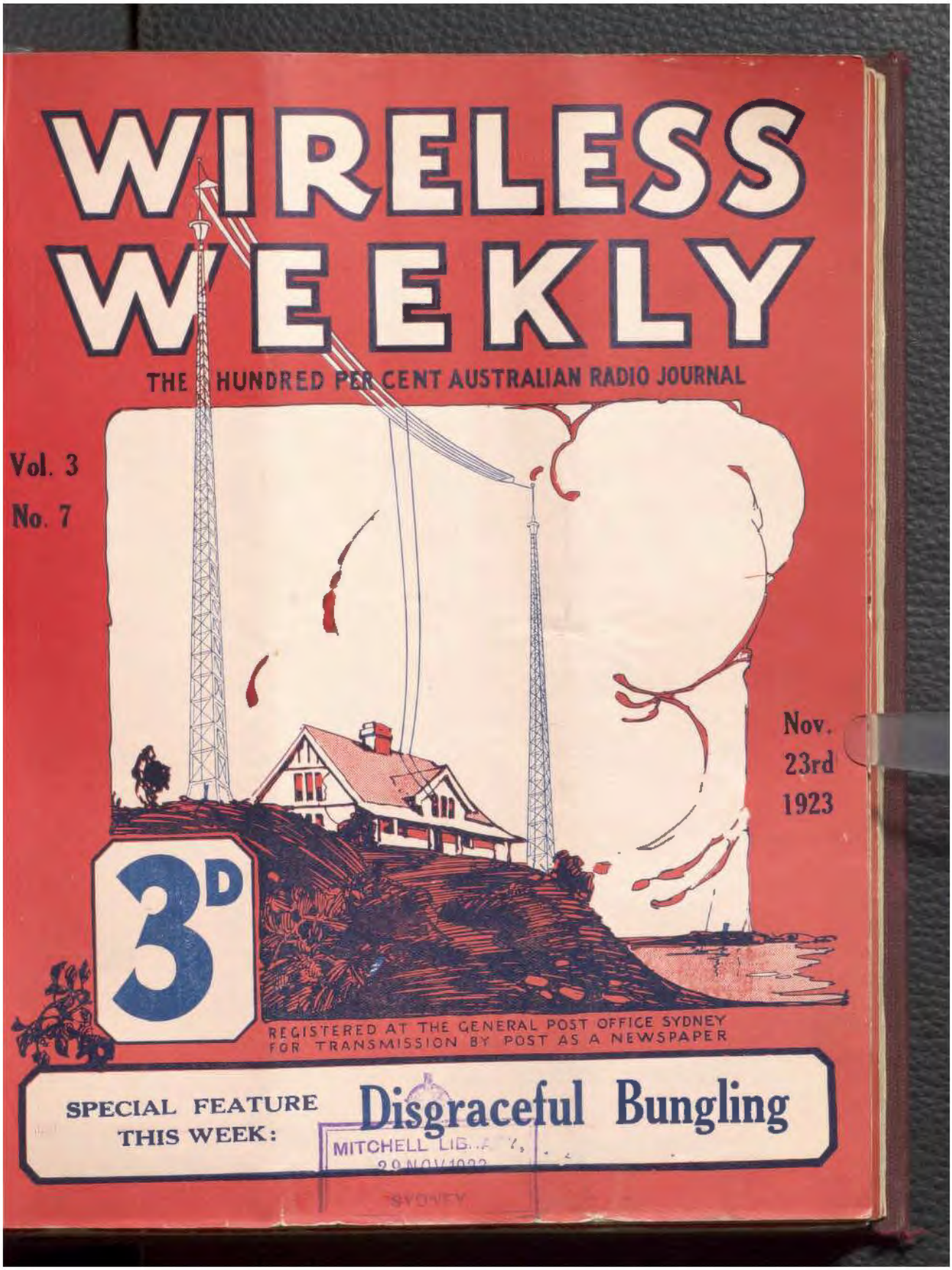
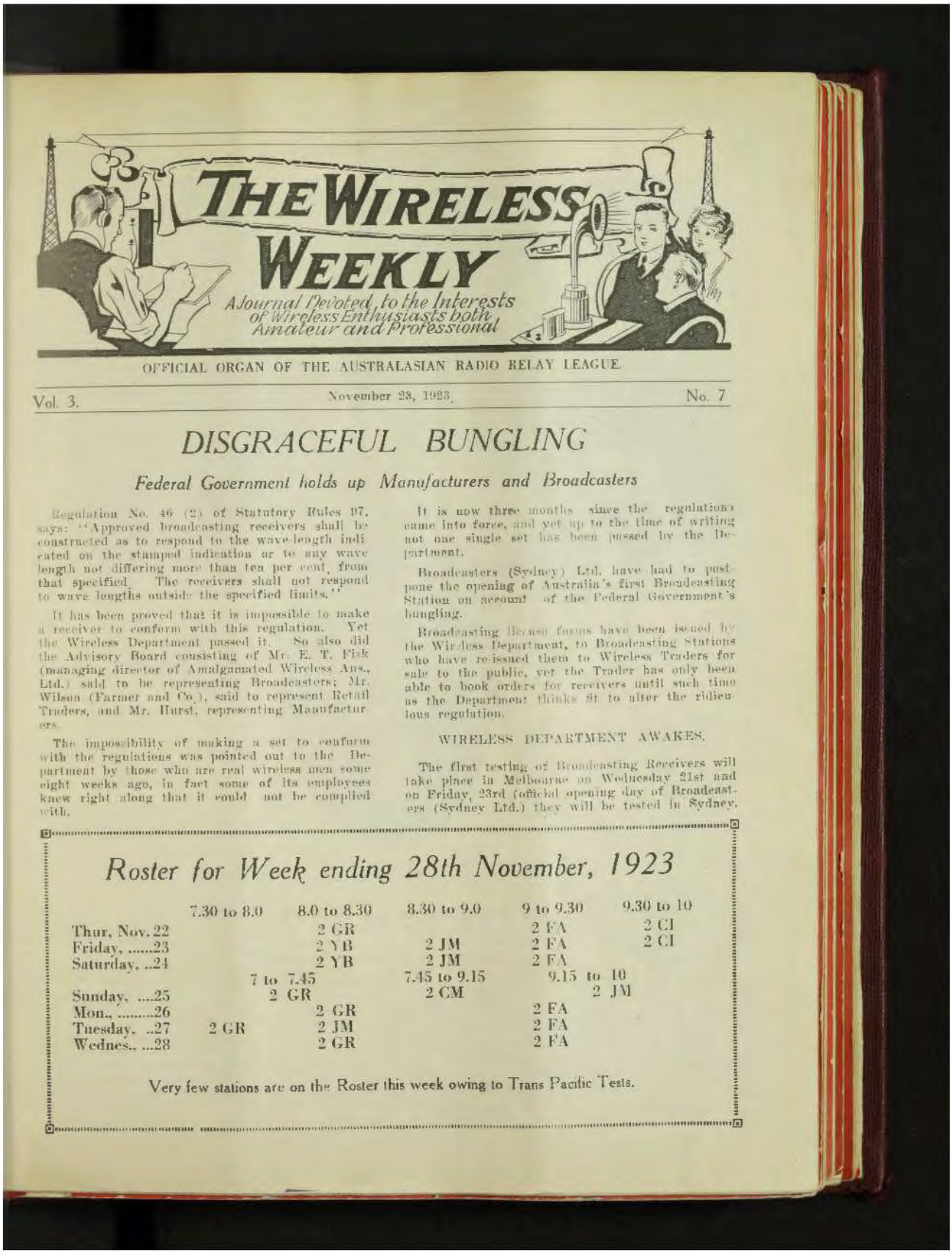




THE WIRELESS WEEKLY

A Journal Devoted to the Interests of Wireless Enthusiasts both Amateur and Professional

OFFICIAL ORGAN OF THE AUSTRALASIAN RADIO RELAY LEAGUE.

Vol. 3. November 23, 1923. No. 7

DISGRACEFUL BUNGLING

Federal Government holds up Manufacturers and Broadcasters

Regulation No. 46 (2) of Statutory Rules 97, says: "Approved broadcasting receivers shall be constructed as to respond to the wave-length indicated on the stamped indication or to any wave length not differing more than ten per cent. from that specified. The receivers shall not respond to wave lengths outside the specified limits."

It has been proved that it is impossible to make a receiver to conform with this regulation. Yet the Wireless Department passed it. So also did the Advisory Board consisting of Mr. E. T. Fisk (managing director of Amalgamated Wireless Aus., Ltd.) said to be representing Broadcasters; Mr. Wilson (Farmer and Co.), said to represent Retail Traders, and Mr. Hurst, representing Manufacturers.

The impossibility of making a set to conform with the regulations was pointed out to the Department by those who are real wireless men some eight weeks ago, in fact some of its employees knew right along that it could not be complied with.

It is now three months since the regulations came into force, and yet up to the time of writing not one single set has been passed by the Department.

Broadcasters (Sydney) Ltd. have had to postpone the opening of Australia's first Broadcasting Station on account of the Federal Government's bungling.

Broadcasting Licence forms have been issued by the Wireless Department, to Broadcasting Stations who have re-issued them to Wireless Traders for sale to the public, yet the Trader has only been able to book orders for receivers until such time as the Department thinks fit to alter the ridiculous regulation.

WIRELESS DEPARTMENT AWAKES.

The first testing of Broadcasting Receivers will take place in Melbourne on Wednesday 21st and on Friday, 23rd (official opening day of Broadcasters (Sydney Ltd.) they will be tested in Sydney.

Roster for Week ending 28th November, 1923

	7.30 to 8.0	8.0 to 8.30	8.30 to 9.0	9 to 9.30	9.30 to 10
Thur, Nov. 22		2 GR		2 FA	2 CI
Friday, ...23		2 YB	2 JM	2 FA	2 CI
Saturday, ..24		2 YB	2 JM	2 FA	
	7 to 7.45		7.45 to 9.15	9.15 to 10	
Sunday, ...25	2 GR		2 CM	2 JM	
Mon., ...26		2 GR		2 FA	
Tuesday, ..27	2 GR	2 JM		2 FA	
Wednes., ...28		2 GR		2 FA	

Very few stations are on the Roster this week owing to Trans Pacific Tests.

Famous Radio Personalities

The Lives and Work of some of the Pioneers of Radio

EDOUARD BRANLY.

The form of detector used by Hertz in his original laboratory experiments consisted of a metallic loop, the two ends of which were separated by a narrow gap. Each pulse of radiated energy as it flowed past the ring set up an electromotive force which caused a discharge of minute electric sparks across the gap.

This device was not, however, sufficiently sensitive to indicate the presence of electric waves at any considerable distance from the transmitter.

In 1890 Professor Edouard Branly, of Paris, discovered that the passage of an electric spark had a curious effect upon the conductivity of a mass of metallic filings. He enclosed a loosely packed mass of aluminium fragments in a glass tube and joined the two ends of the tube to a dry cell. Owing to the casual contact between the various pieces of metal, the circuit as a whole possessed a high resistance, but at the same time it allowed a passage of a certain amount of current.

Each time a distant spark-gap was discharged the conductivity of the mass of filings immediately altered, obviously in sympathy with the energy radiated from the source of electric disturbance.

Branly carefully investigated this phenomenon and found that whilst in general the effect of the spark lowered the resistance of the filings, yet in certain instances the resistance of the circuit was increased. In every case, however, the result was quite pronounced.

By inserting a telephone in series with the dry cell and the tube of filings, the arrangement can be used to indicate the passage of a train of wireless waves. As the radiant energy strikes against the filings the resistance of the whole circuit is altered, and the consequent change in the local current is heard as a click in the phones.

The original form of Branly coherer was liable to become insensitive after the passage of the first train of waves, the action of each impact apparently causing the metal fragments to adhere slightly to one another. It was therefore found necessary to combine it with an automatic shaking or tapping device, which by incessantly agitating the filings kept the detector always ready for action. In this improved form the coherer was successfully employed by Marconi in his first long-distance experiments in 1897-'8.

It is to be observed that the action of the coherer was apparently known to Professor Hughes, the in-

Mr. NEILS ANDERSON
The Clever Violinist
who has entertained "Listeners-in" from Broadcasters (Sydney) Ltd.

ventor of the microphone, many years before its independent rediscovery by Branly. Hughes did not, however, publish his knowledge until after the Frenchman's apparatus had been perfected.

Edouard Branly was born at Amiens, in 1846. He is a member of the French Academy of Sciences and Professor of Physics in the Catholic Institute of Paris.

R. A. FESSENDEN.

Whilst Marconi, Lodge, and their contemporaries were establishing the science of wireless communication in this country, important developments were taking place abroad, particularly in America, France and Germany. Among American pioneers the name of R. A. Fessenden stands out in prominent association such such men as Stone, Hammond, Lee de Forest, and Squiers.

Reginald Aubrey Fessenden was born at Milton, U.S.A., in 1866, and from 1886 to 1890 was associated with the famous inventor, T. A. Edison. In addition to being the author of numerous philosophic and scientific works dealing with the essential nature of matter, magnetism and electricity, gravitation and inertia, he is the holder of numerous wireless patents of wide scope and ingenuity.

Following the early search for an efficient detector, Fessenden evolved a form of magnetic receiver somewhat similar to the better known Marconi instrument, in which a thin strip of steel is passed close to a pair of magnets and is then demagnetised by the oscillatory currents received on the aerial so as to give rise to signals in a pair of phones.

He also devised an electrolytic detector in which the incoming wireless oscillations were caused to destroy the thin film of polarisation gas in a platinum-nitric acid cell, thereby altering its internal resistance and setting up correct corresponding signals in an associated receiving telephone.

Another Fessenden detector is of the thermal or Bolometer type, the temperature, and consequently the resistance, of a fine loop of Wollaston wire being directly controlled by the minute currents flowing in the receiving aerial.

Apart from his researches into the action of wireless detectors, the American inventor was one of the first to produce a syntonic or tuned method of transmission and reception along the lines of the well-known Lodge-Muirhead system.

Mr. Coleman's Jazz Orchestra
Photographed outside Broadcasters (Sydney) Limited temporary Studio

CRYSTAL INFORMATION

Various methods of restoring the sensitiveness of "worn-out crystals have been tried and some of them are fairly successful. The most obvious remedy, of course, is to break off a piece of the crystal and so expose a fresh surface for use, but the objection to this sort of treatment is that some of the specially-faked crystals are only sensitive upon the surface.

Washing the surface with absolute alcohol or carbon bisulphide sometimes works wonders with crystals which have lost their freshness but care must be taken to dry the crystal thoroughly before re-testing it. (Do not dry it before the fire by the way because both the re-agents mentioned are extremely inflammable.)

A method which has a considerable vogue in the United States is to subject the crystal to prolonged heating by immersing it in molten Wood's metal, but it is doubtful whether this treatment would suit the surface-sensitive varieties.

DAMPING IN CRYSTAL SETS.

By "damping" is meant the effect produced upon the received oscillations by all the losses which occur in the set. In the case of a crystal set the avoidable losses are chiefly matters of leakage and resistance, and care taken in reducing them as much as possible is well repaid by improved signal strength and an increased sharpness of tuning.

Prevention of leakage, of course, is a matter of attending carefully to insulation, both upon the aerial and in the set, by shellacking and baking tuning coils and formers, avoiding damp, and using ebonite wherever possible, or failing ebonlote, wood which has been damp-proofed either by varnishing and baking, or, better, by soaking in hot melted paraffin wax until bubbles cease to rise.

Reduction of resistance, it should be remembered, is only of importance in the tuned (i.e., aerial to earth) circuit, and is to be effected by using heavy wire for the aerial, lead-in, and earth lead, making sure of a really good earth connection and winding the tuning coils with a stout gauge of wire, say, No. 20 S.W.G.

THE USE OF A TESTING BUZZER.

When a crystal set is used at a considerable distance from a broadcasting station it is necessary to adjust the crystal to a sensitive condition before starting to tune in, and a convenient method of doing so is to make use of a testing buzzer. This valuable little accessory constitutes a simple transmitter of very weak wireless waves whose tuning is so flat that they may be heard upon any adjustment of the tuning, thus permitting the detector to be easily tested.

The buzzer, which should be of the high-note type for preference is fitted up with a switch and dry cell, and a length of about three feet of insulated wire is attached

to the contact-point to act as a miniature aerial.

The testing set should be placed at a distance of a few feet from the receiving set, and it will then be found that when the crystal is properly adjusted the note of the buzzer will be heard in the phones when the switch is closed. The indications are more easily noted if the buzzer is silenced by enclosing it in a box lined with felt or cotton wool.

PROBLEMS THAT PERPLEX.

When a solo with piano accompaniment is broadcasted, the placing of the microphone so as to catch instrument and voice in their natural proportion to each other is always a bit of a poser. No two artists can transmit faithfully with the microphones in the same position, alterations are always necessary. Even then the volume of the singer's tone increases towards the end of the solo, the accompaniment fades out. This is because the soloist's intensity exhausts the ordinary microphone. The new magneto-microphone, however, obviates this, for it allows the volume of both voice and piano to be electrically adjusted in the control room. At the trial test, three of these coils and magnets were used, one was fixed in the extreme treble, one in the bars of the grand piano, and in the middle register. Balanced in the control room, as explained above, very fine results were obtained.

* * *

THE ROYAL ROAD TO RADIO?

The officer-in-charge of the Pensacola Air Station, U.S.A., stands sponsor for the following idea. He declares that he can teach students the radio code while they are asleep far more quickly than in the ordinary oral classes. He also claims that backward scholars have been tested before and after treatment, and that the necessary knowledge has been successfully instilled into their subconscious minds, when it seemed a hopeless task to try and get it into their conscious mentalities. Before retiring at night, the students adjusted their head receivers. Then messages were tapped out to them throughout the night at high speed, some ten words a minute faster than the victims' daytime speed. The next day it was found that the subjects could easily receive messages at the higher rate of speed. For a would-be aviator this is an important thing, because the twenty words a minute receiving test must be passed at the end of six months for a pilot's certificate. This has many times proved a stumbling block.

* * *

WHAT PHINNEY FOUND.

The originator, Chief Mate Phinney, discovered this method by accident. He was practising with a mechanical sender and attempting to take thirty-five words a minute. He fell asleep over his desk, with the apparatus still working, and found when he woke that he was able to easily receive at the fast rate which had previously beat him. His theory is that the subconscious mind works always, and that teaching everything in this way is practicable. Phinney cites educational tests he has made, in which unbelievably hefty passages of literature have been memorised, and prophesies that the class-rooms of the future will have to be furnished with sleeping accommodation, not to speak of radio head-sets.

Mr. Mullard buys a Marconi valve for his broadcast receiver.

MAKE YOUR OWN

A Compact Two-Valve Receiver

With the set here described all the broadcasting stations may be received on a reasonably good aerial fifty miles from the station.

The principle behind the design of the aerial circuit is novel so far as I know, an aerial inductance being chosen of such size and its distance from the secondary adjusted to a point at which there is a satisfactory balance between the energy received by the aerial and the energy transferred to the secondary circuit.

It is sometimes found that a tuned aerial used in conjunction with a tuned secondary circuit, owing to the resistance of its coil and the resultant damping, actually passes on to the secondary less energy than does a smaller untuned coil, especially on rather weak signals. After all, there is a very good foundation in theory and practice for the use of different inductance values to fit the strength of signal received. Thus, in winding alternating current transformers we adjust the number of turns to suit both the periodicity, which is the equivalent of the wavelength, and the voltage, which is the equivalent of the signal strength.

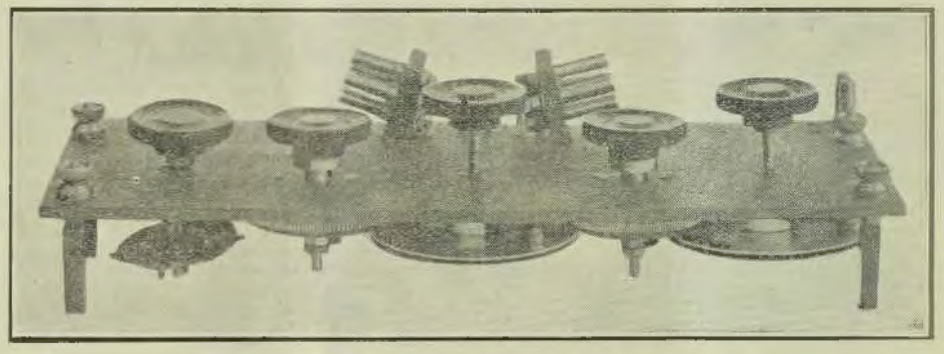
For loud signals we thus use a larger aerial coil, say, 100 turns, and for distant signals a smaller coil, say, 30 turns, connected direct to aerial and earth without any condenser in the primary circuit. The secondary circuit is tuned in the usual way, and the coupling between primary and secondary is variable.

With this system of aerial and secondary the secondary can oscillate and heterodyne incoming signals without any sign of oscillation in the primary (aerial) circuit. Tightening the coupling both increases the tendency of the primary to oscillate and decreases the oscillations in the secondary circuit, and it is very easy with slow movement of the coupling to strike any point of oscillation desired.

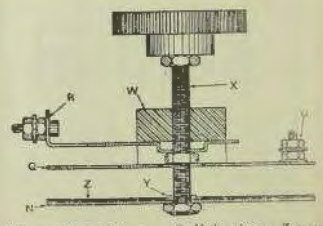
The coupler itself consists of two coils on two hubs on the same spindle. The first hub is secured to the panel by two set screws only. Rotation of the spindle causes movement of the second hub which is tapped 2BA to fit the spindle. Rotation of the second hub is prevented by two guides fixed on the first hub, passing through clearance holes in the movable hub.

The set tunes from about 300 to something over 600 metres. All three coils (including the plate circuit inductance) are uniform and consist of 90 turns of 32 D.C.C. wire.

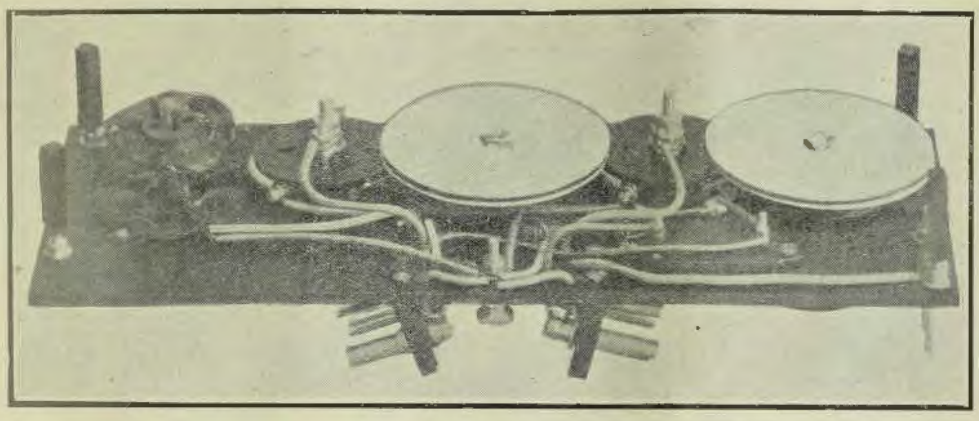
The condensers are of an unusual type, consisting of two three-inch



Complete two-valve receiver of particularly simple construction.



The variable condensers. Q, N the plates; Z mica and shellac; Y holding-down collar; W insulating mounting piece; X 2BA spindle; R, U terminals. A copper strip, insulated with mica, secured to the strip leading to the terminal R, serves as a grid condenser.



Underside view. The arrangement of the variable coupling between the inductances can be seen, and also the construction of the variable condensers. In this instance a grid condenser of the usual type is employed instead of the insulated clip on the condenser lead.

aluminium discs, one fixed and one movable. The fixed disc is secured to a vulcanite hub which is in turn secured to the panel, the fixing and hub being uniform with those of the aerial and secondary coils.

The fixed hub of the condensers is ¾ in. in length, and there is thus sufficient clearance between the fixed plate of the condenser and the underside of the panel for part of the filament rheostat which can thus be dovetailed in between two three-inch condensers fixed at 4 ins. centres.

Capacity effects between the fixed condenser plates and the rheostats do not cause ill effects, as the fixed plates of the condensers are connected to the filament and the high tension positive respectively, and the moving plates which are connected to the first and second grids respectively are completely shielded by the fixed plates at all positions.

The coils used are all standard, wound on vulcanite formers and screwed to hubs which can be fitted either to the tuner coupler as fixed or moving coils, or they may be fixed behind the tuned anode condenser between the rheostat and the panel, making a very compact construction. The wave length and damping of the coil is not appreciably affected so long as the distance between the coil and the condenser plate is at least ¼ of an inch.

Variation of the values of the condensers is effected by turning the spindle on which is affixed the moving plate. This spindle is threaded 2BA, and is held firmly between the screwed hub and a lock nut sunk into the hub with a spring washer between the two to prevent backlash.

The increase of strength of signal when using these condensers is probably due to the small amount of metal used in their construction.

The minimum value of the condensers is very low, enabling a range of wave lengths from 300-700 metres do be obtained by the use of one coil and condenser only.

The terminal of the moving plate of the condenser is on an arm of spring copper held between the spring washer and the lock-nut, and is for convenience brought out to the edge of the condenser plates.

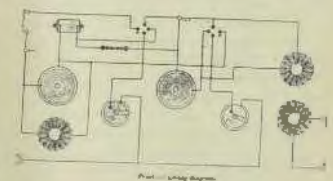
If a piece of 1 in. copper strip is bent over one of the terminal arms of the condenser with a piece of mica for insulation between the two, a grid condenser will be formed which is both mechanically strong and very efficient. The value of the condenser is small (0.0002 uF), and with "A.R." valves signals may be rather better without a leak on distant signals. The set is, however, more stable when using a leak. There is nothing unusual as regards the connections: no reaction is used.

The condensers may be used either with a 90 turn coil as mentioned above, in which case five or six turns are required to cover the whole broadcasting wave length, or a smaller coil of 50 or 60 turns may be used, in which case the condenser plates are much closer together and the broadcasting range is covered by half a turn, enabling an ordinary dial to be used.

Tuning is a little bit tricky at first, but results are well worth the slight extra trouble.

There are three adjustable features, the coupler between aerial and secondary, the secondary condenser and the tuned anode condenser.

The easiest procedure is as follows:—



Start with loose coupling, say, ½ inch between aerial and secondary coils; then screw both condensers up to high values until the click of starting oscillation is heard, making sure that the aerial itself is not

Continued on page 14, col. 1

Testing High Frequency Transformers.

SIMPLE TESTS FOR EFFICIENCY AND OPTIMUM WAVE LENGTH.

The apparatus required is as follows:—

2 "R" valves.
1 inductance coil (say, 25 turns).
1 low tension battery, 6 volts.
1 high tension battery, 60 volts.
1 telephone transformer.
1 pair low resistance telephones.
1 grid condenser, 0.0003 mfds. (2 megohm leak).
The high frequency transformers to be tested.
1 buzzer wave meter.

Increasing the value of the wave meter condenser (thus bringing up the wave length) will probably have the effect of increasing the strength in the telephones, thus showing that the efficiency of the transformer (H.F.T.) is somewhat higher at this altered wave-length.

The wave meter is moved in relation to "L" so that signals become just audible, and the experiment is repeated several times until it will be found that the coupling

particular wave length, and will give good amplification, but their efficiency will fall off rapidly if the wave length is slightly changed.

The principal constructional difference between one type of transformer and another in relation to the foregoing remarks lies in the size of wire which is employed in the windings and the closeness of the coils. Transformers designed for broad tuning are usually constructed with a very fine wire, offer-

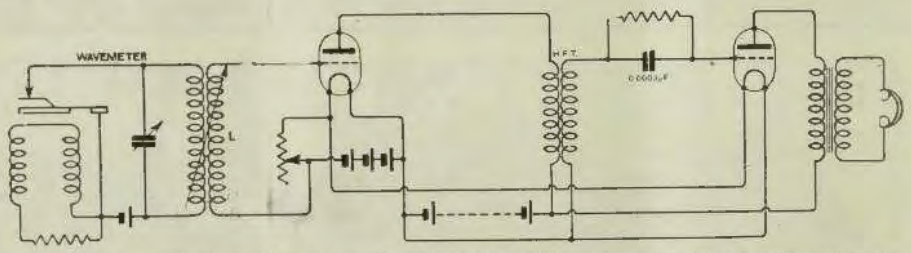


Fig. 1. The wavemeter on the left induces oscillations of the desired wavelength into the inductance "L" and high frequency amplifying circuit, affording a simple method for testing the efficiency of the H.F. transformer.

In this experiment it is first required to find the wave length to which the high frequency transformer will most readily respond. Alternatively, if the experimenter desires to make his own transformers for any particular wave length, it forms a ready method of determining when the windings of the transformer are correct. In the first case the procedure is as follows:—

The apparatus is joined as indicated in Fig. 1. The wave meter is set up so that it can act inductively on the untuned coil "L"; the object of this coil is to conduct the oscillations generated in the wave meter to the grid of the first valve, and incidentally to maintain this grid at a normal potential in relation to the filament. This is the usual working circuit when the valve is employed in the reception of signals. The coupling between the wave-meter and the coil "L" should be made so weak that signals are just audible in the telephones. Commencing with a short wave length setting of the wave meter, the strength of response should be noted carefully,

between the wave meter and "L" is the minimum for a particular wave length. As to whether this coupling is sharply defined or not, will depend on the construction of the high frequency transformer. If the latter is designed for short wave lengths the coupling will as a general rule be found to be quite sharply defined, the opposite being the case for long wave lengths.

High frequency transformers of different makes vary considerably in their efficiency, and it is necessary for the experimenter to decide what it is he requires his transformer to do before determining whether one particular type will be more suitable for his purpose than another. As a general rule it may be stated that high frequency transformers, if designed to give a fairly high efficiency over a broad range of wave length, will not have a sharply defined maximum efficiency, or, in other words, the wave meter adjustment in relation to "L" will not be found accurately. On the other hand, some transformers are designed to give a fairly sharp resonance on or close to a

ing a considerable resistance to high frequency currents and the primary and secondary are tightly coupled. The reverse is the case in transformers designed for high optimum efficiency.

For the guidance of experimenters desirous of building their own high frequency transformers, the Fig. 2 is given. This diagram shows the pin connections of the disc type of transformer, which is perhaps

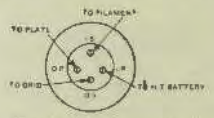


Fig. 2. Usual method of connecting the plug-in type of H.F. transformer.

the most widely employed, and is on the whole as satisfactory as any other. The standard connections of one large manufacturer of transformers of this description are shown. The pins marked "I.P." and "O.P." correspond to the inside and outside primary wires, and those marked "I.S." and "O.S."

to the secondary wire. The windings have not all an equal number of turns; it is preferable to have a few extra turns (say 10 per cent.) on the secondary to those on the primary. This is especially the case if the primary winding is to be tuned, as is indicated in Fig. 3, and it is desirable that the size of wire

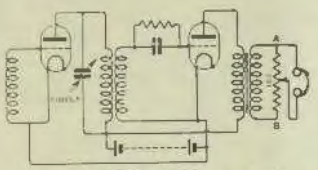


Fig. 3. Tuned H.F. amplifying circuit with an arrangement in the telephone leads for comparing signal strength.

employed should be as large as possible, No. 26 or 28 S.W.G. being suitable.

A variation of the above test may be required in cases where it is desired to tune the primary circuit of the H.F. transformer. In this case the experimenter will require to know the wave range which can be covered by the variable condenser across the primary winding. It is not desirable to have this condenser too large, a suitable value being given in the diagram (Fig. 3), viz., 0.0003 mfds. It will be noticed in this diagram that an alternative method for determining signal strength is shown, and can be applied, if desired, equally well to Fig. 1. In this case the secondary of the telephone transformer is

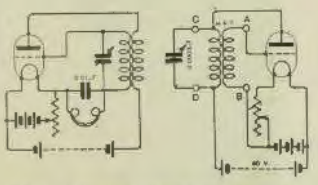


Fig. 4. Heterodyne wavemeter and transformer testing circuit.

joined to the two ends of a potentiometer of 10 ohms resistance. This can be an ordinary valve filament resistance, if there is difficulty in obtaining or making the proper instrument. The variable contact on the resistance is connected to the telephones, the remaining end of the telephones going to a common end "A" of the transformer. The nearer the variable contact is placed to "A," the weaker become the signals, and therefore an arbitrary measure of signal strength can be given by the use of a simple filament resistance scale. If this potentiometer method is employed, it will not be necessary to vary the position of the wave meter, and more accurate results will be obtained.

The method of performing this test is first of all to determine the optimum wave length of the high frequency transformer when the 0.0003 condenser is at its zero position. It can be incidentally noted here that the optimum wave length will be slightly longer with the condensers connected than if it is

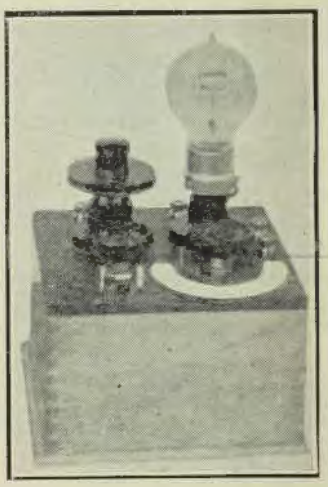


Fig. 5. An instrument specially designed for testing H.F. transformers of the plug-in type for efficiency and optimum wave length.

completely disconnected or removed, so that when it is desired to use a receiver employing one or more high frequency transformers which are to have all their primaries tuned, they must be designed accordingly, to allow for the slight minimum capacity of the variable condenser.

The variable condenser can now be set to its maximum position, and the wave meter condenser readjusted until again the signal strength is the same as before. The two settings of the wave meter condenser indicate the wave range over which the high frequency transformer will efficiently work.

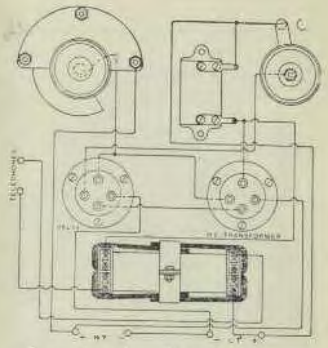


Fig. 6. Connections of the testing instrument.

A small variation in wave length either side of these values will result in a considerable weakening of signals, especially if the high frequency transformers are well designed and constructed.

It may be mentioned that, whilst the above determinations are not suitable for a very high degree of accuracy, they are sufficiently practical to give reliable results, and do not involve any expensive or complicated apparatus.

A more precise method of determining the optimum wave length, making use of a valve oscillator, is shown in Fig. 4.

It wil be seen that the terminals marked AB, CD correspond to the valve socket pins.

On lighting the filament of the valves in H.F. transformer circuit, high frequency oscillations will take place between the terminals CD, and the frequency of these oscillations will be determined by the natural period of the transformer. This period can be altered by adding on variable condenser and testing value to produce any frequency within limits of the transformer inductance values. If now the valve of the heterodyne wave meter is switched on and the whole instrument is placed so that its own inductance lies fairly close, or in inductive relation to the high frequency transformer, a note will be heard in the telephones of the wave meter when the latter's condenser is adjusted to a critical value.

The wave length can be measured directly from the setting of the wave meter condenser in the usual way, and the range over which the high frequency transformer is tuneable, can, in like manner, also be determined. A number of trans-

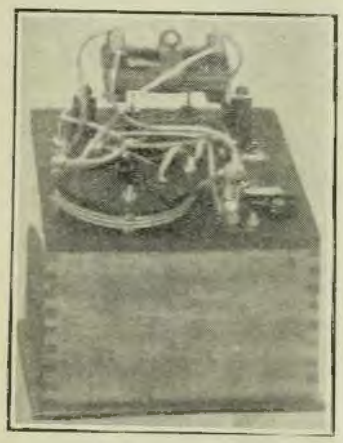
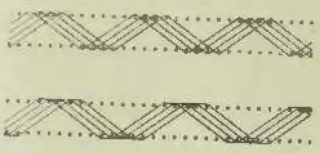


Fig. 7. View of the interior, showing arrangement of components.

formers can be tested very quickly in this way, and before finally soldering the connections to the pins (if the experimenter is making his own), a few turns can be taken off or added to the secondary windings, to bring the transformer up to the particular wave length required.

AN IMPROVED HONEYCOMB COIL

Honeycomb coils wound by hand in the usual manner on formers having two rows of pins, will not have



The upper figure shows the usual method of winding, while the lower figure is a suggested improvement for producing flat sides.

flat sides and a neat appearance unless the pins are very closely spaced.

Flat sides may, however, be obtained by winding round two pins on each side instead of one, as shown in the accompanying diagrams.

The starting pin is No. 1, and the wire is taken round pins Nos. 6 and 7 on the opposite row, then back to 12 and 13 on the starting row, 25 pins being used on each side. The number may be reduced to 13, but in this case the coil may have a little more self-capacity.

An inductance made in this manner takes no more time to wind than the usual pattern of honeycomb coil, and, moreover, bears the neat appearance of the machine-wound article.

REJUVENATING CRYSTALS

Users of crystal sets will be familiar with the fact that the majority of crystals, more particularly some of the super-sensitive synthetic varieties, are prone to lose their "good spots" with exposure to air and dust, and become useless in time.

Tell your friends to buy

"Wireless Weekly"

BROADCASTING

The Editor,
"Wireless Weekly,"
Dear Sir,

With the approaching advent of broadcasting there will, of course, be a vast increase in the number of "listeners-in." These may be divided into several classes. Those who, from motives of economy, will build their own sets. Those who will do the same but for a different reason, sheer love of experimenting and of producing something. Those who desire to purchase sets, and for the reason first quoted will seek for a cheap, or rather low priced article, and finally, those who are able to afford a really good receiver. As pointed out in your journal a few weeks ago, the dealers are unlikely to be in a position to meet the demand for sealed sets for some time, so that the two latter classes are not likely to have their needs satisfied immediately. The requirements of the two first mentioned classes will create a demand for parts and accessories, which will be assembled, and presumably submitted to the Government Department concerned for testing and sealing if they conform to the regulations. Some difficulty will undoubtedly be experienced by them in correctly dimensioning their gear before it passes, but they will gain most useful experience and learning from their failures. "Experientia docet." At any rate, when they have finally succeeded and their sets are passed and sealed they will have the advantage of knowing exactly of what their new possessions are made up. Unfortunately this cannot be said of the two latter classes. These unfortunates—especially those of class three—are, unless they are careful, going to have foisted upon them a quantity of "pink" sets which, being enclosed in sealed cases, cannot easily be examined. At the development of any new industry there are always a large number of "experts" self-styled, who batten upon the innocents. I may instance the motor-car industry. Even to-day there are many repair shops which are famous for high prices and notorious for poor workmanship. They exist solely to "take in" the uninitiated.

An exactly similar state of affairs is bound to occur in the case of radio. Many individuals with a slight knowledge of the subject—how slight they hardly know themselves—and with no greater knowledge of mechanical and electrical engineering and instrument making—are going to exploit the public. That is, of course, unless the public takes care not to be exploited.

The sealed receiver regulation will prove a powerful assistant to these "experts." The remedy lies in the hands of the public. Let them take care to purchase sets only from manufacturers of repute, to demand to see an open set of similar construction before purchasing, and to use, as far as is possible, their judgment in determining that they get value for their money.

Every set sold should bear the name of a recognised manufacturer. He has, as a rule, too much at stake to permit his reputation to suffer by turning out poorly built sets. The amateur "expert" has, unfortunately, no reputation to lose. By reputation is meant, not a name for a good knowledge of radio, but one for the ability to turn out a workmanlike job. I have recently inspected several sets "so called," which were falling to pieces even before they were sold.

Finally, it behoves the dealers and traders, if they desire, as one naturally expects they do, to keep alive the newly awakened interest in radio, to do everything they can to provide well built receiving sets which will work as well after a few months, or years, as they do when new.

Yours faithfully,
EXPERIMENTER.

NOVEL IDEAS AND INVENTIONS.

REDUCING THE ERRORS OF D.F. APPARATUS.

When the waves from a radio transmitting station are reflected by the upper layers of the atmosphere, it is frequently found that there is a change in the apparent direction of the transmitter as observed by a receiving station. This

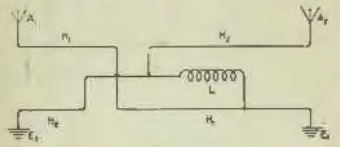


Fig. 1.

effect is the greatest when the radiation from the transmitter has a component of the electrical force which is inclined to vertical. The horizontal component of electric force when reflected, and subsequently recombined with the vertical force produces an effect on the D.F. receiver which can only be neutralised by inclining the loop to the true direction of the station. Thus the indicated bearing becomes in error. Apart from natural causes which may so distort the wave from the transmitter that a horizontal component appears, the shape of the transmitting aerial is of importance in this connection. Only the truly vertical part of the aerial can radiate a wave having the electric force vertical, and any horizontal part of the aerial—such as the top part of an inverted "L" aerial—will cause the radiation of the undesired component.

In the case where two or more spaced aerials are employed to give a transmission directional in a particular plane, the connecting wires between the transmitting apparatus and the vertical parts of the aerial may cause the undesired radiation unless they are arranged so that the external fields are neutralised. One way of overcoming this defect is sketched in Fig. 1. In this diagram A1 and A2 are the vertical parts of two spaced aerials, while the coil L indicates the position of the transmitting apparat-

us. The horizontal connections between L and the two aerials are arranged double as sketched, so that the aerial A1 is earthed at E1 under the aerial A2, while A2 is similarly earthed under A1. Thus the effects of the currents in the horizontal part H1 is neutralised by those due to the oppositely flowing currents in the horizontal part H2.

SLIDING CONTACTS FOR TUNING INDUCTANCES.

The changes in tuning brought about by the uncertain and variable connection made to tuning coils by sliders rubbing on to their turns, are too well known to need emphasis here. These troublesome effects are usually due not so much to defective electrical contact as to the fact that the slider not only makes contact with one turn, but with two or more—the turns under it being short-circuited. The short-circuiting of one or more turns on a coil causes a large change in its effective inductance, and so adversely affects the case of tuning. If, however, the sliding contact is constructed of two parts—one insulating and one conducting—some at least of these disadvantages can be overcome. The insulating portion provides the mechanical support for the conducting part, and if made of proper size, prevents the metallic portion of the slider from touching more than one turn at a time. The advantages of a very narrow slider contact are thus secured without the disadvantages that would arise

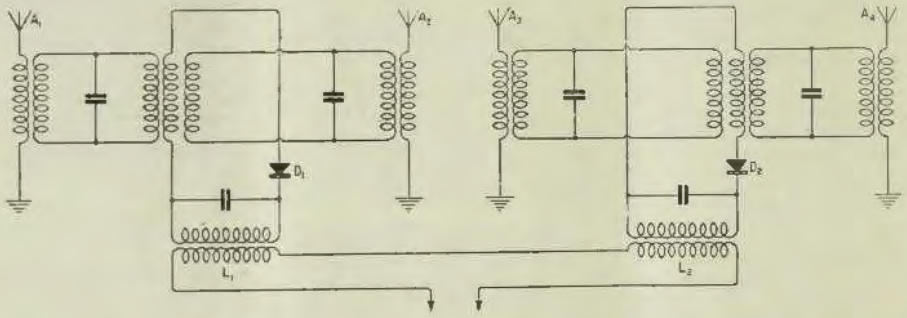


Fig. 2.

from its use due to the difficulty of preventing it catching in the turns of wire while moving it along the coil.

ANOTHER SCHEME FOR REDUCING INTERFERENCE DUE TO ATMOSPHERICS.

Most of the methods that have been proposed from time to time for eliminating the effects of atmospheries by balancing out the atmospheric "signals" from two aerials, one of which is tuned to the signal and the other detuned, do not work out in practice owing to the phase difference between the two impulses preventing a proper balance.

The growth in the use of C.W. has brought increased familiarity with beat effects between two oscillations of nearly the same wavelength, and by an application of this principle to the problems of interference reduction the prospect of a greater measure of success is increased. A proposed scheme consists in the use of four aerials, A1, A2, A3, and A4 (Fig. 2), one only A1, being tuned to the frequency of the desired signals. The second, third and fourth aerials are detuned from the signal frequency, the tunings being so adjusted that the frequency difference between A1 and A2 is exactly the same as that between A3 and A4. The tuned circuits associated with each of the aerials must have low decrements, so that oscillations due to atmospheric and other disturbances will tend to persist.

Thus if the frequency difference between A1 and A2 is suitable, beats will be set up in the rectifier circuit D1; and beats of similar frequency will likewise be set up in the second rectifier circuit D2, since the frequency difference between A3 and A4 is the same as that between A1 and A2.

These two beat currents being of identical frequency and phase can be cancelled out in the common detector circuit L1 and L2.

Thus a signal, since it affects one aerial only, will get through to the detector, whereas an atmospheric will not get through since it impulses all the aerials equally.

GRID LEAKS.

With a view to obtaining constancy in the resistance value of grid leaks and similar resistances used with valve circuits, it has been proposed to construct the resistance material in the form of a cotton thread impregnated with a solution of coppered sulphate. The thread is enclosed in a glass tube provided with contact caps of the conventional type at its ends. For mechanical protection the glass may be enclosed in an external fibre tube.

SIMULTANEOUS TRANSMISSION AND RECEPTION.

Simultaneous transmission and reception of C.W. signals may be effected by using two aerials — one for the transmitter and one for the receiver — using slightly different wave lengths for the transmissions in opposite directions. These two wave lengths should be so chosen that the two waves heterodyne each other, thus eliminating the need for a separate heterodyne arrangement at the receiver. The transmitter is arranged to be continuously in operation so that it can heterodyne the received signals at all times.

INDIAN UNBELIEVERS.

At Sturgeon Lake, miles out in Northern Canada, under the Northern Lights, a few white men entertained a number of Indians with a radio set.

The redskins were unusually appreciative, especially of the jazz items, which were being broadcasted from a cabaret; but also entirely sceptical, flatly refusing to acknowledge such a thing as radio.

Two chiefs listened-in, then listened gravely to the post factor at Sturgeon Lake's detailed explanation, but shook their heads at the finish, and grunted "Wi-Fa-Koo" (crazy). Sturgeon Lake is an isolated bit of territory, a log house or two, and many Indian trappers form its main street. Few visitors lose themselves there, it is mainly a trading post for trappers. The wireless installation belongs to a factor and mail driver, and the inhabitants are now nightly entertained with news and musical programmes from many of the principal broadcasting stations.

NOT BEFORE IT WAS NEEDED.

A new microphone, or pick-up device, has been patented and tried out at Schenectady, N.Y., which will markedly improve loud-speakers. Piano solos have always been a source of trouble to their would-be reproducers, both via gramophone or phonograph and radio. The blows of the little hammers, a negligible sound originally, are usually magnified to an unpleasant extent, whilst the musical quality and overtures sound comparatively weak in proportion when reproduced mechanically. The trouble lies, of course, in the microphone. A perceptible hiss is usually noticeable, besides a kind of blasting effect should the artiste be a little too fortissimo for the microphone.

SIMPLE, BUT EFFECTIVE.

The new device is magnetically operated with a coil system pivoted between the poles. The central magnet is fastened to the piano frame, and the magnetic coil to the sound-board. The arrangement automatically converts the tones of the piano into the correct electric currents, which, in their turn, operate the radio transmitter. The tinkling sound, usually a feature of broadcasted pianoforte solos, or even gramophone records, is eliminated entirely, and singing tones, overtones and hammer-blows assume their correct proportions.

ROUND THE RADIO WORLD. HOW DOTH THE LITTLE BUSY—

Radio is undoubtedly the most progressive of all sciences. No radiophan is satisfied to take things as he finds them, or even leave them there. Experimenting is the greater part of the attraction, and the experienced radio scientist, and the veriest tyro with his home-made crystal set, are one in their desire to alter and improve. The last couple of months have seen several large stations close down for a while to rebuild or improve their plants. In Chicago, U.S.A., stations WMAQ and WDAP have made drastic alterations to their studios, and replaced their former apparatus with more up-to-date devices. The holiday months are the best for purposes like these, for then audiences diminish a little in numbers.

PROFESSOR RADIO, SWIMMING INSTRUCTOR.

Many correspondence colleges claim to be able to teach everything by post. Everything includes swimming, but the latest and most approved method is by wireless. The method has already been tested and found entirely successful in America. A class of young boys assembled at the pool, and the instructor, speaking from station WLW, explained the art, and gave very clear and detailed directions. His orders were promptly obeyed, and the practical value of them

demonstrated on the spot. The youngsters enjoyed the novelty of it, and there is no doubt that experiments of this kind on a larger scale would be equally successful.

THE RADIO TOUCH.

Will Shakespeare must be wriggling uneasily in his grave these days, shuddering at the thought of what modern improvers will do to his "Merchant of Venice." For a New York hypnotist has just discovered that the flow of blood in a person's body can be arrested via radio, thus making it possible to perform operations without bloodshed. Therefore the famous trial scene will have to be revised and brought down to date. Antonio's fate will hold no terror for him, and Shylock's nose will be quite out of joint. Experimenting with a young fellow in Brooklyn, New York, a hypnotist succeeded in getting him under complete control by radio. A series of experiments were conducted.

COMPACT TWO-VALVE RECEIVER

Continued from page 7

oscillating. Then screw down both condensers together, keeping just on the oscillating point until the carrier wave is heard with maximum modulation—not of necessity with maximum strength.

Then leaving the tuned anode condenser alone, tighten the coupling and alter the secondary condenser until oscillation stops. The position of the secondary condenser is now fixed so long as no alteration is made in the high or low tension volts, the aerial, or the number of telephones in circuit.

Other stations may be tuned in by variation of the coupler and the tuned anode only.

The setting of the tuned anode condenser is constant for any given wave length, and its dial can consequently be marked off in actual wave lengths.

ILLAWARRA RADIO CLUB.

At the 35th meeting, held on the 6th inst., buzzer practice occupied a large part of the evening, in which many participated.

The lecture having lapsed (owing to the lecturer's inability to be present), Mr. Gorman made some remarks as to results he had recently been obtaining in copying American amateurs, many of whom he had logged. It was thus seen that Mr. Gorman, with his efficient set, is still upholding the reputation gained by him in the previous Trans-Pacific Tests, when remarkable results had been achieved at Station 2EC. Mr. Gorman hopes shortly to be transmitting, his set being almost complete.

The question of the club's second annual benefit entertainment came up for discussion, Mr. Cuthbert (President) making several valuable suggestions for consideration by the committee, who are now going into details of organising another club show.

The committee have also of late been giving much attention to the club sets. The receiving set is now undergoing reconstruction, and members should shortly see an efficient working set in the club room, which will fill a long felt want.

The next meeting will be held at the club rooms, 75 Montgomery Street, Kogarah, on Tuesday, 20th November, at 8 p.m. A lecture will be given, and all interested are cordially invited to attend.

The Secretary (Mr. W. D. Graham, 44 Cameron Street, Rockdale) would very much like to hear from any local enthusiasts desirous of joining the Club, and will supply any information concerning same on application.

MOSMAN RADIO CLUB.

The first annual general meeting of the above club was held on Monday, 5th November, in the club rooms, 104 Glover Street, 28 members being present.

Business for the evening was as follows:—

A proposal to hold a radio dance, in aid of the club, in the near future. Adopted. Further arrangements were left over to the committee.

Nomination of Vice-Presidents to the club. Gentlemen nominated were: J. W. Scott-Fell, M.L.A., Esq.; the Mayor of Mosman, Ald. Smith; Basil Cooke, Esq.; A. W. Norton, Esq.

Nomination of Basil Cooke, Esq., as Technical Adviser to the club.

Election of responsible officer to supervise and control the construction of the club's radio set. Mr. Ginger was elected.

Buzzer practice was indulged in during the remainder of the evening, messages being sent and received by members.

Application forms can be had from the Secretary, Mr. Nunn, Medusa Street, Mosman, or from the Publicity Officer, Mr. Hale, 100 Muston Street, Mosman, for admission to the club.

BALMAIN DISTRICT RADIO SOCIETY. 2ZB.

This Society is still forging ahead. Membership roll is steadily increasing, not only in quantity, but also in quality.

The latest member enrolled with first-class radio qualifications, is Mr. Hannan, late Radio Engineer, Commonwealth Polar Expedition, Wireless (Valve Systems) Instructor to A. I. F. abroad.

His lectures and services are much appreciated by all.

The Technical Committee consist of Ex-A.I.F. and Royal Australian Navy wireless men principally, and the lectures and buzzer practices has had good effect upon all members.

Many members being successful in recording Interstate as well as local amateur transmissions by using crystal detector, with one stage L.F. valve amplifier.

Information re activities can be obtained from Mr. F. Riecord, Hon. Sec. (P.T.), 29A Ballast Pt. Road, Balmain.

LEICHHARDT AND DISTRICT RADIO SOCIETY.

A very interesting and instructive lecture was delivered by Mr. A. E. Perrett at the 56th general meeting of members of the Leichhardt and District Radio Society, held at the Club-room, 176 Johnston St., Annandale, on Tuesday, November 13th.

The meeting was very well atten-

ded, and Mr. Perrett chose for the subject of his lecture, "Batteries: their Construction, Use, and Maintennnce." This very important branch of Radio work was very thoroughly dealt with, and members of the Society gained much valuable information thereby. At the conclusion of the lecture, Mr. Perrett was called upon to answer numerous questions relating to his subject, and, after responding to a vote of thanks recorded him by acclamation, expressed a wish to see a big attendance of members at his lecture to be delivered at the I.C.S. rooms on the following Tuesday night, it having been decided that members should assemble there on that occasion, instead of at the Club room as usual.

Inquiries relative to the activities of the Society are welcomed, and should be addressed to the Hon. Secretary, Mr. W. J. Zech, 145 Booth St., Annandale.

CROYDON RADIO CLUB.

On Saturday, November 10th, the Croydon Radio Club enjoyed a visit from Mr. R. C. Marsden (2JM) who talked about the forthcoming exhibition in Sydney Town Hall.

He also interested those present with a very instructive lecture.

To interest the members an examination is given upon lectures with prizes for those who can remember most of what has been lectured on. Mr. Marsden made himself a great favourite, and at the close of the meeting was applauded heartily by all present.

The committee will be pleased to welcome all interested in Radio Science at meetings.

Communications should be addressed to The Hon. Secretary, G. Maxwell Cutts, "Carwell," Highbury St., Croydon.

The club meets regularly every Saturday evening at "Rockleigh," Lang Street, Croydon at 7.30 p.m.

STAFF CHANGES. COASTAL RADIO SERVICE.

Mr. J. Green, radio mechanic, Perth, has been transferred to Darwin Radio.

Mr. R. C. Austin, radio mechanic, Darwin, has been transferred to Perth Radio, on completion of his term of tropical service.

Mr. A. S. Hart, radio-telegraphist, Thursday Island, is being transferred to Sydney.

Mr. C. F. Dale, radio-telegraphist, to be transferred from Sydney Radio to Thursday Island Radio.

The relief staff for Willis Island left Sydney per S.S. "Melusia," on the 7th instant.

The party consisted of Mr. A. G. Kempling (radio-telegraphist in charge); Mr. N. Stockton, (Assistant Radio-telegraphist), and Mr. J. Hogan (meteorological observer).

It is interesting to note that both Messrs. Kempling and Hogan were stationed at Willis Island during last cyclone season, and again volunteered for service during the present season.

WIRELESS INSTITUTE OF AUSTRALIA.

South Australian Division

The monthly meeting of the South Australian Division was held in the Physics Lecture Room at the Adelaide University on Wednesday, November 7th. There was a large attendance of members, Mr. R. B. Caldwell (President) occupied the chair.

The minutes of the previous meeting were read and confirmed.

A letter was read from Mr. Rupert Barker, who has had a vast am-

ount of experience in Radio work all over the world, including two years at Radio Central, New York, which is the most powerful station in the world.

Mr. Barker offered to give a lecture at some future date on the working of a real high power system Mr. Barker's offer was received with enthusiasm and he will be requested to give us the benefit of experiences in the near future.

A letter was received from the Chief Manager of Telegraphs and Wireless, stating that several experimenters have been jamming VIA with their transmitters, and requesting experimenters to do all in their power to avoid interference.

It was decided that a special meeting of the Council and transmitting license holders be held to deal with the matter.

Two applicants for membership were admitted, and four new applications received.

A copy of the annual balance sheet was submitted by the treasurer, and accepted.

The Librarian stated that on and after November 19th, the library would be open at Mr. G. A. Miller Randle's dental surgeries, Randle St., Adelaide, at 7 p.m. on Fridays, and from 7.30 to 8 p.m. on the night of the monthly meetings.

It was unanimously decided that the proprietors of the Australasian Wireless Review be requested to make their journal the official organ of this Division, as the magazine now officiating is backed by a certain company who are antagonistic to the experimenter, although they would have us believe otherwise.

A clear and interesting description of a "reflex" receiver, power amplifier and magnavox was given by Mr. L. C. Jones. The reflex receiver contains three valves and a crystal connected to a small loop aerial. A number of musical items were received from 5AH, the experimental station of Mr. Fred Williamson, at Kent Town.

The items were received with marvellous volume, being almost deafening on full power.

The current induced in the small loop aerial used with this set is first amplified at radio frequency by the three valves and then rectified by the crystal. The audio frequency currents are then transferred to the second and third valves and again amplified at audio frequency.

The set thus has the efficiency of an ordinary six-valve receiver.

The crystal rectifier is used because it gives much clearer signals than a valve, particularly in the reception of speech and music.

The music and voice received clearly demonstrated the efficiency of the set.

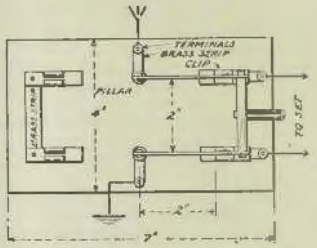
Mr. Jones thanked Professor Kerr Grant for the loan of several batteries which were used with the set.

A hearty vote of thanks was accorded Mr. Jones for his excellent demonstration.

An Earthing Switch

Though there is probably little risk of an aerial being actually struck by lightning, it may become charged to a very high potential in stormy and changeable weather unless a connection direct to earth is provided. If the set is left connected up it may be seriously damaged in such circumstances.

To be on the safe side, it is as well to provide an efficient earthing switch. The word "efficient" is important, for one often sees arrangements that really afford no protection at all. One of these consists of a single-pole knife switch connected across the aerial and earth terminals of the set. Such an affair provides no more than a shunt, and would not prevent some of the unwanted charge from reaching the set.



A double-pole earthing switch.

To be effective, a switch must disconnect the set altogether. For this purpose nothing is better than a large double-pole double-throw switch wired as shown in Fig. 6.

The switch is made up on an ebonite basement measuring 7in.

by 4 in. The pillars for the arms (Fig. 7) are made from 1 in. lengths of 3-8 in. round brass rod. A hacksaw cut ½ in. deep is made in each, a 4B.A. clearance hole being drilled through the rod from side to side to take the bolt which forms the pivot of the arm. A 4B.A. hole is drilled and tapped in the bottom

Dimensions of the clips.

of the pillar for the screw which secures it to the ebonite base.

The clips are of springy sheet brass. Fig. 8 shows the way in which they are cut out with the shears, and subsequently bent into their final shape.

The arms are also made of sheet brass their dimensions being length, 3 in.; width, ½ in. They are secured by means of 4B.A. screws to the bridge, a strip of ¼ in. ebonite 2 in. long and ½ in. wide. The knob is 1¼ in. length of ½ in. round ebonite rod, secured to the bridge by a 4B.A. screw.

Fig. 6 shows the switch complete. The two clips on the left are connected in series by means of a brass strip. The pillars are connected to terminals for aerial and earth leads by other brass strips. The second pair of clips are secured in place by one screw and one terminal each. These terminals take the wires leading to the set.

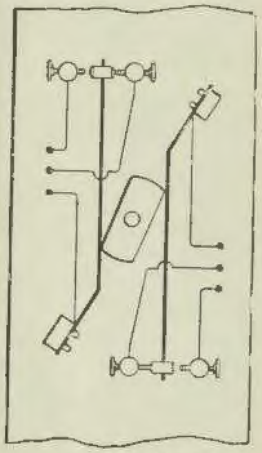
The switch should be mounted on a hard wood shelf, and installed in a handy position outside the window of the room in which the set is kept.

A very desirable refinement consists in the provision of some sort of protection for the switch against rain. This may take the form of a small wooden "pent-house" roof placed immediately above it.

R. W. H.

An Anti-Capacity Switch

Experimenters often wish to have a multi-contact switch of small appearance and size, yet possessing a very low self-capacity, in order to switch in and out of circuit high-frequency stages of amplification. The Dewar pattern of switch, while the neatest obtainable in this country, is not suited for this purpose. A novel type of multi-contact switch which presents



—Details of the switch.

a very neat appearance when fitted to a panel is illustrated here. It may be readily constructed from strips of ¼ in. x 1-16 in. springy brass or phosphor bronze, to the ends of which small blocks carrying short pieces of silver wire may be soldered so as to make good contact. Punch-holes could be made in the strip in lieu of the silver wires, if desired.

A. L. M. D.

A HIGH-TENSION BATTERY FUSE.

Those who have burnt out a valve will appreciate the high-tension battery fuse as a safeguard of the filaments when experimenting with different connections. A piece of ebonite is obtained 2 in. long by 1 in. wide by 1-8 in. thick. Two holes are drilled ¼ in. from each end, and one hole is drilled in the centre. Small bolts are clamped by nuts in the outer holes with washers next to the ebonite.

Under the washer is a narrow ribbon of tinfoil is held. The tinfoil is threaded through the hole in the middle. The reason for threading the ribbon through the hole is so that if the tinfoil melts, it cannot fall across the two terminals. The ribbon of tinfoil should be as narrow as can be conveniently handled. This fuse will "blow" at a very low amperage. It should be mounted on the high-tension battery itself if possible, as there might still be a short behind the fuse.

In the multivalve circuits one of these fuses should be in each high-tension lead. After the fuse has blown a few times the experimenter will feel really grateful that he fitted one. Anyway, it is much cheaper than buying new valves. By experimenting, it is possible to find the correct measurements for a low-tension fuse. It should be remembered that the current-carrying power of the fuse is that of its thinnest part, therefore it is possible and convenient to have substantial end pieces.

R. N. P.

A NON-INDUCTIVE POTENTIOMETER.

Many experimenters do not realise what an improvement a potentiometer makes when it is used to control high-frequency valves or to effect rectification instead of the usual leak.

The materials needed for the following non-inductive potentiometer are: One good quality graphite pencil (H.B.); ten condenser washers (1-8 in.); three terminals; one 8 in. length of ¼ in. square brass rod; two 2 in. lengths of screwed brass rod 2B.A.; one small strip of springy brass or copper, 1 piece of brass 1-32 in. by 1 in. by 1 in.; one small piece of fibre, 1 in. by ¼ in. by ¼ in.; several washers and nuts. The outer casing of the pencil (an H.B.) is removed by boiling in water for a few minutes. As an H.B. pencil has a resistance somewhere in the neighbourhood of 300 ohms, this would be suitable. It should be borne in mind that the harder the graphite the lower the resistance.

Clips to hold down the resistance element are made of copper or brass. A ¼ in. square rod is drilled 1-8 in. from each side to take a 2 in. length of 2B.A. rod. The slider is made by pressing the square inch of brass round the ¼ in. rod. The fit should not be too tight, as the springy strip of brass for the contact is used as a packing between the rod and the slider. The piece of fibre is glued to the top of the slider for a knob. Great care should be taken in handling the graphite resistance element. The springy contact is curled round at the bottom to prevent the edge from scratching the graphite.

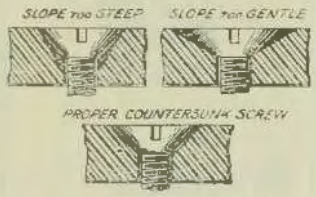
R. N. P.

NEATNESS IN COUNTER-SINKING.

To countersink screws in a panel so that they look neat and have a firm seating is not quite so simple a business as one might think at

first sight. The common method is to select a drill whose diameter is rather larger than that of the screw's head and then drive it into the ebonite until a hollow is made in which the head will lie flush.

The objection to this method is that the angle of the drill point is



—Illustrating correct and incorrect countersinks

very seldom anything like the same as that of the underside of the screw's head. Hence by the time that a hollow has been made into which the screw will fall too much of the material has been removed. A glance at Fig. 7 will show that a screw so fitted has a very poor hold indeed, and that as the nut below it is tightened it will tend to squeeze its way more deeply into the hollow, and when it is tightened hard down it stop will be a little below the surface of the panel. In this case the slope of the drill point is too straight to suit the screw.

Fig 7 also shows what happens if the slope is too gradual. By the time that the hollow is deep enough to allow the screw to lie flush its diameter at the top is too great. Hence there is a small, unsightly gap all round the head between it and the ebonite.

Our last illustration shows a properly countersunk screw. Here the sides of the holow have exactly the right slope. The head bears against them and the screw has a good hold. A screw so fitted will be flush with the surface of the ebonite, and will remain so.

Such perfection can be attained very easily if one cares to use only one make of screw and to grind a special set of drills for countersinking them. But not everyone wants to keep a set of drills that will be rarely used.

A simpler method, if your standard drills do not happen to have exactly the right slope, is to use two different drills for each countersinking operation. The first should have a diameter rather less

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Amateur Wireless Licenses

NEW SOUTH WALES.

Transmitting

Nature of Licence. Call Sign.	Name.	Address.
	Name.	
2 I N	Payne, J.	143 Avoca St., Randwick. T.
2 A Y	Cureton, J. P.	"Narona," Burwood Rd., Burwood. T
2 Z R	Perdrian, W. J. S.	47 East Esplanade, Manly. T.
2 J T	Luckman, C.	14 Queen St., Croydon. T.
2 L D	Schultz, L. N.	"Warraba," Burns' Bay Rd., Lane Cove. T.
2 E D	Gregory, H. R.	"Gerrobar," Walton Crescent, Abbotsford. T.
2 Z T	Bean, L. P. R.	86 Muston St., Mosman. T.
2 Z U	Universal Electric	156 Kurraba Rd., Neutral Bay. T.
2 G U	Dunn, R.	324 Anzac Parade, South Kensington. T.
2 Z V	Universal Electric Co. (A. L. Dixon)	244 Pitt St., Sydney. T.
	The undermentioned has been cancelled:—	
2 I X	Burwood Radio Club	203 Burwood Rd., Burwood. T.
	The following have removed to the addresses indicated:—	
No. 2545	Taplin, H. F.	14 Rocklands Rd., Wollstonecraft. T.
No. 2746	Coles, A. F.	C/o. Mrs. Bamford, Queen St., Campbelltown. T.
No. 1628	Parker, H. R.	5 Campbell St., Paddington. T.
No. 1686	Levy, L. J.	Duntroon St., Hurlstone Park. T.
No. 2193	Chandler, R.	43 Baltic St., Newtown. T.
No. 1492	Tripp, C. J.	Allman St., Campbelltown. T.
No. 965	Anderson, F. W.	"Merton," Penkivil St., Bondi. T.

Receiving

Nature of Licence.	Name.	Address.
V	Alder, S. D.	5 Denning St., Drummoyne. R.
C	Archbold, A.	Gordon Rd., Roseville. R.
C	Abbott, B. J. B.	"Barsham," Blandford. R
V	Alcock, H. M.	Newtown Rd., Bega. R.
C	Anderson, G. W.	"Bearbong," Gilgandra. R.
V	Anderson, J. F.	172 Wollongong Rd., Arncliffe. R.
V	Anderson, J. M.	Wattle St., Punchbowl. R.
V	Ashworth, A.	Wallace St., Willoughby. R.
V	Atkinson, C. H. F.	Pine and Cumberland Rds., Auburn. R.
V	Adams, P.	9 Cremorne Rd., Cremorne Point. R.
C	Andrews, W. C.	44 Rothschild Ave., Rosebery. R.
C	Ackland, A. H.	Macquarie St., Tamworth. R.
C	Aston, J.	Coylton, Sydney. R.
V	Buchanan, D. G.	14a Shadforth St., Mosman. R.
C	Brake, J. W. B.	"Quambie," Denver Rd., Five Dock. R.
C	Boultbee, W. D.	11 Milner St., Sydney. R.
V	Begg, W.	Wauchope. R.
V	Bridgeman, H. G.	1 Myalla Court, Hall St., Bondi. R.
V	Brittain, V.	53 Redmyre Rd., Strathfield. R.
C	Baxter, V. A.	"Cremona," Bromley Ave., Cremorne. R.
C	Bartholomew, R. J.	68 Queen's Rd., Hurstville. R.
V	Beverley, R. S.	31 Winchester Rd., Clovelly. R.
V	Boyd, A. R.	"Bemor," Albyn Rd., Strathfield. R.
V	Boynton, A. W.	"Coolangatta," Victoria Rd., Woollahra. R.
C	Bates, W. L.	53 Arden St., North Coogee. R.
C	Bell, R. A.	31 Woodend St., Marrickville. R.
V	Burgin, R.	Cr. Cheltenham Ave., and Boulevarde, Cheltenham. R.
C	Boggs, L.	Mansfield St., Inverell. R.
C	Bagley, A. A.	Beamish St., Campsie. R.
C	Ballard, F. W.	"Roseville," Copeland Rd., Beecroft. R.
V	Brodie, D. A.	46 Warren Rd., Marrickville. R.

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than that of the screw's head. It is sunk to the full depth of the head. The second, which is larger, is used to enlarge the top of the hollow so that the screw will sink properly into it.

You may be worried when countersinking by the occurrence of "chatter marks." These are caused sure, which causes th edrill to bite usually lby applying too much pres- deeply and tear the ebonite. Should these be present in a countersinfl hollow they can be removed without difficulty. Place a round-headed screw head downwards in the drill stock, grease the head and dip it in knife powder. A few turns of the drill crank will grind out the offending marks.

R. W. H.

Amateur Wireless Licenses (Continued)

V	Brainwood, G. F.	Dochat Ave., North Sydney. R.
V	Burt, S. F.	225 Miller St., North Sydney. R.
C	Ball, A. W.	95 Newington Rd., Marrickville. R.
C	Cambridge, G. P.	44 Park Rd., Hurstville. R.
C	Cawood, G. C.	Ford St., Bellingin. R.
C	Carter, W. C.	Barker College, Hornsby. R.
V	Carver, D. B.	"Ventnor," Ranger's Rd., Neutral Bay. R.
V	Cooper, G. E.	35 Tabrett Street, Banksia. R.
V	Cook, L. H.	10 French St., Kogarah. R.

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