I tried to calm him, and assured him his sleep would be unbroken, but he was very very dubious.

No words of mine can tell you the excitement that aerial caused. Gesticulations, discussions as to the effect of lightning, and fire running down the wire or up the wire, it would be sure to be one or the other.

The electrician had just been married, and his wife sobbed the whole time he was on the "Minaret"; she feared he would receive a shock from the aerial and lay a corpse at her feet, her dear, dear husband.

(*Concluded on page* 18)

Correspondence.

To the Editor of T. & R. BULLETIN.

SIR,—I received the following message from GFUP relayed to me via A3BD to-night at 19.30 :—

"To all G's. GFUP, qra H.M.S. Durban, Hong Kong, China, is on 37 metres. Please keep look-out for him and let him have report if you hear him."

I had been following the qso between GFUP and A3BD. As soon as message was received by A3BD he called "cqG." I got in touch and had message five minutes after it left China.

Please insert message in T. & R.

Faithfully yours,
BERTIE WALSH (G2IT).
T. & R. Radio Society of Great Britain.

Clovelly, Armagh, Ireland. February 12, 1926.

To the Editor of T. & R. BULLETIN.

SIR,—Will you kindly insert in your next issue the fact that the Manchester Wireless Society are anxious to carry out tests on 23 metres, call letters G6MX, G5MB, G5WX, and G2YO. Transmission can be arranged for any time during the day or night, and power varied from 5 watts to 250 watts.

Information is also required as to the possibility of co-operating with other stations on 8 metres and comparing circuits, etc., with a view to obtaining information about this particular wavelength.

The following are the addresses of the members working the stations:—G6MX, G2YO, Y. W. P. Evans, Hon. Sec., 66, Oxford Road, Manchester; G5MB, W. H. Lamb, 808, Stockport Road, Manchester; G5WX, R. Hallam, 81, New Street, Altrincham, near Manchester.

Reports may be forwarded to the respective addresses or direct to the Hon. Secretary. The stations mentioned usually work on 45 metres, except G2YO, which is fixed on 23 metres, with 8-metre station in course of erection.

Yours faithfully,
Y. W. P. EVANS,
Hon. Secretary.

Manchester and District Wireless Society,
66, Oxford Road, Manchester.

To the Editor of T. & R. BULLETIN.

SIR,—I have reason to believe that some unauthorised amateur is using my call sign and transmitting Morse on a wavelength of 75 metres—a wavelength on which I am not authorised to work under the present terms of my licence. I have a report from a London listener to the effect that my signals were picked up strength R6 on this wavelength on Saturday last, when my station (2YU) was not working.

If any members can assist me in tracking down the offender, I shall greatly appreciate their kind co-operation.

Thanking you. I trust I am in order in reporting this matter to you.

73S,
Yours very truly,
MAURICE H. WILKINSON,
G2YU.
(Member R.S.G.B. and T. & R. Section).

Traffic Notes—(*Concluded from page* 14).

This is another case where reports from Australia would have been of the utmost value, as various aerials have been in use, and DX reports are of great assistance in deciding the best type to employ.

2DR.

Irish Notes.

Prepared by 5NJ.

DURING the past month Irish stations have continued to push their signals to the ends of the earth, and several more countries have been "conquered." Many more receiving stations are active, and this shows that the short wave game has come to stay here. There are, also, one or two new transmitters on the air, and it is hoped that old Ireland will now cease its internal strife and pay attention to DX work! Certainly our future prospects are much brighter than they have been for a long time, as far as wireless is concerned, at all events. And now for the reports. 2IT has worked the Philippines, Palestine, Newfoundland, French Indo-China, Canada, and Madeira. Certainly a satisfactory "bag" for the month. 6TB has been heard, according to a report, in the U.S.A. when he was using less than 6 watts. F.B.O.M.! 6YW, of low power fame, is still hard at it, and has worked, amongst others, Sweden and Spain on 1.8 watts on a receiving valve! He is now QSO with most of Europe, being reported R6 nearly everywhere.

5NJ, my own station, has not been doing much DX of late, owing to testing work with various aerials. But we are still QSO Australia every week-end, and we have also worked 1WP of India, this being his first QSO with the British Isles. 6YW reports hearing Indian 2BG; anyone received him before? 2WK, using a single valve and a six-foot aerial, has received many DX countries, his list being on another page.

1IB, of Co. Wicklow, has succeeded at his first attempt in working with MICH, of Boston, U.S.A. This is the first two-way between the South of Ireland and the U.S.A., and 1IB used only 7 watts, being reported R$\frac{3}{4}$ through bad QRN. 5NJ has worked the United States naval boat "Blackhawk" NAJD, off Manilla, Philippine Islands, and also QSO Egypt reported R7 Madeira (R9) and French Indo-China again R7 (power 98 watts).

My Christmas Morning—(*Concluded from p.*17).

The postman and the concierge gave advice in loud tones, and a few gardeners brought up the rear.

I thoroughly enjoyed myself listening to their remarks.

Soon, however, the aerial was up and the lead-in very conveniently close to the dining table.

My hostess's neighbour and the electrician were soon provided with headphones, and after a minute or so two pairs of brown eyes grew larger and larger. Ca y est, Le voila, they shouted, and they were glued to the spot. 'Twas with difficulty I got rid of them.

We had "Big Ben" with our aperitives, and soon after "A deep depression . . . . . "

Calls Heard.

Australian—1ax; Brazil—bzb2; Canadian—c2ax; French—8xh; Holland—n10bl; U.S.A.—1ck, 1sw, 1akz, 1rd, 1se, 1aep, 1bi, 1coj, 1ve, 1ch, 1af, 1sz, 1hi, 1cm, 1ck, 2cpa, 2cyx, 2ku, 2gk, 2ahm, 2dm, 2cu, 2cj, 2bq, 3pf, 3cel; miscellaneous—smui, smxt, pcll, uwir. January; 1 valve; wavelengths between 32½ to 47.—CYRIL R. HUNT, Kensington House, Church Street, Sheringham, Norfolk.

Great Britain—1rw, 2dx, 2fm, 2gy, 2ia, 2it, 2kf, 2lz, 2mi, 2od, 2sa, 2sz, 5hg, 5jw, 5kz, 5ls, 5so, 5wv, 5xy, 6ep, 6jo, 6jv, 6my, 6ou, 6ox, 6qb, 6rm; Ireland—11b, 6mu; Germany—kö, 4fr, kpl; Holland—ohb, opm, 2pz, pb7, pc2; France—8bf, 8cax, 8frx, 8hm, 8hu, 8jc, 8jn, 8jr, 8pep, 8rbp, 8yor, 8tk, 8vo, 8zb, ocmv, ocng; Belgium—b2, c22, g6, h6, j9, p7, q2, s2, s4, s5, u8, 4cc; Denmark—7bx, 7ew, 7zm; Finland—2co, 2nd, 2nn; Sweden—smsr, smvj, smwf, smxu, smyc; Hong Kong—xa1; Palestine—6zk, 6yx; French Indo-China—f18qq; Malta—gha; Australia—2cm, 3bd, 3bq; Yugo-Slavia, ys7xx; New Zealand—2ac, 2xa, 4ac, 4as; N. Africa—maroc; sundries—fw, gfp, gfd, not, ntt, sab, wiz, wgy, 1ls, 11ag, r8ww. All heard in daylight 30/50 m., from 18/1/26 to 9/2/26.—C. A. JAMBLIN, G6BT.

U—1aao, 1aap, 1ae, 1ala, 1arn, 1axa, 1ayj, 1bi, 1blu, 1bsd, 1bux, 1bz, 1bzp, 1cal, 1ccp, 1cjc, 1ck, 1cmf, 1cmx, 1coj, 1fs, 1ga, 1ii, 1kk, 1rm, 1sd, 1sq, 1sw, 1sz, 1ue, 1uw, 1yb, 2ahm, 2aib, 2aid, 2agb, 2apy, 2box, 2bqb, 2bw, 2cft, 2cjx, 2crb, 2cty, 2cvl, 2cvu, 2cyw, 2cyx, 2gk, 2ol, 2pp, 3aib, 3ba, 3cel, 3cir, 3ckj, 3ft, 3mc, 3pf, 3vx, 3zg, 4dm, 4oy, 4rz, 5up, 7alk, 7df, 8bfe, 8bpl, 8brd, 8byx, 8cbi, 8zae, 9adk, 9aio, 9aoi, 9hg, nkf, nba; C—2bg, 2hy, 8ar (Newfoundland, r7 at 7.10 p.m. G.M.T.); PR—4ur, 4je; I—1au, 1ay, 1bs, 1no, 1rm; BZ—1ab, 1ac, 1an, 1aq, 1bd, 1ia, 4iv, sq1, sni, 5aa, 5ab; SM—smss, smtn, smwf, smxu; A—3bd, 3xo; M—1aa; O—a6n; miscellaneous—kw3, kq5, hbk, maroc, d7mt.

G—2dx, 2dy, 2gy, 2dm, 2jj, 2kf, 2kr, 2lf, 2lz, 2ma, 2od, 2of, 2qb, 2qm, 2qn, 2qj, 2sw, 2uv, 2xv, 2xy, 2zc, 2zf, 5ax, 5gn, 5ha, 5hq, 5io, 5jw, 5ku, 5lf, 5ls, 5ox, 5sk, 5so, 5tz, 5us, 5uw, 5ns, 5pd, 5ma, 5wq, 5wv, 5yk, 5ym, 6ci, 6bd, 6er, 6fa, 6gh, 6iv, 6fl, 6lj, 6mu, 6nf, 6og, 6ox, 6pu, 6tm, 6td, 6vp, 6ym, 6yu, 6yv, 7rw, 7aa, bvj, byc, gfp; A—2cm, 2yi, 38d, 3fz, 6ag; B—b7, c22, d4, e9, i1, i3, k2, j9, p2, p7, r7, s2, s4, s5, u8; BZ—1ia, 1ab, 1ac, 1an, 1as, 1bd, sq1; C—1ar, 1ed, 2cft, 5go; D—7mt; E—ear21, ear23; F—8awi, 8bp, 8cax, 8di, 8dp, 8fp, 8hfd, 8hm, 8hsf, 8jc, 8jms, 8jn, 8jr, 8ldr, 8mac, 8nn, 8nnp, 8pep, 8py, 8rbp, 8rv, 8sax, 8sse, 8ssc, 8sss, 8ww, 8xh, 8vo, fw, ocmv, onm, fl, sp, md; F1—8qq; I—1bb, 1bd, 1bk, 1bw, 1gw, 1ma, 1mt, 1rm; K—i8, w3, y8, kpl; N—oco, ocz, ogg, oms, owb, 2p2, pc2, pcuu; O—aie, aim, a2o, a6n, a3n; P—3fz; RE—6zk, 6yx; PI—1hm, 1hr; R—fb3; S—2nd, 2nn, smra, smsr, smss, smua, laia; U—1aao, 1aca, 1aep, 1aes, 1air, 1aiu, 1akz, 1ayl, 1bal, 1cal, 1cmp, 1coj, 1bzp, 1cmx, 1ckp, 1bke, 1cs, 1ga, 1gi, 1jr, 1kmx, 1mnm, 1rd, 1yb, 1se, 1sw, 1sz, 1xam, 1xm, 2aes, 2afn, 2agb, 2agq, 2ahm, 2akb, 2anm, 2apv, 2awf, 2bbx, 2bm, 2cxl, 2cyx, 2cje, 2ihm, 2kr, 2kx, 2kg, 2hh, 2xy, 3afw, 3ahl, 3arw, 3as, 3dh, 3jo, 3ot, 4dm, 4gy, 8avj, 8aly, 8ccg, 8ccr, 8gut, 8xk, 8zu, 8zz, 9eji, kdka, nal, nkf, nap, wir, wiz, wqn, wqo, wgy, npl; X—3yy; Y—crp; Z—2ac, 2xa, 4ac, 4ak; also egen, ocdj, octa, ane, anf, da, ntti, neqq, naif, bdr, byz, gha, ftj, fjj, 7vx, 7ch.—D. GROVE-WHITE, 5GW.

1aac, 1aae, 1aal, 1aap, 1aep, 1ab, 1agq, 1agg, 1ahm, 1aiu, 1ajg, 1amf, 1ana, 1ake, 1arh, 1atj, 1awe, 1axa, 1azl, 1bes, 1bgc, 1bpm, 1bke, 1 bvl, 1aaw, 1cbp, 1ccx, 1ck, 1ckp, 1cmf, 1cmp, 1cmx, 1cbe, 1er, 1ef, 1fd, 1hj, 1te, 1si, 1sm, 1ww, 1wx, 1xam, 1xm, 1yb, 1xa, 2aes, 2afn, 2ago, 2ahm, 2ain, 2akl, 2aky, 2amj, 2apv, 2awf, 2ax, 2ayn, 2azl, 2hap, 2bbx, 2bu, 2beo, 2bg, 2bgi, 2bm, 2brb, 2bxg, 2bxj, 2cgi, 2cgj, 2ckj, 2clg, 2cmb, 2cpa, 2cqz, 2cse, 2cv, 2cyj, 2cvv, 2cxl, 2cxf, 2po, 2jr, 2gy, 2hk, 2kr, 2nn, 2np, 2po, 2ur, 2wr, 2zy, 3apq, 3aha, 3aha, 3aws, 3bco, 3bbj, 3bbms, sbta, 3bwj, 3cdv, 3cel, 3ckj, 3hg, 3jo, 3jw, 3lw, 3xav, 4ao, 4aok, 4ov, 4eg, 4ev, 4oi, 4oa, 4pm, 4tv, 4w, 5zai, 8ada, 8adg, 8adm, 8aj, 8ajf, 8aby, 8aul, 8avj, 8avl, 8awa, 8bers, 8brc, 8bth, 8buk, 8bwr, 8byn, 8can, 8cwk, 8cyi, 8don, 8eq, 8eg, 8fc, 8gy, 8pl, 8sq, 8zv, 9aot, 9bn, 9brg, 9cxk, 9dkc, 9xn; Mexico—1b; Brazil—1ab, 1ac, 1af, 1an, 1ia, 2sp, 5aaot; Argentine—afi, bai, cbb, fg4; Australia—2cm, 3lg; Newland—2ca, 2ae, 4ac, 4ag; Java—ane.—RALPH H. PARKER. By 2KK.

Algius (f8ux) (8wk? Algiers); American—1aw, 1ckp, 1cgb, 1caw, 1ck, 1ga, 1ads, 1gn, 1ni, 1ran, 2bx, 2co, 2bz, 2dm, 1ccp, 1cf, 1ck, 1cmf, 1sw, 2akz, 2cvj, 2aes, 2ahm, 6bhz, 6cas, 9zuh; Australian—2cm, 2ef; Belgian—c22, d2, 4rs, g2, r2, s4, s2, u3; British—2du, 2so, 2nz, 2yx, 2io, 2xy, 2qv, 2fm, 2dx, 2uv, 2cc, 2qb, 2nz, 5wq, 5mh, 5po, 6yu, 6do, 6er; Fone—6yu, 2od, 2kf, 2nm, 2lz, 2sz, 2io, 2xy, etc; Brazilian—1ai, sni; Chile—2ar; Czecho Slovakia—ok2; Danish—7lm; Dutch—0cz, 2pz, 0wc, pb7, okh, 2mx, 12bb, 2pc, 0ca, 0aw; Finnish—2co, 2nm; French—8nn, 8gi, 8mg, 8jn, 8aix, 8rz, 8ldr, 8aij, 8es, 8jac, 8sss, 8cax, 8pam, 8xh, 8yor, 8jr, 8awi, 8ct, 8pep, 8hm, maroc, 8rb, 8tk, 8pli; Germany—kys, kpl, k2s, k5lf; Italy—1bd, 1nm, 1ac, 1rm, 1co, 1gw, 1ss, 1mt; Norway—11ar; New Zealand—2ac, 1ar, 2xa, 4ar, 4ac, 4aq; South Africa—oa6n, 0a4n; Spain—ear21; Sweden—smvr, smxt, ph (now smsr), smzs, smxu, smui, smwf. Worked—Algiers—f8vx; British—2qu, 2dx, 2xy, 2uv, 2so, 2du, 5oc, 5io, 5po, 5kz, 5us, 6yu, 6nc, 6ab, 6aw; Belgian—s2, r2; Dutch—2pz, 0wc, 12bb, 0kh, 2pc, 0bl, 0aw; French—8gi, 8ix, 8ldr, 8xh, 7vx, 8sss, 8ram, 8wk; Italian—1bd, 1mt, 1ay; Swedish—smxt, ph (smsr), smzs, smvr, smuk, smwf.—By 6UZ, Stoke-on-Trent.

American—1aiu, 1ahm, 1aci, 1ch, 1cal, 1adi, 1ga, 2ev, 2fo, 2nz, 2aes, 2ku, 2cjj, 2bmz, 2bux, 2afo, 3pf, 3ot, 3bwt, 3ahl, 5yd, 8adg, 8xe; British—2zf, 2qb, 2mx, 2zu, 2qv, 2uv, 2qm, 2vq, 5wv, 5io, 5oc, 5qm, 5tz, 5po, 5sk, 5xo, 5rz, 5kz, 5nj, 6yw, 6ox, 6ft, 6bt, 6yd, 6kk, 6uz, 6ry, 6td, 6er, 6jv; Belgian—j9, 4yz, s4; French—8jr, 8sss, 8adg, 8hu, 8vo, 8aix, 8xh, 8ip, 8px; Dutch—opx, 2p2, okv, ocz, ogn, oea, stb, pc1; African—oa3b; Australian—3xo, 3bd; New Zealand—2xa, 3ad, 4ar; Swedish—smwu, smyu, smsr, smvj; miscellaneous—raa8, rfh4, s2nn, nsa, k2hr, kk7, ph, ciar, bzian, sph, ocmv, bzsqi, kw3, crp, sgc, eibh, laiq, csoki, d7ch, pe, 6zk, liag, yhbk, gha, q2mk. "A card for a card." Pse qsl if w qrk mi sigs.—G2XV.

g2cc, g2wj, g2kf, g2dx, g2sz, g6mu, 11b, 6uz, 5hs, 2nm (phone), hbk, q2, gbl, usab2, 2md, i1bw, 1nd, e4, kdka, s2co, s1nd, wiz (morse), dbr, gf, 8rz, 1ag, 8qq, 1fc, 2xp, 5nj, 5oc, a4z, wgy (phone), a2cm, a2ac, pox, c1dd, kpl, 6zk, f8be, f8nta, u1a. Receiver single valve, counterpoise and aerial 6 feet long, 6 feet high.—W. A. HAYES, 2WK, Moyallon, Portadown, Northern Ireland.

Britain—2vq, 5pm, 5jw, 2qm, 5fs, 6yd, 6er, 5rb, 5mq*, 6ep, 6jv, 2zb, 5us*, 6gf, 6yc*, 2un*, 5yz, 6wg*, 5wv, 6mj, irw*, st1*, 5ax*, 5so*, 5xy*, 2xy*, 2dq*; U.S.A.—1xm, 1rr, 1aw, 1si, 1rd, 1qm 1cmp, 1ga, 2zv, 2ipv, 2bl, 2bxj, 2aev, 2ez, 2aom, 2cgj, 3auv, 3cd, 3bhv, 3te, 3bwj, 4cu, 4io, 6awt (California), 8bgl, 8aj, 8bpl, 8bpn, 8er, 9adk, 9zt; Porto Rico—4sa, 4je; France—8cr, 8dk, 8yor, 8sf, 8éf, 8uwa, 8ar, 8rbp*, 8fr, 8ww*; Belgium—p2, o8*, 4gr, bk5, d4, q2*, c22*, p7*; Holland—oro, oaw, opm*; Spain—eac2, ear2o*; Panama—99x; Brazil—1al, 1ia, 1an, sq1, 6qa; Australia—a2ds, a4rb, N. Zealand—1ax; Phillipines—1hr; India—2bg (Assam), hbk; Capetown—oa4z, oa6n; Indo-China—fi8qq, fi8lbt; Italy—1nc, 1rm, 1bw, 1ma, 1fc; Sweden—sdk, smuk, smwt, smws*; Finland—1na, 2nm; Germany—ky5, ky4; Canada—1ar, 8ar, 1ak; Norway—la4x, la1a; Portugal—3gb, 3fz; various: iax, f8xx, not, gha (Malta). *Denote two-way working on 2 watts.—T. P. ALLEN, 19, Ardgreenan Drive, Strandtown, Belfast, Ireland.

French—1amw, 7vx, 8rf, 8nn, 8ldr, 8ww, 8py, 8jx, 8fp, 8mar, 8gi, 8dk, 8ll, 8jm, 8ssf, 8rz, 8ci, 8fr, 8cj, 8bbq, 8vo, 8hu, 8ez, 8fn, 8ct; Italian—1bb, 1ap, 1bk, 1no, 1bd, 1mc, 1ay, 1gw, 1cw, 1rm, 1au; Belgian—b-c4, p7, s4; Spanish—1bes, ear24; U.S.A.—1apv,

(*Concluded on next page*)

Calls Heard—(*Concluded from page* 19).

1bz, 1aao, 1ue, 1bux, 1ueo, 1bb, 1ahb, 1ic, 1cmf, 1aiu, 1bdx, 1buo, 1bgc, 1ga, 1aep, 1asu, 1ckp, 1ol, 1awe, 1gr, imi, 2cp, 2cft, 2cel, 2ahm, 2apv, 2cyx, 2rd, 2bxj, 2fo, 2cre, 2bg, 2cxl, 2cjx, 2atr, 2crb, 2gp, 2big, 2kz, 2cjj, 3be, 3lw, 4tn, 4bu, 4gy, 4aae, 5yb, 6dl, 7xc, 8dg, 8jn, 8aol, 8ccq, 9xi, 9xk; Norway—1a, 1a; Dutch—o-ea, 2pc, o-hb, o-rp; Scandinavian—smtx, 2nd, 7bx, 2bs, smuk, 2nn, smsr, 2co, smxt, sivr, smtm, smsc; Philipines—3aa; China—8qq; Egypt—e-geh; Yugo Slavia—7xx; Brazil—1ae, 1af, 1ap, 1aw, 1ab, 2af; Russia—rcrl; Australia—5br, 5ag; New Zealand—7nd; Unknown—ky5, srd, bbzi, urs; Morocco—itz, maroc.—S. R. Wright, 2DR.

G—2ao, 2cc, 2dm, 2dx, 2gy, 2ia, 2kw, 2ma, 2mx, 2oq, 2qm, 2to, 2xv, 5bu, 5da, 5fq, 5gs, 5ko, 5ku, 5ls, 5ff, 5jw, 5mq, 5pd, 5po, 5qm, 5qz, 5sk, 5so, 5us, 5wq, 5wv, 5yk, 6ah, 6bd, 6bt, 6er, 6fg, 6fq, 6gw, 6iv, 6jv, 6kb, 6ll, 6mp, 6my, 6kk, 6og, 6oh, 6op, 6ox, 6ry, 6td, 6uz, 6vp, 6yu, 6yv, 6yw, 6yx, 6zk, 6zm, gha, 1r.v; F—8dgs, 8pkx, 1rf, 8rbp, 8nil, ocnq, 8hsf, 8hw, 8ct, 8nn, 8xh, 7vx, 8rat, 8dk, 8pep, 8sax, 8sot, 8gi, 8ix, 8ic; B—p7, j9, s4, z9, q2, d4, j8, b2, u3, w3, s4, s5, g6, κ2, p2, k8, h6; I—1as, 1bb, 1gn, 1gw; S—sgc, smuk, smui, sdbg, smsr, smxr, smta, smxu, smyu, smri, 2co, 2nd, 2nn; Miscellaneous—1x1, d7xp, d7eh, na1q, h9xf, kpl, p-3fz, gw-11b, l-1ag, sq1, e-geh; Pse QSL—Cards waiting.—L. H. Thomas (G-6QB), 33, Harpenden Road, West Norwood, S.E.27, London.

A—2cg, 2yi, 3bd, 3bq, 3ef, 3xo, 5bg; Z—1ac, 1ao, 1ax, 2xa, 3af, 4ar, 4av; P.I.—1cw, 1hr, neqq, najd; B.Z.—1ab, 1ac, 1af, 1aq 1aw, 1ia, 5aa, 5ab; O—a4z, a6n; C—1ar, 2be; U—6ro, 6clj; F.I.—8qq, 8lbt; P.E.—6yx, 6zk; Various—p3fz, miaa, rcb8, egeh, gha, hbk, da.—5HS, Straight ckt.

U—1axa, 1aci, 1cn, 1aao, 1aiv, 1bhh, 1bhm, 1cri, 1rd, 1aof, 1vc, 1hj, 1jl, 1ald, 1cmx, 1bz, 1bhs, 1iar, 1yd, 1sz, 1aid, 1yb, 1xm, 1sw, 1cal, 1ii, 1jr, 1afy, 1g.i, 1bvl, 1nt, 1wl, 1akd, 1cmf, 1ahl, 1bdx, 1ayl, 2cxl, 2fo, 2ami, 2agw, 2bwa, 2kr, 2kx, 2anm, 2afv, 2cth, 2fc, 2kg, 2nz, 2ax, 2cyx, 2mk, 2ikb, 2cft, 2ev, 2adm, 2ahm, 2ag, 2cbk, 2afn, 2gk, 2nb, 3bhv, 3bta, 3jo, 3ckd, 3aas, 3bck, 3trg, 3ckj, 3lw, 3ava, 3bia, 4cu, 4tn, 4dm, 4rm, 4tv, 5jf, 5adz, 8bgn, 8xe, 8bds, 8aly, 8coo, 8bta, 8pl, 9dqu, 9xi, 9zt, 9dge, 9xe, 9eji, 9ebj, btr, nal; B.Z.—1an, 1ta, 1ab, 1af, sq1; C—1dd, 1ed, 8ar, 2ax, 1ar, 2be, 3xc; A—3bb, 3bq, 2yi, 3ef, 2pp; P—3fz, 1af; P.I.—1hr, najd; P.R.—4se, 4ur; Y—1aw, hbk; N.Z.—3af, 4ac, 2xa, 2ac, 3ad, 2aq; R—5uw, oa6n, fi8qq, ys, 7xx, pe6zk, S—smxu, smxr, smvr, smwf, smuk, smvj, smvg, smxx, smss, smyu, smri, saj, 2co, 2nn, 2bs, la1a, la4x; B—4yz, 4rs, e9, s2, s4, j9, z9, d4, z1, g33, b2, m2, r2; N—opx, 13bb, owc, oii, obl, K—2hr, i2, y8, 4lv; I—1gw, 1bb, 1bk, 1as, 1ba, 1ma, 1rm, Egypt—egeh, egbh; Spain—ear9, ear23.

U.S.A.—1ch, 1jr, 1ka, 1kl, 1lw, 1pi, 1qp, 1yb, 1axa, 1axi, 1amf, 1aof, 1aff, 1afo, 1aiu, 1ahl, 1aae, 1are, 1aao, 1azt, 1apv, 1ahv, 1anq, 1ahg, 1all, 1aci, 1ask, 1bqq, 1bsw, 1byx, 1bzp, 1blu, 1bgc, 1cmf, 1cjc, 1cmp, 1ctl, 1cmx, 2bg, 2bw, 2bf, 2gk, 2ku, 2kg, 2mk, 2pp, 2uk, 2xq, 2zk, 2aan, 2amf, 2ahm, 2agq, 2apv, 2akb, 2aky, 2akv, 2aey, 2adκ, 2agt, 2amj, 2bnu, 2bxj, 2bmz, 2ctf, 2cvj, 2crb, 2cvl, 2cxl, 2cyx, 2cns, 2cwj, 2wik, 2xbf, 3bf, 3bg, 3mv, 3tr, 3lw, 3jn, 3dh, 3qt, 3kp, 3zo, 3pf, 3io, 3bwt, 3bmz, 3op, 3ld, 3bhv, 3bta, 3adt, 3cnu, 3cjn, 3ckj, 3chg, 3bva, 3bwj, 4rm, 4sa, 4ll, 4it, 4rl, 4js, 4je, 5jf, 5gj, 5att, 5alz, 8eq, 8zr, 8xe, 8zu, 8bt, 8bs, 8mc, 8jq, 8rv, 8pl, 8aly, 8ada, 8alo, 8avk, 8adm, 8bdc, 8bav, 8bpd, 8but, 8bgn, 8byn, 8bas, 8cau, 8daa, 8dqa, 8xaw, 9es, 9gk, 9ek, 9zt, 9nk, 9adκ, 9aoi, 9bzi, 9bvh, 9bht, 9bxj, 9dbh, 9dng, 9dqu, 9eji; Canada—1ak, 2ax, 2cc, 8ar; Australia—2cm, 2yi, 3bd, 3bq, 3ef, 3lm, 3xo, 6ag; New Zealand—2ac, 2xa, 4aa, 4ac, 4ak, 4as; Africa—a3e, a4z, a6n; Egypt—e1eh; Brazil—1ab, 1ac, 1af, 1an, 1bd, 1ia, 2af, 5ab, rgt, sq1; Argentine—aa8, ba1; Philippine—1hr, 1fn, najd; Indo China—8qq; India—hbk, 8ug; Bermuda—ber; Palestine—6zk; Miscellaneous—rfrl, 16e, gb1, gha, ghb, nrdm, ntt, nkf, nar1, ngy, naw, sgt, o28, 1dh, wva, aabz.—J. Rodgers (6JO), Falmouth.

U.S.A.—1bs, 1bz, 1cf, 1ch, 1ga, 1gi, 1ht, 1hj, 1ii, 1kl, 1my, 1pl, 1rd, 1sz, 1sw, 1si, 1uw, 1wl, 1xm, 1yb, 1za, 1aao, 1apv, 1aba, 1abn, 1atj, 1alκ, 1aoz, 1aiu, 1akz, 1aci, 1aep, 1aid, 1aap, 1abx, 1ams, 1ald, 1afy, 1axa, 1bhs, 1bhm, 1bqt, 1bdp, 1bzp, 1bdx, 1bkp, 1bqp, 1cal, 1cmp, 1cmx, 1cmf, 1ckd, 1xam, 1xao, 2ax, 2bm, 2bq, 2cp, 2ev, 2fk, 2gk, 2hh, 2kr, 2ld, 2kg, 2md, 2uz, 2nb, 2ol, 2pp, 2qs, 2xq, 2afo, 2agb, 2agm, 2aun, 2ahm, 2akb, 2aef, 2arh, 2amj, 2acp, 2awf, 2aky, 2bwa, 2bum, 2bir, 2cje, 2crb, 2cxl, 2cyx, 2cjj, 2ckj, 2cty, 2cvj, 2cft, 2cff, 3co, 3ds, 3hg, 3io, 3jo, 3lw, 3ld, 3qt, 3ue, 3vx, 3afw, 3ahl, 3aha, 3acw, 3avk, 3bta, 3bwt, 3bmz, 4je, 4ur, 4fg, 4dm, 4kt, 4rz, 4sa, 4cu, 4bj, 4it, 4wr, 5jf, 5yd, 8es, 8fi, 8jq, 8xe, 8zt, 8zk, 8ayk, 8axd, 8afq, 8acu, 8aks, 8bds, 8byn, 8ccr, 8dpj, 8dme, 8daj, 8zae, 9zt, 9za, 9adk, 9bjk, 9eji; Australia—2yi, 3bd, 3bq, 3ef, 3xo, 5bg; New Zealand—2ac, 2xa, 4ac; Argentine—cb8, ba1; Brazil—1ac, 1ab, 1an, 1ia, 2ab, 2af, 2ql; Canada—1am, 1ar, 1dd, 1ed, 2it, 2ax, 2be, 3ka, 3xi; India—8ug, 8cr, hbk, x2bg; Indo China—8qq, 8lbt; Africa—a4z, a6n; Palestine—6zk, 6my, 6yx; Philippines—1hr, 1cw, npo, najd, neqq; Miscellaneous—nar1, not, nkf, nal, naj, nfv, uba, 99x, sgc, sdk, gha, lc6, vkp, gfp, 1tz, 2pt, 1pt, gfd, dbr, e3xr, egeh, 1dur.—J. Rodgers (G-6JO), Falmouth.

A Competition.

Canadian 1DD, Major C. W. Borrett, probably better known as "Billy" Borrett, has offered an incentive to ham stations working DX. He has offered to present to the station working Canada the largest number of times in 1926 a genuine Red Indian tomahawk club, which he has nick-named "The Original Canadian Doughong." A sketch of the club will appear in our next issue, and a suitable inscription will be made upon it before it is presented. The Editor has agreed to act as judge when the results of the entries are examined. There is no need to signify that you are entering the competition—you merely keep a record of your transmissions. The judging will take place early next year. Now, who will win the trophy? Only R.S.G.B. T. & R. members are eligible to enter the competition.

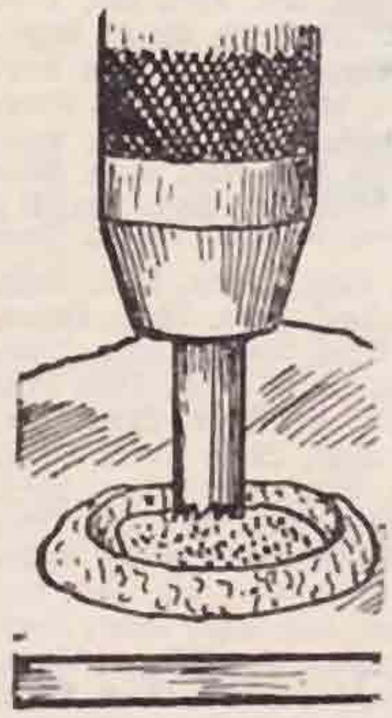
Glass Boring.

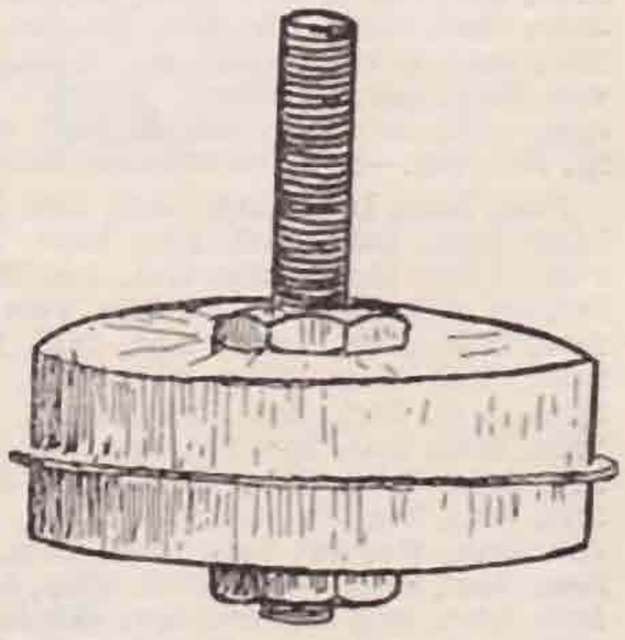
By J. P. J. Chapman.

About boring holes in glass (page 11, January 26). I agree with 2XV when it is a window, but if a flat sheet, make a basin on the glass with putty and fill this with fine sand and water, then drill with a copper tube cut ratchet fashion; it will go through fine—and with a rush— leaving a clear hole. Of course, a bench drill is required, and the glass must be clamped.

I am very willing to give any tips on glass and how to cut it, any shapes or sizes, grinding or polishing, on application.

Glass being really an excess of sand mixed with caustic soda, it is surprising how SOFT tools will work it.





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