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Wireless Weekly

Vol. 5. No. 23.

ROUND-THE-WORLD WIRELESS

By PHILIP R. COURSEY, B.Sc., F.Inst.P., A.M.I.E.E.

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EDITED BY JOHN SCOTT-TAGGART, F.Inst.P., A.M.IE.E

The Wireless League and the B.B.C.

THE great interest taken by the listening public in the quality of the programmes broadcast by the British stations is well indicated by the formation, at the initiative of *The Daily Express*, of what is to be called "The Listeners' League." The object of the league is to ensure that the views of the man-in-the-street are adequately represented and that he should have at least some measure of control over what is broadcast. As matters stand at present, the public, which pays the piper, must take what is given to it, and is in no way represented on the Board of Management. We have previously indicated in these columns how easily the British Broadcasting Company can be misled by relying upon the letters it receives as giving a true reflection of general public opinion; certainly the most vocal portion of the public is by no means the most representative.

Provided it is conducted in a proper manner, the Wireless League may, we believe, prove of value in the broadcasting movement. It must not be forgotten that, although the Radio Society of Great Britain has worked to further the interests of the wireless amateur and experimenter, it has, on the whole, failed to enlist the sympathy and the support of the general broadcast listener. The Wireless League may go far to remedy this state of affairs due to the absence of any adequate representation of the public's point of view in the arrangement of the programmes, and the general relations between the B.B.C., Postmaster-General, the industry and the public.

Here and there in the correspondence relating to the formation of the League we have noticed letters suggesting that better broadcasting programmes would be obtainable if the B.B.C. monopoly were broken and competition in broadcasting instituted. With this view we strongly disagree. However unconstitutional the arrangement may seem to be, however strange it may appear that a government department should collect revenue on behalf of a commercial company, and whatever reasonable defects may usually attach to monopolies, the present arrangement—with safeguards—seems to us to be by far the most generally satisfactory and workable. It is, however, imperative that the closest watch should be kept to see that the B.B.C. do not abuse the great powers given to them by the public. Unfair competition with private enterprise must be checked firmly, and the management of the company must bear in mind that their revenue, powers, and, possibly, even the life of the B.B.C. will depend upon the exercise of sympathy and tact. An excessive development of *amour propre*, perhaps natural at the moment, while temporarily satisfying is likely to lead the company into considerable difficulties in the future. The chances are that the autocratic powers of the B.B.C. will tend to wane as the public becomes more intimate with broadcasting, while political changes in the future may even revolutionise the present system. At such a future time the B.B.C. will be forced to exercise the discretion and outward show of sympathy which they now regard as a condescension on their part.

The troubles of the B.B.C. are by no means over, and they may need all the support possible from those who take the long view and favour a system which is satisfactory as long as it is conducted soberly and in harmony with public opinion.

Our only fear is that in the heyday of their success they may alienate this support and give extremists the opportunity for ill-considered attack. The tendency to minimise newspaper criticism is very marked, the B.B.C. forgetting that, however evanescent these attacks may be, their repetition has in the public mind an unpleasant effect, which no amount of propaganda through the microphone can remove.

Meanwhile, any league or society which will assist in preventing abuses will be doing useful work provided it is conducted vigorously and with good judgment.

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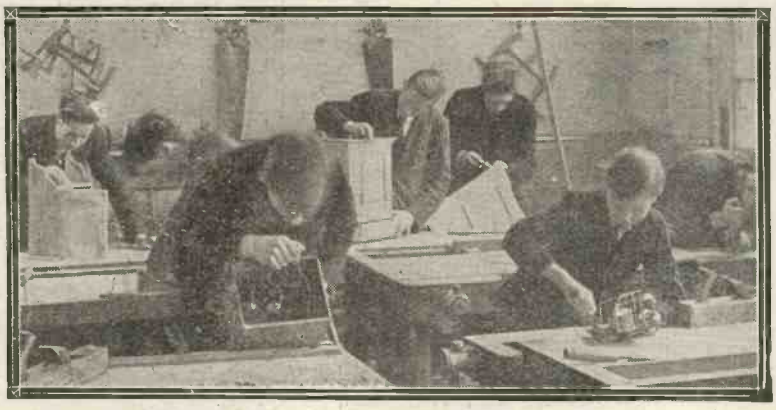


Boys at the Beaufoy Institute busily engaged in the workshop in constructing wireless components and receivers.

Wireless . . . and the Young Idea

A brief description of the Schools Wireless Exhibition.

IN many schools and institutes wireless as a hobby for boys, and as an aid to developing their interest, and to lead them to a broad appreciation of the realities of science and its methods, is given every encouragement. The recent exhibtion of wireless work by London schoolboys, held by the Schools Radio Society at the L.C.C. Beaufoy Institute, is of great value in this connection.

Eighteen Schools

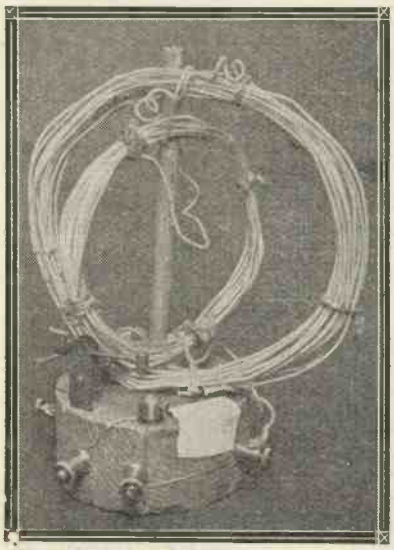
Exhibits were shown from eighteen elementary schools of examples of the constructional work done by the boys both at their homes and in the school workshops. Examination of the general science syllabuses of several schools showed that the scheme of work included instruction in simple wireless theory, while in some cases practical and constructional work formed a definite part of the curriculum.

Exhibits

Some interesting exhibits were those by the students of the Beaufoy Institute, the school three-valve set, constructed entirely by the students, and embodying a simple straight circuit consisting of a detector and two low-frequency valves, being a particularly well-made receiver.

"Polyversal" Cabinet

An exhibit of remarkable ingenuity was the "Polyversal Cabinet," designed and made by Mr. T. F. Barrett, a member of the staff at the institute. This complex piece of work is an arrangement to give by means of various forms of switching a multiplicity of circuits using a crystal and from one to seven valves. It is understood that the possible circuits include the ST100, other reflex circuits, T.A.T. circuits, Neutrodyne, and others, in addition to the usual straight circuits. A single-valve reflex receiver embodying the ST 74 circuit, and a four-valve set were among the other examples of the work done by the boys at the institute.



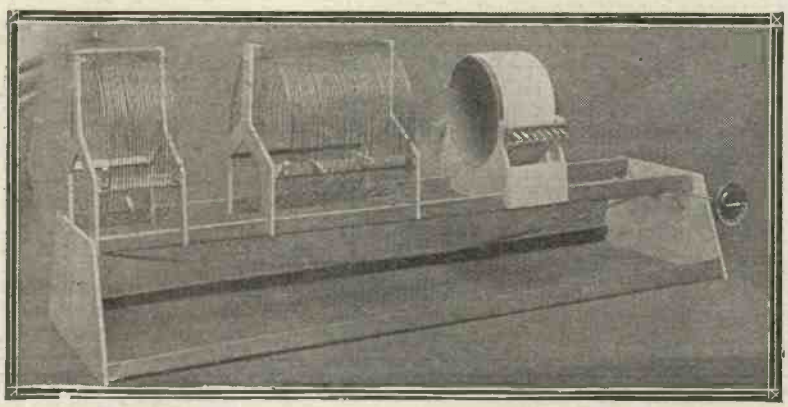
A typical specimen of the type of receiver made as a class exercise at the Dalston Road School. The design is that of the crystal set described by Mr. A. D. Cowper in "Modern Wireless" of December, 1923.

Components

The interest taken by the scholars in the working and construction of wireless sets is reflected in the many examples of component parts and accessories constructed by themselves. These included home-made frame aerials, numerous types of variometers, fixed condensers, different forms of coils, crystal detectors, etc., and pieces of apparatus to illustrate the principles of electricity involved.

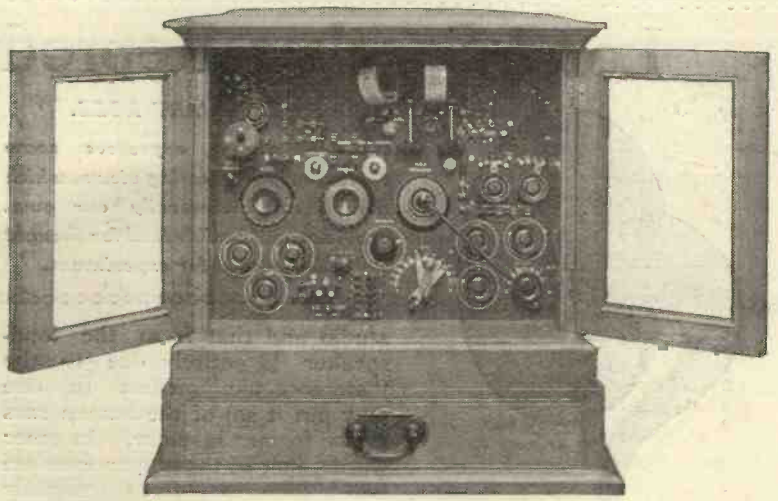
Crystal Sets

There was a large number of crystal sets of different types all



A low-loss tuning unit of skeleton construction exhibited on one of the stands.

The interest in wireless taken by the average schoolboy is very admirably expressed in the number and variety of home-constructed wireless receivers which were to be seen at the recent Exhibition held at the L.C.C. Beaufoy Institute.



The "Polyversal Cabinet" is a multi-purpose receiver of unique design.

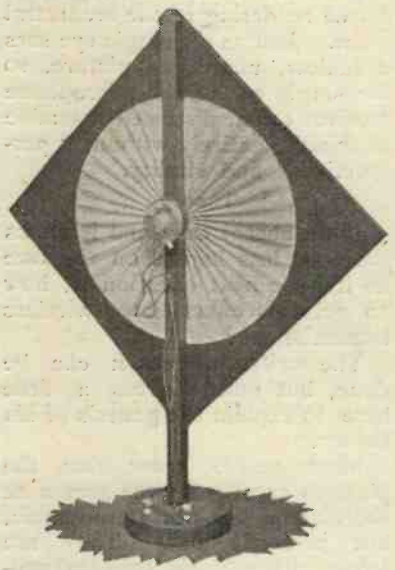
constructed by boys between the ages of twelve and fifteen. The majority of these used either a slider and coil or a variometer of the type shown in one of the accompanying photographs, and in most cases the crystal detectors were home-made. The standard of workmanship was on the average distinctly good.

A Four-Valve Set

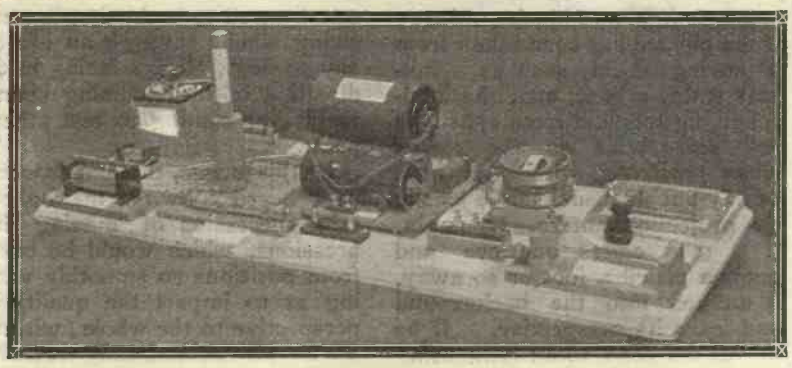
Some well-made sets were shown in the exhibit of the Mansford Road School, a tuning unit and a four-valve experimental set by a boy of fourteen being particularly good. The school wireless set made by the boys of the Michael Faraday L.C.C. School was another interesting exhibit. This was constructed in an "upright grand" gramophone type of cabinet, also the handicraft of the boys, and the circuit used in the set is that of the All-concert de Luxe so familiar to our readers.

Valve Characteristics

Another interesting part of the exhibition was that provided by the Wireless and High-frequency Section of the Regent Street Polytechnic. Apparatus for more advanced work was shown here, and a useful set of valve characteristics taken by the students themselves was a noticeable feature of the exhibit. A pleated diaphragm type of loud-speaker designed by the students was also of interest.



A pleated diaphragm loud-speaker designed by the students of Regent Street Polytechnic.



A selection of parts made by the boys of the Elizabeth Street School. The microphone amplifier in the centre is the work of a boy of 13.

Various demonstrations and exhibits of commercial apparatus gave added interest to the exhibition.

American Re-transmission of Chelmsford.

SOME misconception of the true position of American re-broadcasting of English stations has taken place owing to a number of amateurs picking up a harmonic of the Chelmsford station under the impression that they were receiving the American re-transmission of 5XX. The first actual re-transmission occurred on Tuesday morning, the 13th inst., when traces of music and the time signal from Big Ben got through. The music was from a special programme, and the re-transmission took place through the station WJZ.

On Saturday night, the 14th inst. (or rather Sunday morning, the 15th), a much more successful re-transmission took place, this time for two hours, the stations being WJZ and WGY. The re-transmission of the Savoy Bands and a special programme took place. Credit for this is due to the Radio Corporation of America, to Mr. Beverage of aerial fame, and to Dr. Goldsmith and Mr. Weinberger. Portions of the WGY programme were received in England, and reports of good reception have also been received from Barcelona and Vienna.

Loud-Speaker Reproduction

By C. STUART ROSE.

Our contributor expresses some particularly interesting views, which though not necessarily our own, provide considerable food for thought and material for experiment.

THE best of present-day wireless loud-speakers, in the opinion of the writer, reproduces imperfectly. Any criticism, however, reflects the more seriously on the shortcomings of the gramophone industry—for the principle in both forms of reproduction is the same, but whilst wireless is an infant, the gramophone has had 40 years in which to improve itself.

The simile of the " band playing in a tunnel " is still true of the gramophone and the loud-speaker to a very marked extent.

Shape of Trumpet

Until quite recently the theory was held that the shape of the trumpet was responsible for this " distortion "; but when gramophone reproducers were evolved which eliminated the trumpet altogether, there was no noticeable improvement. Now it might still be pointed out that, although the trumpet was not used for reproduction, it could not be dispensed with for *recording* in order to concentrate the sound properly.

Muffle

Even if this is granted, it does not dispose of the presence of this same disturbing muffle in the wireless loud-speaker, because the *input* end (the microphone) is not enclosed in a funnel at all!

We must go further than this, and many authorities are now of the opinion that the marked difference between music heard in the studio and that from the loud-speaker is entirely due to the " stereoscopic " effect (if one may put it so) of the human ears in the former instance. In other words, just as the human eyes see two pictures from slightly different angles, which combine to give the brain a perfect relief-view of the scene, with all values absolutely correct, so the ears hear two sets of sounds, also from different angles, which combine to give us a true rendering of the orchestral piece. Just as the single eye sees a hollow, unrelieved picture, so the single ear of the microphone receives a flat, distorted ensemble of sounds, entirely without " perspective " and vitality.

Theory

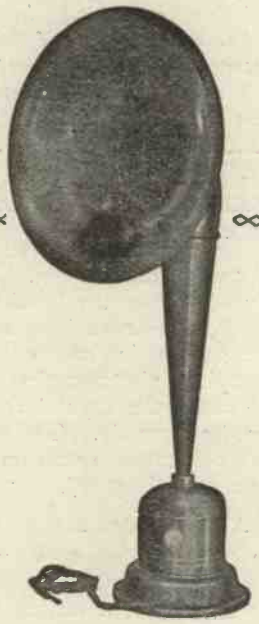
If we accept this (and it seems more or less logical on the face of it), the next question is, how to get this effect into wireless transmissions?

The writer believes it can be done, but must digress a little here to explain the genesis of his theory.

Most people know that the pictures thrown on the screen at the cinema are not stereoscopic, but perfectly flat. They are taken with a single lens, and projected through another single lens.

Analogy

But here is an amazing thing—if the picture has been taken from a moving object, such as a railway train, a boat, etc., the landscape, figures and trees *appear in full perspective on the screen when projected,* without the aid of any but the usual single lens in the projection-lantern. Or again, if a man closes one eye and holds a pencil a foot or so away, it merges into the background and loses its perspective. If he moves his head about (still using only one eye, however) the pencil regains its proper optical value,



and stands out in relief, as though the two eyes were being used.

Now, it is submitted that if a single lens on a moving platform can take a series of pictures that, when reproduced with the present available apparatus, appear solid and life-like, a single microphone (or ear) on a moving base can " accept " a series of sound-waves that, when reproduced in the ordinary way, will have all the bright and vivid characteristics of the original music, without any flatness at all.

Swinging Microphone

The analogy is reasonable, and there seems to be a sound argument for a trial of the theory in actual practice. This could probably be arranged by so suspending the microphone (or the recording diaphragm of the gramophone; the theory applies equally well to both) that it could swing slowly through an arc of, say 30 deg., always facing in the direction of the incoming sound, and never coming to rest at any point.

By this means, the sounds would be " heard " by the microphone in a succession of moving impressions, which would be taken from positions so smoothly varying as to impart the quality of perspective to the whole, without which all mechanically or electrically-reproduced music must be dull and lifeless.

An Auto-Coupled Crystal Set

By C. E. LOTCHO.

An interesting crystal receiver embodying an air-spaced low-loss inductance.

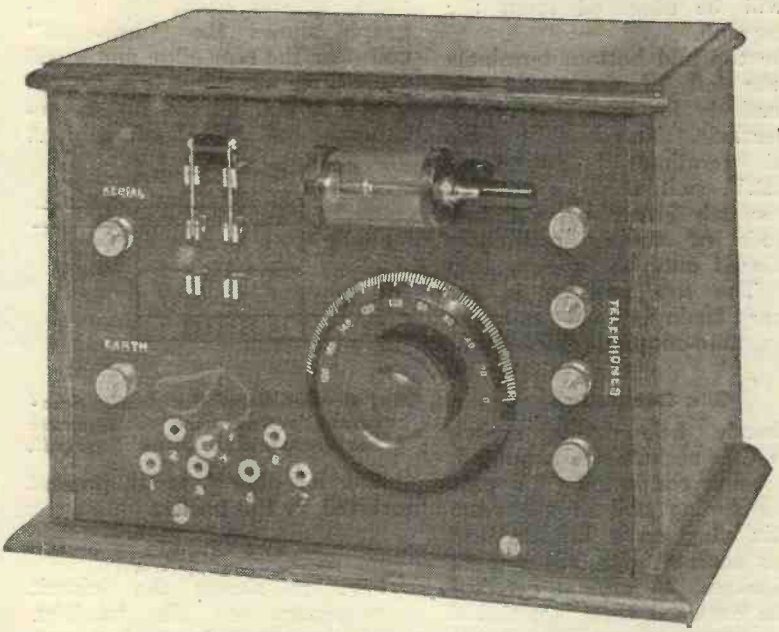


Fig. 2.—Appearance has not been sacrificed in the construction of this efficient crystal set.

CRYSTAL sets, when compared with valve sets, possess two important advantages which have served to keep them in constant demand by wireless listeners. One point is that their initial cost is cheap, and the upkeep nothing at all; the second point is far more important in the eyes of many—the unrivalled purity of reproduction obtainable.

Limitations

Unfortunately, however, the crystal receiver has several notable disadvantages, the chief of these being the limited receiving range and volume possible, and the inherent lack of selectivity due to the damping effect of the crystal. The crystal set shown in the photographs has been designed with a view to overcoming to a certain extent the latter defect, while in regard to the former, results are certainly decidedly good, being equal to those obtained from the best crystal receiver previously tried.

Two Methods of Tuning

Provision has been made for two different forms of tuning, one method being for use where increased selectivity is desired, and the other for ordinary conditions. From this, however, it should not be inferred that selective tuning is unsuitable for ordinary purposes. When the set is arranged for selective reception, a form of tuning known as "semi-aperiodic aerial tuning" or "auto-coupling" is brought into use.

The other method consists of the usual arrangement of a tuned coil connected directly to the detector circuit. An unusual feature has been introduced in the latter case by the provision of a means of obtaining very fine tuning over a considerable wavelength range.

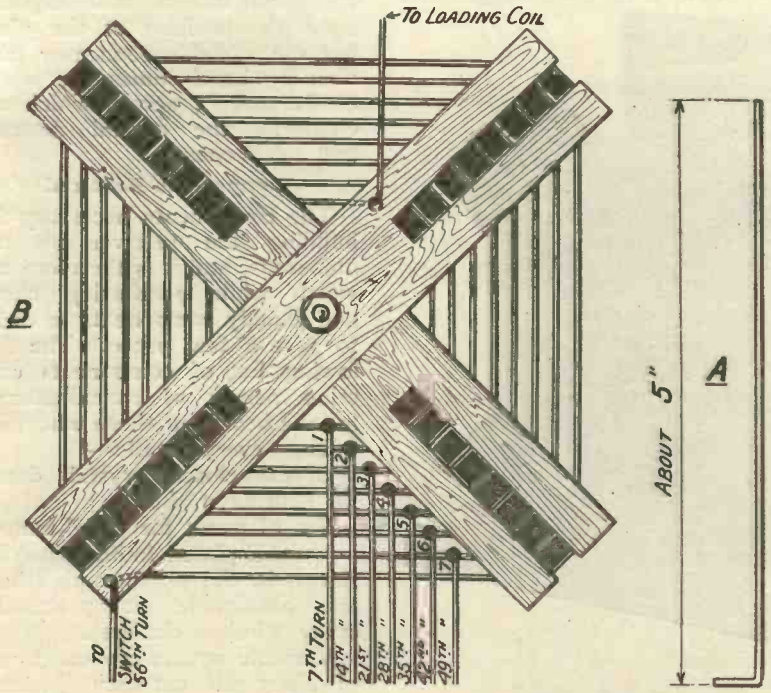


Fig. 1 illustrates how the tappings to the low-loss coil are made; at A is shown a specimen tapping wire.

The Tuning Coil

Many readers will observe that the tuning coil is of similar pattern to one which I described in the March 11 issue of *Wireless Weekly*, both turns and layers being spaced by air. Mr. G. P. Kendall recently tested for me a coil wound in this manner, and, the results being very good in view of the moderate space requirements, it was decided that the time expended in making such a coil for the receiver would be more than justified.

The Layout

Without sacrificing efficiency it has been possible to arrange the components upon the front of the panel in an orderly manner, as will be observed from the photograph.

The top and bottom terminals on the left of the panel are respectively for aerial and earth connections. To the right of the aerial terminal is a small D.P.D.T. switch. By means of this switch either of the two methods of tuning previously mentioned may be brought into use. The top position is for ordinary tuning, while the lower brings auto-coupling into operation.

Clix Connections

Directly below this switch seven Clix sockets are arranged, each being connected to a part of the tuning coil at the rear. A Clix plug on a flexible lead makes contact with any one of the sockets. A crystal detector of the enclosed type is situated in a convenient position at the top of the panel, while below is a knob controlling a variable condenser of .0005 μF maximum capacity. Four terminals on the right of the panel permit the use of either one or two pairs of 'phones. It is often advantageous, in the latter case, to place the two pairs in series, and this has been made possible by the internal wiring of the terminals.

Coming now to the components mounted on the wooden panel at the back, the photograph shows the "low-loss" coil near the rear edge and a coil mount, for use when it is desired to add a loading coil for the reception of Chelmsford. A

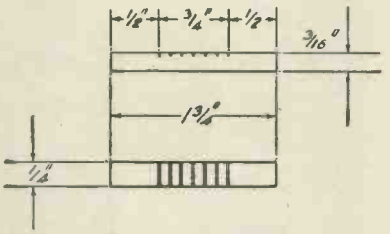


Fig. 4.—Details of the ebonite separating pieces used to separate the layers and the turns of the coil.

"shorting-plug" is at present inserted in the socket.

The Circuit

Fig. 7 shows the circuit arrangement of the receiver. With the switch in the top position, the crystal detector is joined directly to the aerial, while the lower side of the variable condenser C1 of .0005 μF is connected to earth through a fixed condenser of the same capacity. The resultant maximum capacity is .00025 μF (half the capacity of either when used alone), and this is more suitable for the present form of tuning.

Upon changing the switch to the lower position, the number

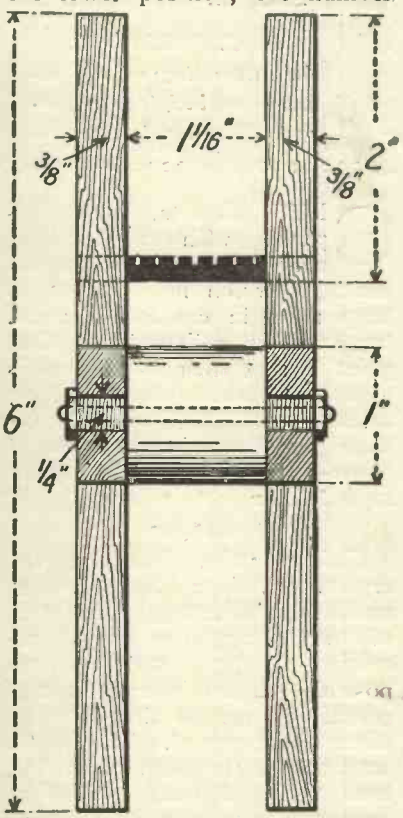


Fig. 5 shows the construction of the coil former.

of turns of the coil L1 included in the aerial circuit still depends upon the position of the plug, but the variable condenser (this time by itself) tunes the whole of the coil L, across which are connected the crystal detector and telephones.

Components Required

The components necessary for building the receiver are not numerous, and it is therefore not worth while purchasing cheap and shoddy components in order to save a few pence. The following list of components contains names of manufacturers for the benefit of those who wish to copy every detail :—

Glass-enclosed crystal detector (Burndept, Ltd.).

Set of parts for panel-mounting nickel-plated knife switch as shown in the photograph (these are obtainable at practically every wireless dealers).

Variable square-law condenser of .0005 μF capacity (Jackson Bros.).

Six W.O. type terminals.

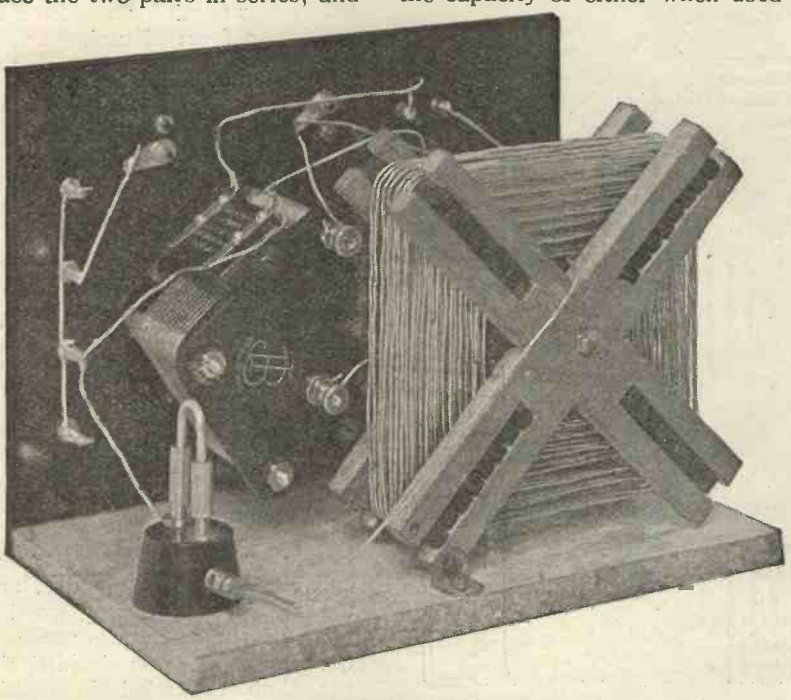


Fig. 3.—This back-of-panel photograph shows clearly how the low-loss coil is mounted.

Seven Clix sockets and one plug (Autoveyors, Ltd.).

Ebonite panel 8 in. x 6 in. x ¼ in. (This should be guaranteed free from leakage.)

Baseboard 8 in. long x 5 in. wide x ⅜ in. thick.

Cabinet of suitable size to take panel and baseboard.

Fixed condenser of .0005 μF (Dubilier).

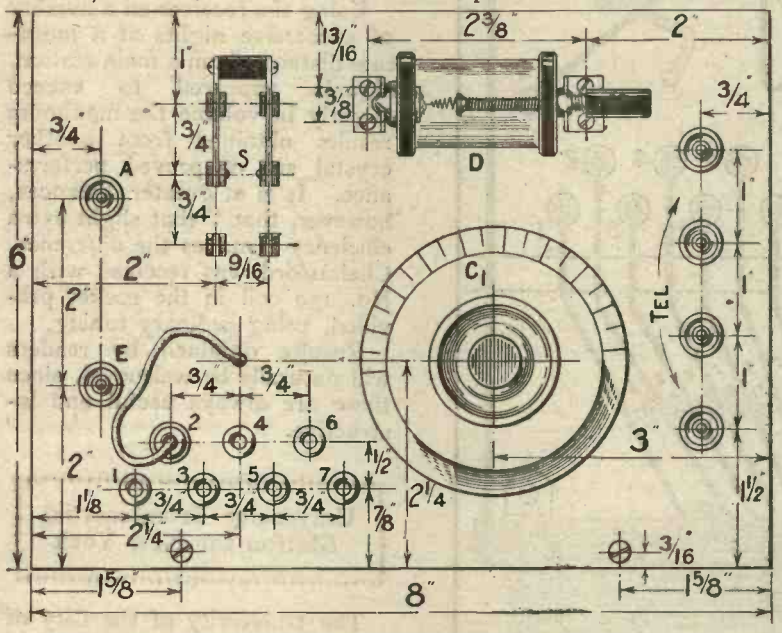


Fig. 6 shows the panel layout, with all dimensions necessary for marking out and drilling.

Coil socket for board-mounting (McMichael).

Shorting-plug for above.

For the construction of the coil we require :—

½ lb. of No. 18 tinned copper wire, or alternatively enamelled copper wire.

2 ft. of wood 1 in. wide and ⅜ in. thick.

A piece of ebonite 1¾ in. wide and 3/16 in. thick, and preferably 9 in. or 10 in. long.

Packet of Radio Press panel transfers.

Constructing the Coil

Bare tinned copper wire has been used for winding the coil shown, and I experienced no troubles whatever due to "shorting" between neighbouring wires or layers. Should the constructor of this set feel any doubt whatever as regards his ability to make a firm job of the coil, however (no great skill is required actually), I strongly advise that enamelled wire be used for the winding to ensure safety, for a poorly-made bare wire coil in which some of the turns touch may exhibit remarkable and puzzling symptoms.

Detailed instructions regarding the building of a coil of this type were given in the March 11 issue of *Wireless Weekly*, and if that issue is referred to no difficulty need be anticipated in this part of the constructional work. The present coil, however, is larger than that described previously, for it contains eight layers, each layer consisting of seven turns, a total of 56 turns resulting.

The two cross-pieces of the coil former are identical with those of the coil already described. It will be seen from Fig. 5 that the only way in which the present former differs is in the distance between the two crosses, which in this case is 1 1/16 in. Otherwise it is identical.

When the 56 turns have been wound on in the correct manner tappings are taken at seven points on the coil for connection to the Clix sockets on the panel. Fig. 1 (B) illustrates how the tappings are made and also at what points. The numbers one to seven correspond with the numbers of the Clix sockets, to which they must shortly be connected. At (A) in the same figure a specimen tapping wire is shown, the lower end being soldered to the coil.

Drilling the Panel

All the positions for the holes to be drilled in the panel are given in the drilling diagram, and no difficulty should be experienced here if all the components are at hand so that the correct sizes for the various holes may be quickly ascertained. The baseboard may be fitted to the panel at this stage, two wood screws as shown being suitable for the purpose.

Mounting the Components

When mounting the components in their places, reference should be made to the photographs and the drilling and wiring diagrams if necessary. A point which may require elucidation is the mode of fixing the coil on the baseboard. This is very simply carried out with the aid of two "Meccano" angle brackets and four "Meccano" bolts. If these are not procurable, two pieces of brass strip may be bent to suitable shapes and used in the same manner.

Wiring-up

The wiring diagram shows all the connections required, and care should be exercised to follow this correctly. The fixed condenser C2 is secured in position partly by means of the stiff wire used for making the connections (this being similar to that used in the winding of the coil). It is also allowed to rest on the variable condenser.

It will be seen from the wiring and drilling diagrams that a flexible lead passes through a hole in the panel, and is terminated outside by a Clix plug. With the wiring finished the receiver is ready for work.

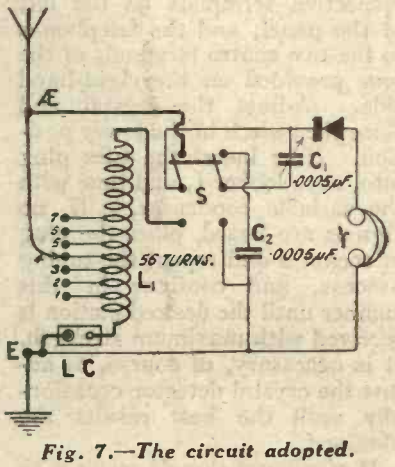


Fig. 7.—The circuit adopted.

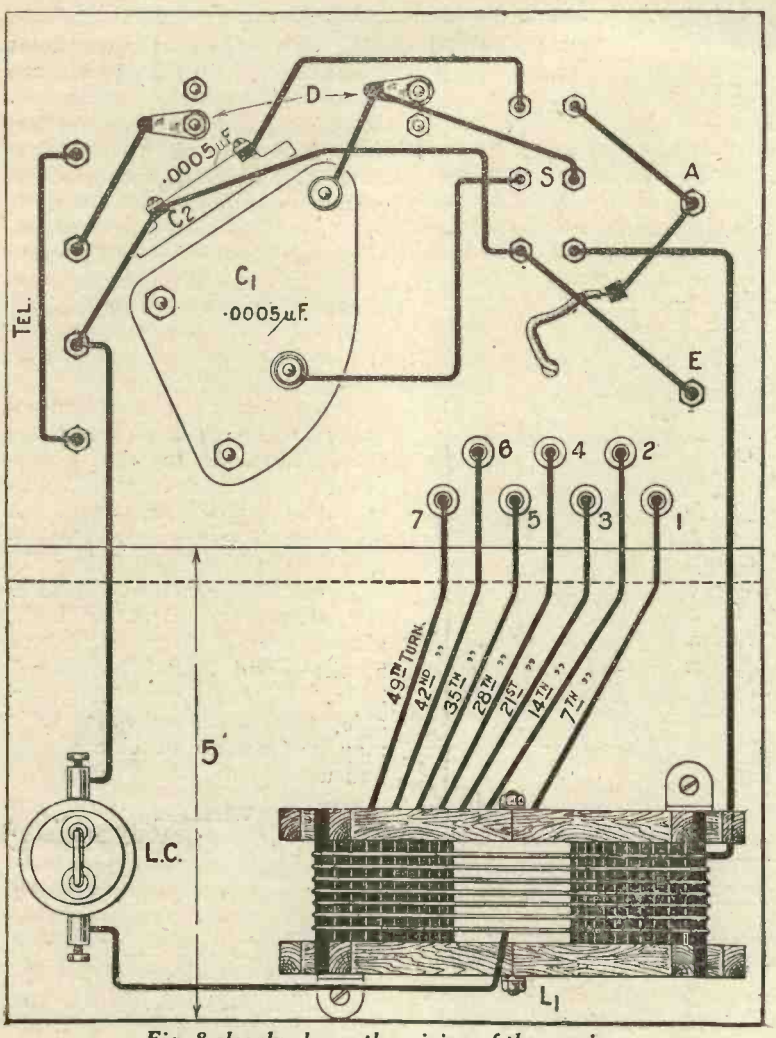


Fig. 8 clearly shows the wiring of the receiver.

Operating the Receiver

We will deal first with the selective form of tuning. Connect the aerial and earth to their respective terminals on the left of the panel, and the telephones to the two centre terminals of the four provided on the right-hand side. Adjust the crystal and place the switch in the lower position. Now insert the Clix plug into, say, socket 1, and tune with the variable condenser. If no signals are heard, place the plug in socket 2 and repeat the tuning process, and continue in this manner until the desired station is received with maximum strength. It is necessary, of course, to adjust the crystal detector occasionally until the best results are obtained.

If maximum signals result with the plug in socket 4 the set may be made more selective by plugging into socket 3, and still more so by going down farther. Since this also results in a decrease in signal strength, however, a compromise must be effected when interference is experienced. If your local station is a " relay " whose wavelength is not much over 300 metres, slightly better results might be obtained by making the coil one of seven layers instead of eight.

Ordinary tuning may be reverted to by changing the switch to the upper position, when tuning may be carried out in the manner described for semi-aperiodic aerial tuning. The remarks regarding selectivity and signal strength do not apply in this case, however. It will be found in some instances that the form of tuning first outlined is superior not only as regards selectivity but also in regard to signal strength. Much depends upon the aerial employed.

Using Two Pairs of 'Phones

It is often impracticable to use two pairs of 'phones in parallel, especially if their respective resistances are dissimilar. It is always safe, however, to place them in series, and this may be effected on the set by connecting one pair to the two upper 'phone terminals and the other pair to the remaining terminals.

Some Results

Using the receiver on a number of successive nights at a moderate distance from a main station, signals appeared to exceed slightly in volume the maximum results obtained from another crystal set of proved performance. It is at greater distances, however, that " that slight extra efficiency " makes the difference. Chelmsford was received with a No. 150 coil in the socket provided, using ordinary tuning.

Results obtained by readers will naturally be welcomed, since these are always useful and instructive.

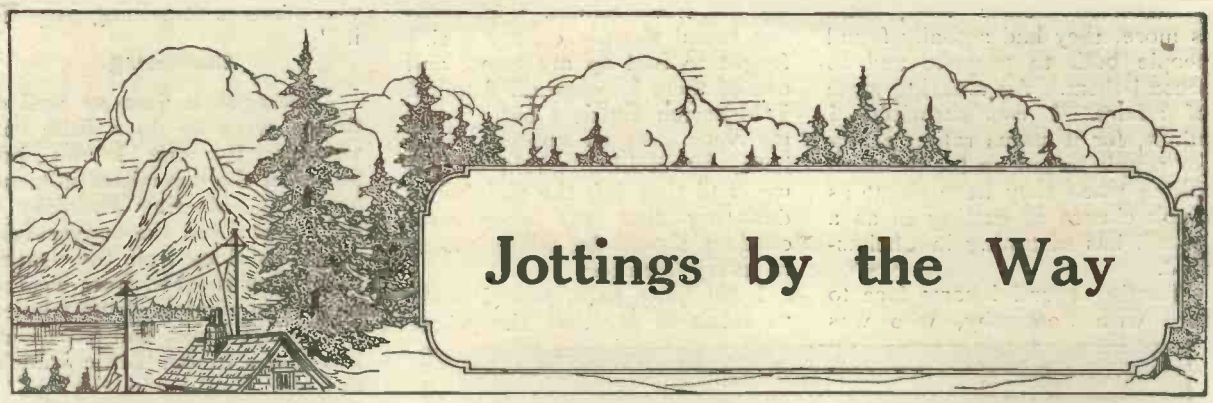
University Broadcasting Station for New York

The University of the City of New York has completed plans for the erection of a broadcasting station which will possess several unusual features. One of the aerial supports will be a mast from Sir Thomas Lipton's yacht, the *Shamrock IV*, which was the craft which competed with the *America* in 1920. The mast consists of two sections, one of steel 113 ft. high, and a topmast of wood 56 ft. high, equipped with a masthead light, which will be visible at night for many miles around.

When the station commences working, the University authorities expect to use it for the broadcasting of lectures, which are now being sent out from other New York stations. The entire equipment will be constructed in the Sage Laboratories of the Engineering School.

BASKET COIL ADAPTORS

With reference to the article on " Basket Coil Adaptors " in our March 4 issue, we note that a coil-holder of similar type may be purchased from Hall & Brenard, Ltd. (price 3s. 6d.).



Jottings by the Way

The Committee

HOW many clubs, I wonder, wireless or otherwise, have their activities hampered, their comfort destroyed, their finances wrecked, by the baleful activities of their committees? I have always felt rather strongly that the committee of the Little Puddleton club is not all that it should be, and I have not hesitated to say so at many meetings, or, rather, to begin saying so, and to go on until stifled by the chairman. Since the chairman is, of course, himself a member of the committee, one can never get in a really resounding smack such as one's soul longs for. And, after all,

. . . *Poddleby rotates* . . .

with fellows like Bumpleby Brown and Poddleby on the committee, what can you expect? What do they know of high finance? How can they possibly have acquired any knowledge of organisation and management? Can people so utterly bereft of *nous* be trusted to sift out candidates for election properly, choosing the sheep and rejecting the goats? I think not. It was largely for these reasons that I came to a sudden resolve this spring when it was announced that Bumpleby Brown was to retire in rotation that there would be a vacancy on the committee.

Rotation

I have never seen Bumpleby Brown rotate, though Poddleby performed this feat once before my eyes when, whilst walking down the High Street, he stepped upon a lemon sole which

. . . *Cross-word puzzles are so difficult* . . .

had slipped from the slab of Mr. Rabbitts, our local fishmonger.

A Noble Prospect

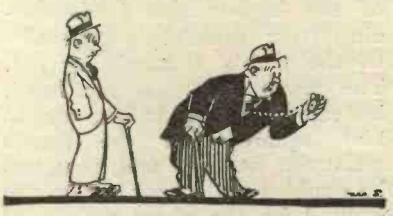
But to return to the committee. As I have said, the notice stated that Bumpleby Brown would retire in rotation, and I am anxiously waiting to see him do it. The resolve to which I came, after lying awake for a whole afternoon devoted to thinking the matter over, was that I would offer myself as a candidate for the vacant seat. One swallow, we know, does not make a summer, and the inclusion of *one* really efficient member can hardly be expected to reform our committee entirely all in a moment. But, as you know, I am one of the world's workers,

. . . *He doubled up* . . .

and I intended to leave no switch unturned in my efforts to make the committee quite worthy of the club.

Cross-word Puzzles

You will realise what a sacrifice I am making in offering myself for the post. Already my time is fully occupied, as you will readily understand when I tell you that directly my after-breakfast pipe is finished I sit down to work and do not rise until my wife summons me to lunch by prodding me in the ribs and suggesting that it is about time I woke up. Women are always prone to mistake deep thought for mere sleep. The afternoon is equally strenuous and the whole evening is one long spell of work. The cross-word puzzles in the evening



. . . *He glanced hurriedly at his watch* . . .

papers are so difficult nowadays, are they not?

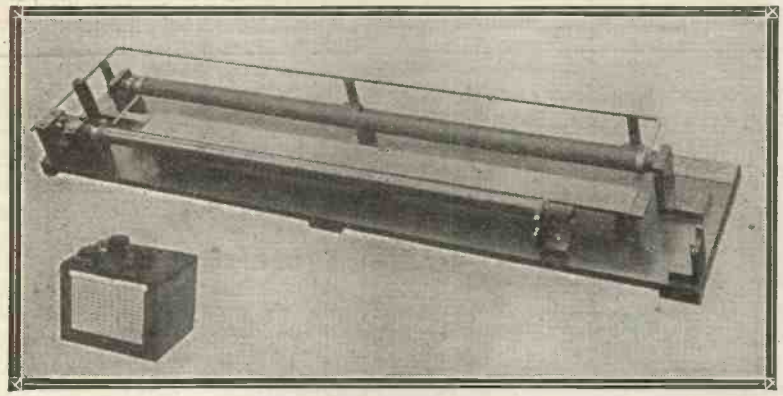
Preparations

I imagined, naturally, that when I allowed myself to be proposed and seconded, I would be given a walk-over, for it is not every day that a club has the chance of putting a fellow like myself upon its committee.

You will hardly believe it when I tell you that when I next sauntered down to the club and glanced at the notice board I found that there were *two* candidates besides myself for the vacant post. There beneath my own was Snaggsby's name as large as life, and immediately below his came that of Admiral

Whiskerton Cuttle. And, what is more, they had actually found people both to propose and to second them. An amazing state of affairs. I was surprised, I admit, for it seems rather a pity for people to put up for the committee when they have about as much chance of getting in as a 50-coil has of tuning in Chelmsford.

Turning round I came face to face with Snaggsby, who was



An early type of wavemeter, the Cymometer, invented by Prof. J. A. Fleming, M.A., D.Sc., F.R.S. A modern wavemeter may be seen in the foreground.

standing two or three yards from the board. I rushed forward with outstretched hand to greet him, but was unfortunate enough to catch my foot in one of the high-tension leads running from Poddleby's generator to the club's transmitting set. The result was that my hand, instead of landing in his, caught him squarely on the fourth waistcoat button, and that, as he doubled up, I bore him to the ground by the sheer weight of my unintentional charge. Any decent fellow would have seen that the whole thing was an accident, but Snaggsby went about saying that I was so disgusted at his putting up for the committee against me that I had rushed upon him and knocked him down without a word of warning.

I did my best to explain. When we picked ourselves up I held out my hand once more, but Snaggsby, saying that he wanted no more ju-jitsu, retired behind the generator and dared me to come on. It was an unlucky morning for me, for whilst I was standing in front of Snaggsby's entrenchment explaining with outstretched arms that I meant no harm, I heard a sudden hearty shout almost in my ear from behind. In turning round sharply on my heel I forgot to fold up my arms, and one of them knocked off Admiral Whiskerton Cuttle's hat. I did my very best to appease them both, but neither would believe me, and they left the club-house declaring that my disgraceful conduct should be made known to every member.

I am quite sure, now I come to think of it, that the whole thing was simply a plant. If you will listen for a moment, my dear Watson, I will tell you my theory. The committee were terrified when they saw my name down as candidate for the vacancy. "This," they said to themselves, "will never do. If a really efficient fellow like Wayfarer is elected, all our old peace will be gone and we shall have to do some work. Let us get two others to stand as candidates and let us urge them to do all they can to blacken Wayfarer's name. We will hide the fact that he spent an entire legacy in giving us a new terminal; we will belittle the services that he has rendered to the club; if we cannot make his name mud, we will make it something jolly like it."

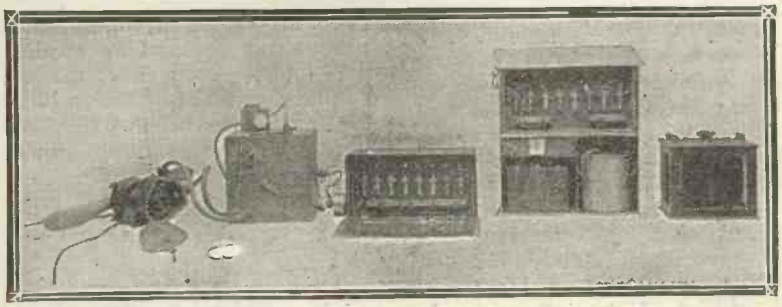
Canvassing

I thought it just as well as things were to do a little canvassing, for one knows how powerful the committee influence can be. Meeting Poddleby in the street I led the conversation gradually along from the weather to weather reports, from weather reports to wireless, from wireless to wireless clubs, and from wireless clubs to the Little Puddleton club. "I am relying," I said, "upon your support in the election." I could see that Poddleby did not dare to give himself away for fear that some of his fellow-members on the committee came to harm. Though, in answer to my remark, he glanced hurriedly at his watch and said that he must be getting home, I realised that he was heart and soul behind me.

An Honour to Us All

Therefore, dear reader, when next I write to you, I shall do so, not as one of the common herd of the Little Puddleton Wireless Club, but as a member of the committee. I am sure you will feel as I do, that my elevation is an honour to all of us. I shall be delighted to crack a bottle with you in honour of the occasion, if you will kindly forward it to me at the committee room of the club.

WIRELESS WAYFARER.



The original Marconi aircraft transmitter used on the Rolls Royce Handley-Page biplane which was preparing to fly the Atlantic from Newfoundland in 1919, when Captain Alcock forestalled the attempt.

STOP PRESS.
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Can we Signal to Australia in the Summer?

By PHILIP R. COURSEY, B.Sc., F.INST.P., A.M.I.E.E.

In this highly informative article Mr. Coursey reveals how all experimenters were misled on the first two-way communication with Australia and New Zealand.

"2OD." Mr. E. J. SIMMONDS, famous for his two-way working with the Antipodes.

WHICH way do our signals go to Australia and New Zealand? This is a query about which there has been some discussion, and it is the purpose of these notes to endeavour to throw some further light on the subject. Now, Australasia as a whole lies to the eastwards of the British Isles—*i.e.*, its longitude is east of Greenwich—and hence the shortest distance from this country to any point in either Australia or New Zealand is found along an easterly route. It is for this reason that prior to the hearing of New Zealand and Australian signals and the establishment of two-way communication with radio amateurs there, it was anticipated that such communication, if ever found possible, would be effected only when the Eastern Hemisphere was in darkness. This only occurs near sunset here, which corresponds to early morning in New Zealand.

It came, therefore, somewhat as a shock that the first interceptions of signals should be made in the early morning here when the Eastern Hemisphere is bathed in sunlight. For some reason or other the signals were thought to prefer, apparently, the westerly and longer route via America, which would be in darkness. This was attributed largely to the superior carrying properties of signals over the Pacific Ocean, westerly from the United States.

A Point Overlooked

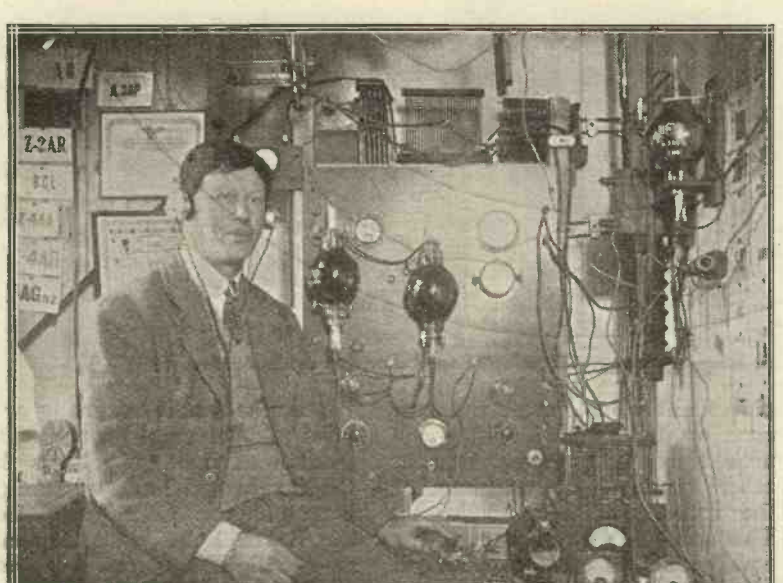
In connection with such surmises, however, the real direction of, say, New Zealand from London has apparently been overlooked—that is to say, the shortest great-circle direction. Reference to a great-circle map of the world plotted with London as centre, such as is reproduced in Fig. 1, shows that there is very little question of truly *easterly* or *westerly* routes as ordinarily understood, but that the true direction is north-east in the case of New Zealand, and about N.E. by E. for Eastern Australia to E.N.E. for Southern Australia. It should also not be forgotten that the earth's equator does not lie in the plane of the ecliptic, and consequently that the limits of light and darkness as separating day and night do not pass through the poles except at the equinoxes.

How the Globe Helps

Reference to a globe map of the world is a great help in considering these matters, and when this is done the surprise previously felt with regard to the time of first making contact with New Zealand radio amateurs is at once lost, bearing in mind that it was effected in the autumn.

Dawn and the Map

A sketch drawing of a globe arranged at the appropriate angle corresponding to winter in the British Isles and dawn in London is reproduced in Fig. 2. From this it will be at once evident that the "twilight band" passing through London, passes in approximately a north-east by northerly direction, passing over Norway, Northern Russia, and thence (by inspection of the actual globe) it is seen to cross Northern Siberia to China, and thus to Australasia. In other words, the twilight band separating night from day at the time of dawn in London during the winter months runs precisely *in the direction of the shortest distance to New Zealand.*



"2 NM." Mr. Gerald Marcuse, another amateur who has worked Australia and New Zealand.

Hence signals between these places can under these conditions and in winter travel almost, if not quite, in darkness, and yet follow practically the shortest route. What is more, they may actually be helped or guided by this " twilight band," the transition from night to day perhaps acting as a sort of guiding reflector for the waves.

The sketch in Fig. 2 is drawn at the position of the earth at mid-winter at approximately dawn in London, and is drawn from a position looking slightly downwards on to the earth from a point somewhat above the equatorial plane. The North Pole is thus marked on the drawing, just inside the upper limit of the map. This position enables the route taken by the twilight band to be more clearly seen, as more of the northern coastline of Europe is thereby made visible. Although, of course, this " twilight band " is comparatively narrow, and therefore will only cover a comparatively narrow part of New Zealand at one time, yet signalling to places near the band—places either just inside the dark zone or just into the light—will probably be much easier than at other times, since the bulk of the route will be in darkness. This spreading to places near the band would be quite sufficient to account for the ability to signal to Australia as well as to New Zealand, since in the foreshortened view of these places as " seen " from England along the route indicated, they occupy only a comparatively narrow angle measured from here.

The day-night transition line is obviously a great-circle on the earth, and hence at sunrise in London will be representable on the great-circle map of Fig. 1 by a straight line. Since at mid-winter the sun is vertically overhead at places $23\frac{1}{2}°$ south of the equator at noon, it follows that the northward limit of sunlight is the Arctic Circle $23\frac{1}{2}°$ from the North Pole. Consequently our twilight line on the great-circle map will pass through London and be a tangent to the

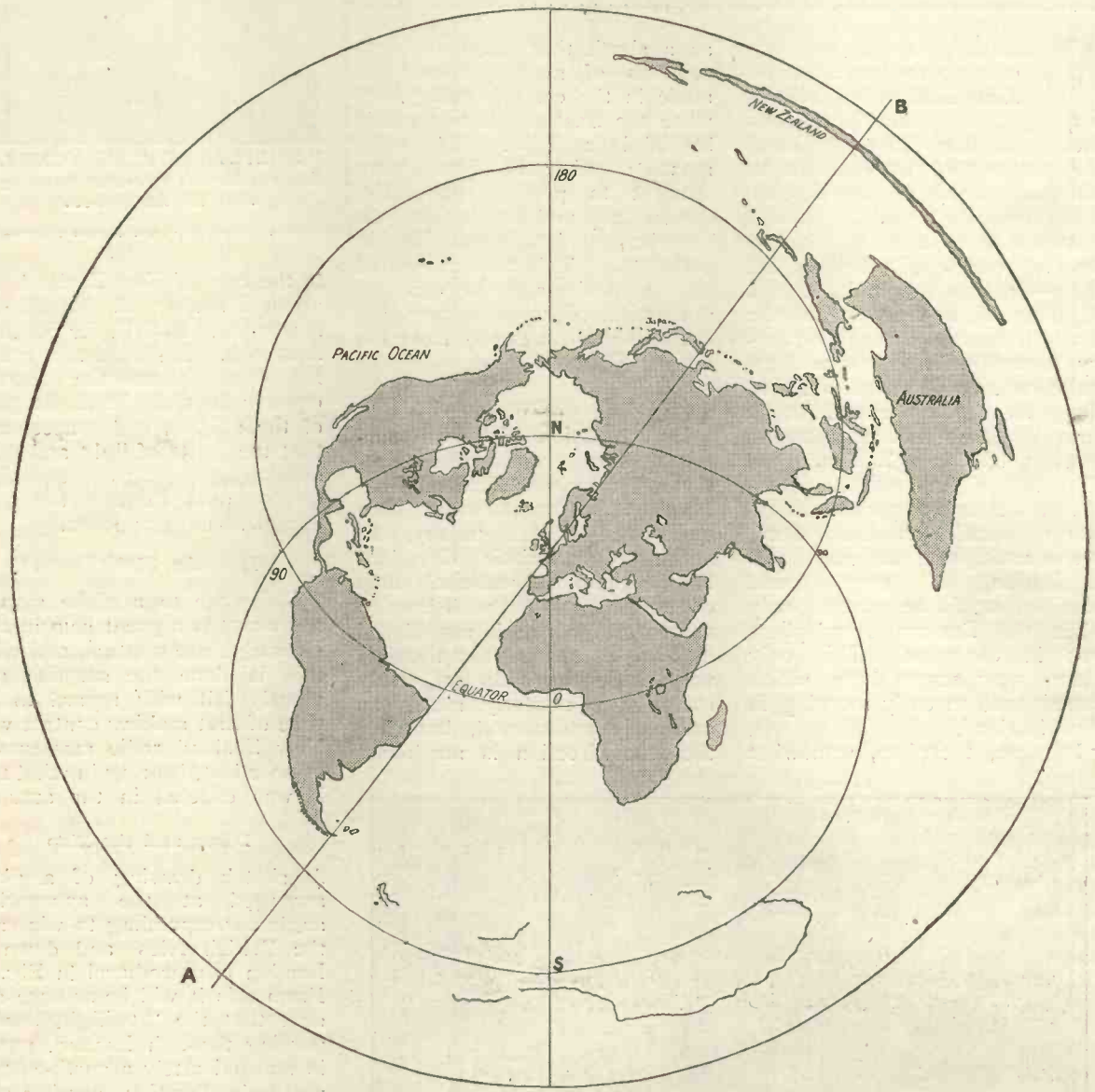


Fig. 1.—A great circle map of the world, plotted with London as its centre.

curve of latitude 66½° north. This line is marked A-B on the map, which is reproduced, and it will be seen to pass right across the southern island of New Zealand. Communication with these parts, and also with adjacent territory, should under these conditions be much aided.

Summer Displacement

As the year advances, and the sun travels northwards, the inclination of this line A-B representing the division of night and day to the meridian of Greenwich will become less and less. At the equinox it will coincide with the meridian, and at midsummer it will be inclined at a similar angle to the westward instead of to the east. Communication with Australasia should at these times (*i.e.*, dawn in London in summer) be much more difficult, even if not quite impossible at the same wavelengths as before. Whether it will be possible at other and shorter wavelengths remains to be seen. It is, however, perhaps important to note that even at midsummer in England we still have conditions very similar to those we have been discussing, and as represented by the line A-B in Fig. 1, but under these conditions they are found in the *evening in London*, which is early morning in New Zealand and Australia.

What to Expect

From this we may quite reasonably be led to expect that near *sunset* in summer we may experience very similar signalling conditions as were found in the early winter just before sunrise. Whether this will be so and whether two-way working can be maintained then remains to be seen. Static is, of course, another factor which must be reckoned with to some extent.

Naturally the possibility of signalling being helped in the manner indicated here will not be confined to the mathematical line as drawn on the map of Fig. 1, but the effect should obviously extend for some distance on either side of the line, since the signals will still be travelling quite close to the twilight band. Of course, local conditions, geographical or otherwise, along the route may modify the exact route followed by the signals, causing them to deviate somewhat to the east or west. This accounts for the duration of the period each morning during which signalling has been possible, while the shifting of this day-night line as the year progresses accounts for the gradual shift which has been experienced in the hour at which signalling has been possible.

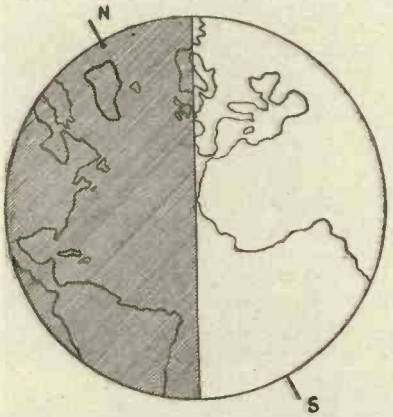


Fig. 2.—A sketch of the globe indicating night and day conditions with winter in the British Isles and dawn in London.

Even, however, if there is no such strengthening effect due to reflecting mirror-like action of the twilight band, it must be evident that from what has been pointed out above it is quite possible for the signals between England and Australia and New Zealand to traverse practically the whole route in darkness with only a short distance in light, and yet follow very closely the shortest route as shown on the map.

It is also interesting to note that on the basis of this theory signalling to Japan should be practicable under similar time conditions as signalling to New Zealand; but, again, whether this will ultimately prove possible must remain to be seen. It may well prove more difficult to signal the shorter distance to Japan (only some 5,500 miles) than it is to Australia, if there is any strengthening of the signals due to the proximity of New Zealand to the antipodes of London, but since Australia is very considerably removed from the antipodes and yet two-way signalling to radio amateurs there has been possible, it would seem that, so far as our knowledge goes at present with these wavelengths, this effect is not of very considerable importance.

Measurement Necessary

Even if local effects do actually modify the real route to some extent as compared with the above, it yet seems extremely probable that the actual route must much more approximate to the one described than to a truly westerly (although dark) one across America and the Pacific. Unfortunately we cannot follow the signals all the way, but some D.F. measurements, if they could be made, might be a very considerable help. Possibly, too, in due time, as more and more radio amateurs spring up in other countries of the world, we may gradually accumulate more information of this type by finding out what places it is possible to signal to at the same time, and in this way our knowledge of the routes of the signals and of the mechanism of radio transmission may be further increased.

OBITUARY

Mr. W. W. BRADFIELD, C.B.E.

All who are concerned in the world of shipping and in the wireless industry will hear with the deepest regret of the death of Mr. W. W. Bradfield, General Manager of the Marconi International Marine Communication Co., Ltd., which occurred in a London nursing home on 17th March. Mr. Bradfield was born in London on 18th March, 1879, and thus passed away a few hours before the 46th anniversary of his birth.

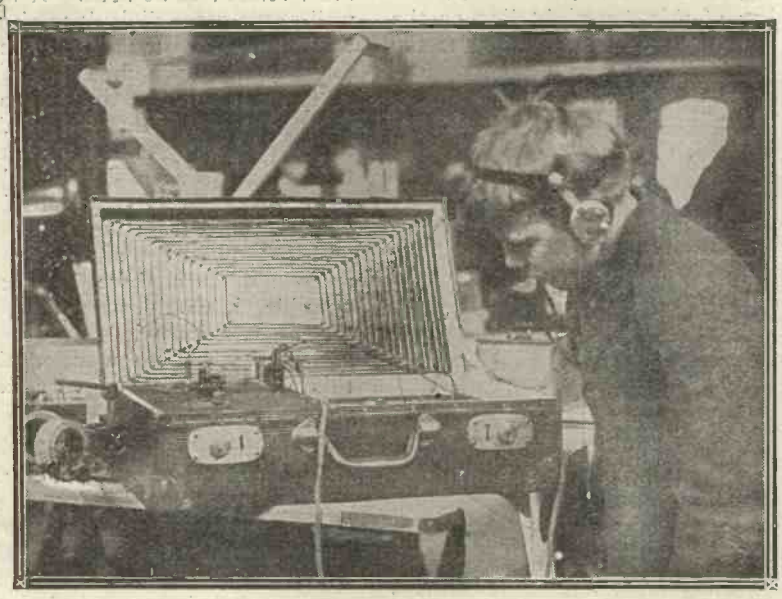
Mr. Bradfield had been in failing health for some time, but, with the devotion which he had always shown to the interests of the Company, he could not be persuaded to follow the advice of his doctor and take the rest which he so much needed. Consequently he broke down completely towards the end of last year and went to Switzerland for treatment. Unfortunately, it was too late to restore him to health, and he was brought back to London.

Mr. Bradfield belonged to the following institutions:—The Institution of Electrical Engineers (London); The Institute of Electric Engineers (New York); The Institute of Radio Engineers (New York); The Electro-Harmonic Society; The Old Students Association, Finsbury Technical College; and the following clubs:—The Junior Constitutional Club; The Royal Automobile Club; The Aldwych Club; The Chelmsford Rugby Football Club, and New York Athletic Club.

Reception Conditions Week by Week

By W. K. ALFORD.

Review of reception for week ending March 15th.



A two-valve portable receiver made by scholars of St. Paul's School, Dorking.

RECEPTION conditions, in general, have taken a mild turn for the better this week, and, were it not for the continuance of the very intense "X's," long-distance reception would have been as good as at any period this winter.

An interesting feature of the week was the testing of the new London station during the daytime, and up to the present my anticipation that very little change would be noticed has been upheld, although some effect may take place at greater distances.

Almost simultaneously with my remarks last week, on the potential chaos which is beginning to show itself in Western Europe, owing to the haphazard allocation of wavelengths, a representative conference has been arranged among the companies concerned, and it is to be hoped that this will bring about a friendly settlement of the matter.

Continental Stations

In this connection, the example set by the British stations in rigidly adhering to allotted wavelengths will show in striking contrast to the looseness of certain Continental stations. On Tuesday last (March 10) what was, perhaps, the greatest concert which has ever been broadcast, was given by Madame Tetrazzini, assisted by a number of very eminent artistes, and practically the whole of Europe listened, to say nothing of America, where, I am given to understand, the concert was relayed extensively throughout the Eastern States.

The "Radiofonica" station at Rome also gave an excellent relay, which was distinctly heard in this country.

Was ever the appreciation of the enterprise of a great British newspaper so widespread?

Manchester Station

While we are on the subject of simultaneous broadcasting, I should like to mention a point which is quite familiar to a number of people and yet is quite unnoticed by others.

It refers to the reception of Manchester and other stations which are distinctly difficult to receive well in the South. Now a lot of people are heard to say that, at times, they receive, say, Manchester easily, and at good strength. On going into the subject I found that the solution lay in the fact that the apparent strength of Manchester increased by nearly 100 per cent. when taking the London programme—the reason being fairly obvious. Most sets cannot separate London and Manchester properly at about 20 miles from London, and when Manchester is tuned in, when taking a London programme, the transmission of the latter is still filtering through, giving the impression of remarkable reception of the former station—the "time-lag" being so small that the two transmissions seem as one.

The number of people experiencing this apparent phenomena without realising its cause is quite remarkable, and it is worth remembering that the same thing may happen with other stations under the same conditions, before being thrilled by what appears, at first, to be a fine feat of reception.

Long Distance Reception

The experimenter interested in "DX" morse reception has had a rather trying period lately owing to the bad atmospheric conditions. American amateurs are still coming in in large numbers and it is quite impossible to "log" them all. One or two use telephony quite a lot and it is sometimes possible to hear what they say with the help of a little imagination, which is really remarkable considering the small powers used.

The "jamming" on the amateur wavelengths in the States must be appalling. One well-known transmitter told me, the other evening, that there were eight stations, all working at the same time, all within a mile and a half of him, and all in a wave-band of four metres!

Keenness

The keenness of the ordinary broadcast listener to learn the morse code is growing apace, and I know quite a number who sit down for half an hour every evening armed with a "buzzer key" and the Postmaster-General's Handbook, fully determined to elucidate the mysterious sounds which sometimes spoil his broadcast enjoyment.

A Hint for Long Wave Tuning . . .

A useful tip which may be applied when it is desired to receive the long wave telegraphy stations

IN the receiving sets of a year or two ago it was usual to have tuning condensers of quite large maximum capacity. The A.T.C. was usually of 0.001 μF, whilst the capacity of the secondary and anode tuning condensers was as a rule 0.0005 μF. Modern practice favours the employment of condensers with maximum capacities of about half those mentioned. Thus, in few up-to-date sets designed for general work will the maximum of the A.T.C. be found to exceed 0.0005 μF, and anode circuit tuning is generally done with condensers rated at 0.0003 μF.

Long Wave Reception

The low minimum capacity obtainable with a well-designed condenser of to-day makes it possible to cover a respectably wide band on the medium wavelengths with one set of inductances used in conjunction with condensers of these values. But for long wave work it is desirable to be able to bring in larger capacities at will.

Clip-in Condensers

A very handy method is as follows: Close to each variable condenser fit a pair of clips upon the upper surface of the panel, connecting one of them to the fixed and the other to the moving plate contact. Provide a set of clip-mounting fixed condensers with values equal to those of the variable components. When work is being done on the longer waves the capacity of the variable condensers can be supplemented as necessary by placing fixed condensers in the clips, in which position they will be in parallel with the fixed ones.

Mr. S. K. Lewer, of West Hampstead, who is only seventeen years of age, has a splendid record as a wireless enthusiast. Up to now he has logged several hundred American and Canadian Stations, and has picked up Mexico, North Greenland, Argentine, Australia, and New Zealand. During 1924 he made five thousand log entries.

An Example

Suppose for example that a 0.0005 μF aerial condenser will not tune the set quite up to the wavelength of a desired signal, a 0.0005 μF fixed condenser is placed in the clips, the knob of the variable being turned back to zero and then gradually advanced. In this way a variable capacity from the minimum limit of the variable condenser to 0.0005 μF is first obtained; then when the fixed condenser is placed in shunt the capacity in the circuit can be varied between the minimum of the variable component *plus* 0.0005 μF and 0.001 μF.

Stated Capacities

This method of paralleling is effective only if the variable condenser is up to its stated maximum capacity and the fixed one has a value not exceeding that claimed for it. If the variable condenser had an actual maximum of 0.0004 μF, and the fixed condenser was of 0.0006 μF, there would be a gap in the tuning which might make it impossible to tune in the signal desired. Fortunately variable condensers of good make can be relied upon; many of the best makers give actual guaranteed figures for their components. Fixed condensers, too, of reputable makes are accurate to within quite small limits.

R. W. H.

Historic Wireless Apparatus

IN connection with Messrs. Selfridge's birthday celebrations during this week there will be on exhibition in the wireless department of the stores a number of pieces of historic wireless apparatus, lent by Marconi's Wireless Telegraph Co., Ld., some of which have never been publicly exhibited before.

They include early examples of a wireless telegraph coherer receiver, aircraft wireless equipment, wavemeter, valves, and magnetic detector, which, for comparison, are ranged side by side with their most modern counterparts.

The New 2LO Station

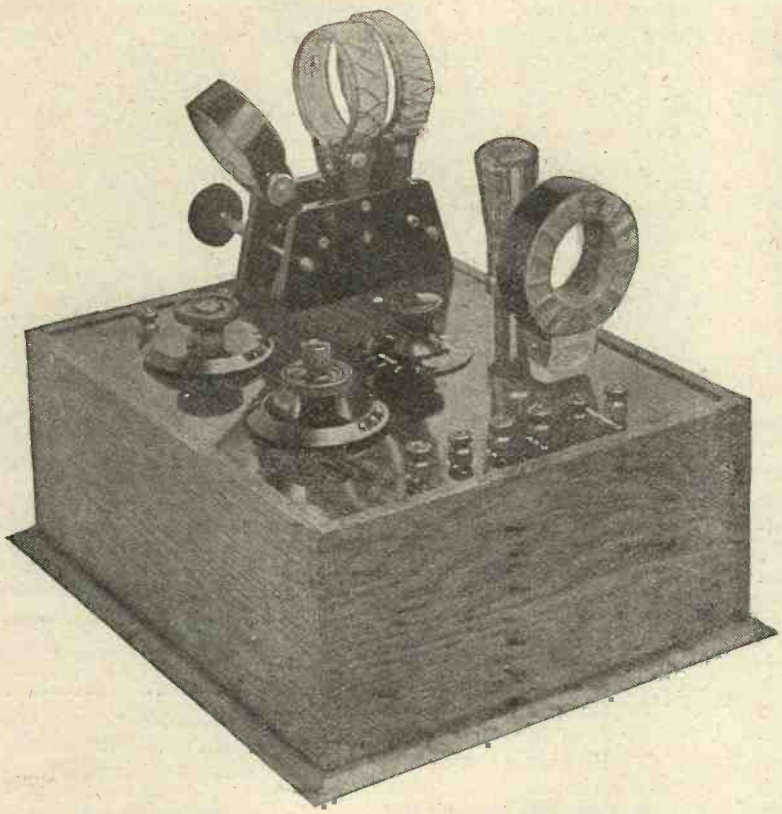
The London broadcasting station on the top floor of Marconi House has now closed down, and the new one in the West of London has undertaken the regular transmission of the daily programmes of the British Broadcasting Co. The old station, however, is being kept as a standby until the new station has proved itself thoroughly effective.

An Ordinary Meeting of the R.S.G.B. will be held to-night at 6 p.m. at the Institute of Electrical Engineers, when Mr. P. K. Turner will lecture upon "The Testing and Measuring of Wireless Components."

A Reinartz
Using Plu

By STANLEY G. RATTE

Full constructional details build a sensitive single va fine control of reaction. added attraction of being semi-aperiodic aerial



The aerial and grid coils are tightly coupled, as shown in the three-way coil-holder.

THOUGH, strange to say, the Reinartz circuit has never risen in this country to that condition of popularity so familiar with other good circuits, those readers who have experimented with it will doubtless agree that it is a very fascinating arrangement. The two main characteristics of its attractiveness are good selectivity and fine reaction control; the first is obtained by a semi-aperiodic aerial coupling, whilst the latter is given by a combination of electrostatic and electro-magnetic reaction coupling in the manner shown in the theoretical circuit diagram.

Adaptations

In last week's issue of *Wireless Weekly* there was published a special article by the inventor of this circuit, namely, Mr. John L. Reinartz, and upon referring to that article it will be seen that his Fig. 4 circuit for use with short-wave work still retains the main details of his original circuit. The experimenter who introduced the circuit to this country is Mr. Percy W. Harris, who has to his credit many adaptations of the original arrangement, including the use of plug-in coils.

Wavelength Range

In *Wireless Weekly* for August 15, 1923, I described the construction of a two-valve Reinartz receiver in which tuning was obtained by means of a tapped coil and variable condenser, whilst more or less rough adjustments for reaction were made by a similar means, being subsequently corrected by another variable condenser. The essential difference between the tuning arrangements of that receiver and the one under description is that whereas in the earlier set the wavelength range was limited to a relatively small waveband, in the present case all the telephony wavelengths, excluding the ultra-short waves, may be covered without difficulty, tuning and reaction control being given by the two variable condensers.

Coils

The compact appearance of the receiver may be gathered from the photograph of the set with the coils and valve in position, the two terminals on the left being for the aerial and earth connections, whilst those on the right are for the batteries and telephones. The two coils seen to the back of the three-way coil-holder are the aerial and grid-coils, and with the receiver in use are coupled together as tightly as circumstances will permit; the remaining coil of the three shown in the holder is the plate-coil, and is adjusted for the optimum

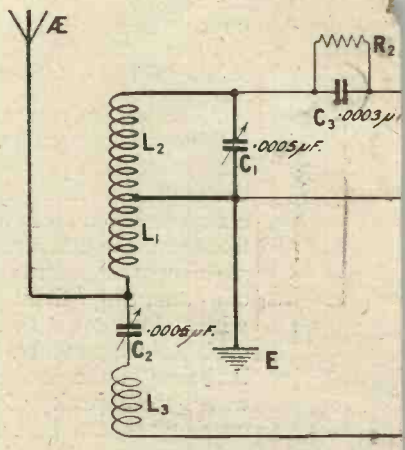
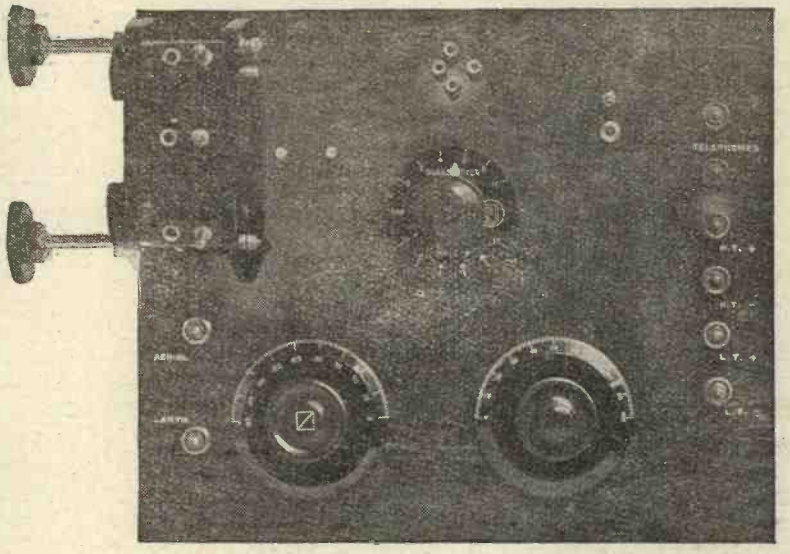


Fig. 1 —The theoretical

z Receiver
g-in Coils

E, M.I.R.E., Staff Editor.

are here given of how to ve receiver which gives a This little receiver has the xtremely selective, in that coupling is employed.



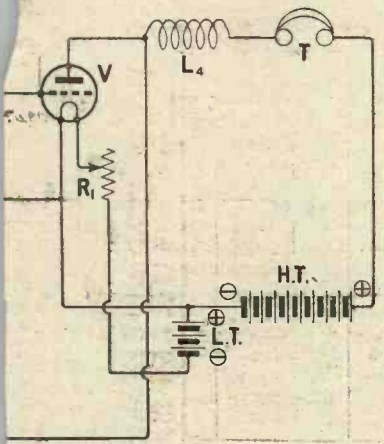
This full-face view of the panel shows the disposition of the components and terminals.

coupling, after which, as with the other coils, it is left alone. The coil seen to the right of the valve is a choke-coil of the plug-in variety, actually a No. 300, the purpose of which will be explained later.

The two condensers seen at the front of the set are for secondary or grid circuit tuning and reaction control, that fitted with the "vernier" plate being the reaction condenser.

The Circuit

The theoretical circuit arrangement incorporated in this receiver is shown in Fig. 1, wherein L1 constitutes the semi-aperiodic aerial coil conductively and inductively coupled to the secondary or grid-coil L2, this latter being tuned by the condenser C1. The coil L3 is the plate-coil consisting of another plug-in inductance, the condenser C2 giving the desired control of reaction.



circuit of the receiver.

Connected between the plate of the valve and the telephones there will be seen still another coil L4, which serves as a choke to ensure that the high-frequency currents take the path through the reaction or plate-coil and condenser rather than through the self-capacity of the telephones.

To make certain that this self-capacity of the telephones does not by-pass these high-frequency currents the radio choke L4 should always be used, and should itself for obvious reasons be a coil of low self-capacity. The remaining details of the circuit are much the same as in any other single-valve circuit, and call for little comment.

Components

The components for the construction of a receiver of this type should be of good quality if the best results are to be obtained, and in accordance with the usual procedure the actual parts embodied in the receiver illustrated are given below together with their origin. This information is given purely for the information of readers, however, and does not necessarily mean that other makes should not be used; on the contrary, any good make of component may be substituted so long as the values stated are respected. Should the reader have by him any good make of condenser other than either of those incorporated for instance, then it may be included without hesitation so long as its value is the same as that it is intended to substitute.

One ebonite panel measuring 12 in. x 10 in. x ¼ in. (That in the photograph is a Radion mahoganite panel 3/16 in. thick.)

One three-way coil-holder (Peto-Scott).

One 0.0005 μF square-law condenser (Peto-Scott).

One similar condenser with vernier (Radio Instruments, Ltd.).

One dual filament resistance (Radio Instruments, Ltd.).

One grid-leak and condenser of 2 megohms and 0.0003 μF respectively (McMichael).

One coil socket complete, or parts for panel mounting.

One valve-holder or parts for panel mounting.

Eight terminals. (Those in the photograph are a special type with an "oxi-copper" finish which matches the mahoganite

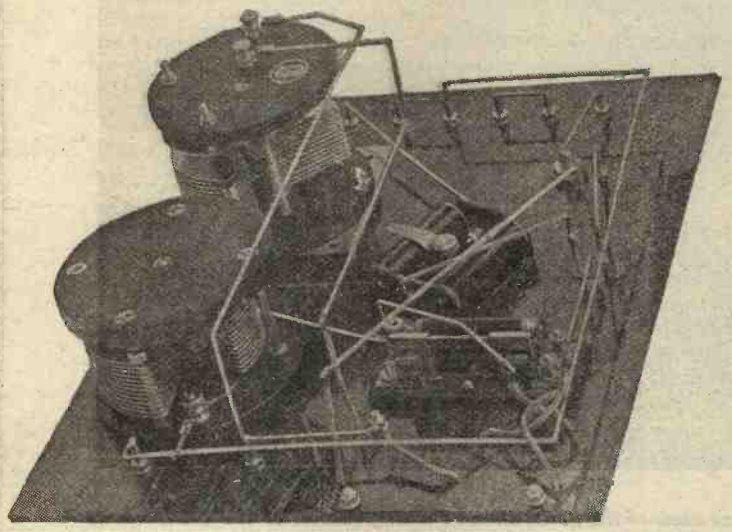
panel, supplied by Grafton Electric.)

Quantity of square tinned copper wire for connecting purposes.

Set of Radio Press panel transfers.

The Panel

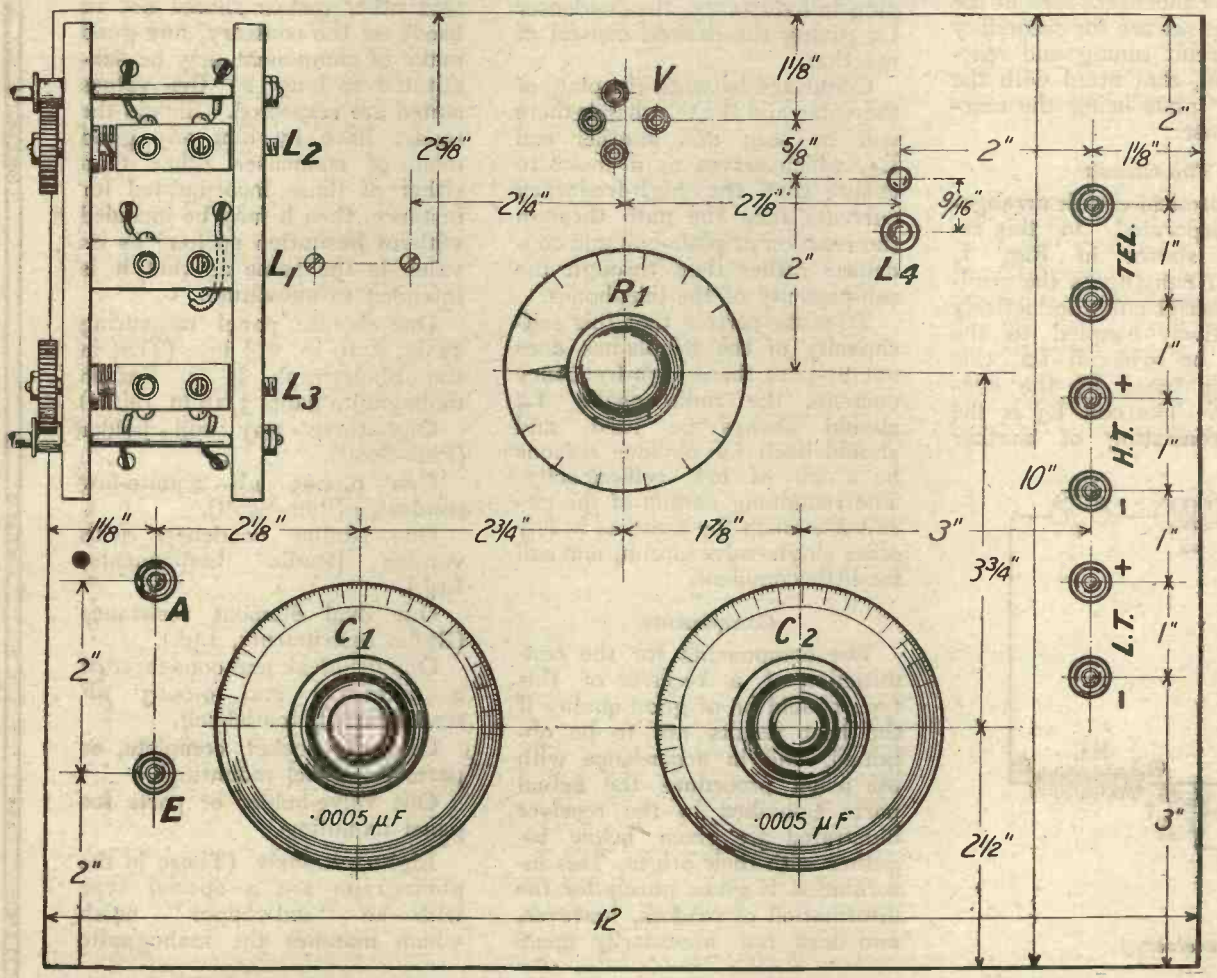
The panel should be drilled in accordance with the instructions given in the layout and dimensioned drawing, and before mounting the components the countersinking should be done where necessary. In connection with this panel, readers are advised to buy guaranteed ebonite, and since this material is now so easily obtainable there can be no reasonable excuse why a retailer should seek to persuade a purchaser of a panel to buy inferior quality ebonite.



The well-spaced wiring and easy access to the components may be seen from this photograph.

Wiring Up

The wiring up of this receiver is a perfectly straightforward piece of work, and since the components are all easily accessible little difficulty will be experienced by even the beginner in set construction. The actual wiring may be observed from the photographs showing the underside of the panel, whilst the wiring may be followed for practical purposes from that illustration showing the wiring as a working drawing.

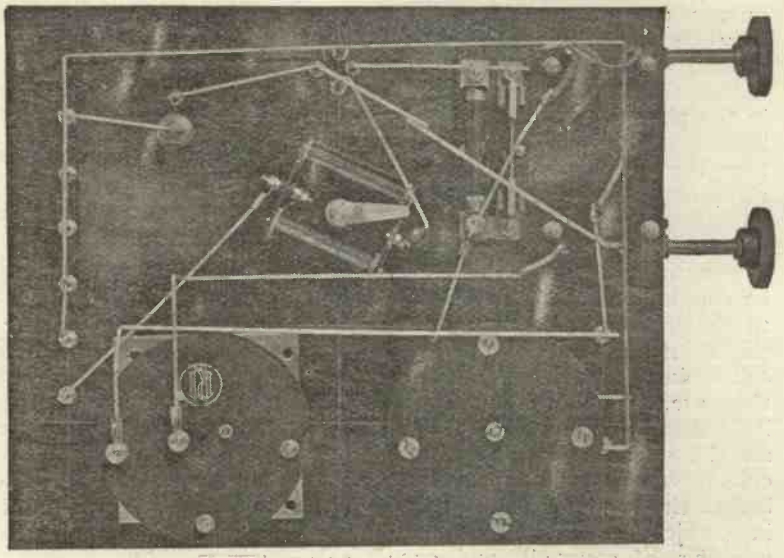


This drawing, which is exactly half-size, shows the purposes served by the terminals and also gives the necessary drilling dimensions.

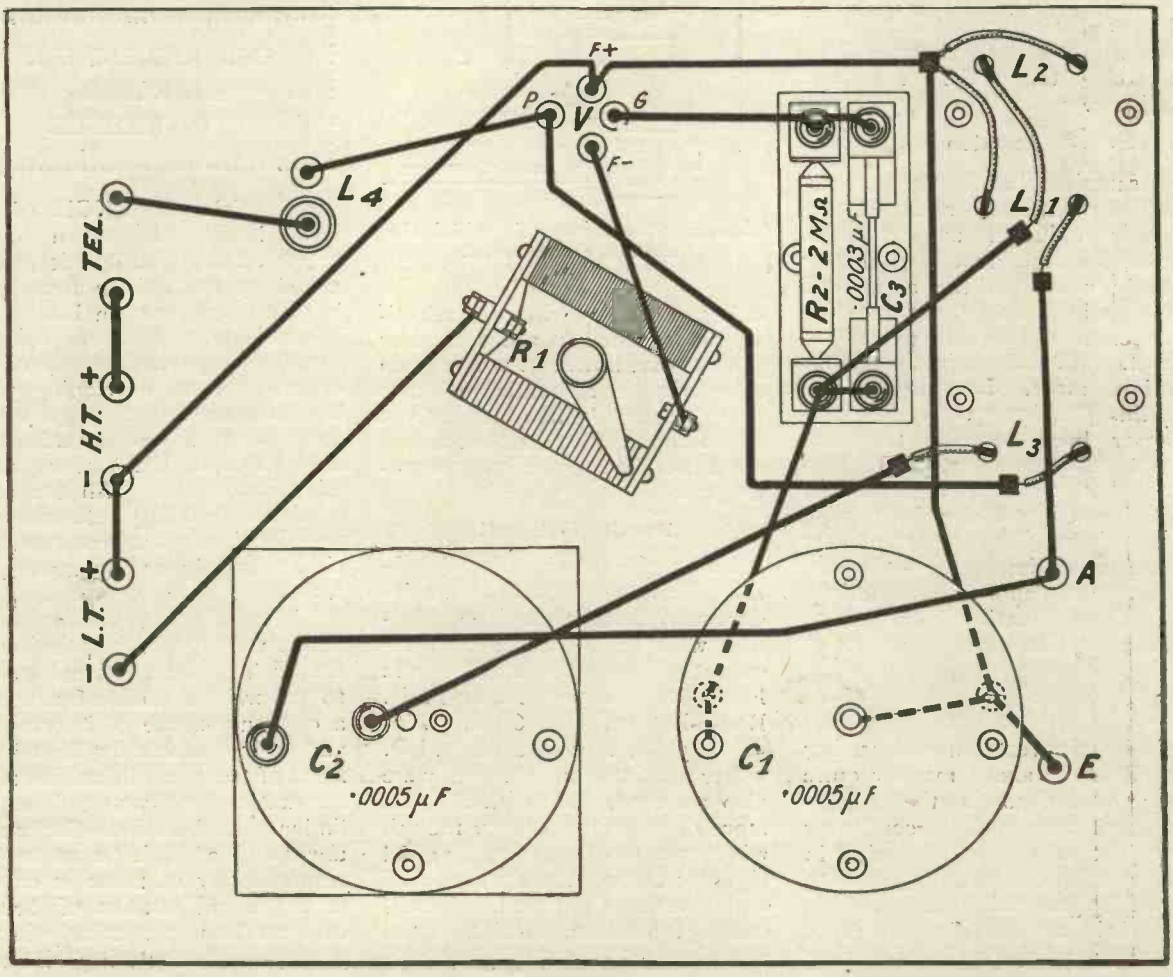
For simplicity in connecting up it is best to wire up first the L.T. negative leads and then the plate circuit before attempting the other connections, as by so doing the panel is kept clear for the more twisted leads. After the plate circuit has been connected up the wiring of the L.T. positive lead further simplifies the wiring which is to follow. The connecting up of the coils should be observed with extreme care in that if two of them are connected the wrong way round serious tuning defects will result when the operation of the set is attempted. To make sure of these connections a separate figure of how the joins should be made is reproduced.

Operating the Receiver

With the wiring completed the valve may be inserted in its socket and the batteries connected for testing purposes to the terminals, as indicated in the illustration of the panel layout. Assuming that the valve brilliancy answers in accordance with the control given by the filament resistance, insert a No. 250 or 300 plug-in coil in the choke-coil socket (L_4); connect aerial, earth and telephones. The best results with a receiver of this type will



By comparing this photograph of the underside of the panel the actual wiring of the original receiver may be followed.



A practical back-of-panel wiring diagram which may be compared with the photograph shown above.

be obtained when the aerial coil (L1) used is best suited to your own particular aerial, but for purposes of trial a No. 25 coil may be inserted in the aerial socket, with a No. 50 in the grid circuit (L2) and a No. 50 or 75 in the plate socket (L3). Before lighting the valve for reception turn the reaction coil (L3) at right angles to the aerial coil (L1), and set the reaction condenser (C2) at the zero value. The aerial coil (L1) should now be coupled as tightly as possible to the grid-coil (L2) by turning the adjusting knob of the grid-coil socket. Leaving the coils as they are, the valve should be lighted and tuning made upon the aerial condenser (C1). With the coils given, it will not be long before the local station is tuned in (subject to B.B.C. stations working, of course!), and once the loudest signals have been found turn the reaction condenser about halfway round its scale, and see if the set will oscillate; if it does turn the condenser back immediately until oscillation stops, though it is unlikely that the set *will* oscillate.

Reaction

Assuming that the set does not oscillate with the reaction condenser adjusted as described, move the reaction coil (L3) very slowly nearer to the aerial coil (L1), still keeping the reaction condenser at the halfway adjustment, until the set *just* oscillates and no more. Leaving the coil in this position, turn the condenser back towards the zero value until the set stops oscillating. With the coupling so found, reaction control can be carried out by means of the condenser alone, alteration of the secondary tuning condenser necessitating, sometimes, further adjustments of the reaction condenser.

Coupling

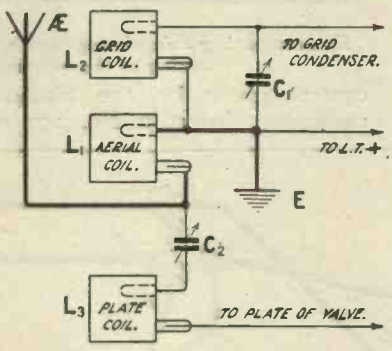
With the reaction coil setting found in the above manner quite large variations in the adjustments of the secondary condenser *may* necessitate an alteration in the reaction coil coupling, though it will be generally found possible to obtain a good reaction effect over the whole scale of tuning condenser.

Should it be desired to tune to the stations with wavelengths above the 400 metres line, then the No. 25 coil should be replaced by a No. 35, whilst a No. 75 and No. 50 should be used for the grid and reaction coils respectively.

For the reception of Chelmsford or Radio-Paris, the aerial coil should be a No. 100, with a No. 200 and No. 250 for grid and reaction coils respectively; in the same sequence coils No. 150, 300 and 250 may be used for the reception of the Eiffel Tower.

Selectivity

If more than average good selectivity is desired, then it may be understood, within reason, that the smaller the aerial coil (L1) the sharper and more difficult the tuning with the selectivity it is aimed to procure. For general use, however, where good selectivity is demanded without that "super" fine tuning, a No. 25 coil in the aerial socket is most useful upon the lower wavelengths.



Showing the manner in which the coils are connected.

Results Obtained

Using the receiver in South-East London first upon an indoor aerial and then in conjunction with an outdoor aerial, excellent results were obtained from Ecole Superieure, Radio-Paris, Radio-Iberica, 5IT, 6BM, 5WA, 5XX, 5NO, and of course 2LO. Other stations than these were also received, but with a little more difficulty in tuning, though when once tuned gave really good signals; among these were 2ZY and several Continental broadcasting stations, which upon referring to *The Foreign Radio Times* proved to be Berlin, Hamburg, Zurich, Radio Belge, and Breslau. An attempt at reception was also made upon the short wavelengths, using a Gambrell a/2 as L1, a Gambrell a as L2, and a Gambrell A as the plate or reaction coil, when a number of French, British, and American amateurs were received without difficulty.

The operation of the receiver throughout is very simple in spite of its selectivity, and particularly attractive is the smooth control of reaction. For the reader who wishes to build for himself a small receiver, which will give him the full range of a single valve, with the assurance that he will be able to eliminate possible interference, then the set described will satisfy his requirements. Further, the easy control of reaction will in some cases find a greater appeal than that given by the more usual method of varying the reaction coupling by means of a swinging coil.

INTERNATIONAL WIRELESS CONFERENCE

A CONFERENCE of the leading European broadcasting authorities, convened by the British Broadcasting Company, met in London on Wednesday, March 18, to examine ways and means of co-ordinating and developing wireless broadcasting through agreement between the broadcasting authorities of the various countries concerned. All the principal broadcasting authorities on the Continent were represented, either directly or by agents in London.

The whole field was explored, and it was agreed in principle to establish an international bureau to perform the double function of a clearance-house of information and an instrument for the adjustment of technical difficulties of an international character. The preliminary deliberations disclosed a unanimity of opinion as to the responsibility of those in charge of the administration of broadcast services, particularly in the direction of fostering international good will.

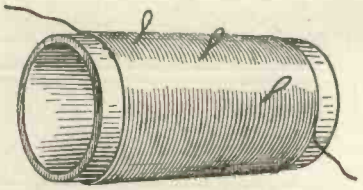


Fig. 1 shows the simplest method of taking tappings on a single-layer coil

Making Coil Tappings

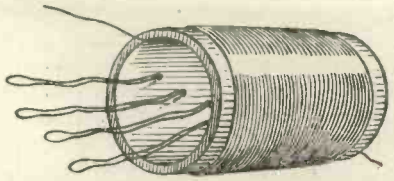


Fig. 3.—By this method the connecting wires are all inside the former.

IT may be required to make up special coils from time to time from which a certain number of tappings want to be taken. If the coil is a single-layer solenoid there are several ways of taking these tappings. What is probably the simplest of these is

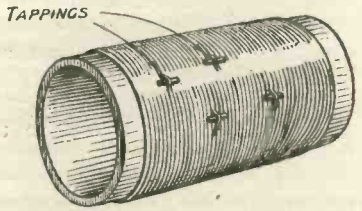


Fig. 2.—Raising the tapping turns with small pieces of ebonite.

shown in Fig. 1, and merely consists in twisting a loop in the wire while the coil is being wound at the point that a tapping is needed. These loops are bared after the coil is completed and the necessary leads soldered on. Another method is to wind the coil to the end, then, with some sharp-pointed instrument, lift a turn of the wire at the point where a tapping is wanted, and place a slip of wood or ebonite underneath it (Fig. 2).

Soldered Connections

Finally strip the insulation from the raised portion of the wire and solder the connection on. Yet another method is shown in Fig. 3. Here again a loop is made in the wire at the point that a tapping is to be taken, but instead of just twisting the wire a long loop is made and pulled through a hole that is made in the former on which the coil is being wound.

Loop Tappings

The loop is made of sufficient length to reach to the point to which it is to be connected, and thus eliminates the necessity of soldering a lead to it. Yet another method will be seen in Fig. 4. This consists in drawing a small loop of wire through a washer securing it with a small wooden or ebonite pin; then when the coil is completed the wire can be bared at the various points and the necessary leads soldered on. Care should be taken when soldering leads on to tapping-points on a coil that no

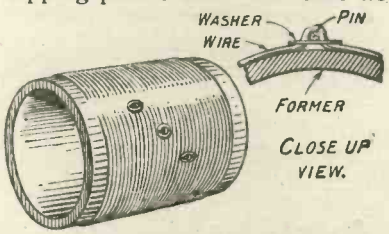


Fig. 4.—Another neat method for taking tappings.

flux is allowed to drop or splutter on the cotton insulation of the wire, or its insulating properties may be seriously impaired.

C. P. A.

Our photograph shows M. Paderewski, the famous pianist, who broadcast to all stations on March 15.

A Useful Store Box

By H. BRAMFORD

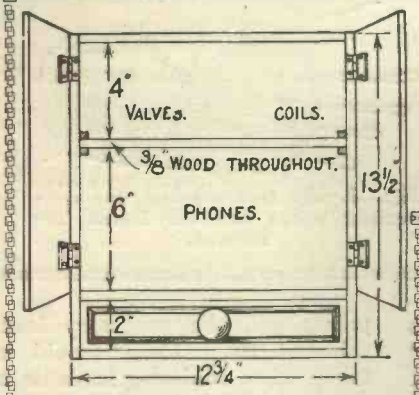


Fig. 1.—Details of the construction.

The expense of constructing such an item would be small in comparison with the cost of one damaged valve. Details of construction are shown in Fig. 1. The dimensions given are cutting sizes. Plain deal ⅜-in. thick will be very suitable for construction.

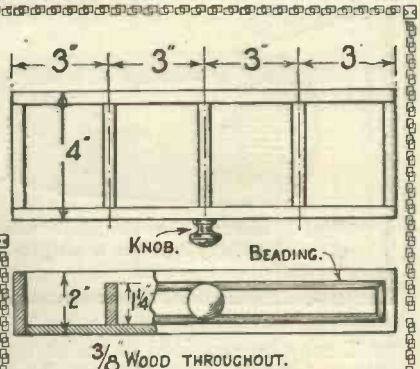


Fig. 3 shows the arrangement of the drawer.

IT is necessary to conveniently store certain wireless components in such a way as to ensure their safety, and at the same time to have them immediately accessible. Valves are expensive things to leave lying about, when the slightest jolt may injure their filaments; coils are easily damaged with knockabout use, and several other small accessories are also often required at hand. The idea is therefore to construct a special cabinet to contain such articles, the needed component always being at hand, thereby dispensing with the usual "where on earth did I put that crystal?" accompanied by endless searchings in junk boxes.

Details of the coil and valve shelf are shown in Fig. 2. Valve

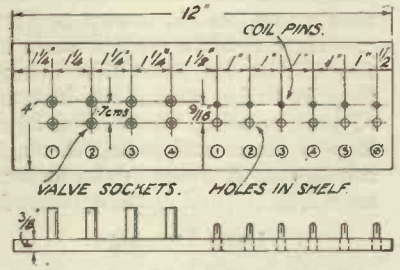


Fig. 2.—Dimensions of the shelf for valves and coils.

sockets are used to support the valves. Two sockets are required for each valve. These are spaced equi-distant to the plate and grid pins of the valve.

The coils are supported by means of a coil plug and a hole in the shelf. The centres of the panel hole and the plug are 9-16 in. apart. The valve division may be lined with green baize or thick felt. The shelf below the valve shelf is intended to receive two pairs of headphones. At the bottom of the cabinet is a pull-out drawer divided off as shown in Fig. 3 for the storage of clip-in condensers, plug-in transformers, crystals, cat-whiskers, shorting plugs, links, etc. A good finish may be given to the cabinet with walnut stain. The stain is made up by simply mixing walnut crystals with water to the depth of colour desired.

Madame Tetrazzini, at the dinner given in her honour by Burndept, Ltd. Our photograph shows, left to right, Countess Brambilla, Duke Fillippo Caffarelli, Madame Tetrazzini, Mr. Geoffrey Duveen, Mrs. W. W. Burnham and Mr. W. W. Burnham.

Easily-made Neutrodyne Condensers

By R. W. HALLOWS, M.A., Staff Editor.

Some notes of interest to those readers who wish to improvise suitable Neutrodyne condensers for experiments with the Hazeltine Neutrodyne circuit.

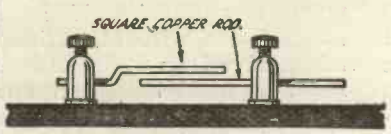


Fig. 1.—A simple application of square rod.

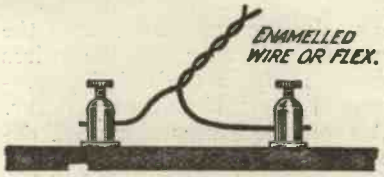


Fig. 4.—The twisted wire method.

THE merits of the Neutrodyne system of high-frequency amplification were recognised theoretically a long while ago, but for some curious reason this method of stabilising multi-stage sets was not until recently very widely used in this country. At the moment it is attracting the attention that it deserves, and Neutrodyne receiving sets are being made up by a large number of constructors.

Three H.F. Stages

With the Neutrodyne method three sharply tuned high-frequency stages can be used with comparative ease, and a set made on these lines is a revelation both for its signal strength and for its almost uncanny power of bringing in distant transmissions at times when other receivers can do nothing with them.

Neutrodyne Condensers

Those who construct Neutrodyne receivers according to the instructions given in *Wireless Weekly* will, of course, provide themselves with specially-made variable condensers of small maximum capacity, several excellent types of which are now available at very reasonable prices. But should the reader wish to experiment with the original American arrangement of the circuit he will find that it is possible to make up suitable condensers in a variety of simple ways, a few of which are described below.

The American Method

Fig. 1 shows one of the most convenient and simple of all methods. Two telephone or "push-in" terminals are mounted about 2 in. apart. In one of them is fixed a small piece of the square tinned rod used for wiring sets, which is bent as shown in the drawing. This is the "fixed plate." The "moving" plate consists of a straight piece of the same rod inserted into the second terminal. By varying the length of the protruding piece of straight rod the capacity can be adjusted very finely, and there is little difficulty in finding the point at which the desired Neutrodyne effect takes place. Should it be found that adjustments are not sufficiently fine the maximum

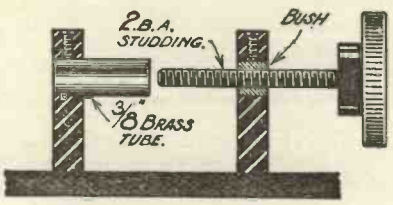


Fig. 2.—A more elaborate arrangement

capacity of the condenser may be reduced by increasing the bend in the fixed rod, which creates a greater air space between the two.

Another Suggestion

A more elaborate Neutrodyne condenser can be made up in the way shown in Fig. 2. Here the end pieces are ¼-inch ebonite fixed to a small baseboard by means

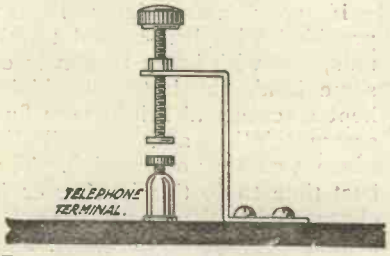


Fig. 3.—Another suggestion for a small capacity variable condenser

of screws. In one is mounted a short piece of ⅜-inch brass tubing, which is fixed in position by means of a setscrew. The other end piece is provided with a bush tapped 2 B.A., which is also fixed by a setscrew. Through this bush runs a length of 2 B.A. studding fitted with a standard condenser knob. The contacts are made by soldering leads to the tubing and to the bush. The advantage of a condenser of this type is that it enables minute adjustments to be made, whilst if a small white spot is made on the outer surface of the knob the number of turns required to produce the desired capacity may be counted and noted for future reference. In making up this kind of condenser great care must be taken to see that both the tube and the piece of studding are straight and correctly centred, for it must not be forgotten in some forms of Neutrodyne circuit a faulty condenser may lead to a disastrous short circuit.

Old Crystal Detectors

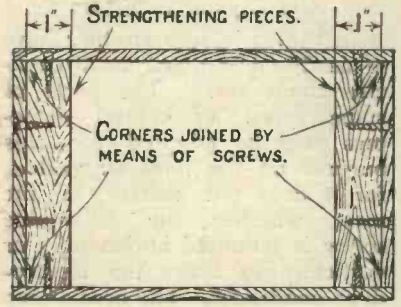
In Fig. 3 is seen another form of easily constructed small capacity condenser. The parts of some types of crystal detectors may be adapted for this purpose on the lines suggested, for it does not matter in the least whether the adjustable screw is mounted horizontally or vertically to make the Neutrodyne condenser. The crystal cup is removed, and in its place a telephone terminal is mounted, the setscrew being turned hard down so that there may be no shake in it. The cat's whisker having been removed, a small circular metal disc may be soldered to the end of the adjusting screw to form the moving plate of the condenser. Here again care must be taken not to cause a short circuit by making actual contact between the two plates of the condenser. A method which is occasionally employed is shown in Fig. 4. Here two pieces of enamelled wire are inserted into terminals, and their ends are simply twisted together until the right amount of capacity is obtained. This way of making an emergency Neutrodyne condenser has also the

advantage of simplicity to recommend it, but it must be used with considerable care, for should the enamel covering of the wires crack away in the twisting process a short circuit may occur. A short piece of flex may, if desired, be used instead of the wire. If you test this method with either enamelled wire or flex let me warn you against the "bright idea," such as that which occurred to a friend of mine. He had the inspiration that the simplest way of finding the correct adjustment would be to twist together pieces of wire that were obviously too long, and then to snip off a tiny piece at a time with the wire nippers until the proper point was found. If he had snipped one wire at a time all might have been well, but he forgot that when both were cut at the same time there would be a short circuit through the jaws of the nippers!

□

Cabinets for Wireless Sets

MANY people do not want to pay the price of new cabinets for their sets, and those experimenters who make up many different sets can ill afford a fresh commercially made cabinet for each one. Skeleton cabinets (namely, those without any bottom, just two sides and two ends) are quite sufficient. They give a finished appearance to any set, keep dust out, and protect the wiring and components at the back of the panel. Incidentally inspection of the interior of a set is possible without the necessity of removing several screws.



The constructional details of a home-made cabinet.

These cabinets are easily made in the following manner:—A piece of wood is required for the front, sides, and back, just wide enough, so that when the box is made it is a little deeper than all wires and component parts on the back of the panel. This wood may be of mahogany or oak, if desired, but plain white wood, when stained or varnish-stained, is quite good enough. The piece of wood is cut into four lengths, two as long as the longest way of the panel, and two the length of the other measurement of the panel, minus twice the thickness of the wood used. These are joined, as shown in the diagram, by means of two or three screws at each corner, care being taken to keep the corners at right angles.

If there is any tendency for the completed box not to be quite firm two pieces of wood for strengthening may be put in at the bottom of the box. These should be about 1 in. wide and fixed with four screws each, as shown. A further help in keeping the box square is to put two screws to each side of the panel when screwing down instead of one as is generally used.

A. S. C.

□

Hints on Accumulators

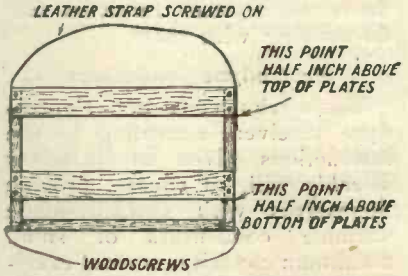
THERE are a few points about accumulators to which due attention is not always paid. Care should be taken to observe the correct charging rates, not to discharge below the safe maximum discharge rate, and never to leave an accumulator in a discharged condition or to use acid of incorrect specific gravity. Neglect of these main points may seriously impair the efficiency of the accumulator, but the little extra trouble taken in observing them will help to increase the useful life of a battery.

If your accumulator is not provided with lead-coated terminals, but with brass terminals of some kind, the latter should be kept smooth and bright with fine emery cloth, and periodically given a coating of vaseline. The best time to do this is after each charge, when the tops of the cells should be wiped quite clean and dry with a piece of rag.

Always have a carrying crate; if you have not one, the description here given for making one is very simple, and such a crate costs very little. Make it out of teak or ordinary wood soaked in paraffin wax. The wood should be ½ in. or ¾ in. thick, according to the weight and size of the accumulator. First cut a suitable piece for the base the same size as the bottom of the accumulator. Then two end pieces, the same width and coming about an inch above the top of the containing cases of the accumulator, are screwed on. Now cut four strips about 1½ in. to 2 in. wide, and screw in positions as shown in the diagram, two each side of crate.

The top piece should be about ½ in. above the top of the accumulator plates, and the bottom piece about the same height above the bottom of the plates. This allows inspection of the acid level and the amount of sediment without taking the accumulator out of its case. A piece of strap is screwed on for a carrying handle, as shown in the sketch.

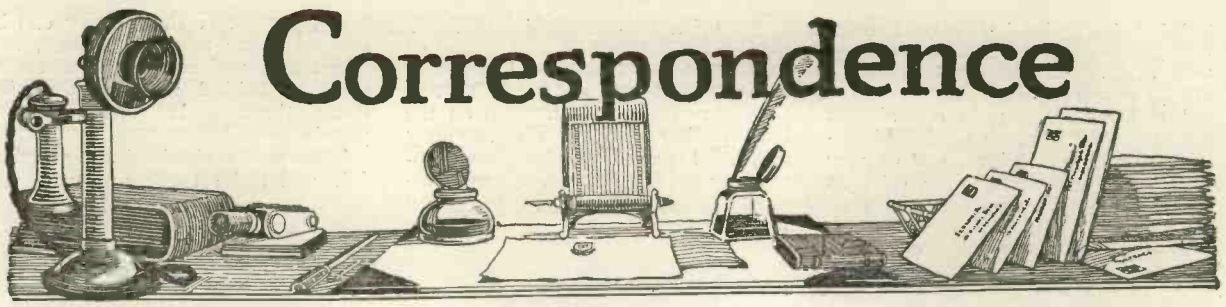
A. S. C.



A suggestion for building a carrying crate.

A FLOATING RELAY STATION

The broadcasting station at Copenhagen has acquired a floating relay station recently in the shape of the s.s. *Aalborghus*, which re-transmits on 445 metres the concerts which are broadcast from Copenhagen on 750 metres. Three days a week, on Tuesdays, Thursdays and Saturdays, when the ship is lying in the harbour of Aalborg, the Danish station can be picked up by listeners in the neighbouring countries on two wavelengths, those of the main station and its aquatic auxiliary.



"THE FOREIGN RADIO TIMES"

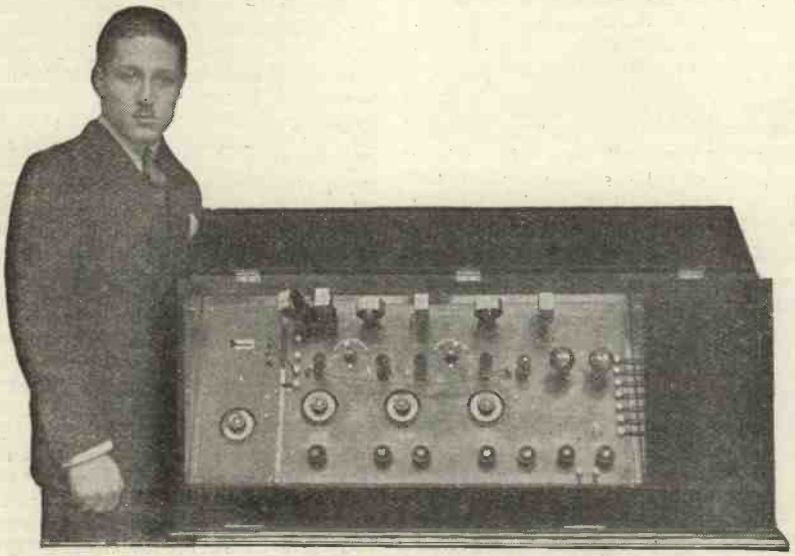
SIR,—Congratulations on your excellent and useful innovation to *Wireless Weekly*, the programme supplement, *The Foreign Radio Times*.

Please allow me to put in a plea for the programmes of Brussels, Hilversum and Madrid. The first two can be tuned in without the slightest interference from 2LO (about seven miles away) or Chelmsford respectively. Brussels is heard at really good loud-speaker strength on Mr. Harris's four-valve Family Set (Envelope No. 2).—Yours faithfully,

A. J. ROBERTS.

London, S.W.17.

SIR,—I have been a subscriber to *Wireless Weekly* for some time now, and I think your new supplement is of great use to amateurs.



Mr. J. Elliott with the seven-valve T.A.T. he has built. An A.B C. wavetrap which he sometimes uses may be seen on the left.

I notice you do not always publish the programmes of the broadcasting station at Brussels, and I should be glad if you could see your way to include these in future. I have often been able to tune in broadcasting stations on the Continent, and being unable to ascertain the station I have not had the pleasure of knowing whom to thank for an agreeable programme.

I am looking forward to your next issue.—Yours faithfully,

H. ALDOUS.

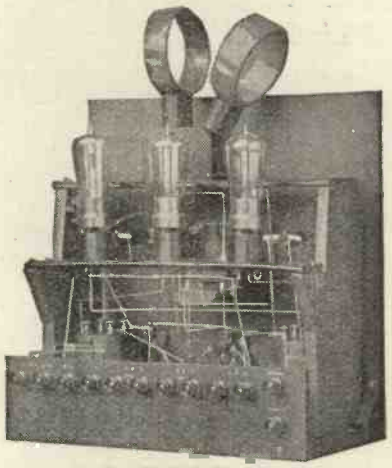
London, N.W.1.

SIR,—In response to the request for suggestions *re The Foreign Radio Times*, I am sending you a few herewith. I sincerely hope that this will become a permanent feature of your journal, and that you will find it possible to devote at least six pages to this interesting feature.

Personally, although I can receive American broadcasting almost any night, I see little object in including programmes of these stations, because the season for American reception is nearly over. I suggest, however, keeping in all the Paris Stations, and Brussels, Zurich, Rome, Hilversum.

As regards German stations, judging from receptions both here and 12 miles south of Guildford, I think the following stations the best for inclusion: Hamburg, Munster, Munich, Frankfurt, Stuttgart and, if space permits, also Berlin. These stations would, I think, fit fairly well into four pages for the five days, and if you could see your way to increase this to, say, five or six pages and the whole week, I am sure it would be much appreciated by your readers.

One point which, I think, should be rigidly adhered to, is that the same stations should be given each day as long as they are working, *e.g.*, one does not want to see Hamburg down for Wednesday, but omitted on Thursday. If new stations are added you should see there is room to include it every day.



Mr. Scarborough's three-valve receiver seen behind the panel.

If the power of Leipzig is increased to 5 kw., this should also be included.

I trust that these suggestions will be of some assistance to you, and wish your journals every success, but please do not start any more, or none of us will have money left in our pockets. —Yours faithfully,

H. C. L. GRENSIDE.

Liverpool.

P.S.—I view with much displeasure the increase of power at 2LO, as I usually reside in Highgate, N., and it was quite bad enough cutting out the old 2LO. As the London programme is accessible almost anywhere in the country via the relay stations, it seems rather unfair on London listeners to increase the power of this station.

H. C. L. G.

SIR,—I much appreciate the new supplement which you are now publishing in *Wireless Weekly*.

I have often been able to tune in stations on the Continent with a two-valve set, but as the call signs

are not given very frequently from foreign stations, I have not been able to discover the exact station I am in touch with.

I notice that you do not always give any programmes for broadcasting stations in Belgium, and wonder if there is any reason for this, as these are stations which are very easy to get.

I hope this supplement will be a regular feature, as it is of great value to listeners.—Yours faithfully,

(Miss) W. McLeod.

London, N.W.1.

Sir,—As yet I am not the fortunate possessor of a wireless set, but frequently listen-in at a friend's. I am very much struck by your *Foreign Radio Times*, which so enhances the pleasure of a foreign concert, and feel I must write and express my sincere appreciation of your new venture.

With every good wish for its future success.—Yours faithfully,

Blanche F. Williams.

Brighton.

Sir,—With reference to last week's correspondence in your issue *re* the publication of the Supplement, *The Foreign Radio Times*, and your request for further correspondence on the matter, I strongly endorse the opinion of others that I hope it will be a permanent feature and also the present publication enlarged in order to bring in more programmes. Hilversum deservedly should have a place in the supplement; they come through very clear and give good programmes, and they are evidently out to give further satisfaction, as they often ask listeners in this country to send them reports and criticisms on the station's reception. I would like to see Brussels, Madrid and Frankfort also included.—Yours faithfully,

T. V. Johns.

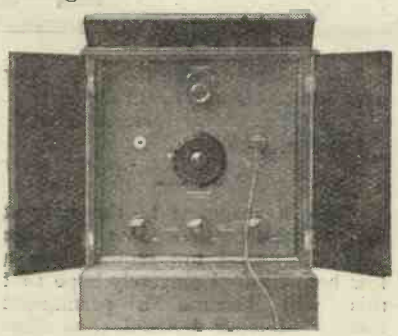
Lowestoft.

THE "ALL-BRITAIN" RECEIVER

Sir,—Having made the "All-Britain" set as described in last year's autumn double number of *Modern Wireless*, I thought that you would be interested to know the results which I have obtained with it.

As you will see by the photograph, I have made it as a portable set, being absolutely self-contained. The lid of the case—which is covered with leather-cloth—comes right off, as you will see, and plugs in the top of the case by means of a removable plug. A frame of five turns of flex is wound inside the lid and brings in any station within about 25 miles at excellent loud-speaker strength.

With regard to results I may say that I have never before imagined that a set could cut out London at a distance of four miles and receive Cardiff at moderate strength on the loud-speaker—I can do this any night. I have had American stations on several occasions, and Brussels, Radio Paris, Madrid and Hamburg, all come in at good strength.



The neat layout of Mr. Scarborough's receiver is shown by this layout.

Wishing you continued success, I remain—Yours faithfully,

Brian M. D. Westgate.

Crouch End, N.

THE SEVEN-VALVE T.A.T. RECEIVER

Sir,—Enclosed are photographs of the Seven-Valve T.A.T. Receiver by Mr. John Scott-Taggart, including the A.B.C. Wave-Trap by G. P. Kendall, which may be of interest to you and your readers.

I have constructed the cabinet to make it as fool-proof as possible while giving due regard to accessibility. You will see the whole cabinet can be shut up with the glass panel in front, switches being provided at the right-hand side of

The "All-Britain" receiver as built by Mr. Westgate.

the battery box outside the cabinet to connect the H.T., L.T. and G.B., while the loud-speaker terminals are connected to a plug in the lid. I leave the set tuned to the local station, which can be instantly put into operation with the three switches by anyone during my absence.

The two panels are built into a frame hinged at the bottom so that an inspection of the interior can be quickly made to replace fuses, etc. The aerial and earth leads are also enclosed behind the panels, which come through between the two panels.

The results obtained are wonderful, and the set gives every satisfaction.

Wishing Radio Press every success.—Yours faithfully,

J. Elliott.

London, N.W.11.

A READER'S RECEIVER

Sir,—Having made the Transatlantic V, the Puriflex, the Family Four, all by Mr. Percy W. Harris, I thought the enclosed would perhaps interest you.

It is a straight three-valve set exactly as given by you in the April issue of *The Wireless Constructor*, except it has separate H.T. for each valve, with plug and jacks for two or three valves. The lay-out is my own idea, and is really as good as it looks.

Since the photos were taken I have added C.A.T., which is a refinement.—Yours faithfully,

Jas. Scarborough.

Doncaster.

A SINGLE VALVE RECEIVER FOR KDKA

Sir,—Ever since KDKA started broadcasting on 68 metres last year I have been trying to find the ideal set for this work, *i.e.*, efficiency and simplicity and ease of control and volume. I buy all the wireless papers and have made up lots and lots of short-wave receivers, and though they all worked, none of them, in my opinion, came up to what I wanted, but I have found one at last, and that is the Single Valve Set described in February's *Modern Wireless* by Stanley G. Rattee. It answers all above requirements, and providing one uses extension handles (in my case they are 15 in. long), no trouble is experienced with capacity effects. I was so pleased with the results on one valve that I added a L.F., and so pleased with the results of two valves that I added a second L.F., which give excellent results on the loud-speaker. I don't mean you have to bury your head in the speaker to hear, but it can be heard in the next room easily. I personally have been complimented so much on these results that I consider that the right person to get the praise is Mr. Rattee, though I hope that at least "·06" of the results are due to my having taken great care in my aerial and earth installation and also care and trouble in the other points which are so vital to short-wave work. I should like to add that I have an ordinary four-valve set besides this

one, on which I get great results—America, etc., etc., and have managed to get it to go down as low as 60 metres, but there is no comparison between reception on my original set and this latest one.
—Yours faithfully,

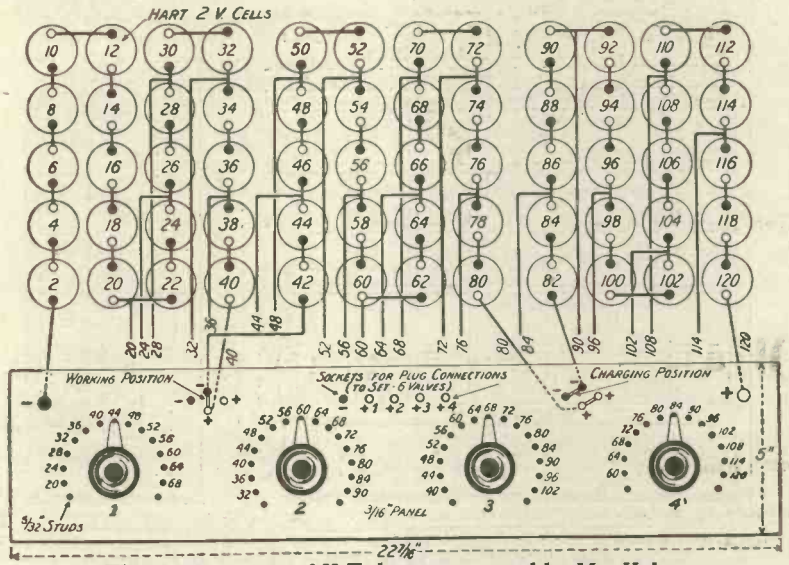
C. FISHER.

Bournemouth.

HIGH-TENSION ACCUMULATORS

SIR,—I have been much interested in the recent references in *Wireless Weekly* to the use of small capacity accumulators for high-tension units. I have for some time used a 120-volt accumulator, made up of 60 Hart cells of the circular type; these are arranged in three groups of 20 cells each, contained in a drawer and wired up to four selector switches, the studs being so spaced that it is not possible to short-circuit adjacent studs when moving the switch arms. I enclose sketches of both the drawer and the switch panel and wiring. You will notice that the three groups of 20 cells are wired up in such a way that by inserting the short-circuiting "U" plugs in the manner shown as "charging position," the battery may be charged as a 40-volt unit from one lamp passing .3 ampere.

When using the battery as a 120-volt unit the short-circuiting plugs are inserted as shown as "working position"; in this position the three units are in series.



The arrangement of H.T. battery as used by Mr. Haley.

Thanking you for the interest derived from your most excellent publications, *Modern Wireless* and *The Wireless Constructor*.—Yours faithfully,

J. N. HALEY.

Finchley.

A SINGLE-VALVE RECEIVER FOR KDKA

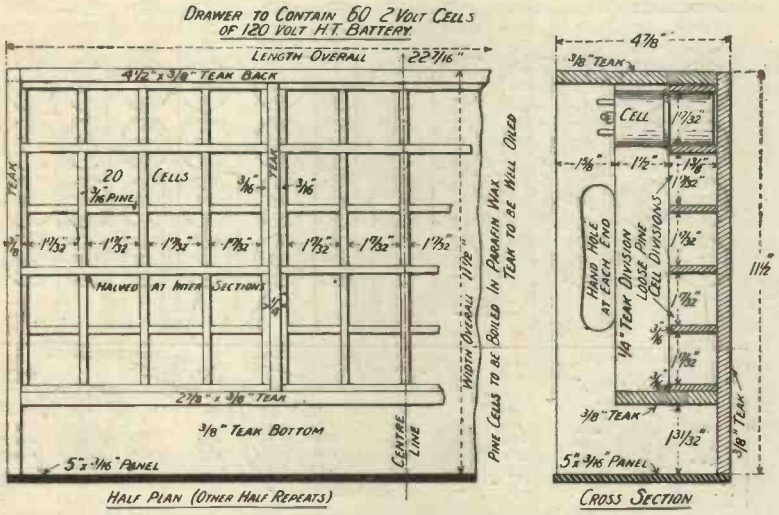
SIR,—Heartiest congratulations to Mr. Stanley G. Rattee on his wonderful little one-valve set described in the March issue of *Modern Wireless*. I recently constructed same *exactly* according to the plan, although I was unable to secure the first-class components indicated, and

had to be satisfied with what I could get over here.

After changing over the connections to the reaction coil, I found that the set oscillated well over the whole scale of the condenser and picked up with the greatest of ease quite a number of French and Belgian amateurs, morse and telephony. Last night at about 11.30 I heard an orchestra as loud and distinct as one usually receives a local station on a good crystal set. Every instrument could be heard with perfect clarity. I could not believe this to be America until the announcement came through strong and clear (and with an American accent), "This is Station KDKA, Pittsburgh, on 68 metres."

The results are wonderful and far beyond my expectations.—Yours faithfully. FRANK HAWKINS.

Brussels, Belgium.



The containing box used with Mr. Haley's H.T. battery.

AERIAL INTERACTION

SIR,—I have just read Mr. Harris's article, "Random Technicalities," in the March 4 issue about radiation variation, and note his invitation to readers to let him know of their experiences in the same way.

Some time ago I was conducting experiments with a small power transmitter of the Hartley circuit, and I noticed the radiation was not always the same for given input powers valve and wavelengths. This puzzled me for quite a long time, until one night I found the solution.

I generally do some short-wave reception at night on about 60-100 metres, and often check off the wavelength of the amateurs being received by means of a buzzer wavemeter, and the radiation drop only occurred when using a wavelength of 73 metres.

Finally, I came to the conclusion that the receiver or wavemeter had something to do with it. About that time I was trying to identify a station or harmonic of one which I read every night on 73 metres,

but he never gave any call sign, or at least I never heard any. I found that the radiation dropped 50 per cent. when the wavemeter, 3 ft. from the transmitter, was left tuned to 73 metres; on detuning the wavemeter up to about 300 metres the radiation went up to about 60 per cent. of normal. Then the receiver, which was switched on to 73 metres and on an indoor aerial directly under the outdoor, was cut out and the radiation again jumped up to full normal reading. This strange behaviour of the Hot Wire Ammeter was more noticeable when using pure c.w. rectification and smoothed A.C. than when using I.C.W. (T.V.T. unit).

Hoping these notes may interest you and your paper, which I wish every success.—Yours faithfully,

HAROLD HARDY,
British 2A.O.X.

Liverpool.

H.F. RESISTANCE MULTI-LAYER COILS

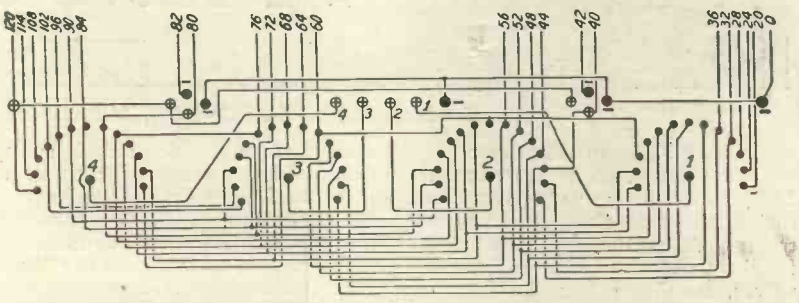
SIR,—I was most interested in reading the article in Vol. 5, No. 14 issue on H.F. resistance of coils. It is the first time I have seen actual figures published on this most important point. It will be most useful in designing coils in the future. On one point, however, I do not quite follow your contributor. He states that basket coils are in effect multi-layers. Surely they are more closely related to single-layer coils. In the "Radio Experimenter's Handbook," Part 2, by P. R. Coursey, it states that winding depth and length are to a first approximation interchangeable in calculating inductance, and it would seem to be also the case respecting skin effect, since both are due to magnetic lines of force. I have had no experience of basket coils, but have found the disc type coil wound in a groove in an ebonite X described by Mr. Percy W. Harris in your columns, even more efficient than single layers.

Wishing your excellent periodicals every success.—Yours faithfully,

A. R. MONCORN.

Sherborne.

[NOTE: Our contributor placed basket coils in the multi-layer category solely from the point of view of skin effect. Approximate calculations of inductance are certainly made by the method quoted by our correspondent, but this does not affect the fact that many authorities consider that all spiral coils are open to the same objection of serious skin effect losses as true multi-layer coils. In this connection we would refer our correspondent to the remarks of Mr. Kendall on p. 634 of the February 11 issue.]



Illustrating the connections employed in Mr. Haley's arrangement. The dead studs are not shown for reasons of simplicity.

Apparatus we have tested

Conducted by A. D. COWPER, M.Sc., Staff Editor.

Dual Filament Rheostat

From Messrs. Radio Instruments, Ltd., we have received a sample of their dual-purpose rheostat, for controlling filament temperature both for bright-emitter and dull-emitter valves, so that either can be used at will on the same receiver.

This is a highly finished and substantially built instrument, with a one-hole fixing device of unusually good design that will accommodate panels of varying thickness up to $\frac{3}{8}$ in. A neatly engraved metal scale is provided, which has a double graduation for the two ranges. The controlling knob is secured by a substantial set-screw on its spindle. Below the panel a metal frame carries two solenoid-type wire resistance-spirals, side by side, and a single metal spring contact-finger works over either of these according to the position of the controlling knob. On measurement the maximum of the thin wire resistance spiral was about 25 ohms, whilst that of the thick wire one for bright-emitters was about 4 ohms, and it carried the current for a standard type of R valve without noticeable heating-up. The action was smooth and silent in both ranges. A definite "off" position is provided, and substantial stops.

The space occupied by the whole instrument is about $2\frac{1}{2}$ in. square and a depth of 1 in. behind the panel. Small terminal screws on the frame are supplied for the connections, and are easily accessible for wiring up.

"Duwatcon" Variable Condenser

An interesting type of double-range variable condenser has been sent to us by Messrs. Dubilier Condenser Co., Ltd., designed to cover continuously a considerable range of frequencies with a single tuning inductance, by means of series-parallel switching of the tuning condenser. It is well known that the ordinary series-parallel switching arrangement often leaves a gap in the series of available wavelengths, which has to be bridged, in practice, by the insertion of another tuning coil. In this "Duwatcon" variable condenser the wavelength range is made continuous by providing an overlap in the available tuning capacities by means of two

variable condensers of different capacities with an actual overlap in the engagement of the two sets of moving plates with their respective fixed plates. The moving plates are mounted all on the same spindle, but are cut in the form of a segment of a circle in place of the usual semi-circle; the smaller set (of eight plates) begins to engage with its fixed plates before the larger set (of 20 plates) is completely entered between its own fixed plates. The small capacity is permanently connected in parallel with the inductance; the larger capacity is put in series with the aerial in one position of the series-parallel switch, and in the "parallel" position is out of use altogether. The effect of this is that, with ordinary aerial capacities, there is the necessary small overlap of total effective tuning capacity when changing over to give a continuous tuning range.

In general build, finish and workmanship this instrument recalls other condensers from the same makers which have been reviewed here recently, and has the same type of under-panel fitting with a small false panel carrying indicator and stops. Similar large terminals are provided, three in number; a substantial "pig-tail" connection is made with the moving plates. The space occupied is about 3½ in. diameter by 4 in. below the panel. The actual capacities of the two parts of the condenser, on measurement, came out at just over .0006 μF and just under .0002 μF, with minima of 33 and 18 $\mu\mu$F respectively. The insulation resistance was excellent, and, tested on an oscillating circuit, the losses were evidently of a low order.

Chaseway Variable Grid-Leak

Messrs. The Chase Electrical Manufacturing Co., Ltd., have submitted samples of their "Chaseway" variable grid-leak. This is of the one-hole-fixing variety, and is contained in an insulating case about 2⅜ in. by 1 in. by ½ in. The control is by a small knob on a spindle which moves in and out longitudinally through about 1⅛ in., quite freely. This moves a small block sliding within the case, in which are mounted two spring contact brushes of graphite, which make contact with the usual pencil lines or streaks of graphite made, in this instrument, on the inner narrow sides of the case. Small terminals fitted on the sides of the case provide connection to the thickened ends of the pencil lines. As the two graphite lines are in series, the available range can be quite large. On measurement, the resistance was variable from about 17 megohms in each of two samples to a minimum which ranged around 24,000 to 40,000 ohms, but not very precisely defined. The variation was very rapid in the neighbourhood of the minimum. In actual use in reception the grid-leaks were silent enough when once set, but left something to be desired in the matter of silent operation when adjustments were being made. They operated satisfactorily when set. The values of resistance appeared to be fairly reproducible, with sufficient accuracy for practical purposes. It is evident that with a wholly enclosed and protected pencil line and with graphite contact brushes backed by a spring, as here, a much more satisfactory variable leak will result than is usual with the ordinary type of pencil line leak.

A Double Universal Coil-Holder

A curious and versatile type of three-coil-holder has been submitted for test by Messrs. Rap Instrument Co. In this instrument, in addition to the usual central fixed coil-plug fitting (arranged on a rectangular base 3½ in. by 2¾ in.) there are two outer holders which have a double motion, pivoting on vertical pillars and rotating on axes at right-angles to these pillars. The result of this combination of motions, which are controlled by 4-in. handles fitted with the usual knobs, is that the reaction coupling

or primary and secondary coupling can be varied between wide limits or reduced effectively to zero. The coils can also be brought very close together if required. On trial, it was found that the long handles gave the necessary fine control over coupling when that was required. The bearings for the rotational movement about the horizontal arms are capable of adjustment by set screws, but the holder is scarcely suitable for the very large coils used in long-wave telegraphic work. For broadcast reception on the ordinary wavelength the instrument appeared rigid enough to carry the ordinary types of plug-in coils.

The workmanship and finish of the instrument were commendable and the insulation resistance, on test, proved to be very satisfactory. Connections are made by ordinary flex to the two outer coils to small screws on the coil-plugs; the centre holder is provided with terminals on the base.

Non-Resonant Loud-Speaker Trumpet

Messrs. Scientific Supply Stores have submitted for test a large pattern of their series of non-resonant loud-speaker trumpets, intended to be substituted for an existing metal or wooden horn, in order to get rid of the characteristic resonance or ring (the "gramophone" effect so much deprecated) which such a trumpet of hard, resilient material generally exhibits. We understand that these horns are made of various sizes and shapes, with nozzles to fit most of the existing loud-speakers on the market.

The material of the horn is a special composition which possesses the necessary mechanical strength without being hard; the surface, both inside and out, is made quite rough, so as to further diminish any resonant effects. The shape of the large pattern which was submitted to extensive tests was that of a long, straight cone, with flaring mouth; smaller patterns are made with a bend and of the conventional shapes. The finish is in a quiet, attractive dull bronze, which does not look out of place in a private dwelling-room.

The effect of replacing an ordinary small metallic trumpet by this large non-resonant one was remarkable; apart from the increased power, the resulting fidelity of reproduction was positively startling, the illusion of actual presence of the artists in the room, or perhaps behind a door-opening, being very near indeed. An impression of effortless power was given, there being an entire absence of the localised blare and shout of the ordinary small trumpet when on full power. Even an ordinarily indifferent small loud-speaker was vastly improved by this trumpet, and became endurable to listen to continuously—though of course the distortion introduced by too thick or resonant a diaphragm, or by some particular mechanism behind the latter, cannot be compensated for by a trumpet; nor can the reaction-distortion of an over-pressed receiving set nor the effect of poor, cheap L.F. transformers. With an efficient three-valve receiver, on a moderate suburban aerial, and with modern practically distortionless transformers and a power valve for the last stage, etc., *i.e.*, under fair conditions, and with a good L.S. base to which the large trumpet was applied, every word of the speech from the local station was clearly readable in every room of a large house, and there was no blare or noticeable distortion. The gramophone effect so much complained of was not there at all.

We can most strongly recommend this type of non-resonant trumpet for application to existing instruments, to replace the ringing smooth-bored type of trumpet usually fitted, and strongly advise at the same time that the larger patterns be chosen. We gather that the prices are very reasonable.

Information Department

SUPPLIED BY RADIO PRESS SERVICE DEPT., LTD.

M. G. R. (LIVERPOOL) states that he possesses a pair of adjustable headphones, whose positive and negative tags are not marked, and he asks how he can identify them for himself.

A general method which is applicable to all adjustable types whose tags are not marked positive and negative is as follows :—First of all, when actually receiving signals, so adjust the 'phones that the diaphragms or reeds, as the case may be, just drop back upon the pole pieces, and produce weak and probably harsh signals. Now reverse the two tags and note whether the diaphragms or reeds spring clear again. If they do so the 'phones were correctly connected in the first instance, and the tag which was gripped under the telephone terminal which was wired internally to the high-tension positive should be marked positive, perhaps by binding with red cotton. If, on the other hand, there is no apparent change, the 'phones should be readjusted to the point at which the diaphragms just, and only just, fall back on to the pole pieces, and the connections again reversed to the old order. If the pole pieces now spring clear the connections should be altered to the second arrangement, which was the correct one.

The procedure given will serve for the majority of receivers, but some instruments may require different treatment. It is possible in these cases that when the diaphragms have just dropped on to the pole pieces, with the aid of the steady anode current, they will not spring clear upon the reversal of that current, and in this case the aim should be to adjust the 'phones so that the diaphragms just fail to drop on to the pole pieces, whereupon a reversal of the tags should be made. If the diaphragms now fall against the pole pieces the new arrangement is the correct one. If they do not do so adjust once more until they just fail to drop on to the pole pieces, and then once more reverse the tags. If they now start to give the characteristic rattle against the pole pieces, it shows that this new connection is the proper one, and the tags may be marked as previously mentioned.

A. L. J. (BRADFORD) is in considerable difficulty with the

quality given by his loud-speaker, which is of a certain well-known make and is the third specimen of this make which he has tried. He has returned the two previous specimens as being defective, but the third possesses exactly the same objectionable qualities, and he therefore asks our assistance. The reproduction which he obtains is very harsh and metallic, and no adjustment of the gap between the diaphragm and the pole pieces produces any improvement.

Since our correspondent has tried three specimens of a perfectly reliable make we think it safe to assume that the trouble must undoubtedly be in his receiving set; but he assures us that he has used the best of components throughout, the two low frequency transformers being of a well-known make. The objectionable quality which our correspondent describes may be due to continuous oscillation taking place in the low-frequency circuits at some inaudible frequency, and the usual experiment of reversing the IS and OS of one of the transformers should be the first test which is made. The description of the trouble, however, leads us to think that it is more likely to be due to the lack of the correct size of shunting condenser across the loud-speaker itself, since it is of one of the makes which functions very much better with the aid of this condenser. We suggest that one of .004 μF should be tried, increasing this to .005 and .006 if the desired improvement in quality does not take place. If it proves impossible to remove the whole of the metallic tone in this way without introducing the hollow muffled effects, characteristic of the use of too large a condenser, the effect of placing small condensers in parallel with the secondary winding of the second low-frequency transformer should be tried, the suggested value being .0001 μF for a preliminary test, increasing this value if necessary. In addition to this, a shunting resistance of about 100,000 ohms or a quarter of a megohm should be tried in the same position.

E. A. B. (Matlock) has built a "Transatlantic V" receiver (his first set) and reports that although he can get all stations at fair strength in the phones, when he switches over to the full five-valves only weak signals are heard from the loud speaker.

There may be an actual fault in the circuits of the low-frequency valves, but the symptoms given in detail in our correspondent's letter make this seem improbable. It is more likely that the trouble results from a characteristic of all sets in which resistance capacity coupling is used on the low-frequency side. In such sets switching in the low-frequency valves involves bringing a resistance of (usually) 80,000 ohms into the anode circuit of the detector valve, with a consequent drop in the effective anode voltage of perhaps 50 per cent. The result, of course, is to upset completely any critical adjustment of reaction, and throw the set a long way from its most sensitive state. Hence, it is quite possible that a station which was quite strong in the phones when the reaction was critically adjusted will scarcely be heard from the loud-speaker unless the set is readjusted after switching in the low-frequency valves. In the case of the "Transatlantic V," the set should be brought back to its most sensitive state after switching in the L.F. valves by turning the potentiometer towards the negative end, or by bringing up the reaction coil to the necessary amount and slightly re-tuning as may be required. Another possible cause is that the accumulator is too small, so that the additional load of the last two valves causes a voltage drop on the previous three.

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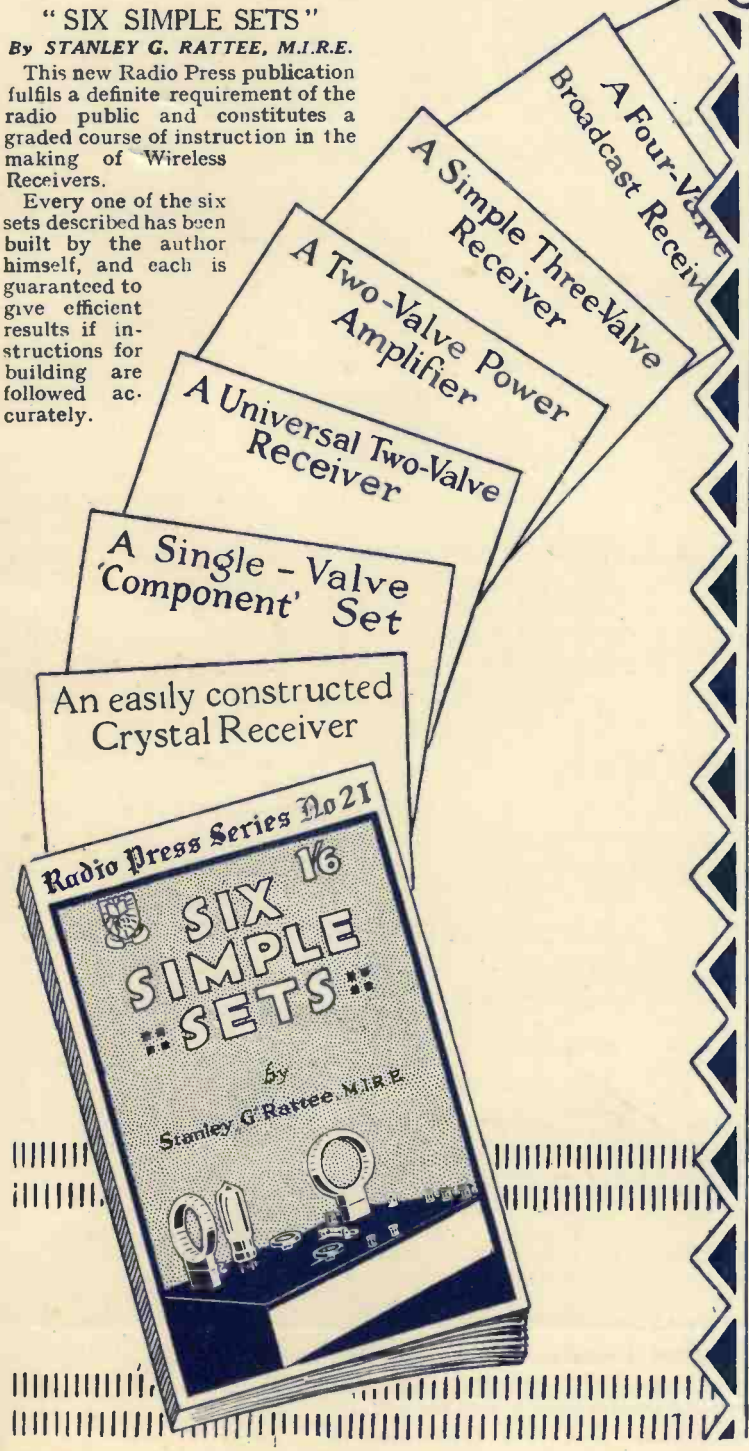

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