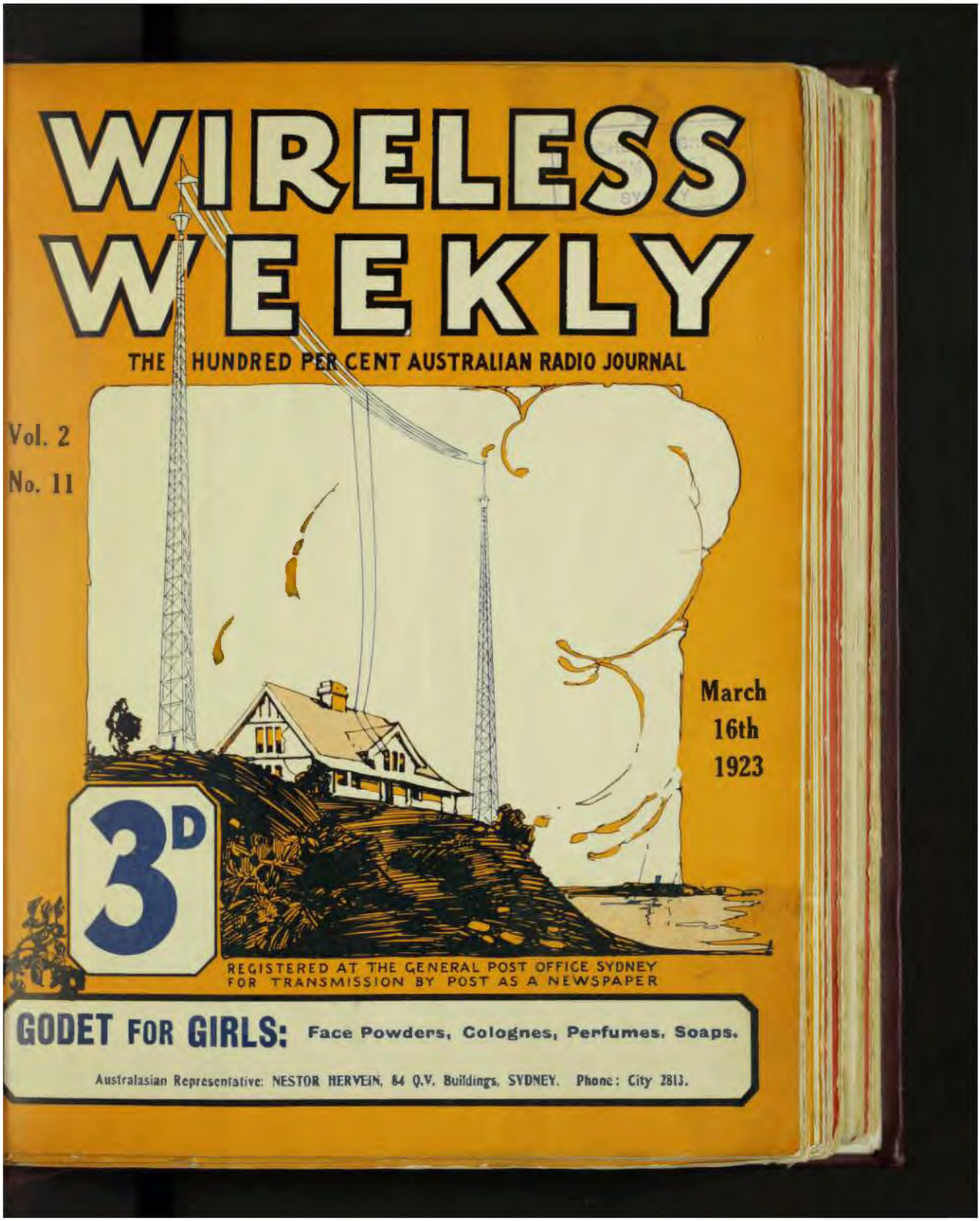

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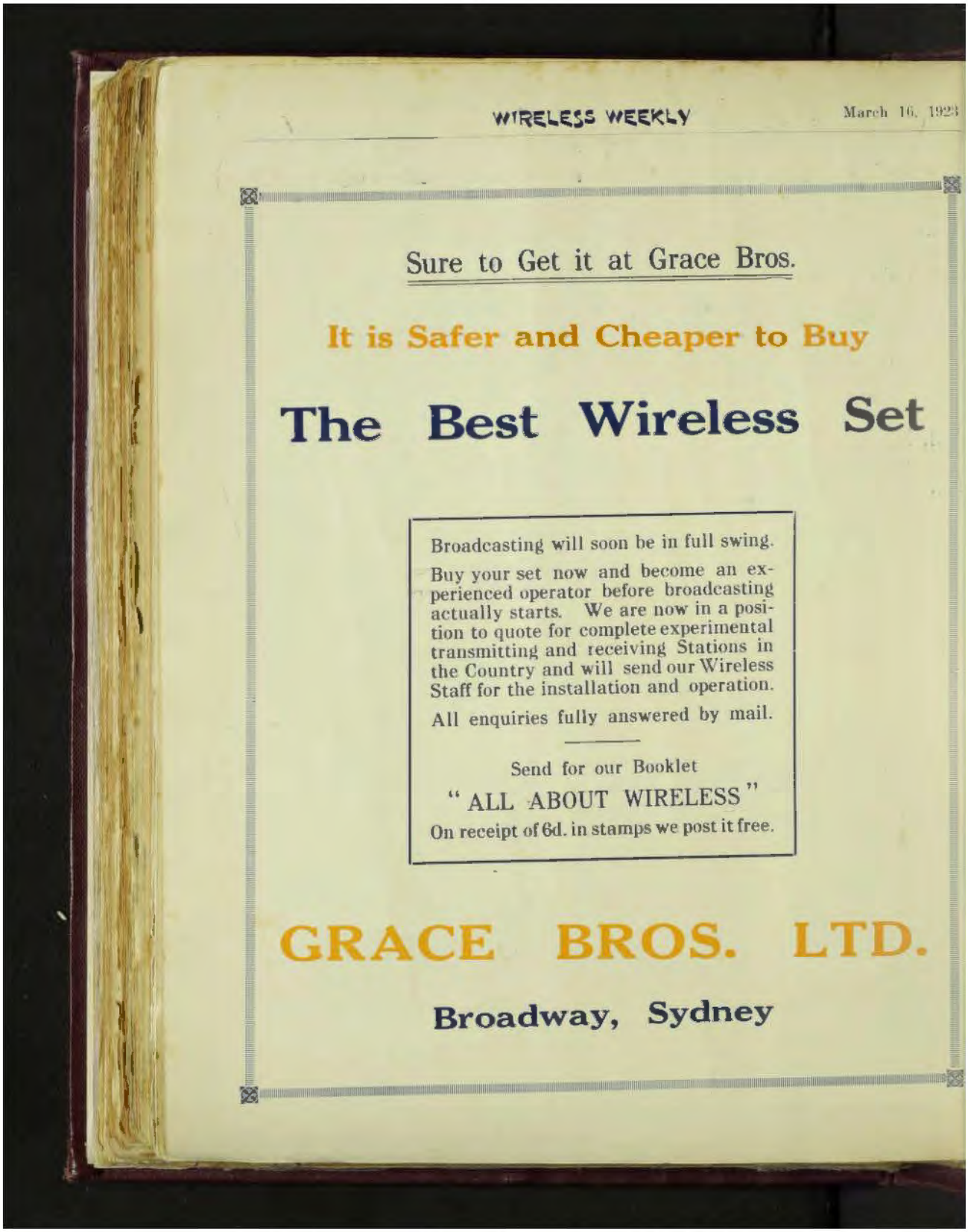

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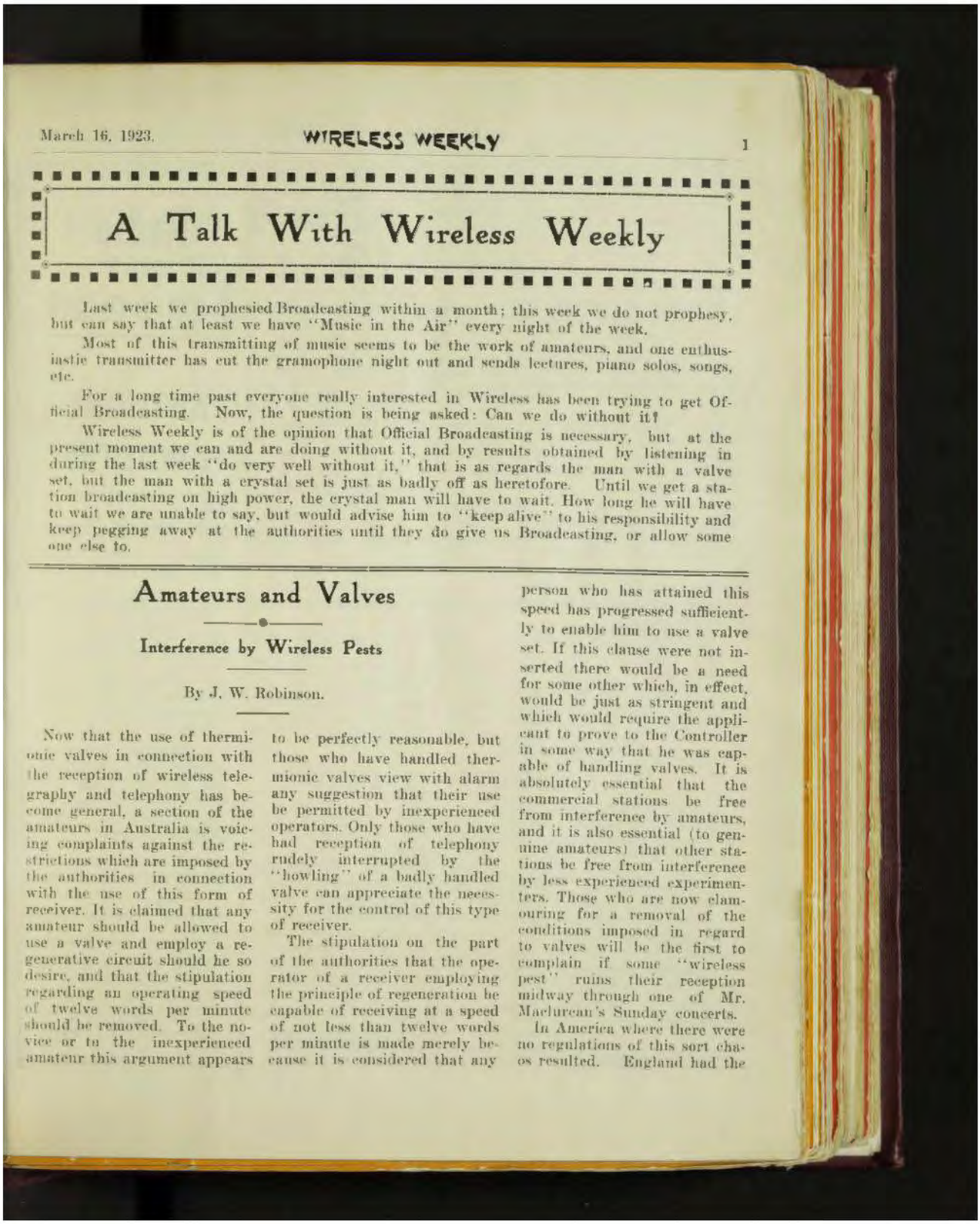

A Talk With Wireless Weekly

Last week we prophesied Broadcasting within a month; this week we do not prophesy, but can say that at least we have "Music in the Air" every night of the week.

Most of this transmitting of music seems to be the work of amateurs, and one enthusiastic transmitter has cut the gramophone right out and sends lectures, piano solos, songs, etc.

For a long time past everyone really interested in Wireless has been trying to get Official Broadcasting. Now, the question is being asked: Can we do without it?

Wireless Weekly is of the opinion that Official Broadcasting is necessary, but at the present moment we can and are doing without it, and by results obtained by listening in during the last week "do very well without it," that is as regards the man with a valve set, but the man with a crystal set is just as badly off as heretofore. Until we get a station broadcasting on high power, the crystal man will have to wait. How long he will have to wait we are unable to say, but would advise him to "keep alive" to his responsibility and keep pegging away at the authorities until they do give us Broadcasting, or allow some one else to.

Amateurs and Valves

Interference by Wireless Pests

By J. W. Robinson.

Now that the use of thermionic valves in connection with the reception of wireless telegraphy and telephony has become general, a section of the amateurs in Australia is voicing complaints against the restrictions which are imposed by the authorities in connection with the use of this form of receiver. It is claimed that any amateur should be allowed to use a valve and employ a regenerative circuit should he so desire, and that the stipulation regarding an operating speed of twelve words per minute should be removed. To the novice or to the inexperienced amateur this argument appears to be perfectly reasonable, but those who have handled thermionic valves view with alarm any suggestion that their use be permitted by inexperienced operators. Only those who have had reception of telephony rudely interrupted by the "howling" of a badly handled valve can appreciate the necessity for the control of this type of receiver.

The stipulation on the part of the authorities that the operator of a receiver employing the principle of regeneration be capable of receiving at a speed of not less than twelve words per minute is made merely because it is considered that any person who has attained this speed has progressed sufficiently to enable him to use a valve set. If this clause were not inserted there would be a need for some other which, in effect, would be just as stringent and which would require the applicant to prove to the Controller in some way that he was capable of handling valves. It is absolutely essential that the commercial stations be free from interference by amateurs, and it is also essential (to genuine amateurs) that other stations be free from interference by less experienced experimenters. Those who are now clamouring for a removal of the conditions imposed in regard to valves will be the first to complain if some "wireless pest" ruins their reception midway through one of Mr. Maclurcan's Sunday concerts.

In America where there were no regulations of this sort chaos resulted. England had the

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experience of America, yet did not profit by it, and now that the radio boom is in full swing in that country much trouble is being experienced by the faulty use of valves. Australian wireless authorities in many cases fully deserve adverse criticism, but in this particular case they are entitled to the thanks of genuine amateurs for the protection they are affording the amateur who has made progress.

While every encouragement and help should be given the beginner, it is to be hoped that there will be no relaxation on the part of the authorities in connecton with the use of valves. The following article which appeared in the London "Morning Post" of January 12 this year gives some idea of the trouble which is at present being experienced in England in this direction:—

"Now that broadcastng has become popular, there is one question that will become more and more acute as the weeks pass: that is how to check the use of reaction in their wireless sets by careless or inexperienced people. During the radiation of the opera performances at Covent Garden this week many people have found their reception of the music marred owing to the disturbances created by the unskilful use of reaction by someone in their neighbourhood. Trouble from this cause is also reported from the Provinces. Take Birmingham, for example. The Broadcasting Station there has shut during the radiation of opera this week by the London Station. Consequently many residents in that district have "listened-in" for Covent Garden. In a great many cases, however, directly they have switched on to the wave-length of 369 metres, nothing could be heard save distressing noises. These were due entirely to people with small receiving sets quite unsuitable for "listening-in" to stations more than 15 to 20 miles away, trying to get the London Station by using reaction. As long as this chaotic state of affairs continues, one of the chief objects of organising wireless broadcasting in this country will remain unattained. The only person who can act in the matter is the Postmaster-General. He has power to cancel sets and licenses, but at the moment no one takes seriously the threat of such action. There is no doubt that the authorities are quite alive to what is happening, and one can safely prophesy that these wireless "pests" will not enjoy the immunity of which they boast at present for many months longer. The number of bona fide broadcast licensees is growing rapidly, and will soon outstrip the experimental licensees, among whom (and the people without a licence) are those responsible for the trouble.

A CONDUCTING CEMENT.

Difficulty is sometimes experienced in obtaining a good electrical contact between a metallic body and a partial conductor, or some substance which cannot be soldered. For example, it is not always easy to obtain a connection to some types of grid leaks or anode resistances. A very good composition may be made from a powdered conductor, such as graphite, together with some binding material, such as gum arabic. The graphite should be as finely divided as possible.

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Continued from Page 2

and it may best be obtained by gently scraping a block of "black lead," such as is used for polishing stoves. A small heap should be scraped on to a piece of wood, upon which the paste is made. Gum arabic is usually sold in small lumps, and this should be dissolved in water until a very thick liquid is obtained. The process is somewhat slow, and it is advisable to dissolve the gum some time before it is to be used. The graphite is worked into a very stiff paste, with a small piece of wood, or an old knife blade, adding the gum drop by drop. The cement will remain in a workable state for several hours, but as soon as it begins to crumble and break, it gives a rather indifferent contact. It is advisable therefore, not to make more than is required for immediate use.

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THE SINE WAVE

By George Sutton, A.M.I.E.E.
in "Modern Wireless."

One does not attend many wireless society meetings before one encounters the lecturer who, to make a point clear, refers to a "pure sine wave." Immediately the mathematician pricks up his ears, the average member tries to look as if he understood and approved, but the elementary member frankly gives it up, and follows the reasoning at a distance, so to speak, and hopes to catch up later on. Now it is essential for an intelligent understanding of many wireless phenomena, that we have a more or less clear view of what underlies harmonic motion, and it is the writer's effort to give an elementary idea of what this means, and how our perfect emission wave is built up upon it.

We will start with an example which is familiar to all, that of the clock pendulum. It requires little consideration to appreciate that when the pendulum is travelling over the space immediately below its point of suspension it is moving at its greatest velocity. This velocity diminishes and dies down to nothing, when the pendulum has reached the end of its excursion, when, immediately after stopping, it reverses its direction of swing. No clock could keep time if the succeeding pendulum swings did not each occupy the same length of time, and normally the length of swing does not vary very much, therefore, it follows that when it passes its centre point it is always moving at the same velocity.

Let us set off, on a straight line, a number of points, say, 26, the distance between each of which shall be the distance travelled over by the pendulum in one twenty-sixth of its swing. At the middle of the line the distance between the points would be greatest, because the pendulum would be there swinging at its greatest speed while near the ends of the lines, the points, would get closer together. From these points set up perpendicular lines which will meet the circumference of a circle to be drawn from the middle of the line, with half the line as radius, and the intersection of these perpendiculars will divide the circumference into equal arcs. This circle, which is shown in Fig. 1, is called the circle of reference of the motion of the pendulum, and nearly all regularly recurrent cycles of operations, like the swing of the pendulum, can be analysed by building up such a circle and studying it.

First of all, the ratio of the circumference to the diameter, about 3.1416, or 3 1-7 plays a part in the solution of these problems. But in what manner is all this going to help us? First of all, we built up the circle of reference, and now we make use of this circle to study the sine wave form. Imagine a point circulating at a uniform known speed. Its position at any moment may be determined by this method. In one case, by calculating what point it has reached on the circle, and, in the other, chiefly used mathematically, by calculating where

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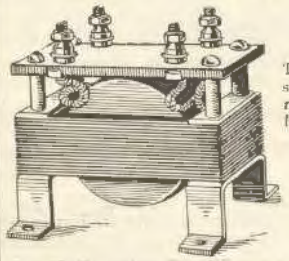

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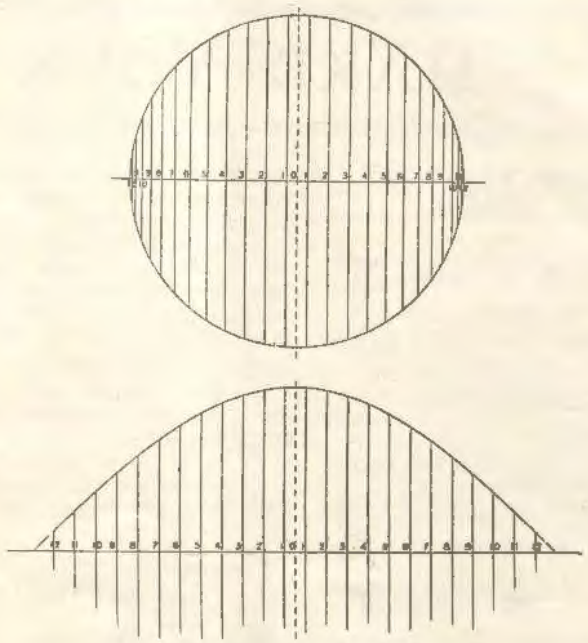
its trace or shadow would be on the horizontal line.

Thus with regard, to the clock, the pendulum would have a movement to the right, followed by a movement to the left. With regard to a ribbon of paper, moving uniformly under the clock from left to right, the trace or shadow might appear to move twice as fast at one time as it actually did, followed by a dead standstill, or even an apparent reversal. If the ribbon of paper were moved in a line at right angles to the path of the motion of the pendulum, the trace of the pendulum bob would be a sine wave curve, and it is this curve which is most studied when we are considering oscillations of current set up in a wireless circuit.

Let us get back again to our first example. The equidistant points on the circumference of the circle when projected down on to the horizontal diameter, though they represent, when on the circumference, equal intervals of time, as the moving particle taking that path is supposed to be travelling at a uniform rate of speed, yet they are crowded together at the ends of the line as the motion of the pendulum which we were plotting was slower there. But, take the projection of the longest distance between two points on the horizontal line and step off this distance on a new horizontal, and now this new line represents the passage of time and not the path of a swinging pendulum.

From the first figure, transfer the heights of the perpendiculars to those similarly numbered, but equidistant on the new line, and the ends of these lines will now make points in a sine wave curve, and the rate of change of the slope of the curve will at any point represent the change of velocity of the moving particle whose motion we are studying. It is obvious that this kind of analysis could not be studied at the rate of reversal of the alternating electric light current of 50 cycles per second, still less with a 300 metre wireless wave of 1,000,000 cycles per second, but there are means of getting a trace of what really takes place in that time, and then, like the slowing down of a film at the cinema, put the thing through very slowly and study it at our leisure. The sine wave we have built up is a "pure sine wave," that is, it portrays only the fundamental vibration of whatever kind of harmonic motion we are studying.



The formation of a Sine Wave

It is possible, however, with many recurring harmonic oscillations to have a more complex form of cyclic motion. Suppose, for example, our pendulum in swinging had also a "wobble," such as is often the case with clock pendulums, it would be necessary, if making a detailed study, to take into account this wobble, and the curve would have to show the periodic tremor which this parasitic disturbance caused. Indeed, this is just the office of harmonic analysis, as this study is called, to find out first of all if a tremor is taking place; in the second place to trace its cause, and then, if desired, to arrange for its prevention or removal.

When, however, we come to study a musical instrument emitting a note, we find that the

(Continued on page 14)

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MAKE YOUR OWN

HOME MADE LOUD SPEAKER.

By E. Carnutt.

Material Necessary.

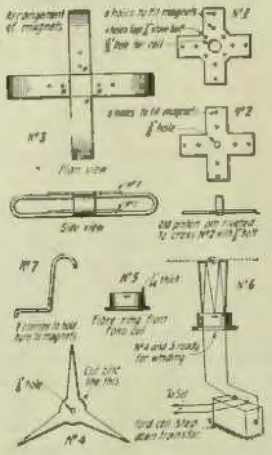
12 stove bolts, 3/16 x ¾ of an inch, flat head.
1 phonograph horn.
4 stove bolts 3/16 x 1½ inch, round head.
1 stove bolt 1/8 x ½ of an inch round head.
1 carriage bolt 3/8 x 3½ inches.
4 magnets from old magneto.
1 Ford spark coil.
Piston pin ¾ x 3 inches.
Part of old disc phonograph record.
Scrap of zinc 3½ x 3½ inches.
Auto horn with diaphragm about 4½ inches in diameter.
2 pieces of iron 6½ x 6½ x 3/16 inches thick.
33 feet of No. 36 enamelled wire.

Procedure.

The main frame consists of two crosses, No. 1 and No. 2 in diagram, made from two 6½ x 6½ x 3/16 inch pieces of sheet iron. Four holes are drilled and tapped to receive the four 1½ x 3/16 inch stove bolts so that the horn and diaphragm can be adjusted. One 15/16 inch hole is drilled in the centre to receive the coil mounting. Eight holes are drilled to match holes in the magnets to receive the 3/16 x ¾ of an inch stove bolts.

No. 2 has eight holes drilled in it to match those in the magnets and a 3/8 of an inch hole in the centre in which is inserted a 3/8 of an inch bolt 3¼ inches long which passes through the hollow piston pin and is riveted fast to the same. This forms the south pole of the four magnets and the 15/16 of an inch hole in No. 1 forms the north pole.

The four magnets and the two crosses are assembled, the piston pin from the south pole to be in the centre of the 15/16 inch hole in No. 1 when assembled. The four magnets are arranged as in No. 3.



No. 2 is bolted on the bottom, inside, and cross No. 1 is bolted on the top, outside, using the 3/16 x ¾ of an inch stove bolts.

Dismantle the auto horn, remove all the works, and cut out with a chisel in under plate that held the diaphragm, a hole about 2 inches in diameter. Cut from the old phonograph record a disc small enough to fit inside of the screws and to take the place of the old diaphragm.

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Bore a 1-8in. hole in the centre. Take a block of wood as large as the disc, drive a brad in the centre and place the disc on this and rub on sandpaper until disc is as thin as No. 20 gauge iron. Put this in place of the old diaphragm and reassemble the horn.

Completed Loud Speaker

A three-legged clip is made as shown in No. 4 to hold the moving coil against the diaphragm.

Take off the vibrator from the Ford coil, lift the small fibre ring that surrounds the wire coil, put back the vibrator and screw the points down tight. This coil will be the step-down transformer for the loud-talker.

File the fibre ring as in No. 5 and with point of a knife make three little slots to receive the points of No. 4. File the inside of the ring to fit loosely over the piston pin. After No. 4 and 5 are assembled, as in No. 6, wind on 33 feet of No. 36 enamelled wire and shellac, leaving about 6 inches for leads which are attached to the binding posts.

After No. 6 has been wound, it is fastened to the diaphragm with the 1-8 x ½ inch stove bolt and the auto horn and coil are set on the four 1½ x 3/16 inch bolts and the coil is slipped over the piston pin. Then the phonograph horn is fastened to the auto horn with the two clamps, No. 7.

The moving coil is adjusted so that the top of the wire of the winding is just a little higher than the top of the piston pin.

The loud speaker may be hung on the wall and a straight phonograph horn used, or it may be set on the table and used as shown in the photograph.

This will make a loud-talker that is almost as loud as a commercial one, and requires no battery. With a two-step amplifier, the signals can be heard across the street very plainly.

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OUR RADIO YARN :: THE RESCUE :: By W.M.

The junior wireless operator of the Central Pacific Company's Station at Copernik Island in the Mid-Pacific, lay back in his chair listening to the roar of the storm.

"Jolly dull life this," he observed laconically to the one and only clerk that the company kept on the island.

Tom Mackey assented moodily.

"That's just it, Dicky, old son," he said, "just the same old monotonous work, day in and day out. You've only been out here a little over a year; and even though the Dad is a director of the company, I've been stuck out here in this God-forsaken hole for over three. Always the same old routine, the same dirty natives —nothing at all to liven things up."

Suddenly a familiar sound came to the ears of the operator. Starting up, Dick Heath pulled his ear-pieces into position. Then snatching up his pencil he scribbled out the message:—

"—S.O.S. - - - S.O.S. - - - s.s Copernicus - - - cargo of copra ablaze - - - can't keep afloat long - - - "

"- - - s.s. Copernicus - - - send location - - -" Dick tapped.

"- - - 18 knots, S. 20 deg. W. - - - Copernik Island - - - hurry - - - no more steam - - - Hurry as we can't - - - -" and the message faded away.

The young operator realised that something must be done, and done quickly. The ship at least could receive messages, but could not reply.

Dick briefly explained the situation.

"Well," said Tom. "Seeing as we are the only two whites on the island this week, now that the Boss is away, I guess it is up to one of us to risk it, and try and get those fellows off the boat. You can't leave the station here, so I guess it is up to yours truly to get the launch to the poor beggars."

"There's a heavy sea running to-night, you know," cautioned Dick, but Tom realised what had to be done and was determined to do it.

"Tell them I'll try and get the launch out to them," he said, pulling on his oilskins. The transmitter was already in action as he slammed the door behind him.

Tom almost flew down to the jetty, to which, luckily, the company's launch was tied. It took him but a few moments to cast off, take a flying leap into the launch, and start the engine.

It was exceptionally rough weather, even for the South Seas, the waves were constantly dashing right over the little craft and many times she was in imminent danger of being completely overwhelmed. But she was powerfully built, and despite the weather Mackey succeeded in urging ten knots out of her.

Doggedly he clung to the wheel, determined to do or die, and at the same time offered up a silent prayer that God would give him strength to win through. About an hour and a half later, he caught sight of a glowing red spot in the distance. He swung the prow in the direction of the light, and twenty minutes later he was within 500 yards of the burning ship. It seemed to be just one mass of flame when suddenly, without the slightest warning, her bow reared upward and, in a mass of hissing steam, the vessel sank beneath the waves.

Tom's heart sank as he gazed upon the awe-inspiring spectacle. For probably half a minute he stood there thunderstruck, when the sudden darkness seemed suddenly to galvanise him into action. He immediately switched on the searchlight, and played it across the water. Almost at once the beam seemed to light upon what seemed to be a lifeboat. Turning the launch in the direction of the object and keeping the searchlight trained upon it, it soon became apparent that his surmise was correct. There were men on board. With great difficulty he drew the launch alongside, and a figure clambered aboard. Tom had all his attention so fixed in keeping the two boats sufficiently close together for the men to get on to the launch that he had no opportunity. Of the five men who were taken aboard, three appeared to be

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in a state of collapse, and on the homeward journey the remaining two were doing all they could to render first-aid.

The little craft raced before the gale, and after what seemed an eternity to the lad the Copernik light was sighted. At length, rescuer and rescued, stood upon the jetty. The captain came up to Tom.

"My boy," he said, putting out his hand, "I don't know how to thank you. We had one of the directors with us this trip too, and he will surely— Why, here he is now."

A cry for mutual recognition broke from them.

"Father," cried the boy.

"Tom, my boy," said the director.

Next day Thomas Mackey (sen.) was talking to his son.

"Tom," he said, 'I came here just on a surprise visit to you, and you, by your heroism saved not only my own life, but also the lives of the crew of the Copernicus.

"I'd like to do the right thing by you and your pal with the radio. We are going to have a new high powered radio station erected at 'Frisco, and your pal can rest assured that he will have the running of it. You are coming back to Sydney with me on the next boat for a good long holiday—you need it. And, after that, I will put it up to the board of directors to give you the 'Frisco managership. How would that do you?"

"Do me? Too true, Dad."

KNOW YOUR LOUD-SPEAKER.

The ideal loud-speaker has not yet been developed; but a few types on the market give admirable results when handled properly. These instruments fall in two general classes—those using auxiliary current, known as "electrodynamic loud-speakers," and those that merely employ sensitive phone receivers attached to the horn, perhaps the more popular method.

In using the phone receiver loud-speaker bear in mind that if the current from the receiver is passed through the magnet coils of the loud-speaker in the wrong direction, they will become demagnetised, reducing the efficiency of the instrument. It is important, therefore, to determine the polarity of the coils as well as of ordinary head telephones. Many manufacturers are now marking telephone cords so that no mistake can be made.

If, by mistake, the speaker is wrongly connected, and its magnet demagnetised, the situation may be remedied by carefully reversing leads to the receiver and then passing more than the usual amount of current for a considerable time until molecules of the iron magnet re-arrange themselves and reconvert the metal back to a permanent magnet. A loud-speaker will not function properly unless the output of the radio receiver is of good quality; hence tuning is of prime importance.

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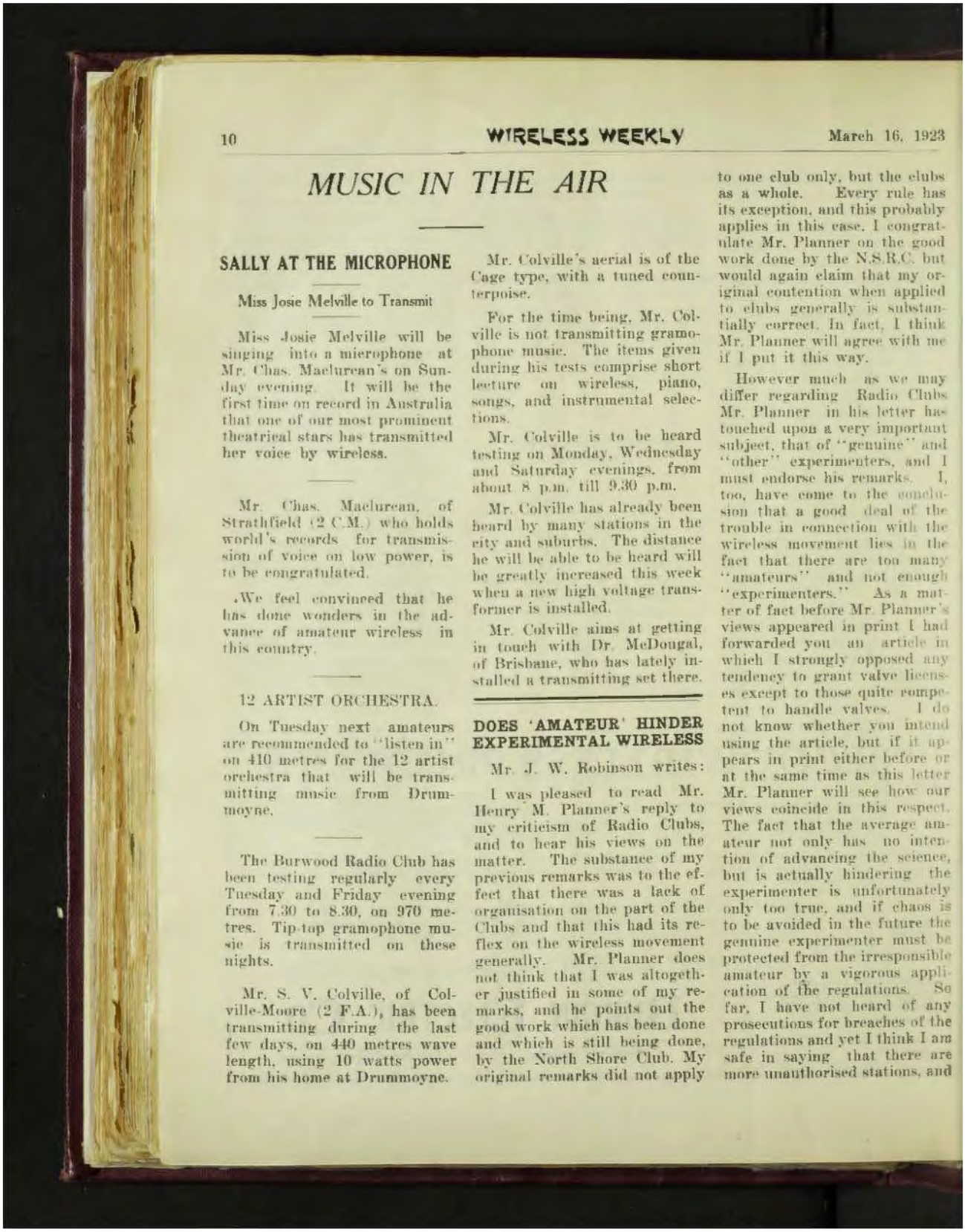

MUSIC IN THE AIR

SALLY AT THE MICROPHONE

Miss Josie Melville to Transmit

Miss Josie Melville will be singing into a microphone at Mr. Chas. Maclurean's on Sunday evening. It will be the first time on record in Australia that one of our most prominent theatrical stars has transmitted her voice by wireless.

Mr. Chas. Maclurean, of Strathfield (2 C.M.) who holds world's records for transmission of voice on low power, is to be congratulated.

We feel convinced that he has done wonders in the advance of amateur wireless in this country.

12 ARTIST ORCHESTRA.

On Tuesday next amateurs are recommended to "listen in" on 410 metres for the 12 artist orchestra that will be transmitting music from Drummoyne.

The Burwood Radio Club has been testing regularly every Tuesday and Friday evening from 7.30 to 8.30, on 970 metres. Tip-top gramophone music is transmitted on these nights.

Mr. S. V. Colville, of Colville-Moore (2 F.A.), has been transmitting during the last few days, on 440 metres wave length, using 10 watts power from his home at Drummoyne.

Mr. Colville's aerial is of the Cage type, with a tuned counterpoise.

For the time being, Mr. Colville is not transmitting gramophone music. The items given during his tests comprise short lecture on wireless, piano, songs, and instrumental selections.

Mr. Colville is to be heard testing on Monday, Wednesday and Saturday evenings, from about 8 p.m. till 9.30 p.m.

Mr. Colville has already been heard by many stations in the city and suburbs. The distance he will be able to be heard will be greatly increased this week when a new high voltage transformer is installed.

Mr. Colville aims at getting in touch with Dr. McDougal, of Brisbane, who has lately installed a transmitting set there.

DOES 'AMATEUR' HINDER EXPERIMENTAL WIRELESS

Mr. J. W. Robinson writes:

I was pleased to read Mr. Henry M. Planner's reply to my criticism of Radio Clubs, and to hear his views on the matter. The substance of my previous remarks was to the effect that there was a lack of organisation on the part of the Clubs and that this had its reflex on the wireless movement generally. Mr. Planner does not think that I was altogether justified in some of my remarks, and he points out the good work which has been done and which is still being done, by the North Shore Club. My original remarks did not apply to one club only, but the clubs as a whole. Every rule has its exception, and this probably applies in this case. I congratulate Mr. Planner on the good work done by the N.S.R.C. but would again claim that my original contention when applied to clubs generally is substantially correct. In fact, I think Mr. Planner will agree with me if I put it this way.

However much as we may differ regarding Radio Clubs Mr. Planner in his letter has touched upon a very important subject, that of "genuine" and "other" experimenters, and I must endorse his remarks. I, too, have come to the conclusion that a good deal of the trouble in connection with the wireless movement lies in the fact that there are too many "amateurs" and not enough "experimenters." As a matter of fact before Mr. Planner's views appeared in print I had forwarded you an article in which I strongly opposed any tendency to grant valve licenses except to those quite competent to handle valves. I do not know whether you intend using the article, but if it appears in print either before or at the same time as this letter Mr. Planner will see how our views coincide in this respect. The fact that the average amateur not only has no intention of advancing the science, but is actually hindering the experimenter is unfortunately only too true, and if chaos is to be avoided in the future the genuine experimenter must be protected from the irresponsible amateur by a vigorous application of the regulations. So far, I have not heard of any prosecutions for breaches of the regulations and yet I think I am safe in saying that there are more unauthorised stations, and

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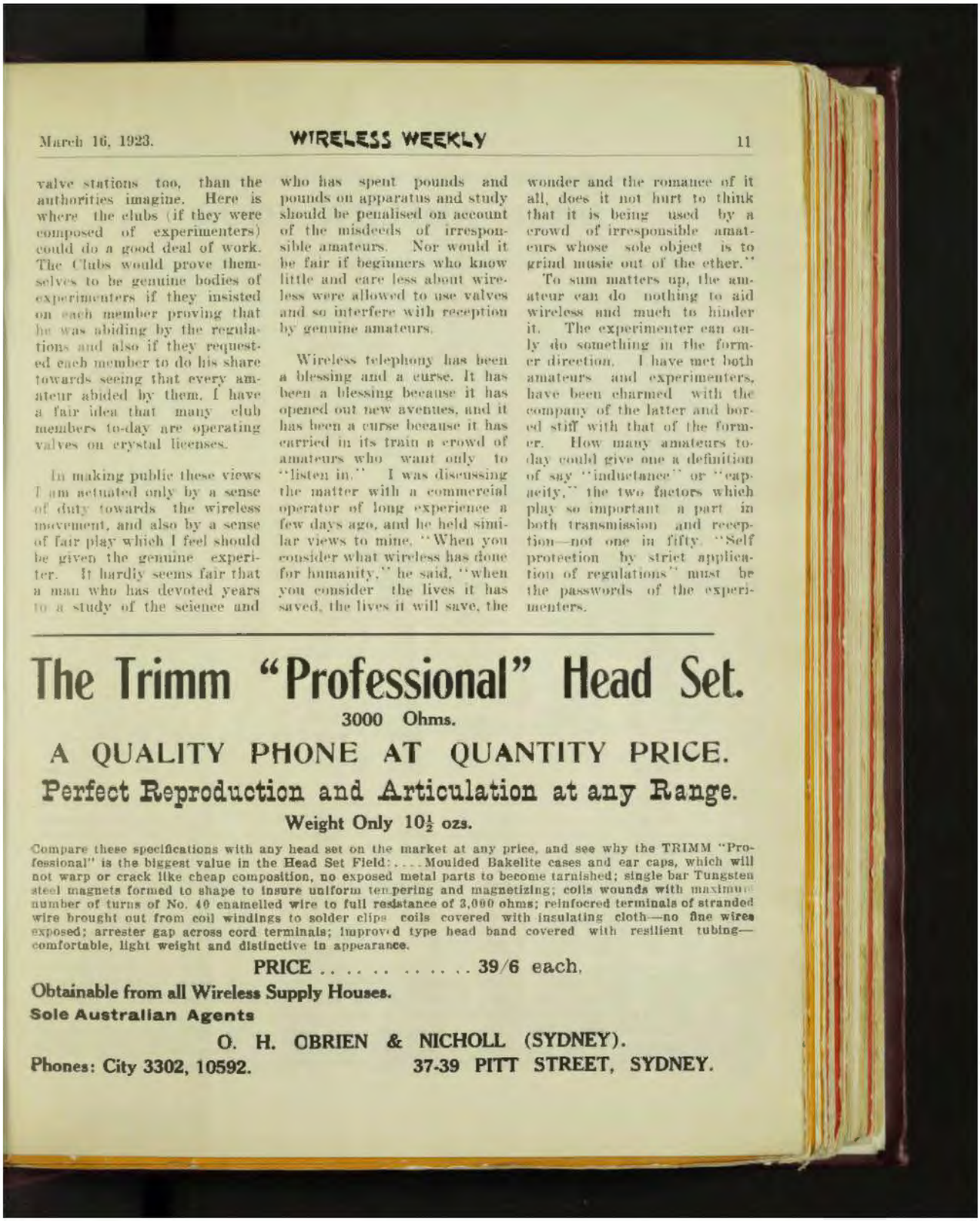

valve stations too, than the authorities imagine. Here is where the clubs (if they were composed of experimenters) could do a good deal of work. The Clubs would prove themselves to be genuine bodies of experimenters if they insisted on each member proving that he was abiding by the regulations and also if they requested each member to do his share towards seeing that every amateur abided by them. I have a fair idea that many club members to-day are operating valves on crystal licenses.

In making public these views I am actuated only by a sense of duty towards the wireless movement, and also by a sense of fair play which I feel should be given the genuine experiter. It hardly seems fair that a man who has devoted years to a study of the science and who has spent pounds and pounds on apparatus and study should be penalised on account of the misdeeds of irresponsible amateurs. Nor would it be fair if beginners who know little and care less about wireless were allowed to use valves and so interfere with reception by genuine amateurs.

Wireless telephony has been a blessing and a curse. It has been a blessing because it has opened out new avenues, and it has been a curse because it has carried in its train a crowd of amateurs who want only to "listen in." I was discussing the matter with a commercial operator of long experience a few days ago, and he held similar views to mine. "When you consider what wireless has done for humanity," he said, "when you consider the lives it has saved, the lives it will save, the wonder and the romance of it all, does it not hurt to think that it is being used by a crowd of irresponsible amateurs whose sole object is to grind music out of the ether."

To sum matters up, the amateur can do nothing to aid wireless and much to hinder it. The experimenter can only do something in the former direction. I have met both amateurs and experimenters, have been charmed with the company of the latter and bored stiff with that of the former. How many amateurs today could give one a definition of say "inductance" or "capacity," the two factors which play so important a part in both transmission and reception—not one in fifty. "Self protection by strict application of regulations" must be the passwords of the experimenters.

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DUAL AMPLIFICATION

(BY P.G.A.H.V.)

Although many amateurs know that one valve can be made to do the work of two by making it amplify the radio and audio frequencies simultaneously, there are few amateurs who know how to do it, and still fewer who use their valves in this manner.

The principles involved are simple, and the resulting circuits need not be more complicated than the corresponding circuits using one valve for each stage. As a detector for weak telephony, the writer always uses treated galena. This crystal has many fancy names. Mostly ending in "ite" and the synthetic variety has a granular appearance. It should be used in a detector in which the moving part is small and very light. For preference, two detectors should be used with a switch, so that they can be set by comparison with one another.

In order that a valve may amplify both HF and LF, it is necessary to superimpose the HF on the LF in the grid circuit.

Fig. 1 gives a diagram of the connections. The LF input is derived from the secondary of a transformer when a valve detector or crystal requiring a polarising current is used, but if a crystal not requiring a potentiometer is used, the LF input may be taken direct from the blocking condenser in the crystal circuit.

The best way of superimposing the HF is by means of a coil coupled to the aerial, but a direct connection to the aerial circuit itself may be used.

A small condenser across the LF input will generally be necessary to keep the filament and the lower end of HF input at the same HF potential.

The HF voltage is applied to an ordinary HF amplifier by direct connection to grid and

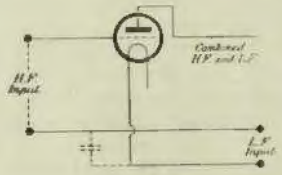

Fig. 1

filament. In these dual circuits the connection to the filament is opened, and a condenser is inserted. This condenser has a very small impedance to HF currents, and as far as they are concerned, it is as good as a direct connection.

In an ordinary LF amplifier the LF voltage is applied by direct connection to grid and filament; in these circuits the connection to grid is broken, and a coil whose LF impedence is negligible is inserted. The LF input terminals are also shunted by a condenser which will make little difference to the LF efficiency providing it is not too big (say .001 F.).

The valve now amplifies both HF and LF. If more than one valve is to be used for dual amplification, couplings capable of dealing with both frequencies must be used. The simplest coupling is the resistance — capacity — resistance coupling, but for LF and short wave-lengths, this coupling is not so good as transformers specially designed for the purpose.

The best dual intervalve coupling consists, therefore, of a tuned HF transformer and an iron core LF transformer, both in series. If the windings of the LF transformers do not have sufficient capacity to by-pass the HF currents, they should be shunted by small condensers. About .002 F for the Primary and .001 F for the secondary is generally ample.

The methods of applying the dual voltage to the first valve and passing it on to the next, when more than one is used, have been described. It now remains to describe how the H F is selected from the LF in the plate circuit of the last valve.

One method of doing this is to put another HF transformer in series with the phones, which should be shunted by a by-pass condenser. The secondary of the HF transformer can then be connected to the crystal detector and its blocking condenser.

Fig. 2 gives a single valve dual circuit and crystal detector as described above. It will be seen that it is not more complicated than an ordinary 1 valve HF, crystal and 1 valve LF circuit.

In the circuit shown the batteries are not connected to earth. This is sometimes a disadvantage near lighting mains, because the batteries will pick up the hum, and it will be audible in the phones.

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If it is desired to earth the batteries, the best way is to use as HF input, not the aerial coil itself, but a coil coupled to the ATI. If the coil is loosely coupled, it will have to be tuned, but if it is tightly coupled, this will not be necessary.

Magnetic reaction can be obtained by coupling the plate coil to the aerial coil. With some designs of transformers this is not easily done, and then capacity reaction, which is equally efficient and generally more convenient, should be employed.

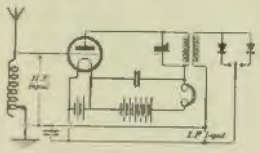

Fig. 2

To get capacity reaction, either the HF transformer or the aerial coupling coil must be connected so as to reverse the voltage. A very small variable condenser (.00005 F maximum value) should then be connected across the valve and either the HF transformer or the aerial coil so that there is the amplification and reversal due to the valve, and one other reversal of voltage between the points to which the reaction condenser is connected.

The use of a tuned coupling between valve and crystal brings in an adjustment which can be eliminated at the expense of selectivity by using an aperiodic coupling whose efficiency as valve to crystal coupling is very high, even on short waves. Such an aperiodic coupling is similar to a resistance—capacity—resistance coupling, with the resistances replaced by HF chokes. The size of these chokes depends on the maximum wave-length required, and if they are basket coils about 4 in. external and 1½in. internal diameter wound with 600 turns of 42 SWG wire, they will work well up to 3,000 metres. The two chokes should be coupled together so that the magnetic coupling assists the capacity coupling.

No difficulties should be experienced when working one or two valve dual and crystal circuits below 5,000 metres, but to use 3 valve dual is not so simple for the following reasons.

With three stages of HF, the H F current through the crystal becomes so great that there is a HF ripple on the voltage across the blocking condenser. This ripple being in the grid circuit of the first valve, easily causes sufficient reaction to make the whole circuit oscillate.

With three stages of LF, the LF current is so great that some of it easily passed on to the detector by the HF coupling, and being passed through to the first grid circuit, causes the whole set to howl.

For simplicity it is therefore not advisable to use three valves

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The Sine Wave

(Continued from page 5)

characteristic tone or timbre depends on the purity or complexity of its sound wave formation. For example, the flute note is very pure, while the violin note is very complex. Purity in this case does not necessarily mean pleasantness, for one is sooner tired of the note of the flute than of the violin, for the very reason that they are relatively pure and complex. Analogous with this is the fact that a pure primary colour does not appeal to the artistic taste as does a mixed or modified tint. With wireless, we want a pure sine wave when we are sending Continuous Wave telegraphy, but the harmonies emanating from our big stations indicate that their emission is by no means so pure as to be perfect.

The timing of a blow is closely associated with harmonic motion. Any cricket or tennis player will know what is meant by perfect timing. It is not enough to hit the ball. To get the best effect it must be hit at a certain instant. In cricket, for example, the ball must be hit when it is at such a spot in the air that the forward swinging bat shall present its face at such a perpendicular and horizontal angle as to place the ball on its rebound just where the batsman desires it should go.

A little reflection will show that this timing has to be done very closely. In harmonic motion this manipulation has not to be done once now and again, but every time the phase of motion recurs at, we will say, the one millionth part of a second, and the importance of the study will now perhaps be manifest, particularly in the incidence and effect of the harmonies with relation to the fundamental. In our diagram of a sine wave curve it may be that it is spread out laterally much more than usual, but one has only to set the ordinates or equidistantly placed vertical lines closer together to obtain the dimensions of the curve as usually drawn. It should be noticed that if the time by this means is made to appear to pass more rapidly the slope of the curve is also changing in exactly the same proportion, and this is a property of the sine curve, which, expressed mathematically, is the ratio of the perpendicular to the hypotenuse.

(Continued from page 13)

as dual amplifiers, but to use the third as a simple note magnifier in the usual way.

When using these circuits with reaction for weak telephony, it is advisable to connect the crystal (cat whisker towards the grid), so that the rectified current makes the first grid positive. This introduces grid current and makes the whole circuit very stable, it being possible to eliminate overlap completely. With loud telephony, the carrier wave after detection makes the first grid so positive that it is extremely difficult to get to oscillation point, thus making it very difficult to cause interference with broadcasting and other loud stations.

If the crystal connections are reversed, it makes the grid negative and with loud stations the efficiency is greater, but it is easier to oscillate and cause interference. Fortunately, however, with the crystal reversed the circuit instead of oscillating often buzzes near oscillation point, and thus gives warning of what is happening.

On a 100ft. aerial in London 2LO owing to the limiting action of the dual valve and crystal circuit is hardly any louder than with a single valve detector circuit. PCGG, however, just audible with the single valve detector, is audible in the loud speaker with single valve dual and crystal.

RADIO AND CENTRAL STATIONS.

At the recent New England convention of the New England division of the National Electric Lamp Association, T. Johnson, Jr., of the General Electric Company, pointed out that the use of separate antennae gives better results in radio telephony than the development of utility distribution circuits for reception of waves by owners of modern sets for use with broadcasting station service. Broadcasting over central-station mains is as yet comparatively undeveloped. Recent carrier-current experiments have used frequencies up to 20,000 cycles but if these are employed on circuits having gaps, secrecy is lost at the gaps. Four carrier-current sets of the 50-watt size will soon be installed for central-station service in New England, according to Mr. Johnson. Carrier-current equipment is now available for use on lines as long as 85 miles with no intervening tie-in. Each tie-in reduces the range of transmission by about 10 miles because of reflection. Apparatus is being developed for 260 mile transmission, using a 250-watt transmitter. For straight radio telephony in central-station service with a range of 50 miles upward the antennae should be from 175 feet to 200 feet high and about 200 feet long.

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THE LEICHHARDT AND DISTRICTS RADIO SOCIETY

The members of the above Society held their 20th general meeting at the Victory Hall, Annandale on Tuesday, 6th instant. The minutes of the previous February meetings were read and confirmed. Six new members were admitted, making a total membership of 34. There being no lecture set down, the first half of the evening was spent at buzzer practice. Later on a discussion was entered into with reference to the club's new aerial which it is hoped to have erected within a fortnight. It will be a 60 ft. long converted L, about 50ft. high. Several members have promised to donate or lend material for the erection. The club's orchestra is progressing well. It consists of a piano, violin, cornet, banjo, ukulele and two mandolin-banjos. With hard practice we hope to be able to hold a ladies' night in the near future.

During the absence of Mr. Zech, who is on vacation, all enquiries will be gladly received by Mr. Fred Thompson, Hon. Sec. (pro tem), 12 Pearson St., Balmain East.

TELEPHONY FROM NEW ZEALAND.

A New Zealand Experimental Station is sending out telephony and telegraphy every Monday and Friday evening, between the hours of 7.30 and 9.30 p.m., and sometimes up to 10 p.m. New Zealand time, which would be about 6 p.m. to 8 p.m. Sydney time. The wave-length is 270 metres and the power used is 15 Watts. Mr. Mingay of the Burgin Electric Co., would be pleased to hear from any amateurs and experimenters who may be fortunate enough to pick this station up.

SIGNALLERS FOR LIGHT HORSE REGIMENT.

Lieut. Mingay, who is Signalling Officer to the 1st Light Horse Regiment (N.S.W. Lancers) would be pleased to receive applications from those desirous of volunteering for service with the signalling section of this regiment. Candidates must possess knowledge of the Morse Code up to about 8 words a minute and also must be able to provide a horse for the mounted parades which are held about every 4th Saturday afternoon and at the annual camp for one week. This should be a golden opportunity for amateurs and experimenters to gain considerable knowledge in regard to wireless in addition to being in a mounted regiment with such traditions as that possessed by the N.S.W. Lancers. Lieut. Mingay is desirous of having the whole of the signalling section of volunteers and he will provide as much instruction as possible in signalling generally and in wireless.

The Burgin Electric Co. advise that they are now in receipt of a large supply of Mullard Valves, which are especially suitable for high frequency amplification. Others for audio frequency amplification, detectors, transmitting valves for 20 and 30 watts, etc. These valves are as made and used by the Navy, and have a reputation second to none. In the recent tests between America and England, a Mullard valve won the prize of having received the first signals from the American amateurs. Their cost and the low voltage to work is rather a good point with these valves.

FORMATION OF A WIRELESS CLUB AT BONDI.

Persons interested in the formation of a Wireless Club at Bondi are requested to be in attendance at 276 Birrell St. (between Ocean and Watson Streets), at 8 p.m. on Tuesday, 20th March, 1923. Address any communications to A. Callaway, Esq., 33 Ocean Street South, Bondi.

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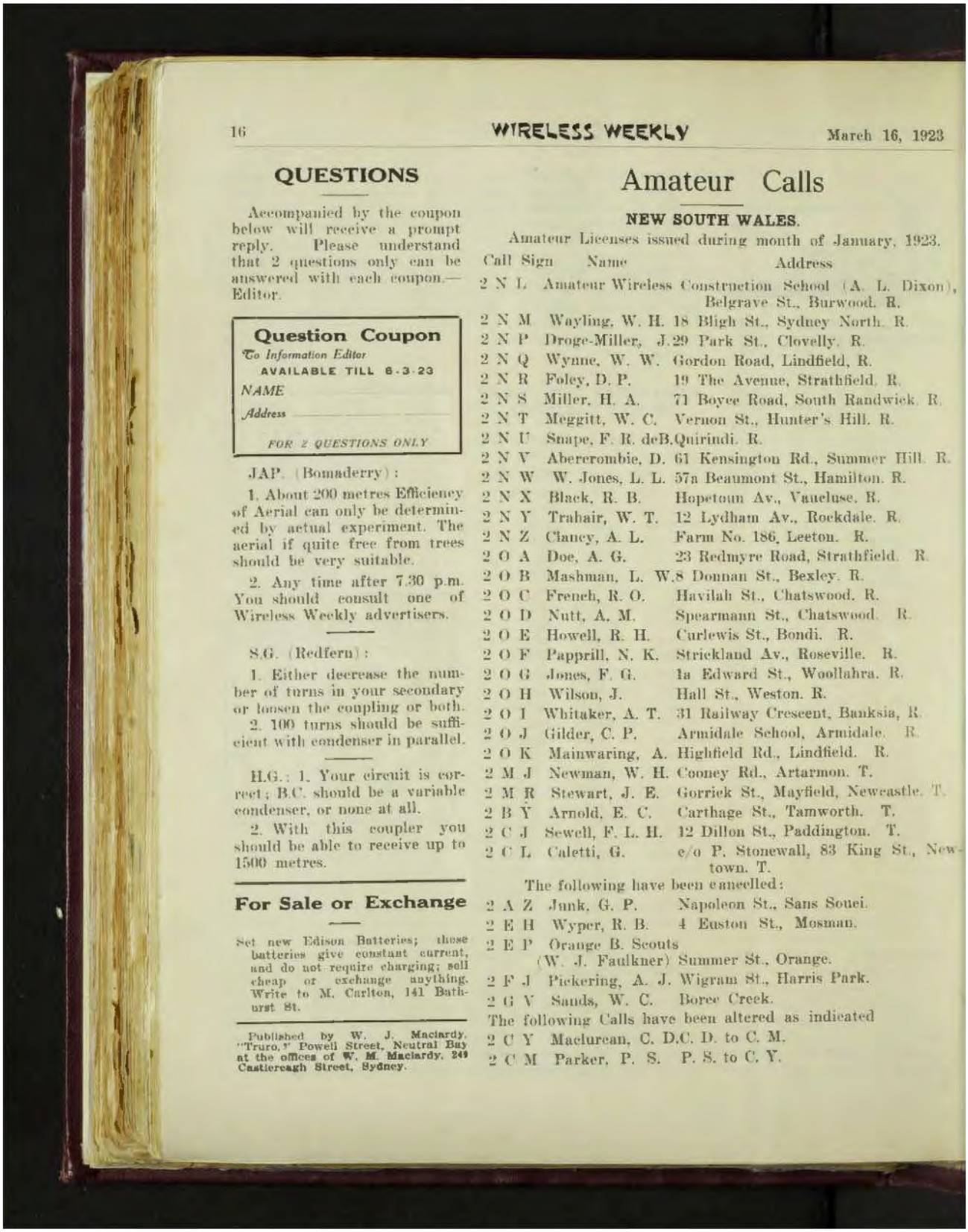

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Call Sign	Name	Address
2 N L	Amateur Wireless Construction School (A. L. Dixon),	Belgrave St., Burwood. R.
2 N M	Wayling, W. H.	18 Bligh St., Sydney North. R.
2 N P	Droge-Miller, J.	29 Park St., Clovelly. R.
2 N Q	Wynne, W. W.	Gordon Road, Lindfield, R.
2 N R	Foley, D. P.	19 The Avenue, Strathfield. R.
2 N S	Miller, H. A.	71 Boyce Road, South Randwick. R.
2 N T	Meggitt, W. C.	Vernon St., Hunter's Hill. R.
2 N U	Snape, F. R. deB.	Quirindi. R.
2 N V	Abercrombie, D.	61 Kensington Rd., Summer Hill. R.
2 N W	W. Jones, L. L.	57a Beaumont St., Hamilton. R.
2 N X	Black, R. B.	Hopetoun Av., Vaucluse. R.
2 N Y	Trahair, W. T.	12 Lydham Av., Rockdale. R.
2 N Z	Clancy, A. L.	Farm No. 186, Leeton. R.
2 O A	Doe, A. G.	23 Redmyre Road, Strathfield. R.
2 O B	Mashman, L. W.	8 Donnan St., Bexley. R.
2 O C	French, R. O.	Havilah St., Chatswood. R.
2 O D	Nutt, A. M.	Spearmann St., Chatswood. R.
2 O E	Howell, R. H.	Curlewis St., Bondi. R.
2 O F	Papprill, N. K.	Strickland Av., Roseville. R.
2 O G	Jones, F. G.	1a Edward St., Woollahra. R.
2 O H	Wilson, J.	Hall St., Weston. R.
2 O I	Whitaker, A. T.	31 Railway Crescent, Banksia, R.
2 O J	Gilder, C. P.	Armidale School, Armidale. R.
2 O K	Mainwaring, A.	Highfield Rd., Lindfield. R.
2 M J	Newman, W. H.	Cooney Rd., Artarmon. T.
2 M R	Stewart, J. E.	Gorrick St., Mayfield, Newcastle. T.
2 B Y	Arnold, E. C.	Carthage St., Tamworth. T.
2 C J	Sewell, F. L. H.	12 Dillon St., Paddington. T.
2 C L	Caletti, G.	c/o P. Stonewall, 83 King St., Newtown. T.

The following have been cancelled:

2 A Z	Junk, G. P.	Napoleon St., Sans Souci.
2 E H	Wyper, R. B.	4 Euston St., Mosman.
2 E P	Orange B. Scouts (W. J. Faulkner)	Summer St., Orange.
2 F J	Pickering, A. J.	Wigram St., Harris Park.
2 G V	Sands, W. C.	Boree Creek.

The following Calls have been altered as indicated

2 C Y	Maclurcan, C. D.	C. D. to C. M.
2 C M	Parker, P. S.	P. S. to C. Y.

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