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WORLD

ILLUSTRATED

EVERY WEEK



(C. Kadel and Herbert)

All roads leading to camps, bungalows and beaches are crowded with radio equipped vacationists. Some cannot wait until they arrive to "listen in." Miss Peggy Stohl is one of the latter, and has "hooked it onto a star" while the garage man is hurrying along with some gas.

VALUABLE INFORMATION ON PATENTS AND PATENT LAW (See Inside)

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Warning from Our Technical Editor

LETTERS galore have come to RADIO WORLD asking questions, making statements, and wild ones at that, regarding circuit diagrams published. Every one of them shows just one thing: Readers do not read the instructions carefully. They simply glance at the circuit, glance at the text matter, and then "fly off the handle."

This is especially true in the case of the more complex circuits, such as the multi-tube reflex circuits, and the super-regenerative, or other multi-tube circuits. All the letters show that the writer has not intelligently read the article, and therefore has misconstrued some detail or entirely missed the whole thing, with the result that he thinks he has a complaint to register.

If people who are going to construct sets only look at the diagrams without reading the text relative to it they cannot possibly meet with success. An architect can follow blue prints of a building if there are footnotes and measurements. Otherwise he will be just looking at a lot of white lines on a blue background. The same applies to radio sets. And also take into consideration the fact that the architect has studied his business and understands it.

If you have never made your own set before (and many letters state that, decidedly and disgustedly) don't pick out some multi-tube reflex, or super-heterodyne to start on. The instructions in the text and the diagrams are all thoroughly clear to one who has had a little experience, but you would not expect a man who has been fixing Fords to be able to fix his 17-jewel watch with a pair of gas pliers. This is exactly the status of the man who has never constructed a set when he tries to make his own super or reflex. And then, to back the bargain up, he never even makes a serious attempt to understand what he is doing, but glances at the instructions, and if he can't understand something he lets it go and starts in anyway.

In the construction of these complex sets there are many little details that have to be taken into consideration. They may appear minor at first glance, but when you think that even the *tiniest variation* from the standard will cause the circuit to be inoperative you will at least understand why it is so utterly impossible for you to do anything unless you *absolutely follow every instruction* .

Circuits have been worked out by experts, using apparatus that is capable of registering a micro-micro-ampere, and then when you go and disturb the balance of these fine adjustments by changing some minor looking connection, or connecting the wrong lead in some place, you should not expect results.

This article is not meant as a brake on the man who has a working knowledge of radio because he generally understands what he is attempting or at least has a definite reason for doing it, but when a man who has never made his own set tries to change the entire plan of things by working out some clever idea of his own, and then runs into trouble and blames the writer or the diagram, it is time to warn our readers to read the instructions *intelligently* , and follow them to the last inch.

In printing offices the rule is "Follow copy, even if it goes out the window!" That is a good rule in this case. If you follow directions absolutely and the set doesn't work then you have legitimate cause for complaint and criticism, and a real reason for asking questions.



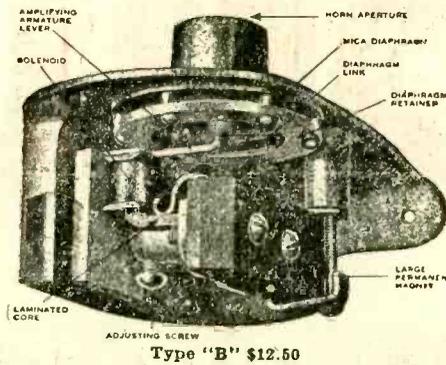
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TYPE "A1"

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21-in. Fiber Horn

The only device of its kind in the Radio field



Study the illustration carefully and you will understand why it produces full, clear, natural tones with perfect reproduction of all vocal and instrumental music. May be used with phonograph. No storage battery required.

The Trinity Loud Speaker is an instrument that combines the best qualities of a phonograph reproducer in combination with electro magnetic principles best fitted for radio amplification. Absolutely perfect reproduction of all music and speech without distortion. The volume may be regulated from that required for a room in your home to a tremendous output that can be heard hundreds of feet out of doors by simply increasing "B" battery voltage. No storage batteries required. The instrument is of a heavy duty type and is guaranteed fully by the manufacturers.

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RADIO IN A CANOE
WITH NO AERIAL

RADIO AT THE HOTEL
AND NO ANTENNA

RADIO ANYWHERE
GOOD-BYE AERIALS

NO MORE LANDLORD'S OBJECTIONS

The Pezet One Tube Completely Portable Set Works Well Anywhere Without Aerial

(No Loops, No Plugs for Light Sockets, No Radio Frequency)

Read what the Radio papers say: Radio Globe of April 28, page 3, said: "RADIO IN MINIATURE. REMARKABLE RECEIVER. WORKS WITHOUT AERIAL." Radio World of June 16, page 9, said: "IT HAS BEEN DEMONSTRATED, AND EXCEPTIONALLY CLEAR RECEPTION RECORDED. . . THROWING A WIRE TO THE WATER IN A LAKE OR CLIPPING IT TO THE FOLIAGE OF A TREE. EXCEPTIONAL SHARP TUNING, GREAT SELECTIVITY. . . THE ESSENCE OF PORTABILITY."

This set has been praised by most of the radio papers. Come to my place and hear it. Complete instructions to make it cost \$1.00. Cabinet and all parts (no phones, tube or dry cells) are \$16.00. Federal phones, W.D. tube, A and B dry cells, \$12.80. Get all that and make your set in a few hours, and then take it to your friend's house, or to the mountains, or up in an aeroplane, or down in a submarine. Demonstrate it anywhere and be always proud of it. It's small, neat and light. Carry it always with you.

THIS IS THE YEAR 1924 SET—GET AHEAD OF THE TIMES.

I AM READY TO SUPPLY YOU WITH INSTRUCTIONS AND ALL PARTS. IF YOU CANNOT CALL, SEND ME AN ORDER AND YOU WILL RECEIVE EVERYTHING BY PARCEL POST, C. O. D. (Detector tube at buyer's risk).

GOOD-BYE, LIGHTNING ARRESTER!

ADIEU, RADIO TROUBLES!

C. A. PEZET, 46 West 65th Street, New York City
CALL EVENINGS.

VOLUME THREE OF
RADIO WORLD

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A Canadian "Hot Dog" Receiver

By A. D. Turnbull

ABOUT this time of year many experimenters and amateurs are trying to find some way in which to simplify their one tube sets so that they can conveniently pack them into suitcases and take them along "amidst purling streams and woodland dells."

As the single circuit sets seem to have it over the tuned circuit sets in the matter of portability as well as volume, I have tried to devise some method whereby extreme selectivity as well as portability could be combined in the same set. The circuit shown herewith is about all that could be asked for in the way of a single tube regenerative set. A good point about this circuit is that there is only one control, the variometer, as once the antenna condenser is set, there is no more fooling around with it and all the tuning is done with the variometer. With this point in view, it is best to provide some means of vernier control, such as a small dial button for the variometer, as the tuning is extremely sharp, sometimes two stations coming in on one division, and a very slight turn of the variometer either way tuning one in to maximum and the other out.

The apparatus needed for this set, exclusive of the panel and box, which I will leave for the builder to plan, as he knows his own needs best, and can get more fun out of it if he plans his own panel layout is: 1 variometer; 1 23 plate variable; 2 .00025 mfd. fixed condensers; 1 .00025 mfd. condenser and variable grid leak; 1 .001 mfd. fixed condenser; 1 .005 mfd. fixed condenser; 1 tube (dry cell preferable); 1 rheostat—10 ohm; 1 22½ volt B battery 1 1½ volt A battery.

In purchasing the apparatus, it is imperative that the condenser capacities be strictly adhered to as none others will give the proper results. It is also best to get mica insulated condensers as then you are always sure of the capacity being constant.

When assembling the apparatus it is well to keep in mind that the condensers and variometer should be thoroughly shielded and grounded to the ground post of the set.

The variometer being the main control of the set,

it is best to buy a good standard make of about the same size shown on the diagram, preferably with about 50 turns on both the rotor and stator. If it is not possible to get one of the exact size, the standard make having 40 turns will do, the only difference being that the stations operating on 492 and 509 will not be heard as loud as with the larger size.

When tapping the variometer, make sure that you get the right side. There is generally one connection made on the shaft which serves as a connection to both the rotor and the stator. Make sure therefore when you are hooking your variometer in the circuit which connection is which, as if you reverse them, it will not help your set any.

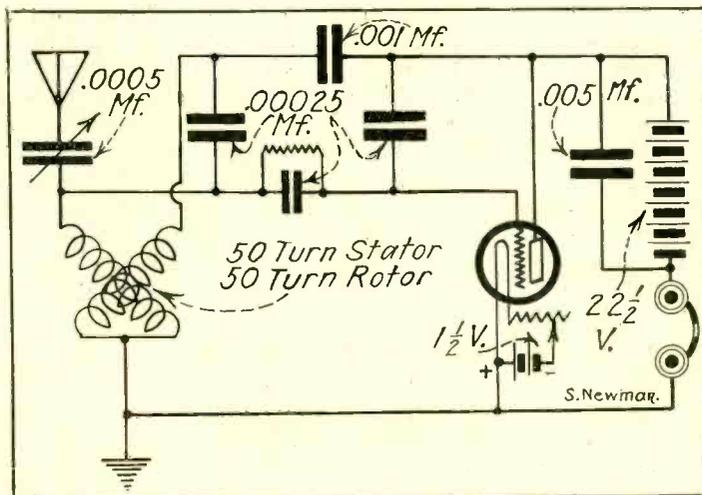
Hooking up the condenser bank, around the grid leak and condenser, can easily be done by putting the three condensers in series, and taking your plate tap off the second one. This will eliminate wiring and make your connections easier and shorter. A word of caution in building this set is to make sure of your insulation. I found to my disappointment when out on a week end tramp, that it is not a good plan to use bare bus wire in connecting up your circuit. There is too much chance of a short circuit or connections crossing. I suggest that the set be wired with light cable such as is used in making drop lights, and running all the connections in bee lines.

A word as to the operation of the set. Make sure of your ground and throw a wire over a tree for an aerial. Then set your

condenser at about 40 and turn your tube up. Turn your variometer slowly until you hear the carrier wave of the station, and tune in between the two squeals and listen to it pound in.

As a few closing words to the skeptics who desire to know just what this little circuit can do in the way of distance I might mention that 50 stations were logged in 24 hours, a few of which are WKAQ 3,000 miles, KFI 3,000 miles, WSB 2,200 miles. They were all copied using just one tube with 22½ volts on the plate.

If care is taken in the making this circuit will pleasantly surprise any one who constructs it.



Something new in "flivver" circuits. Extremely loud signals and sharp tuning are possible, but care should be taken in the construction of the condenser. The .001 condenser can be a variable if it is handy and will give better control of volume. The increase in signal strength will fully warrant the extra expense.

Pitfalls of the Radio Investigator and Inventor

By *Everett N. Curtis*

[*Everett N. Curtis, the author of this article, is the lecturer on patent and trade-mark law at Columbia University and is a patent solicitor in active practice in New York City. He is the author of Curtis' "Manual of the*

Sherman Law" and a number of monographs. He was graduated from the Massachusetts Institute of Technology in 1898 and from the Boston University Law School in 1900.—Editor, RADIO WORLD.]

MANY engaged in radio research and experimental work are the victims of their own lack of knowledge, or of inertia to take pains to acquaint themselves with well known principles underlying the patent law, are prone, when finding themselves in a situation in which their ignorance has led them, to blame the law or some person or persons whom they think have taken advantage of their necessities and caused them to lose valuable patent rights. The purpose of this article is to point out some of these pitfalls of the inventor for which he himself through ignorance is mainly to blame, and to indicate ways and means by which such errors may be avoided.

Generally speaking the inventor is woefully unaware of the importance of keeping records and drawings of his invention and preserving evidence of the earliest date thereof, the dates of disclosures to others, and the dates of reduction to practice. He is ignorant of the bearing which the prior art or prior knowledge and use or the two years statutory bar or abandonment of his invention has upon his rights before he applies for a patent. He is ignorant of the effect of many years of a concealed use of his invention such as for example, a secret process. He is ignorant of the effect of filing an application without a full disclosure of his invention, and without adequate claims covering the full scope of his invention. He is ignorant of the requirement that all applications for patent in this country must be filed by the inventor, and that the filing by joint inventors (so-called), is in many cases a snare and a delusion and likely to result in the patent being declared void. He is ignorant of the necessity of guarding against the disclosure to the world by the issuance of his patent in this country, until he has protected his rights by filing in foreign countries. He is ignorant of his rights where he makes an invention when employed by others, where such invention is in the same line of work as that of his employment. He is ignorant of the effect of licenses and assignments, and the duty imposed by law of recording assignments at the Patent Office at Washington. He is ignorant of the fact that in any event all he obtains from a patent is the right to exclude others from the patent domain and a right of recovery for his damages or the infringer's profits.

This enumeration may seem at first glance as embracing matters technical in character, and as only to be apprehended by a patent lawyer of mature judgment and experience. The fact is, however, that any person of average intelligence may with little application, sufficiently acquaint himself with the law as to safeguard his inventions to a considerable degree and very likely avoid long and vexatious litigation which might otherwise result.

The patent law in this country is derived from the English law as it existed at the time of the colonies. Under our constitution it is provided that the Congress shall have power to promote the progress of science and useful arts by securing for limited times to inventors the exclusive right to their discoveries. The word

"discoveries" is unfortunate, but is interpreted by the courts to mean the same thing as inventions. Beginning in 1790, a number of patent acts have been passed by Congress, and the law has become finally crystallized in the Acts of 1870 and 1875 as amended to date.

The most important provision of the law is Section 4886, under which it is provided, among other matters, that any person who has invented any new useful art, machine, manufacture, or composition of matter, or improvement thereon, not known or used by others in this country before his invention or discovery thereof, may obtain a patent. Thus it is provided that in every application for patent there must be present invention, or exercise of the creative faculty; there must be present novelty or newness, and there must be present utility, or usefulness. It is also provided in effect in the same section that a publication, either here or abroad, two years prior to the filing of the application or a two years' public use or sale in this country prior to the filing of the application will preclude the issuance of the patent thereon. Accordingly underlying the validity of any patent, are the prerequisites of invention, novelty and utility and the so-called statutory bars. Even though the patent be issued, no defendant is foreclosed from showing such patent is defective in any one or more of their particulars and accordingly void.

All that the inventor secures by his patent is the right, in the first instance, to exclude all persons from making, using or selling the inventions covered by it. This, it is true, is a very substantial right and includes not only the right to an injunction but also the right to damages and profits. It should be borne in mind, however, that this right is negative in character and is only presumptive, and that a patent may be declared null and void by the courts for a variety of reasons, as for example, that the inventor was not the true inventor, that the so-called invention is not an invention but involves only mechanical skill, that it is not new, or that it will not operate, etc.

All inventions must be regarded in the light of the prior state of the art, and measured by the advance which they have made. If they are basic in character and perform a function never before performed, they are termed "primary" or "pioneer" inventions, such as the Goodyear process for vulcanizing rubber, the Morse telegraph, or the Bell telephone, and are construed broadly. If they are improvements upon what has gone before, they are secondary inventions and are narrowly construed. Mere mechanical skill is not invention, neither is mere aggregation, nor double use of an old structure, nor duplication nor enlargement, nor mere change of form.

Want of novelty may be shown by prior publications or patents in any language or by any prior knowledge or use accessible to the public. Want of utility may be proved by showing that the so-called invention is inoperative, or that it is injurious to the morals, health or good order of society.

(Continued on next page)

A Handy Tuning Unit for a Loop Set

By Kenneth Malcolm, A. I. R. E.

THOSE fans who have purchased or built loop sets for use during the summer, occasionally would like to reach out for greater distances or would like a greater volume than that afforded by the sets in question. The provision for a regular aerial and ground would make this entirely feasible, as very frequently there come times when the atmosphere is almost entirely free from hot weather annoyances. By means of this provision, a single set could meet almost all the varying conditions of weather, and hence could be used all the year round.

There are many sets that employ loops in which the change can be made directly, by simply removing the loop and connecting the leads directly to the aerial and ground. But sets such as the one described by the writer in a recent issue of RADIO WORLD, or those of the plain regenerative type, having the loop connected in the place where the secondary of the variocoupler would ordinarily be connected, would require the addition of a variocoupler unit before an aerial and ground can be used satisfactorily. Such a unit will be described in the following paragraphs.

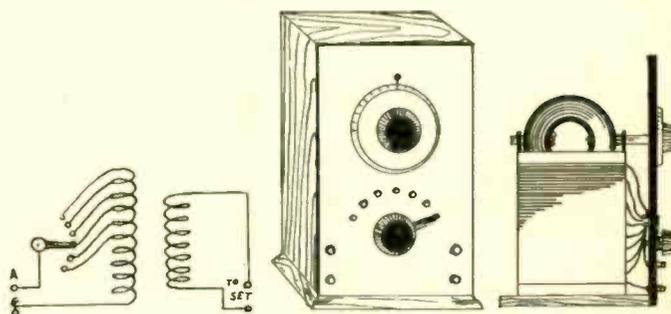
The list of required material includes an insulating panel about 5x7½ inches, a variocoupler, a dial for the coupling adjustment, a switch and the necessary switch points for the wave length adjustment of the coupler primary, the necessary connecting wire, four binding posts and a cabinet.

The panel should be laid out carefully and holes drilled for the coupling shaft, the switch and switch points and the binding posts. The layout suggested in the drawing is neat and attractive. For the sake of convenience it is a good idea to mount the coupler on a sub-base, instead of on the base of the cabinet, or else it could be mounted directly on the panel by means of two small brackets. Before you fasten it permanently it is best to solder the tap leads to the switch points. Now you can assemble the whole affair, and make the connections as shown in the circuit diagram. The end turn of the coupler should go to the lower left hand binding post, the switch lever should go to the upper left hand binding post and the two secondary leads should go to the two right binding posts.

When this wiring is done the panel may be secured in the cabinet, and your unit is complete.

If the set that you wish to use the unit with is of the type before mentioned, it might be well, first of all, to replace the single circuit loop jack with a double circuit jack, and also to mount a pair of binding posts at the lower left hand corner so that they will be opposite to the right hand posts on the unit. Nothing but the jack wiring need be changed. Simply connect the two leads that went to the old jack to the outer prongs of the new jack—the contact prongs. Now, neatly run wires from the two inner prongs to the set of new binding posts. By connecting the two right hand posts of the unit to the two new posts of the old set, the arrangement is ready for operation. If you follow the instructions closely the changes that must be made will be found much simpler than they sound.

With the double circuit jack arrangement, the change between regular aerial and loop aerial is en-



Circuit hook-up and constructional details of a handy loop unit.

tirely automatic. The aerial and ground connections on the unit may be left on permanently, and either aerial may be used at a moment's notice by simply plugging in or taking out the loop from its jack. This convenience cannot be entirely appreciated until it is tried.

Sets which do not have the jack can be used with the unit by removing the wires that lead to the loop and connecting them to the right hand binding posts of the unit.

(Continued from preceding page)

One of the first steps to be pursued by an inventor should be to ascertain whether or not his invention is new, that is if it has patentable novelty. If he is a skilled mechanic, or if he is engaged in a business which brings him into close contact with the art and the trade, he will probably know if there is any commercial device on the market which anticipates his invention. It is quite possible, however, that there may be somewhere in the world a prior printed publication accessible to the public showing and describing his device in some language which he has not seen. If there is any such publication, it is probable there is a copy of the same in the United States Patent Office or perhaps in some public library in any of the great cities. A search therefore at the Patent Office and through technical libraries accessible to the public would probably disclose the publication. In order, however, to be fairly certain there were no prior publications, a very thorough search would be required, which would be expensive and perhaps beyond the means of the ordinary inventor, who would have to be satisfied with his own investigation at the public library, where both

scientific works and copies of domestic and foreign patents might be accessible, or he might have made for him the usual preliminary examination by some resident patent attorney at Washington, who for a small fee would make a cursory examination of the class of U. S. patents where the invention was likely to be found and would send copies of the nearest patents. Such preliminary examination is often of great advantage, since it will usually disclose any very close references, but the inventor must be cautioned from placing too much dependance upon it, as it is at best only a makeshift and cannot in the nature of things be exhaustive. Where the inventor is well acquainted with the art, he could very well in many cases dispense with such examination, and rely upon the Examiner after the case gets into the office to discover and cite such references if any. Even after the usual preliminary examination is made, it is quite likely that the Examiner will cite references not disclosed by it. Such preliminary examination is, however, a safeguard, and in case the inventor is ignorant of the prior art, it is to be recommended for what it is worth.

(To be continued in next issue)

Amateurs Increase by 1334 in Five Months

LEST some fans believe that the reception of broadcasts is the only popular phase of the radio art, be it known that amateurs are still entering the game of "key pounding" at the rate of nearly three hundred a month. Since January 1 last, 1,334 amateur licenses have been granted by the Department of Commerce, and on June 5 there were 18,232 such stations in the United States.

The distribution of amateur stations by Districts as of June 5th, was as follows:

District	Headquarters	Total
1	Boston	2,490
2	New York	2,629
3	Baltimore	1,994
4	Norfolk	444
5	New Orleans	941
6	San Francisco	2,172
7	Seattle	901
8	Detroit	2,932
9	Chicago	3,729
Total		18,232

The above table does not include special amateurs, of which class there are 201, no new licenses having been issued recently. It has been decided by the Department that hereafter District Radio Supervisors will issue special amateur station licenses instead of the Washington office.

The waves assigned to special amateurs are between 150 and 220 meters for use in CW telegraph. Regular amateurs operate on 150 to 200 meters.

WWV Transmits More Standard Test Waves

IN an effort to permit radio operators and fans to check their wave meters and instruments on standard waves, the Bureau of Standards will transmit standard wave lengths, commencing at 10:55 p. m. each night, on July 17, August 15, September 13 and 28, and October 7.

On the last date WWV will enable amateurs to calibrate their receiving and transmitting sets, since the band covered will be from 222 to 150 meters, the signals being sent between 1:50 a. m. and 3:41 a. m. The schedule, which should be kept for future reference, follows:

Date	Frequency, K/c	Wave Length, Meters
July 17	425-1,500	705-200
Aug. 15	425-1,500	705-200
Sept. 13	425-1,500	705-200
Sept. 28	500-1,700	600-176
Oct. 7	1,350-2,000	222-150 (Amateurs)

In continuation of the established practice the Bureau will transmit the call signals "WWV" both in radio telegraph and telephone, each wave length occupying about nine minutes of time.

Loop Antennae Data for Any Wave Length

WHEN you discuss loop antenna with the fan of average knowledge, he will start to tell you that it is perfectly O. K. for broadcast work or amateur reception, but "What are you going to do if you want to receive the long wave transatlantic stations or ships or commercial?" Well, if you happen to be in on the know you will, of course, laugh at him, but if you are not you will swallow it whole, and thereby miss a lot of fun and good experiments by heeding him.

Did it ever occur to you that you could make a loop that would respond to any wave length you wanted? Well, with a little extra work and some knowledge of the correct condenser capacities, windings and sizes, you can make loop antennae that will take the place of any outdoor antenna and you don't have to be afraid that the landlord will object.

Just to show you what you can accomplish if you want to, take a peek at the table below and give some deep thought to it before you condemn the landlord for making you stay off the roof with your wires.

WAVE LENGTH OF A FOUR-FOOT LOOP WITH VARIOUS CAPACITIES ACROSS THE TERMINALS

No. turns in loop	Condenser capacity in Microfarads (across terminals)						No. turns per slot
	.00005	.0001	.0005	.001	.002	.003	
1	65m	128m	178m	250m	310m	1
3	130m	155m	290m	400m	550m	675m	1
6	230m	280m	500m	710m	1,000m	1,200m	1
12	430m	490m	920m	1,250m	1,700m	2,050m	1
24	760m	880m	1,600m	2,100m	3,000m	3,600m	1
48	1,550m	1,775m	3,150m	4,300m	6,000m	7,000m	2
72	2,200m	2,650m	4,800m	6,400m	8,800m	11,000m	3
120	3,930m	4,500m	7,900m	10,000m	14,700m	17,700m	5
240	7,600m	9,000m	15,650m	20,500m	27,200m	32,900m	10

Note: The slots are calculated to be one-half inch apart, and deep enough to accommodate the number of turns necessary.

It can be seen from the above table that it is comparatively easy to cover any wave length from 65 meters up to 32,900 by the use of the correct amount of wire and capacity. In order to figure the amount of wire for such a loop, the following method should be pursued: Take the number of turns necessary and multiply it by 16, which is the square of four, each side of the loop being four feet. It seems incredible that stations 3,000 miles away using waves of 20,000 meters can be received on a four-foot loop, but the table above has been compiled from actual data and everything is worked out so that fans can go ahead and use it.

To Make Your Old Set New

You can increase the range of your receiver by the use of parallel condensers in your circuit.

You can use honeycomb coils to load up your circuits by inserting them in the proper circuit. This means only the breaking of two leads and the insertion of the coil and should be employed in any short wave set, as it allows any range to be reached. It is especially useful in single circuit sets.

You can remove the present inductance and use either bank-wound inductance or re-wind your present one to meet the longer waves.

Increase the length of your antenna to take in the new waves.

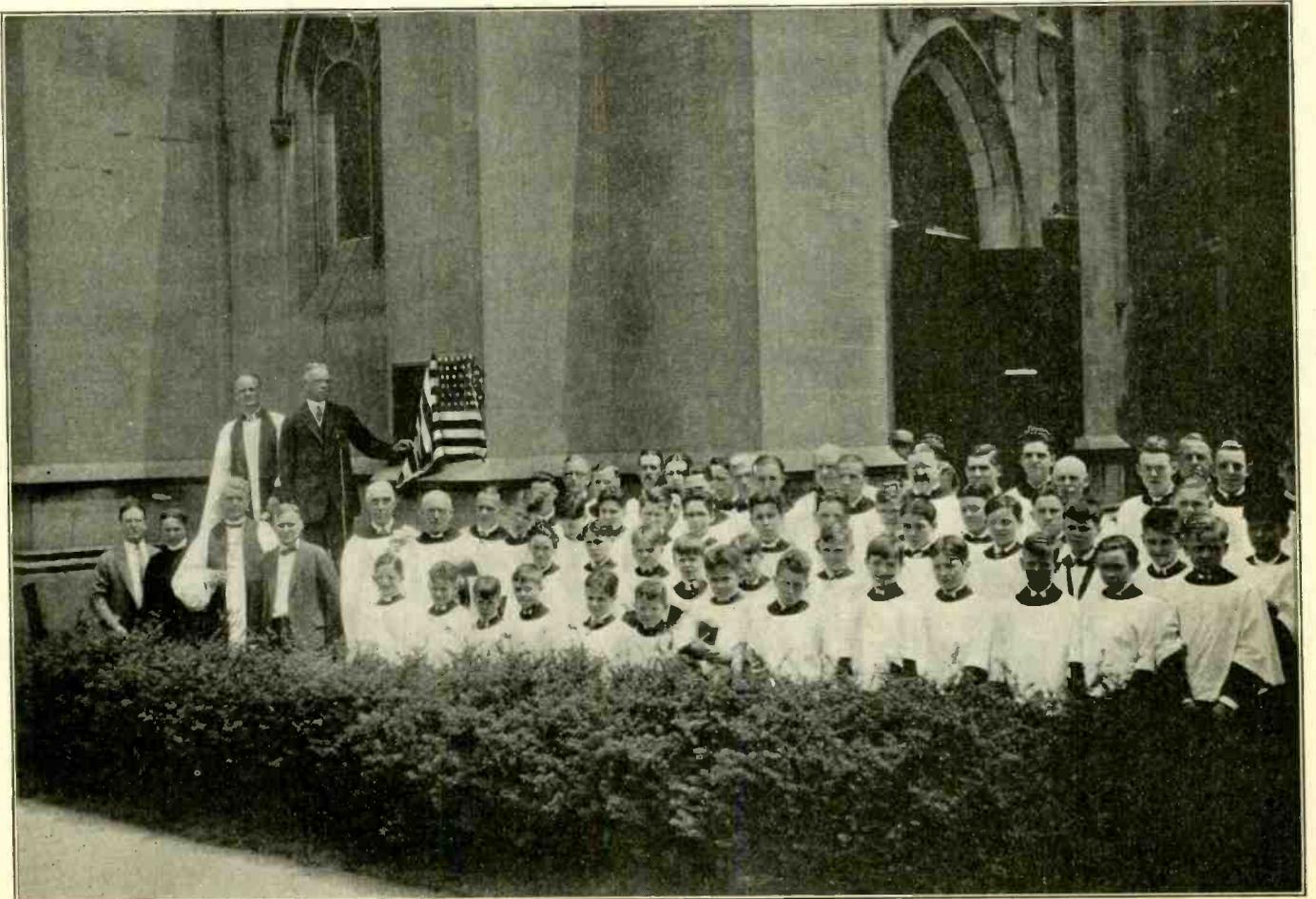
Naval Radio Personnel Receives Rigid Training

THE Naval Communication Service in the past three months has made gigantic strides in efficiency chiefly through educating its untrained personnel. Courses of radio instruction, in addition to the regular schools at Great Lakes, Norfolk and San Francisco, have been prepared and the results are "very gratifying," a recent report states. To-day the 1,200 radio men stationed ashore are receiving intensive training in fleet communication so that they will be familiar with sea operation. To-day the personnel of the Communication Service of the Navy is in better shape than in any other branch of the service, officers are credited with saying.

A survey of the radio personnel situation just completed by the Navy, shows that there are 2,443 radio men on duty, and that vacancies in the three higher rates exist. Following examinations held in May, 170 radio men were promoted to higher rates, fifteen of them becoming Chief Radiomen. There was still a shortage of 562 men in the service.

Opportunities in the Naval Radio Service are good for young men, communication experts point out, citing a recent case where a young man of 20, who held the rate of First Class Radioman, was persuaded to remain in the service, because at 32 he would be eligible for transfer to the Reserve with a regular income of \$75 to \$80 a month. No such opportunity awaited a young man in ordinary business pursuits, it was explained. This young man is now en route to sea duty in the Mediterranean.

Discrepancies in transmission of messages by the Navy have been decreased markedly during the past six months. During a recent period of supervision, five Atlantic stations had no errors, while the only two out of the other seven had over one-tenth of a word in a thousand wrong. Manipulation has improved greatly, operators are better instructed in procedure and are more attentive, the report states.



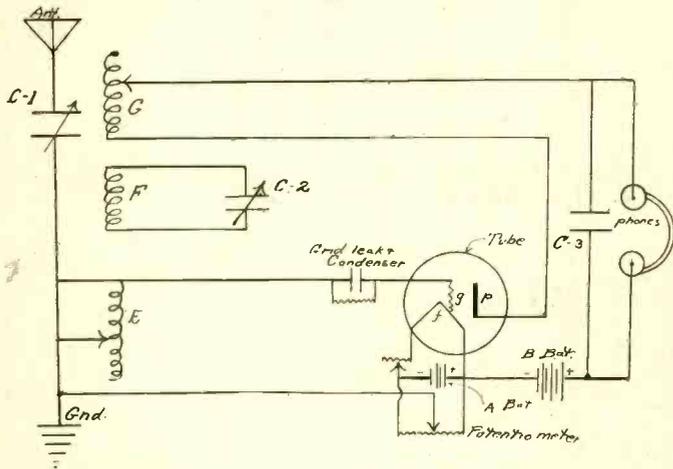
(C. Photonews)

Unveiling of the tablet dedicated to the radio congregation of Calvary Episcopal Church, Pittsburgh, Pa., first church to broadcast services. The story of this ceremony appeared in RADIO WORLD for June 16. H. P. Davis, of the Westinghouse Company, is shown unveiling the tablet.

Tube Hook-Up of Interest to the Vacationist

By C. White, Consulting Engineer

THE advent of the WD-11, WD-12 and U.V.-199 now makes it possible for any one to own a radio set without feeling the burden of unnecessarily heavy upkeep expense. There are no battery chargers or bulky storage batteries to be contended with, and, above all, a portable radio set is within the reach of each and every vacationist. But it must be remembered that all of these tubes are not soft detector tubes and a set designed to use them properly must take this fact strictly into account. A soft or gaseous tube is very critical in the adjustment of its plate voltage and filament current while a hard, or high vacuum tube, when used as a detector is not appreciably sensitive with respect to either of these two controls. Therefore it is quite evident a receiver of the regenerative type that is built to function well with soft detector tubes might not give any reasonably good results with the new types of tubes unless certain changes are made. Hence since the new tubes are not very sensitive in regard to plate voltage and filament current it is foolish to expect any wonderful results if we attempt to control regeneration by means of these two factors. A better method of con-



Circuit incorporating a new idea in coupling. The three coils are wound on the same form and the feedback coupling between coils E and G is controlled by the condenser C-2. Extreme selectivity and very fine control of the regeneration can be had by this means and it is absolutely quiet and stable in action, as well as free from interference.

rol is to look to the design of some type of tickler coupling which would offer a better method of vernier control than the rotating coil or rotor such as is commonly used on the single circuit type of regenerative receiver. In the type of circuit outlined in this article I have endeavored to overcome the difficulty of installing a mechanical vernier arrangement by using an electrical method instead of the movable or rotor tickler coil.

The coils E, F and G are wound side by side on the same bakelite tube, but the coupling between the tickler G and the tuning coil E is very loose as long as the circuit formed by the inductance coil F and the condenser C-2 is not tuned to the same wave length as the inductance E and the condenser C-1. Hence there will be practically no feed back action and regeneration can not be accomplished. But if F and C-2 are tuned to the same wave length as C-1 and E the coupling between E and G will be so increased that the tube will oscillate. Now by varying the setting of the condenser C-2 we can control the feed back or regenerative action with more ease than is possible with the ordinary style of rotor tickler. The construction of the coil units is quite simple since all three coils are wound side by side on the same tube, which should be four inches in diameter. The coils should be placed in the same relative positions as indicated by the schematic diagram; that is,

the coils E and G should be on the ends of the tube while F should be in between the two. All the units are wound with No. 22 D. C. C. magnet wire. The coil E has 60 turns in all with taps at each 15; F has 40 turns with no taps, while G has 40 turns tapped every 10 for switch-points. There should be about one-quarter inch allowed between any two adjacent coils, and, figuring around 20 turns of wire to an inch, then about nine inches of tube length will be required. The condensers C-1 and C-2 are 23 plate air variables with some reliable type of vernier adjustment. The condenser C-3 is nothing more than a bypass condenser for the phones and should have a capacity of .001 mfd.

The operation of this set is just about as simple as the construction. A little experience will be required at first in order to get on to the sensitivity of the various controls. In general there are two methods of tuning in a phone or broadcasting station. One is called the zero beat note method and the other is the critical point method. The former is accomplished by keeping the detector in the state of oscillation and moving C-1 and the taps on E until the carrier wave of the station is picked up. This fact is noted by a characteristic whistle, and as soon as we tune the wave the whistle will disappear for a point on our adjustment and then will reappear if we continue to move our condenser dial. The point where it disappears is called the zero beat note, and if we turn the condenser C-2 until the tube ceases to oscillate the station will be tuned in, and the amount of volume can be controlled to a certain extent by the condenser C-2 which will control the regeneration. This method of tuning in should *not be used* in cities or densely settled localities where there are other radio receivers nearby. It greatly disturbs the other fellow, not only annoying him but encouraging on the part of others the same method of tuning, which if carried out by many others would seriously impair reception in the neighborhood. In country or very thinly settled radio districts of a suburb this method can be used. But the best general method to use is the critical point method. In this the tube is set upon the point of oscillating by the adjustment of C-2. By a little experience you will soon recognize this condition by certain characteristic sounds in the phones. Now as C-1 is slightly moved a sort of breathing sound will be heard if a station is picked up and by finer tuning adjustment of the condenser it can be brought in clearer. C-2 must be moved along with C-1 if the latter is moved to any great extent. When the tube jumps into oscillation we can learn to recognize this condition by a sudden click in the phones at the start of the oscillations and a sound similar to escaping steam or vapor that accompanies the state of oscillation. With a little precaution on your part you can readily learn to prevent this from occurring and save annoying your neighbor who is trying to get some pleasure out of radio likewise. After you have tuned in your station by this considerate and sportsmanlike method you can use the 300 ohm potentiometer as a vernier adjustment on the amount of regeneration and volume. With local stations too much regeneration will sacrifice quality for volume.

Let me repeat that this set is extremely economical to build and operate, owing to the fact that dry cells replace expensive and heavy storage batteries. The clever amateur can readily assemble this set in a small cabinet complete with "A" and "B" batteries enclosed and he will have a good practical portable radio receiver. He can take it on his motor trips, his camping trips and to his summer cottage. All that will be necessary is to set up a suitable aerial and he will be ready to operate.

How to Get Best Results from a One Tube Regenerative Set

By Byrt C. Caldwell

HOW many of us, when we look at those long lists of Radio Golf records made with one tube, sigh and wish that we could make those distance records too? Well, you can, and I am going to tell you how.

Without a doubt, the ideal one tube set for long distance work is the reflex. But as most of us have regenerative sets, I am going to write only about them. The best regenerative set is the three circuit, but wonderful results can be obtained with single circuit sets. If you have no set as yet, and are contemplating buying one, by all means get a three circuit set. The slightly increased cost will more than repay you by the better results and the greatly increased selectivity. The one I constructed and used was a honeycomb set, and I would advise anyone to use this kind. Some say that honeycombs are inefficient on low wave lengths but this is far from the case. I have obtained better results with mine than have many that I know of who are using sets which employ two variometers and a variocoupler.

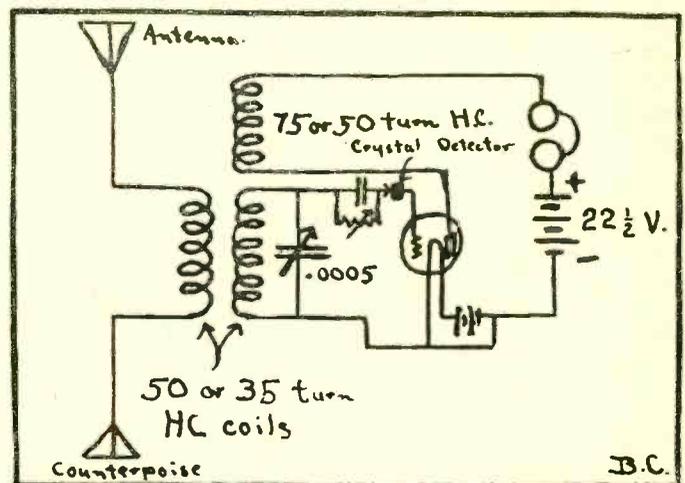
I will start with the antenna and ground system. Without a good antenna and a good ground, DX results are impossible. A one wire aerial about 40 feet high and 80 feet long, constructed of braided wire if possible, is the ideal antenna. A buried copper or iron sheet ground is better than a water pipe ground. Some fans are prevented from obtaining good results because they live in a locality where it is an impossibility to get a good ground. For these, a counterpoise should be constructed. In fact, where it is possible every one should employ a counterpoise. This consists of another wire directly underneath the aerial wire and about ten feet from the ground. This is used in place of the ground. A counterpoise will give results two to ten times better than a ground. Have both antenna and counterpoise insulated as well as possible to prevent any losses of the tiny bit of energy which is collected. Use the best phones you can afford to buy.

We next come to the tuning. A little common sense, mixed with practice, will enable you easily to double or even to triple the range of your set. This is no exaggeration. When we look at the average broadcast fan and watch him twirl the dials, we wonder how he can get any results. In tuning three circuit sets, proceed as follows: First, after the batteries are connected and the filament is lit, place the secondary condenser at approximately the position for the wave length desired. Then tighten the coupling between secondary and tickler until the set howls. Then gradually loosen the coupling until this howling just stops. Now vary the secondary condenser until a station is heard. Many let the tuning go at this. However, the coupling between the primary and the secondary should now be varied. Do this carefully and slowly until a loud click is heard in the phones. Better results can be had if a condenser is put in parallel with the primary. When the rough adjustments above have been made, use infinite care in making much finer adjustments and you will find that you can bring in stations loud and clear that you never even heard before. Vernier attachments are extremely useful in making these fine

adjustments and, for a nervous person, they are almost absolutely necessary.

Any fan who follows these directions carefully will find that, with a little practice, he will have doubled and tripled his range, and he will no longer look at the records made by the "DX Nite Owls" with a feeling of despair, for he will have become one of them himself.

I am showing here the hook-up of my set, which is one of the simplest and one of the most efficient possible to construct. You will notice that I use a variable grid leak. This greatly improves any set as you will find if you test one out. There are several good ones



Circuit diagram of a three unit regenerative set incorporating a new idea. A crystal detector in the grid circuit is said to increase the volume and also the range of the circuit. Try it out—it sure does "make 'em perk."

on the market. Connecting a crystal detector in the grid lead as shown will sometimes greatly increase the range. Don't be afraid to experiment with the connections of your set. You are liable to discover some little kink that will greatly increase your range. However, there is one precaution I would give before telling you to do this. Place a ballast tube in your "B" battery lead or use some other audion protective device, or you are liable to blow out a perfectly good audion.

You will notice also that I do not use a rheostat. I have found it unnecessary for Myers, WD-11, and U. V. 201. I believe that they are unnecessary for any tube if the proper voltage A battery is used.

In a honeycomb set the proper coils for most stations are primary and secondary 50 turn, tickler, 75 turn. However, some of the stations with low wave lengths, such as WNAC (286 meters) require 35 turns for primary and secondary and 50 turns for the tickler, unless an antenna series condenser is used.

What is a "Converter"?

A converter is a machine used to convert D. C. to A. C. (direct current to alternating current). It is similar to a motor in construction, but is supplied with slip rings instead of a commutator.

RADIO PRIMER

For the New Army of Radio Beginners

By Lynn Brooks

TUNING REGENERATIVE CIRCUITS: As before stated, a regenerative circuit allows great amplification of signals if properly tuned. The basic principle of this was explained, and we shall now see how it should be tuned to get that amplification, as well as the extremely sharp tuning that is possible with such a circuit.

Referring to the circuit published on page 11 of the June 16 issue of RADIO WORLD, where the combination circuit was shown, it is called to your attention that there are two circuits possible with this hook-up. We are mainly concerned with the regenerative circuit, so will explain the tuning of that particular one.

When it is desired to use the set the tube is turned up about half way, first making sure that the batteries are connected in the proper manner. As the primary or antenna circuit is the controlling factor in the tuning this circuit will have to be tuned first. This is accomplished by setting the switch arm or slider at a point approximating the wave length of the signal desired. Then the inductance of the secondary is varied along with the coupling of the secondary circuit. When tuning this part of the circuit the condenser C2 is not varied until the entire circuit is tuned, and then it is brought into play to increase the selectivity or cut down interference. All this time the tickler is not brought into play, but after the secondary coupling is closed or tightened the tightening of the tickler should be commenced. As it is tightened a rushing sound will make itself heard in the phones, and suddenly a sharp click will be heard. If signals were heard before the click a noticeable fact will be that they will lose their tone and become mushy or wishy-washy after the click. This is an indication that the point of regeneration has passed and that the circuit is oscillating or forcing oscillations through the circuit. In this condition it acts as a small transmitter, and the coupling of the tickler should be loosened and then increased up to just the point where the signals are loudest without bringing the oscillations over, or making the tube "spill."

The secondary circuit is now tuned, and if the signals are not loud or there is interference the primary circuit should be re-tuned to the place where the signals are loudest. After that all signals for one wave length are tuned by means of the secondary inductance and condenser, secondary coupling and the tickler.

If care is not taken in the tuning of a regenerative circuit you will become the pest of the neighborhood, and every one owning sets capable of picking up undamped signals will be bothered with "birdies," which manifest themselves in squeals, howls and little, high-pitched notes, which vary with every change in the tuning of the set. A little care taken in the tuning of the set and signals will pound in, and the maximum of amplification due to regeneration can be accomplished, and at the same time the set will operate quietly. The signals, instead of suddenly jumping in from a forest of howls and squeals, will be tuned in gradually and smoothly and will be a revelation of smoothness and quality. This method of tuning also obviates the necessity of re-tuning a station upon hearing it. A few precautions and instructions upon this method of tuning are necessary.

When tuning in on a regenerative set do not turn up your tube brightly and tune by the "beat note" method. This is what caused the noise in your and other receivers. Turn

your tube down to the point at which it just has a sort of breathing sound when the coupling of the tickler is closed or tightened. If this is done properly no carrier wave notes will be noticed. Then do not disturb it and when the signals are tuned in you will notice that the carrier waves of the stations are not present to cause distortion and noise, but the voice or music will come in clear and loud.

When using a regenerative set it is always best to include a variable grid leak in the circuit. This will remove the tendency to howl on the part of the set and will allow the maximum amplification when properly set for a tube.

Do not let your receiver oscillate. When the click is heard, do one of two things. Decrease your tickler coupling, or vary the secondary condenser until it is just below this point, and note the clarity and strength of the received signals.

It must be borne in mind that the regenerative circuit, unless handled by some one who is used to it, is a tricky circuit as far as selectivity is concerned and at certain times unless a complete knowledge of your set is in your possession it will seem impossible to separate one station from another, or else one station will come in so loud that it will render any signals of less intensity inaudible by drowning them out. This is generally the fault of the tuning of some particular part of the set, or else there is some part of the set that due to faulty wiring is so close to another integral part of the circuit that the transference of energy is taking place through that place instead of the tuning controls. If such is noticed the place to look for trouble is in your wiring. In wiring a set see that all the leads cross each other at right angles, and that they do not run parallel for too great a distance, and even then it is a good plan to have a fair amount of separation between them. A properly designed and operated regenerative set is very selective in tuning.

In no set, either regenerative or straight detector circuit, where a tube is used as a detector, should the filament be turned up any higher than is necessary to obtain signals of intensity enough to make themselves comfortably heard in the receivers. If the tube is turned up higher the tube will oscillate and the signals will be no louder. They will be distorted and the original quality of the voice or music or signals is lost due to that distortion. It is also a waste of both valuable filament life and current. The tube that operates longest is the one that has been used properly, and just because you can put all the current into a tube without burning it out is no indication or excuse for doing so.

It is better by far to have a crystal clear signal in a pair of phones than to have a room full of funny noises and distorted music in a loud speaker. The real radio man is always known by the manner in which he tunes his set.

DISADVANTAGES OF REGENERATION: Due to the fact that the common regenerative circuit has the power of oscillating (which same principle is used in transmitters) a regenerative circuit, unless properly handled, will generate power of its own, and re-radiate this power, making a small transmitter of itself, whose wave length changes with every change in the tuning of the receiver. This disadvantage is paramount in closely populated sections, where there are numbers of regenerative sets handled by people who do not understand that they are causing interference in neighboring receivers by their sets. A regenerative set if allowed to oscillate will cause interference in receivers over quite a distance, and the persons owning regenerative sets in the neighborhood will be bothered by the radiated wave of the first set. Bear in mind that a regenerative set always gives the loudest and clearest signals just below the oscillating point, or just below the point at which it perks up or "spills."

An Attractive Mounting for Tube Sockets

By Arthur G. Shirt

WHEN an amateur turns his constructive skill toward the building of what is known as a "double-decker" radio receiving set he fastens his midway shelf to the panel by either brackets or screws. This procedure necessitates drilling holes in the face of the panel, and it is also the cause of much annoyance, for all of us have had trouble in making such a shelf substantial. First, we thought we could drive in long, thin screws from the outside of the panel, but we found that wood splits easily when screws are driven into its edge. We also discovered that a shelf supported only from the front is unsteady, and the final outcome of our experience was the addition of two brackets, with the additional holes, trouble and time.

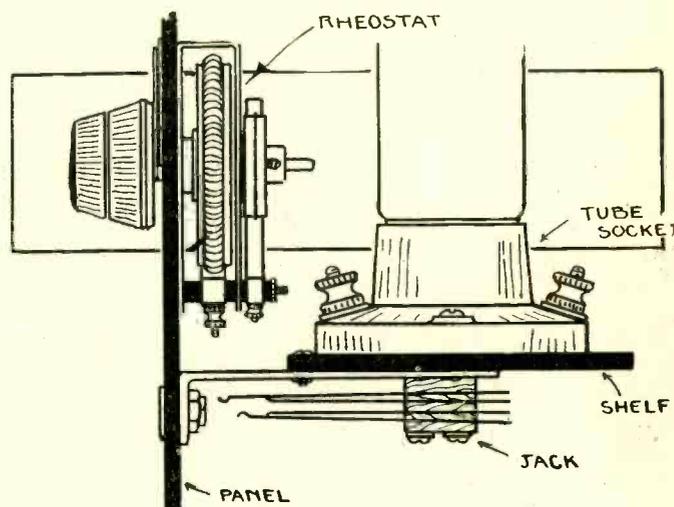
All this, although quite usual, is not in the least necessary. An amateur who was doing a lot of "double-deck" building wasted his time and patience so many times that he decided that if there was a better way of mounting a back-panel shelf he was going to find it. After much labor he finally hit upon the idea of inverting his telephone jack, using its base in the same way as a bracket, and thus mounting the shelf for the tube socket quite independent of the panel. When put into practice the idea resulted in a neat and novel back-panel shelf, easily constructed by any one with the fewest possible tools.

The shelf may be made out of either wood or bakelite, 2½ inches wide. The length of the shelf is determined by the number of tubes which are to be mounted upon it. For a single tube a strip of material 2½ inches long is about right, but for double or triple tubes the length must be proportionately increased. If only one tube is to be mounted there will be only one jack used as a support, while two tubes will call for one extra, etc.

The jacks are mounted on the panel in the usual way, but are inverted so that the metal bases are on top. Drill a hole in this base and tap it with an 8-32 machine thread.

A corresponding hole in the shelf takes a machine screw, by which the shelf is fastened firmly to the jack. Of course, the strip of wood or panel material must first be drilled to take the tube socket or sockets, which must be placed so that there will be no interference one instrument with the other. The transformers may also be mounted on this shelf, either on the top and standing upright, or on the lower side hanging down.

The finished arrangement is not only neat, but attractive. It has other advantages, the chief of which are that it takes up very little room, shortens the leads to the various instruments, obviates drilling the panel, and is superlatively easy



Space-saving method of mounting tube sockets.

to apply, not only in single-tube sets, but also in receivers that boast as many tubes as a fellow has fingers on his right hand.

Personality in Broadcasting

MANY broadcast listeners have become so immune to the romance of listening that they can simply tune their sets and upon hearing an announcer's voice say, without the least emotion or personal feeling, "Oh, that is WSB." Or else they will calmly announce the fact that they can recognize any one of fifty announcers without hearing the call of the station or the announcer's own letters. This, of course, is fine, but—wouldn't they rather listen to a program when the announcer makes them feel that he is telling them a personal secret and at the same time become so friendly that they feel they could go up to him on the street and say with a slap on the back, "Well, that was a corking program last night! I sure was surprised when you 'rang in' that 'cellist. He was great!"

Many have heard WEAF broadcast time after time, but how many can listen to the Sunday evening program when "Uncle Roxy" is speaking without having that "personal feeling" every time he announces? He is different from the rest and he demonstrates it. He doesn't announce as though it was a cut and dried

affair which has to be done—he puts his personality into that little black disk and gives every listener an impression of interested friendliness. He introduces the performers in such a manner that you know that they are almost personal friends of both "Uncle Roxy" and yourself.

Why it is that more announcers have not tried this method is a mystery. Broadcasting is a personal matter and cannot be cut and dried. What difference does it make if they do crack a joke when announcing—they have the "air" and if a little humor will lighten the task of the performers and make them feel that they are working for friends instead of total strangers, think how much harder they will work to please and how much easier it will be.

When broadcasting, the announcer is not talking to mummies or inanimate objects, even though he is doing so through a conscienceless maze of modern scientific apparatus. He is talking to thousands—yes, hundreds of thousands of people who possess emotions that can be brought into play simply by manifesting his personality.

Completed Official List of Broadcasting Stations in the United States

FOLLOWING is the third installment of an official list of commercial broadcasting stations in the United States as issued by the Department of Commerce, and is continued from last week's issue. The list is completed with this installment.

As new allocations of wave lengths to stations now operating on 360 meters are made by the Department of Commerce, the changes will be published by RADIO WORLD.

Readers who save these installments will have a complete list of broadcasters with their station calls, location, frequency, wave lengths and power.

Call	Station	Frequency Kcys.	Wave Length Meters	Power Watts
WOAS	Prince Walter Co., Lowell, Mass.	1,130	266	100
KSD	Pulitzer Publishing Co., St. Louis, Mo.	550	546	500
WLAN	Putnam Hardware Co., Houlton, Me.	833	360	100
WBAA	Purdue University, W. Lafayette, Ind.	833	360	20
KDZQ	Pyle & Nichols, Denver, Colo.	833	360	100
WCAW	Quincy Electric Supply Co., Quincy, Ill.	833	360	10
WLAT	Radio and Specialty Co., Burlington, Ia.	833	360	15
KFHP	Radio Bug Products Co., Kearney, Neb.	1,220	246	10
WRAF	Radio Club, Inc., La Porte, Ind.	1,340	224	10
WJY	Radio Corp. of America, New York, N. Y.	740	405	500
WJZ	Radio Corp. of America, New York, N. Y.	660	455	500
WKAQ	Radio Corp. of America, San Juan, P. R.	833	360	100
KFAW	Radio Den, The, Santa Ana, Cal.	833	360	40
WGAX	Radio Elect. Co., Washington C. H., Ohio	833	360	20
KFEV	Radio Electric Shop, Douglas, Wyo.	833	360	100
WFIG	Radio Engineering Laboratory, Waterford, N. Y.	833	360	20
WHAI	Radio Equipment & Mfg. Co., Davenport, Ia.	833	360	15
KFEP	Radio Equipment Co. (Joseph L. Turre), Denver, Colo.	1,250	240	10
WQAX	Radio Equipment Co., Peoria, Ill.	833	360	20
WQAT	Radio Equipment Corp., Westhampton, Va.	833	360	50
WRAY	Radio Sales Corporation, Scranton, Pa.	833	360	50
WRAO	Radio Service Co., St. Louis, Mo.	833	360	100
KJJ	Radio Shop, The, Sunnyvale, Cal.	833	360	100
WRAS	Radio Supply Co., McLeansboro, Ill.	833	360	20
WMAB	Radio Supply Co., Oklahoma City, Okla.	833	360	100
KFDC	Radio Supply Co., Spokane, Wash.	833	360	10
KNV	Radio Supply Co. of California, Los Angeles, Cal.	833	360	100
WRAH	Read, Stanley N., Providence, R. I.	833	360	10
WGF	Register and Tribune, Des Moines, Iowa	833	360	100
WHAZ	Rensselaer Polytechnic Institute, Troy, N. Y.	790	380	500
WBAU	Republican Publishing Co., Hamilton, Ohio	1,160	258	50
KLZ	Reynolds Radio Co., Inc., Denver, Colo.	833	360	500
WNAR	Rhodes, C. C., Butler, Mo.	833	360	10
KDZE	Rhodes Co., The, Seattle, Wash.	833	360	10
WRAA	Rice Institute, Houston, Texas.	833	360	200
KFCM	Richmond Radio Shop, Richmond, Cal.	833	360	50
WKN	Riechman Crosby Co., The, Memphis, Tenn.	833	360	50
WHAK	Roberts Hardware Co., Clarksburg, W. Va.	833	360	20
WNAL	Rockwell, R. J., Omaha, Neb.	833	360	100
KFID	Ross Arbuckles Garage, Iola, Kan.	1,220	246	20

Call	Station	Frequency Kcys.	Wave Length Meters	Power Watts
KNJ	Roswell Public Service Co., The, Roswell, N. M.	833	360	200
WMAF	Round Hills Radio Corp., Dartmouth, Mass.	833	360	100
WTAU	Ruegy Battery & Elect. Co., Tecumseh, Neb.	833	360	10
WIAW	Saginaw Radio & Elect. Co., Saginaw, Mich.	833	360	100
WCAD	St. Laurence University, Canton, N. Y.	833	360	100
WEW	St. Louis University, St. Louis, Mo.	833	360	30
KGY	St. Martin's College, Lacey, Wash.	1,160	258	5
KFDD	St. Michael's Cathedral, Boise, Idaho	833	360	10
WCAL	St. Olaf College, Northfield, Minn.	833	360	250
WPAT	St. Patrick's Cathedral, El Paso, Texas	833	360	10
KFCD	Salem Elect. Co., Salem, Ore.	833	360	20
WCAO	Sanders & Stayman Co., Baltimore, Md.	833	360	50
WQAF	Sandusky Register, Sandusky, Ohio	1,250	240	5
WWAC	Sanger Bros., Waco, Texas.	833	360	50
KMJ	San Joaquin Light & Power Corp., Fresno, Cal.	833	360	50
WRAB	Savannah Board of Public Education, Savannah, Ga.	833	360	100
KDYM	Savoy Theatre, San Diego, Cal.	833	360	50
WIAO	School of Engineering, and Milwaukee and Wisconsin News, Milwaukee, Wis.	833	360	100
WHN	Schubel, George, Ridgewood, N. Y.	833	360	100
WQAN	Scranton Times, Scranton, Pa.	833	360	100
WFEQ	Scroggin, J. L., Oak, Neb.	833	360	150
KDZT	Seattle Radio Assn., Seattle, Wash.	833	360	10
WHAQ	Semmes Motor Co., Washington, D. C.	1,240	242	10
KFFA	Shelton, Dr. R. O., San Diego, Cal.	1,240	242	50
WSAP	Seventh Day Adventist Church, New York, N. Y.	833	360	250
WEAN	Shepard Co., Providence, R. I.	833	360	20
WNAC	Shepard Stores, Boston, Mass.	833	360	100
WEAV	Sheridan Elect. Service Co., Rushville, Neb.	833	360	100
WLAQ	Shilling, A. E., Kalamazoo, Mich.	833	360	20
WNAY	Ship Owners' Radio Service, Baltimore, Md.	833	360	10
WDT	Ship Owners' Radio Service, Stapleton, N. Y.	833	360	500
WNJ	Shotten Radio Mfg. Co., The, Albany, N. Y.	833	360	50
KDZB	Siefert, Frank E., Bakersfield, Cal.	833	360	100
WDAU	Slocum & Kilburn, New Bedford, Mass.	833	360	50
KFFO	Smith, Dr. E. H., Hillsboro, Ore.	833	360	5
KDYW	Smith-Hughes & Co., Phoenix, Ariz.	833	360	20
KNI	Smith, T. W., Eureka, Cal.	833	360	50
WGAZ	South Bend Tribune, South Bend, Ind.	833	360	100
WFAZ	South Carolina Radio Shop, Charleston, S. C.	833	360	10
WCAT	South Dakota School of Mines, Rapid City, S. D.	1,250	240	100
KFDY	South Dakota State College of Agri. and M. Arts, Brookings, S. D.	833	360	100
WSAB	Southeast Missouri State Teachers' College, Cape Girardeau, Mo.	833	360	100
KDPT	Southern Electrical Co., San Diego, Cal.	833	360	50
WOAI	Southern Equipment Co., San Antonio, Texas	833	360	500
WBT	Southern Radio Corp., Charlotte, N. C.	833	360	500
WGAR	Southwest American, Fort Smith, Ark.	833	360	20
WQAB	Southwest Missouri State Teachers' College, Springfield, Mo.	833	360	20
WOAU	Sowder Bolling Piano Co., Evansville, Ind.	833	360	100

Call	Station	Frequency Keys.	Wave Length Meters	Power Watts	Call	Station	Frequency Keys.	Wave Length Meters	Power Watts
WGAD	Spanish-American School of Radio Telegraphy, Ensenada, P. R.	833	360	500	WLB	University of Minnesota, Minneapolis, Minn.	833	360	150
WSAA	Sprague, B. S., Elect. Co., Marietta, Ohio	833	360	25	WAAN	University of Missouri, Columbia, Mo.	833	360	55
WFAF	Spratley, Henry C., Poughkeepsie, N. Y.	833	360	100	WFAV	University of Nebraska, Lincoln, Neb.	833	360	100
KFAP	Standard Publishing Co., Butte, Mont.	833	360	50	WNAD	University of Oklahoma, Norman, Okla.	833	360	100
WEAB	Standard Radio Equip. Co., Fort Dodge, Ia.	833	360	150	WHAM	University of Rochester, Rochester, N. Y.	833	360	100
KDYX	Star Bulletin Pub. Co., Honolulu, T. H.	833	360	50	WEAJ	University of South Dakota, Vermillion, S. D.	833	360	200
KFHR	Star Elec. & Radio Co., Seattle, Wash.	833	360	100	WCM	University of Texas, Austin, Tex.	833	360	500
WKAC	Star Pub. Co., Lincoln, Neb.	833	360	100	WCAX	University of Vermont, Burlington, Vt.	833	360	100
KFAE	State College of Washington, Pullman, Wash.	833	360	500	WHA	University of Wisconsin, Madison, Wisc.	833	360	250
WRAC	State Normal School, Mayville, N. D.	833	360	450	WSAI	U. S. Playing Card Co., Cincinnati, Ohio	970	309	500
WHAA	State University of Iowa, Iowa City, Iowa	1,060	283	100	WMAP	Utility Battery Service, Inc., Easton, Pa.	1,220	246	50
WBAX	Stenger, John H., Jr., Wilkes-Barre, Pa.	833	360	50	WCAB	Valley Radio, Grand Forks, N. D.	833	360	20
WBAD	Sterling Elec. Co., Minneapolis, Minn.	833	360	100	KFHD	Utz Electric Co., St. Joseph, Mo.	1,330	226	10
WBBC	Sterling Radio Equip. Co., Sterling, Ill.	1,310	229	50	WOAN	Vaughan, James D., Lawrenceburg, Tenn.	833	360	150
WCK	Stix-Baer-Fuller, St. Louis, Mo.	833	360	100	WLAK	Vermont Farms Mach. Co., Bellows Falls, Vt.	833	360	500
WFI	Strawbridge & Clothier, Philadelphia, Pa.	760	395	500	WSAV	Vick, Clifford W., Houston, Tex.	833	360	100
WPAL	Superior Radio & Tel. Co., Columbus, Ohio	1,050	286	100	WGAM	Villanova College, Villanova, Pa.	833	360	100
WFAC	Superior Radio Co., Superior, Wis.	833	360	150	KFAY	Virgin's Radio, Medford, Ore.	833	360	50
WHB	Sweeney School Co., Kansas City, Mo.	730	411	500	WLAJ	Waco Electric Supply Co., Waco, Texas	833	360	50
WNAN	Syracuse Radio & Tel. Co., Syracuse, N. Y.	1,050	286	100	WMAW	Wahpeton Elect. Co., Wahpeton, N. D.	833	360	10
WDAE	Tampa Daily Times, Tampa, Fla.	833	360	250	WDAS	Waite, Samuel A., Worcester, Mass.	833	360	30
WBL	T. & H. Radio Co., Anthony, Kan.	833	360	50	WWZ	Wanamaker, John, New York, N.Y.	833	360	100
WRW	Tarrytown Radio Research Laboratory, Tarrytown, N. Y.	833	360	20	WOO	Wanamaker, John, Philadelphia, Pa.	590	509	500
WRAD	Taylor Radio Shop, Marion, Kan.	833	360	10	WPAR	Ward, R. A., Beloit, Kan.	833	360	10
KDYL	Telegram Publishing Co., Salt Lake City, Utah	833	360	150	KLS	Warner Brothers, Oakland, Cal.	833	360	50
WNAS	Texas Radio Corp. and Austin Statesman, Austin, Texas	833	360	100	KHQ	Wasmer, Louis, Seattle, Wash.	833	360	100
KFBU	Thomas, Bishop N. S., Laramie, Wyo.	833	360	10	WMAR	Waterloo Electrical Supply Co., Waterloo, Iowa	833	360	50
WHAB	Thompson, Clark W., Galveston, Texas	833	360	100	KFJD	Weld County Printing & Pub. Co., Greeley, Colo.	1,270	236	100
WRAR	Thomas, Jacob Carl, David City, Neb.	833	360	20	KFBD	Welch, Clarence V., Hanford, Cal.	833	360	10
KFKH	Thomas Musical Co., Marshfield, Ore.	833	360	10	KZV	Wenatchee Battery & Motor Co., Wenatchee, Wash.	833	360	50
KFIJ	Thoreau, Sidney I., Platte, S. D.	1,270	236	5	WQAO	West Texas Radio Co., Abilene, Texas	833	360	60
KHJ	Times Mirror Co., Los Angeles, Cal.	760	395	500	WHD	West Virginia University, Morgantown, W. Va.	833	360	250
WFAM	Time Publishing Co., St. Cloud, Minn.	833	360	20	WBAY	Western Elec. Co., New York, N.Y.	610	492	500
WMAL	Trenton Hdwe. Co., Trenton, N. J.	1,170	256	15	KFAF	Western Radio Corp., Denver, Colo.	833	360	500
KDYS	Tribune, Inc., The, Great Falls, Mont.	833	360	250	WOQ	Western Radio Co., Kansas City, Mo.	833	360	250
KLX	Tribune Pub. Co., Oakland, Cal.	833	360	250	KFCY	Western Union College, LeMars, Iowa	833	360	100
WDAH	Trinity Methodist Church, So. El Paso, Texas	833	360	200	KYW	Westinghouse Elect. & Mfg. Co., Chicago, Ill.	870	345	500
WMAG	Tucker Elec. Co., Liberal, Kan.	833	360	20	KDPM	Westinghouse Elect. & Mfg. Co., Cleveland, Ohio	1,110	270	250
WAAC	Tuland University of Louisiana, New Orleans, La.	833	360	400	KDKA	Westinghouse Elect. & Mfg. Co., East Pittsburgh, Pa.	920	326	1,000
WLAL	Tulsa Radio Co., Tulsa, Okla.	833	360	100	WEZ	Westinghouse Elect. & Mfg. Co., Springfield, Mass.	890	337	600
WKAW	Turner Cycle Co., Beloit, Wis.	1,240	242	10	WQAD	Whiteall Elect. Co., Waterbury, Conn.	1,240	242	50
WOAF	Tyler Commercial College, Tyler, Texas	833	360	20	WJH	White & Beyer Co., Washington, D. C.	1,100	273	50
WRL	Union College, Schenectady, N. Y.	833	360	500	WJAK	White Radio Laboratory, Stockdale, Ohio	833	360	60
WJAX	Union Trust Co., Cleveland, Ohio	770	390	500	WEAH	Wichita Board of Trade & Landers Radio Co., Wichita, Kan.	833	360	100
WKAH	United Battery Service Co., Montgomery, Ala.	1,330	226	20	WPAD	W. A. Wieboldt & Co., Chicago, Ill.	833	360	100
WAAP	United Elec. Co., Wichita, Kan.	833	360	150	WCAS	Wm. Hood Dunwoody Industrial Inst., Minneapolis, Minn.	833	360	200
WPO	United Equip. Co., Memphis, Tenn.	833	360	50	WHA V	Wilmington Elect. Specialty Co., Wilmington, Del.	833	360	50
KFDH	University of Arizona, Tucson, Ariz.	833	360	250	KFFEL	Winner Radio Corp., Denver, Colo.	833	360	150
KQI	University of California, Berkeley, Cal.	833	360	250	WHAP	Winter Park Elect. Const. Co., Winter Park, Florida	833	360	20
WHAG	University of Cincinnati, Cincinnati, Ohio	1,350	222	100					
KFAJ	University of Colorado, Boulder, Colo.	833	360	100					
WRN	University of Illinois, Urbana, Ill.	833	360	500					

(Continued on next page)

The Radio Woman Changes in Broadcasting Stations

SOME women just can't help being meddlesome. Here's a friend of mine who never will know anything about radio "butts in" on her husband's plans and makes herself perfectly ridiculous. It seems he had planned to take his radio set to their Adirondack camp for the summer and had spent several evenings checking up a list of spare parts he might need. His wife saw the list and brought to bear on it her half-baked knowledge of radio lingo. She decided the list wasn't complete and hid herself to the nearest radio supply store. Then she made this speech to the astonished clerk: "We're going to take our radio set up to our camp for the summer and, with it, a lot of spare parts. My husband has made a list, but he's forgotten something. I'm going to help him out and I want you to measure me off two 450 meter waves, so that if one breaks we'll have another on hand!" Isn't that the limit? The clerk told



(C. Kadel & Herbert)
Baby Ralph Breslin listens while mother prepares the muffins.

the husband, he told my husband, he told me and now I'm telling you. I hope my woman friend buys this issue of RADIO WORLD—and reads it!

* * *

I've been reading a lot lately, it seems to me, of how carefully tubes must be mounted to prevent jarring and breaking the filaments when the set is moved about. In one of the big department stores the other day I saw some sports shoes with soles of what they called "crepe rubber." It was about half an inch thick and very spongy in appearance and feeling. Why not make pads of this crepe rubber and mount the tubes on them?

ELEVEN new Class A stations were licensed by the Department of Commerce during the past week, eight Class C stations transferred to Class A, and two transferred from Class C to Class B.

SUPPLEMENTAL LIST OF LIMITED COMMERCIAL BROADCASTING STATIONS

Call	Station	Frequency Kcys.	Wave Length Meters	Power Watts
K F J A	Central Power Co., Brand Island, Neb.	1230	244	100
K F K A	Colorado State Teachers' College, Greeley, Col.	1210	248	50
W A B L	Connecticut Agri. Col., Storrs, Conn.	1060	283	100
W A B K	First Baptist Church, Worcester, Mass.	1190	252	10
W S A D	J. A. Foster Co., Providence, R. I.	1150	261	50
W T A G	Kern Music Co., Providence, R.I.	1160	258	10
W D B C	Kirk Johnson & Co., Inc., Lancaster, Pa.	1160	258	50
K F J B	Marshall Elect. Co., Marshalltown, Iowa	1210	248	10
K F L E	National Educational Service, Denver, Col.	1120	268	10
W T A K	Swan-Bower Co., Steubenville, Ohio	1130	266	20
K F I L	Windisch Elect. Farm Equip. Co., Louisburg, Kan.	1280	234	100

TRANSFER CLASS C TO CLASS A

W O A K	Collins Hardware Co., Frankfort, Ky.	1250	240	10
W D A I	Hughes Radio Corp., Syracuse, Syracuse, N. Y.	1220	246	100
K F F B	Jenkins Furniture Co., Boise, Idaho	1250	240	10
W C A G	Randall, Clyde R., New Orleans, La.	1120	268	50
W E W	St. Louis Univ., St. Louis, Mo.	1150	261	100
K F F O	Smith, Dr. E. H., Hillsboro, Ore.	1310	229	5
W Q A B	Southwest Missouri State Teachers College, Springfield, Mo.	1270	236	10
W A A N	University of Missouri, Columbia, Mo.	1180	254	50

TRANSFER CLASS C TO CLASS B

W L W	Crosley Mfg. Co., Cincinnati, Ohio "B"	970	309	500
W D T	Shipowners' Radio Service, New York "B"	740	405	500

(Continued from preceding page)

Call	Station	Frequency Kcys.	Wave Length Meters	Power Watts	Call	Station	Frequency Kcys.	Wave Length Meters	Power Watts
WBAN	Wireless Phone Corp., Paterson, N. J.	1,230	244	100	WEAP	Wortham Carter Pub. Co., Fort Worth, Tex.	630	476	500
WNO	Wireless Telephone Co., Jersey City, N. J.	833	360	15	WWAD	Wright & Wright, Inc., Philadelphia, Pa.	833	360	200
WPAH	Wisconsin Department of Markets, Waupaca, Wisc.	833	360	800	WKAF	W. S. Radio Supply Co., Wichita Falls, Tex.	833	360	100
WNAP	Wittenberg College, Springfield, O.	833	360	100	WAAY	Yahrting Rayner Piano Co., Youngstown, Ohio.	833	360	100
WKY	Radio Shop, Oklahoma City, Okla.	833	360	100	KFIQ	Yakima Valley Radio Broadcasting Association, Yakima, Wash.	1,240	234	50
WFAB	Woese, Carl C., Syracuse, N. Y.	1,280	234	200	WJAJ	Y. M. C. A., Dayton, Ohio.	833	360	50
WOAX	Wolff, Franklyn J., Trenton, N. J.	1,250	240	100	KDA	Y. M. C. A., Denver, Colo.	833	360	1KW (1,000)
WOAW	Woodmen of the World, Omaha, Neb.	833	360	50	WABE	Y. M. C. A., Washington, D. C.	1,060	283	50
WOAL	Woods, Wm. E., Webster Grove, Mo.	833	360	500	WKC	Zamoiski Co., Jos. M., Baltimore, Md.	833	360	50
WIAY	Woodward & Lothrop, Washington, D. C.	833	360	50	WIAE	Zimmerman, Mrs. Robert E., Vinton, Iowa	833	360	40
WLAH	Woodworth, Samuel, Syracuse, N.Y.	1,280	234	250					
WWAX	Wormser Brothers, Laredo, Tex.	833	360	100					

How to Make a Single Circuit Regenerative a Phantom Receiver

By Leon W. Bishop 1XP

ONE of the most interesting and spectacular circuits for a single tube may be constructed for vacation use and may be used in a car or at camp and requires little or no aerial. The circuit is an adaptation of the two Armstrong principles and it really produces distance and clarity for a small constructional cost.

The success of any circuit depends upon the constants, particularly this one which would seem to be a standard regenerative circuit but is completely changed by a large tickler and variable grid leak.

This circuit has been designed for the new wave bands of 2,000 to 550 kilocycles (150 to 545 meters) which includes the amateur. The circuit is more efficient on the shorter wave bands so it is possible to get the Class B stations as loud as the Class A stations which is not possible with other types. Due to great flexibility the circuit will work equally well on phone, CW, ICW, and spark which will insure all classes of service no matter where located.

When using this one tube circuit in a car with a four foot aerial it is equal to a three stage radio-frequency amplifier and detector. Due to the short aerial used it is possible to receive through bad QRN and for this reason alone is of considerable value during the summer months.

The best tubes to use are the UV 199 and UV 201-A. The rheostat should be that resistance advised by the makers of the tubes. The B battery can be anywhere from 45 to 90 volts but maximum results will be obtained at about 65 volts. The two fixed condensers .00025 and .002 should be of the mica type. The variable condenser should have from 17 to 23 plates (.0003 to .0005 MF).

The variable grid leak is important and should be variable over a range of from 50,000 to 5 megohms. Several commercial types that were tried did not have the range they claimed so it might be advisable to build your own and for that purpose purchase a ten cent roll of Dennison's black picture binding paper tape whose dull black surface is slightly conducting and can be readily lowered with an extra soft lead pencil. This grid leak can be arranged with a sliding arm or switch and contacts but it must be variable over a wide range and capable of fine adjustment.

Like the grid leak the coupler is of special design and the following values should be adhered to. The best combination to use is the rotor and stator of a standard coupler wound as follows: The tube (stator) should be wound with as large a wire as possible starting with 20 turns on the rotor side of the tube and tap off every ten turns until you reach 120 turns which will leave 11 taps.

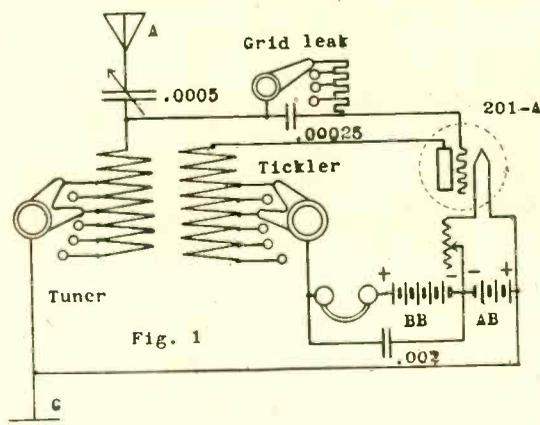
The rotor is also a real job for it is tapped in a similar manner. Start on one side of the rotor with 40 turns and tap off every 10 turns until you have wound on 120 and you will have nine taps. These taps can be passed through the rotor shaft to switch points on the panel or a switch may be mounted on the rotor. Fine wire may be used on the rotor to accommodate the 120 turns necessary.

A warning is issued against the use of shellac on the windings. Firm windings may be obtained by drilling holes at each tap off and binding the wires in them.

Do not use honeycomb coils. Either double or single switch arms may be used. The 180 degree type of coupler can be used. Do not tap the coils any coarser than 10 turns but finer if anything.

The best antenna or collector system is to connect the variable condenser at point A of the diagram to a good ground. No other connection is necessary. There are five adjustments on the set—1, the grid tuning coil; 2, the tickler coil; 3, the coupling between these coils; 4, the variable grid leak; and 5, the variable condenser.

As the tickler coil and grid leak are increased a regenerative condition will be met, which is denoted by a high pitched whistle, the pitch of which can be varied by the grid leak and should be adjusted until it is above the point of audibility and only a slight hiss is heard in the phones. At this point a wonderfully sensitive condition exists for all classes of phone and



Comprehensive circuit diagram illustrating a good single circuit "phantom" receiver.

CW and will tune in contrastingly clear as compared with any single tube circuit.

A given wave length is tuned in by means of the variable condenser and grid circuit tuning coil. The tickler and grid leak are merely adjusted to conform to this condition. The resistance of the grid leak should be so arranged that it will give out a bad screech as it is increased and follow through an intermediate series of pure notes until it passes out of audibility with a range of adjustment on either side.

The right polarity of the tickler coil in the plate circuit will have to be tried out by reversing the leads until the best results are obtained.

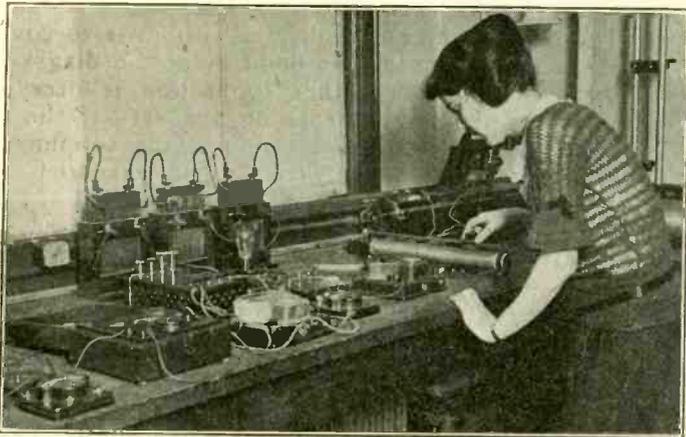
This is a standard circuit and may be used as such with an aerial and ground by reducing the tickler coil turns with the switch. With an aerial and ground the circuit can be used for transmission with a power tube and increased B voltage. All classes of super results may be obtained which makes it an ideal vacation outfit.

There are several aerial combinations that work well. One of the most interesting is to connect the point G to ground and touch the moistened finger to point A. For apartment houses two combinations can be used—connect the point G to ground and the point A to some metal object or a small aerial in the room, or connect just the point A to ground.

Of the Myriad Interesting Radio News Are T

BARNARD GIRLS ENJOY RADIO RESEARCH

The Department of Physics of Barnard College, New York, has some of the most interesting radio research apparatus and laboratories in the city. The most interesting and intriguing part of it is that the course is for girls alone, and that they are studying this research work as a



(C. Kadel and Herbert)
Miss Irene Bowman, class of '23 of Barnard College, determining the operating characteristics of a U. V. 201. The most up-to-date laboratory research apparatus is necessary and is used.

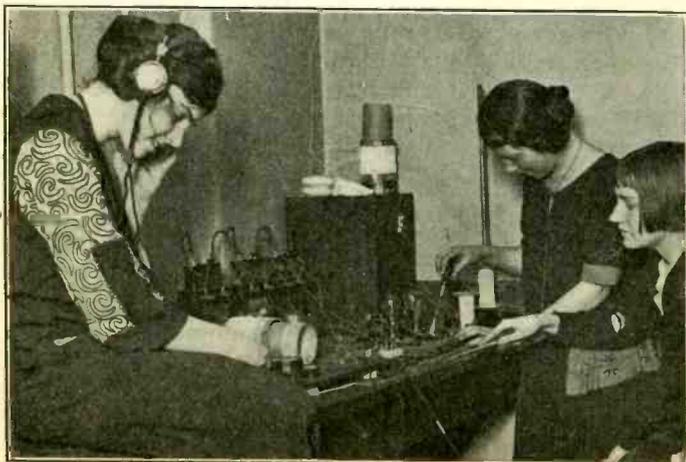
part of their regular college work, and will be graduated with the degree of R. E.

The course is a most extensive and practical course and takes in the theory and actual practice of radio. The girls have a very complete laboratory, where they can work out all the problems and prove out to their own satisfaction the deep, deep theories of all the master minds of the radio profession.

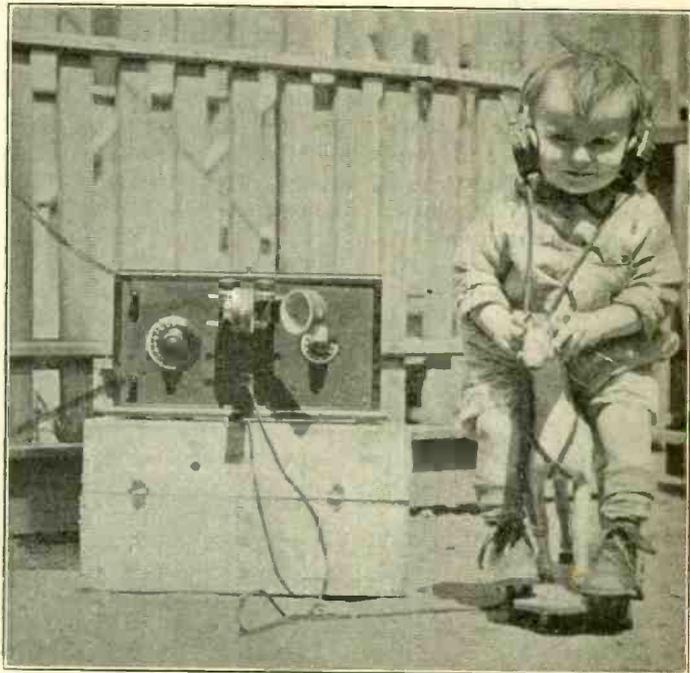
To give a slight idea of the extensive work that they are doing, just look at the illustrations and see them studying tube characteristics and work out neutralizing capacities for different styles and types of tubes. It is deep stuff, but interesting, and watch them go when they can tell the profession that they are full-fledged R. E's.

Captions by

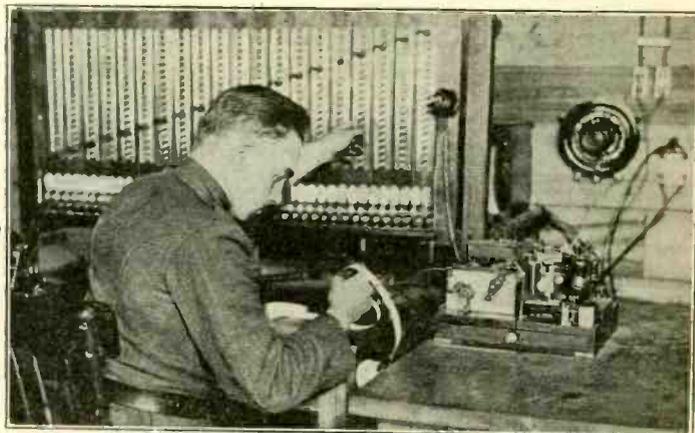
Robert L. Dougherty



(C. Kadel and Herbert)
Miss Olive Gunn, class of '24; Miss Ruth Bass, class of '26; Miss Barbara Collison, class of '26, and Miss Lillian Willson, class of '26, studying the effect of neutralizing capacities on the operating characteristics of a three tube set.

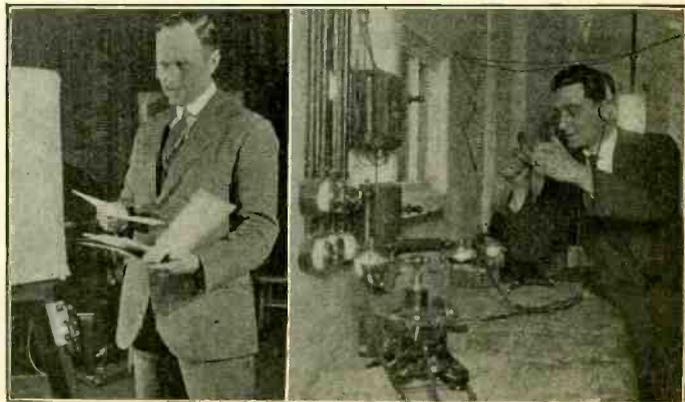


Master Henry Pavel, Jr., of Astoria, L. I., has taken such a liking to Daddy Pavel's radio set that he has to have it out in the play yard in the garden with him. Although only a beginner in the art, he is a "mean dial twister," and would rather hear Uncle Roxy than twist the cat's tail, which is some reformation. The set used is the Sorenson circuit described in RADIO WORLD for January 20.



(C. P. and A. Photos)

Apparatus at Camp Vail, N. J., by which it is possible for the students of telegraphy and radio to quickly see their faults by comparing their transmission with one that is machine sent and perfect. This is possible by comparing the two which are recorded on a moving tape. There are 115 men and officers at this camp devoting their time to radio and signal corps work.



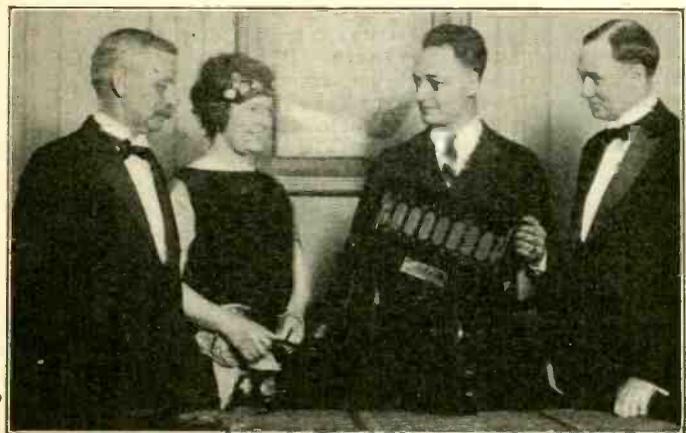
(C. Underwood and Underwood)

How the control man informs the performer of this English station how the music is being transmitted. A window communicates between the studio and the operating room, and visible signals are used as shown. Wonder if "thumbs down" means show emotion or run?

s Events Constantly Occurring These ypical



(C. Keystone View)
It's perfectly wonderful getting your boots slicked up in this shine parlor, if you live in San Francisco. But don't possess a pair of "musical ankles" if they start in to broadcast a good lively jazz while trying to get a shine for church.



(C. Photonews, N. Y.)
Edith Bennet, American concert star, was presented with a full-fledged and complete radio set at the Hotel San Remo when a banquet was held in her honor. The set was donated on behalf of Miss Bennet's efforts for the unseen radio audience some time ago, when she sang the first concert broadcast across the Atlantic.



(C. Kadel and Herbert)
Instead of the usual sleeping potions and drugs they are now serving neurotic patients in all the big hospitals and sanatoriums with a light dose of fresh caught radio music and talk. Doctors claim that it quiets the nerves and soothes the patients much better than the usual harmful habit forming drug. Even nurses like it.

WHN IS A POPULAR STATION WITH THE FANS

The call letters of this station have been heard far and wide despite the fact that it is a comparatively low-power station among a forest of high-powered brethren. This station, although using only 200 watts output, can claim the distinction of being heard in Cuba and Panama, and



(C. Kadel and Herbert)
Chief Operator F. W. Boettcher doing his "daily dozen" in adjusting and checking the wave length of Station WHN, well known and liked by the many listeners.

it is through the co-operation of the studio and the people in the surrounding territory that WHN has gained the name of "One of the most popular broadcasting stations in the East."

The accompanying illustrations show the personnel of the station that tend to make this station more and more popular through combining the public's wishes with their programs and making the people feel that they have a personal interest in WHN.



(C. Kadel and Herbert)
Staff of WHN. Left to right: Robert Pierce (late of WJZ), Mrs. Catherine Chute, Charles Reed Jones, Miss Pauline Kinkel, F. William Boettcher (Chief), Miss Adeline Rabe, Louis F. Mueck. Sitting: Maddling Jonk, Carl Klemmens. Up above the crowd is J. L. White.

RADIOGRAMS

WORLD NEWS HAPPENINGS BRIEFLY
PHRASED FOR OUR BUSY READERS

A man's home is no longer his castle—it's his receiving station.—Exchange.

* * *

The Goldman band concerts in Central Park, New York City, will be broadcast this summer.

* * *

A lady asserts that she never saw the man she is said to have married, but what does that prove in the Age of Radio?—*New York Times*.

* * *

Irving Langmuir, of the General Electric Company's Research Laboratory, has received the degree of Doctor of Science from Union College, Schenectady, N. Y.

* * *

A feature of Children's Day, which was celebrated by hundreds of churches, was the broadcasting of a full "Children's Day Service" from Station WJZ in commemoration of the golden jubilee of the occasion.

* * *

Edward Lind Morse, artist, author and son of Samuel Finley Breese Morse, inventor of the telegraph, died last week at his home in Pittsfield, Mass., at the age of sixty-six. His portraits and landscapes are in many American art museums. His principal literary work was "Samuel F. B. Morse, His Life and Letters."

* * *

Max Graf, president of Graf Productions, Inc., has found a new way to get in touch with the theatre-going public. It's via radio, and last week the producer spoke to the public from WJZ in the Aeolian Building, New York City. His idea, Mr. Graf explained, was not to get publicity, but to ask all those listening in on his speech to write him what they wanted in motion pictures.

* * *

The dancing which followed the recent Shriners' pageant in Washington, D. C., was intended to represent "a united country in step." The music was broadcast by radio throughout the continent and was carried to the thousands of participants through amplifiers along Pennsylvania Avenue. Each block was set aside for a State, and the spectators along the line were invited to join the 140,000 Shriners and their visiting companions in the festival.

* * *

Holger H. Hansen, of "El Ejemplo," Humacao, Puerto Rico, sends to RADIO WORLD a clipping of a public notice signed by Governor Henry H. Hough of the Virgin Islands, reading as follows: "It is hereby brought to public notice that, in pursuance of the provisions of the ordinance approved 28 May, 1910, it is unlawful to establish or maintain a radio or wireless station, public or private, in the Virgin Islands of the United States without the express authorization of the Governor of the Virgin Islands of the United States of America. Violations shall be punishable as prescribed by Chapter I, Section 6, of the ordinance above mentioned."

* * *

It is the plaint of scientists that the public seldom recognizes their work until that work takes on some spectacular aspect, and the reproach is possibly justified, observes a writer in the *New York Times*. It causes them to be reticent with regard to their achievements for fear that the true significance of them may be lost in the attempt to impress them upon the public's mind by some vivid detail. But in the last few years the increasing interest in science because of its close relation to every-day life, the growing knowledge of its service to mankind, has brought about a greater recognition of men whose work was unknown a short time ago except to their associates.

* * *

Thomas Alva Edison attended the graduating exercises of the Massachusetts Institute of Technology at Cambridge, Mass., last week. His son, Theodore Miller Edison, was a member of the graduating class to receive the degree of Bachelor of Science. When asked if he would give his son a job without requiring him to answer one of the famous questionnaires, Mr. Edison is quoted as saying: "My son is a physicist and mathematician, and I am no mathematician. If his mathematics are not too professional he can work with me, but if his mathematics shoot off in the Einstein direction he'll be practically no use at all." Asked why he allowed his son to go to Tech, Mr. Edison is reported to have said: "There is some hope for men who come out of Boston Tech. When they come out of Harvard, Yale and other colleges they leave all hope behind."

Gerard Swope, president of the General Electric Company, received the honorary degree of Doctor of Science from Rutgers College at the recent annual commencement.

* * *

British authors, playwrights and composers have decided they will not permit the broadcasting of their works by radio unless they receive payment for the use of the material.

* * *

Radio communication is rapidly being adopted by Western power companies as a means of maintaining communication with their distant power plants when wire lines are inoperative.

* * *

Governor Smith of New York last week gave an account of his stewardship and explained in detail the various appropriations he has approved. His statement was broadcast in full from Station WGY, Schenectady, N. Y.

* * *

A fund for the purchase of a library devoted to the science of radio has been established at Yale University by Dr. Lee De Forest, who is a Yale graduate. Dr. De Forest has also established a fund for a course of thirty lectures by radio experts for the benefit of the engineering staff.

* * *

Dr. Louis Bell, widely known electrical engineer, died at his home in West Newton, Mass., last week. He organized the course in electrical engineering at Purdue University, was editor of the "Electrical World" two years and chief engineer of the Electric Power Transmission Department of the General Electric Company three years. He designed and installed the first polyphase power plant in this country.

* * *

A British explorer named Buchanan and his party of Arab natives were among the hills of the Sahara Desert when he slipped and fell nearly 100 feet, sustaining bad bruises and internal injuries. Natives carried him fifty miles to the nearest wireless station, a far-flung outpost of the French, over 500 miles from civilization. By wireless the French got in touch with doctors at Algiers and ascertained how to treat Buchanan. Three days later he and his party resumed their march.

* * *

In an effort to decrease governmental radio interference, a special committee composed of members of the Interdepartmental Advisory Committee on Radio has made a study of wave frequencies used by the government, and recommended certain changes to the Department of Commerce. In view of this Secretary Denby, of the Navy, has requested that a complete survey of all government radio activities be now undertaken by this committee so that complete co-operation and co-ordination may be had.

* * *

Chandler Goldthwaite, the brilliant young American organist, who for the last two years has been at the console of the St. Paul Municipal Auditorium organ and enjoys the distinction of having played to the largest audience in the world, sailed for Europe recently. Before leaving on his European concert tour, Mr. Goldthwaite played several Sunday night radio organ recitals which were broadcast from the studio of the Skinner Organ Company, New York City, through Station WEAJ.

* * *

High voltage experiments were conducted at the Pittsfield, Mass., laboratories of the General Electric Company last week during which a realistic electrical storm was manufactured for visiting engineers and newspaper men. All were duly impressed as each had to sign a waiver against claims for possible injury before entering the laboratory. It is estimated that a voltage of 2,000,000 was attained, which is said to be twice that ever before employed in similar experiments. Arcs were sprung between terminals over 15 feet apart.

* * *

A program of singing and addresses was broadcast for the first time simultaneously from four widely separated stations—WEAF, New York City; KDKA, Pittsburgh; KYW, Chicago, and WGY, Schenectady, N. Y.—which were connected by direct telephone wire with the stage of Carnegie Hall, New York City, where the recent convention of the National Electric Light Association was in session. As a result many hundreds of thousands of radio fans in this country and Canada were able to listen to the singing of Miss Anna Case of the Metropolitan Opera Company and to the talk of Julius H. Barnes, president of the Chamber of Commerce of the United States. The transmission of the voices over the telephone lines was so clearly instantaneous that the four radio stations broadcast the proceedings at virtually the same second.

Answers to Readers of Radio World

I HAVE three small De Forest honeycomb coils and two others of another make which are the largest manufactured. With the De Forest I can put them in a circuit with a buzzer or bell and make the circuit, but with the others, I cannot do this. Is this an indication of a break in the coil? Will a one-tube reflex set allow me to get WJY and WJZ on a loop with anything like fair volume?—F. N. Cash, Norwich, Conn.

This is not an indication of a break in the coil. As the larger coils have considerable resistance it is hardly possible that you could ring a buzzer or bell with such a coil in the circuit. They have thousands of feet of fine wire, and the resistance is very high. A reflex set on a loop should enable you to get the stations you desire, if it is carefully made and tuned.

Kindly advise me what materials I would need for a reflex circuit similar to the De Forest. What is the circuit used? What type R. F. transformers are used in the De Forest reflex and are same available on the market? Is it advisable to make your own transformers for this type of work? What is the tuning done with when a loop is not used and antenna and ground is used in the De Forest D7 reflex? Is this type of set

done in the laboratories. In this set when the loop is withdrawn from the jack, it automatically connects the secondary of a tuner in the circuit, and the set can then be tuned by means of an ordinary variocoupler and the secondary condenser. This set is highly selective and the tuning on it is very sharp.

In RADIO WORLD for February 10 you published an article concerning the making of a spiderweb coil tuner. Will paper forms be permissible to wind these on? The forms are to consist of thin white paper fastened together with clear varnish. Why is not slate used for forms such as this in radio work?—W. A. Bond, Hotel Irving, Greenwood, Miss.

Would suggest that you use cardboard formers instead of white paper varnished as you mention. Paper would not have sufficient body to support the coils, and winding with varnished paper as you suggest would have a tendency to give a capacity effect between turns of the winding. The best material for this purpose is either thin mica sheeting, fibre board, bakelite sheeting, or heavy cardboard impregnated with wax or paraffine. Slate is not suitable for two reasons. The first is its working qualities and the

As stated numerous times before, "cheap apparatus gets cheap results—good apparatus satisfies."

In RADIO WORLD for May 19, R. N. King writes an article entitled "The Pup drags It In" and gives a list of stations heard on the set. What issue did this circuit appear in?—A. R. Gurnett, 64 Hallam Street, Toronto, Canada.

This circuit appeared in RADIO WORLD for May 5 on page 7 with a complete description and panel layout.

Can results from the U. V. 199 tubes be expected to equal those of the old 200 or 201 tubes as detector and amplifiers? I am using these tubes in my set as detector and amplifier. With the use of 45 volts on the plate a decided decrease in filament supply is noted and the results obtained are nowhere near my old set. What can I do to remedy it?—Kenneth H. Jones, London Mills, Ill.

Under proper usage, these tubes will give wonderful results. The volume obtained when they are used as detectors is very near that when the U. V. 200 or 201a is used. Extremely careful operation of the filament rheostat is necessary to obtain the best re-

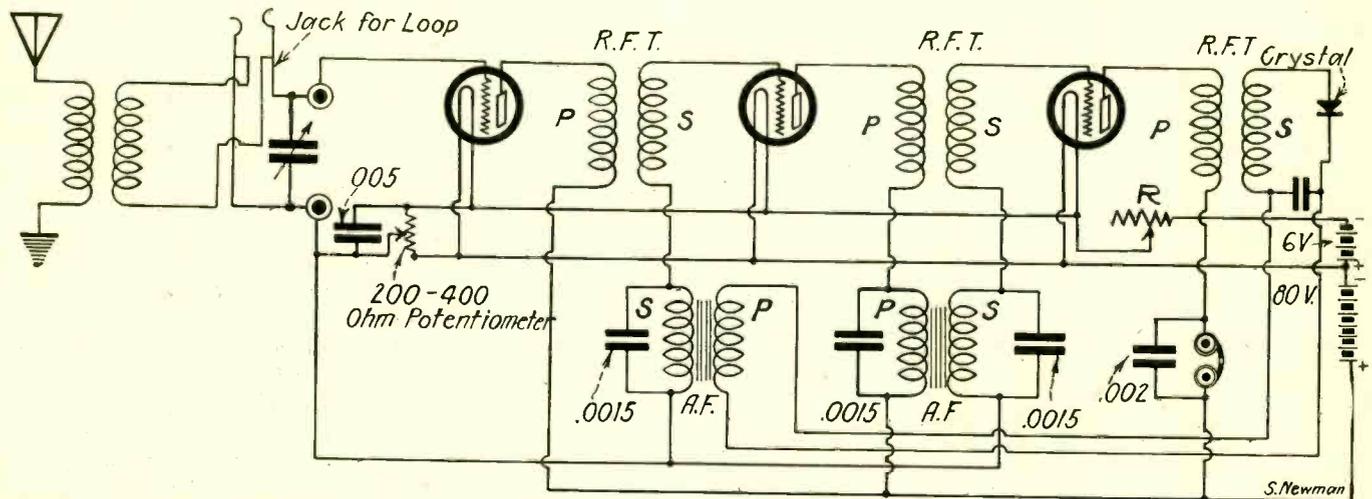


Diagram of the reflex circuit used in the De Forest D7 combination and antenna-ground receiver. When assembling a set of this type extreme care should be taken. A reflex circuit due to its action and construction will often not operate because some simple minor detail has been overlooked. If your circuit does not work, you may be sure that something has been done wrong in the construction and the fault is not in the circuit. Follow the diagram exactly, solder your leads and make them as short as convenient and be assured of success. Don't experiment with your own ideas.

selective?—Howard W. Root, Derby Line, Vt.; A. G. Morris, 967 Fulton Street, Brooklyn, N. Y.; Allen Beardsley, Arlington, Va.

The necessary apparatus for the De Forest type reflex set would consist of three radio-frequency transformers, two audio-frequency transformers, three tubes with sockets, one rheostat (single control), one potentiometer, one crystal detector, one variable condenser, one coupler, one loop and fixed condensers as specified in the diagram. The circuit used is shown herewith. The R. F. transformers that are used in the De Forest are not available as they are especially manufactured for these sets. It is decidedly cheaper to buy your transformers than to make them, as the product that you buy is as perfect as research work and skilled workmen can possibly make them. It takes more than a knowledge of how to wind them, as various factors such as the internal impedance of the tubes and various other technical details have to be considered, and a home-made transformer could not be any more than a makeshift unless all the data was worked out before hand as it is

second is that it is not a good insulator of high frequency currents. Slate is extremely brittle and hard to cut and shape, and using it for formers in such a winding would lead to innumerable troubles in the cutting and drilling. Don't court trouble in trying to work slate unless you have ample stone cutting facilities and experience in working this material.

In the June 2 issue of RADIO WORLD you published a hook-up of a single tube reflex circuit using two RF transformers without description or specification as to what ratio or make to use. Kindly let me know.—R. B. Bannard, Hyde Park, Mass.

If you will refer to the diagram you will see that there is one audio- and one radio-frequency transformer used. They are labeled AFT and RFT. The audio-frequency is shown as a metallic cored transformer and the radio-frequency as an air core transformer. We cannot specify any make of transformers in our descriptions or articles. Buy the best you can afford and be satisfied that your results will be good.

When too much current is used, the volume of the received signals falls off appreciably. You should supply the filament current to these tubes through a 30 ohm rheostat in order to get correct filament current, and even then a fine vernier control is necessary. When these tubes are used as an amplifier a grid bias battery is necessary in the grid lead. This can consist of three cells of a flashlight battery in series for the first step, and two such units of three cells, or six cells in series for the second step. This has been found necessary when using these tubes as amplifiers and your volume will be found to increase greatly if it is done. As before stated, the filament current is very critical. This applies to the amplifiers as well as detectors. If your tubes work better with less B current at the amplifier it is perfectly O. K. to use less, but the fact that you have to decrease your filament current when 45 volts are used points out the fact that you are using too much filament current. Watch this point very carefully before getting impatient with your tubes.

Latest Radio Patents

Radio Receiving Apparatus

No. 1,455,141: Patented May 15, 1923. Patentees: P. D. Lowell and F. W. Dunmore, Washington, D. C.

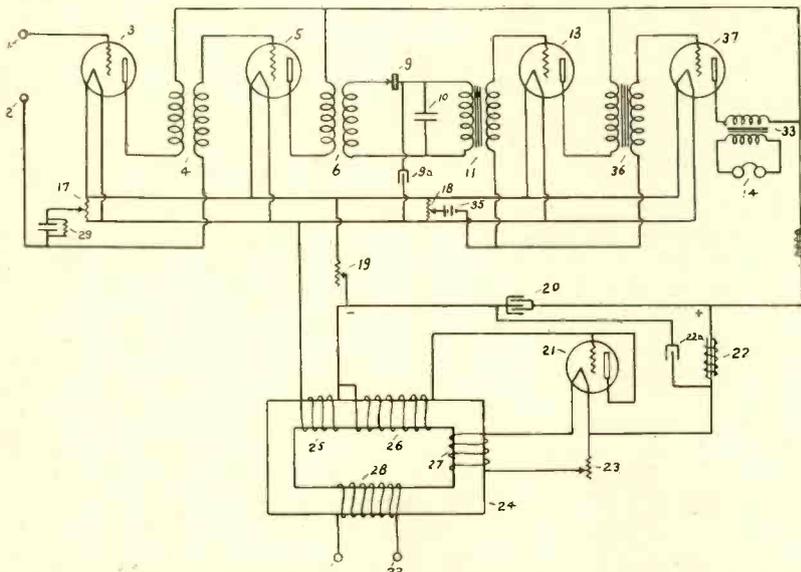
THIS invention relates broadly to radio telegraph and telephone receiving apparatus and more particularly to a circuit arrangement for such receivers.

The object of the invention is to provide a receiver unit of maximum sensitivity employing thermionic vacuum tubes with their circuits supplied with energy from the standard alternating current residence lighting power.

Another object of the invention is to provide both radio and audio frequency amplification at the receiver and means for energizing the power circuits of the amplifier stages from the standard alternating current residence lighting power without interference in the reproducing

frequency stages of the vacuum tube amplifiers and means for rectifying currents and obtaining a steady source of direct current potential for the plate circuits of the vacuum tubes.

Electron tube amplifiers form an important part of practically all radio receiving sets now, except the most simple types. Such amplifiers are in fact necessary to receive distant stations, or when using coil antenna. For good operation, amplifier tubes require for the filament a source of voltage of very constant value (usually about 6 volts) and for the plate a source of voltage of from 40 to perhaps 300 volts. The filament voltage is usually supplied by storage cells, and the plate voltage by dry cells. The maintenance of these cells in operating condition, especially the storage



Means of supplying a multi-tube circuit receiver with plate and filament current from the commercial house current. A crystal detector is used, thereby eliminating any hum, which is further balanced out by an elaborate filter system.

receivers from the hum of the alternating current power supply.

A further object of the invention is to provide a circuit arrangement for a receiver wherein both the radio and audio frequency currents are amplified by means of electron tubes, a crystal detector used as a rectifier, the necessary filament and plate voltages being supplied by the standard alternating current residence lighting power, the residual hum in the telephone receivers being balanced out or neutralized by means of voltage dividers and other devices in the receiver circuits.

A still further object of the invention is to provide means in a radio receiver for transforming the alternating current power supply into currents suitable for the various circuits of the radio and audio

cells, is often a source of much difficulty and annoyance. The storage cells are necessarily bulky and heavy, require constant attention to maintain proper charge and density of electrolyte, give off injurious acid or other fumes and are subject to considerable variations of voltage during the period of discharge. The development of a receiver employing an amplifier which can be supplied from the ordinary 110 volt alternating current lighting mains is of considerable practical importance, since it eliminates the great practical difficulty of maintaining storage cells. The amplifier using such alternating current supply has the important advantages of reliability, convenience, and cheapness both in first cost and operating cost.

Radiotelegraph Signaling System

No. 1,454,624: Patented May 8, 1923. Patentee: Corwin C. Chapman, San Francisco, Calif.

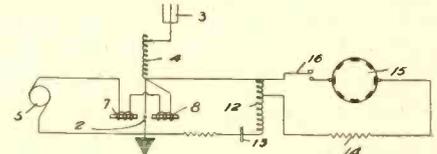
THIS invention relates to radio signaling and particularly to single wave radio signaling.

Heretofore, signaling with continuous oscillations produced by an arc radio gen-

erator has involved the radiation of oscillations of two frequencies, one being the signaling frequency or wave, and the other being the compensating frequency or wave. Signaling has usually been accomplished by variation of antenna inductance, which variation altered the frequency of the radiated wave, so that two waves of different frequency were radiated by a station during signaling.

In order to avoid interference, it was necessary to assign two wave lengths to each station and as the number of stations have multiplied, confusion and interference has been caused by the radiation of oscillations of two different wave lengths from each station.

An object of the invention is to provide a system of single wave radio signaling, in which waves having a frequency above the limit of audibility are converted into signals having a frequency within the range of audibility. The arc radio generator produces continuous waves having a frequency above the range of inaudibility, but many receiving stations are not equipped to receive and identify waves of such frequency. This invention, there-



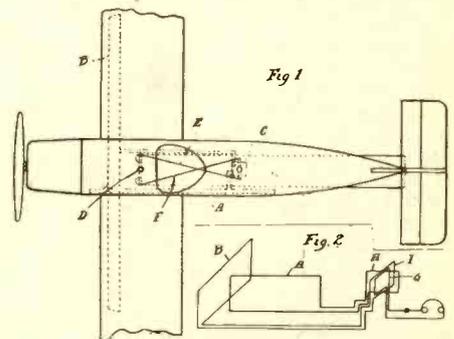
Method of using continuous waves for signaling without the necessity of generating two separate waves.

fore, contemplates so manipulating the high frequency waves that signals will be received by such stations and this is preferably accomplished by converting the continuous wave into wave trains or wave groups, the frequency of the groups being within the range of audibility, so that signals so transmitted are readily received by all receiving stations. This is accomplished with the use of waves of a single frequency, thus eliminating the presence of the compensating wave. With my invention, there is utilized an absorbing oscillatory circuit in shunt with the transmitting circuit so that intermittently this shunt circuit absorbs substantially all of the energy of the source.

Method of Piloting Aircraft

No. 1,454,592: Patented May 8, 1923. Patentees: H. R. C. Van de Velde and J. M. Furnival, Bromley, England.

THE object of this invention is to provide improved wireless direction findings means whereby the pilot of any type of aircraft can automatically find his way. We connect the moving part of any ordinary direction finding means in which the maximum or minimum method is employed either to the rudder bar controlling the direction of flight of the aircraft or to any auxiliary attachment thereto. One method of applying the system is



Antenna system for obtaining directional effects as applied to aircraft. A double balanced loop system is used.

shown in the accompanying drawing which illustrates the standard Bellini-Tosi system. In the drawing: Fig. 1 is a plan view of an aeroplane having a direction finder in accordance with the invention. Fig. 2 is a diagrammatic view showing the angular relation of the coils of Fig. 1.

Whereas They Were Deaf, They Now Hear Again—By Radio

RADIO has broken the shell in which I have been living for forty-five years. There are something like five million people in the United States more or less hard of hearing. Only a few realize what the new discovery means to them. I'd like to go down to Wall Street and stand on the Treasury steps beside Washington's statute to preach the gospel of Saint Radio!"

That is the voice of the man who cares nothing for the process, mechanical or psychological; he wanted not reasons but results. Whereas he was deaf, now he hears. But already the Section on Otology of the American Medical Association has begun to discuss the scientific aspects of radio for the deaf and a paper read at Atlantic City a few days ago expressing a favorable view will soon be published in the medical journals as a basis for general discussion.

A powerful radio set has been placed in the headquarters of the New York League for the Hard of Hearing, at 126 East Fifty-ninth Street, and is enthusiastically used by the members, eight or ten at a time holding the ordinary telephone receivers—a temporary makeshift. Within a few weeks an elaborate installation will be completed with individual receiving apparatus for fifty auditors. The adaptation of radio to the hard of hearing is a delicate process which will take time and ingenuity to work out. But the beginning has been made.

The words of the first paragraph were spoken by Warren Pond, the newly elected President of the New York League. To get the full effect one must imagine him at his office desk—a grave, white-bearded gentleman in the early sixties—busy checking up the count of thousands of songs that lie silent on their separate shelves waiting to be sung or danced or played. The room is lined with these little honey-cells of prisoned music. Just a century ago Mr. Pond's grandfather issued the first composition way down in old New York. His father was Stephen Foster's publisher. There is something ironic in his own activity, forever sending out the notes of a music to which his ears were closed.

The look of the shop suggests years of business history. The look of the man suggests reserve. In sharpest contrast come his words—the irrepressible wonder and delight of the convert.

"My friend Fletcher here used to come in day after day and tell me the fun his boys were having with their set. I paid little attention at first, having learned by hard experience not to put myself in the way of disappointment.

"But my friends kept insisting, and finally made an appointment for me to listen in. I heard enough to decide to have a machine of my own. It had to be a powerful one—there are six tubes—and I used up the first battery in two days!

"I'm not ashamed to confess that when the set came, as I sat there and heard clearly, in my own home, the first notes of a song, the tears came to my eyes. It was the beginning of a new life.

"That was less than two months ago. In these few weeks I have had more of the pleasure of hearing than in forty-six years. When I was 15, typhoid fever left me with impaired hearing. The trouble has grown worse since."

Any one who has talked with partially deaf acquaintances on the telephone has probably noted that they hear much better than when spoken to face to face. In the receiver the vibration is intensified, the sound sharpened. But Mr. Pond long ago passed even the stage where that would

help him. He does not use the telephone at all.

For necessary conversation he carries a sound-magnifying device consisting of an earpiece, a short wire and a little box to be held near the speaker's mouth. This affords too limited a contact with the world for a man with a curious, exploring, social mind.

There are two things that Mr. Pond craved with a desire comparable to hunger—music and a direct, personal, human report of other men's doings. He could read and he could go to the movies. But they left him still unsatisfied.

"I would go to concerts once in awhile," he said, "hoping to get a few of the louder strains, a little phrase of melody to remember. Last year I heard Guilbert sing—that is, I heard an occasional high note."

He was like the small boy who stands wistfully outside the baseball grounds watching the top of the celestial wall for a glimpse of the rare fly batted by an invisible hand.

"One who has good hearing can scarcely imagine the terrible effort required of us by a single concert. I have come away exhausted and suffering in all my nerves. The little pleasure won is blurred by the strain of listening.

"So you can see how many different kinds of satisfaction we get from the radio. First there is the relief of hearing without effort. Then we get the entire selection where we used to feed on scraps.

"You may think Rubinstein's 'Melody in F' is a hackneyed old thing. But it gave me the richest of thrills the other day when I heard it for the first time in years, every note, all the way through. The glorious completeness of it!

"Let me tell you what I heard last Sunday. First, the full morning service at St. Thomas's Church—hymns, anthems and sermon. In the afternoon an address by Dr. Cadman with music by the Gloria Trumpeters. An organ recital ended the day.

"Another Sunday I was present—by radio—at a service where new members were received into a church. There is a good deal of detail in such an affair and it offers a severe test. I heard everything.

"It may not sound very thrilling to the man with good ears, but try to put yourself in my place. Of course, temperaments differ widely. I suppose I care more than some folks do. There is Edison. He invents devices to help the deaf and never uses them himself.

"Of late years I have gone a few times to opera, but I heard so little that there was more fun in taking time for a good dinner. This spring I heard Martha clearly, and I'm looking forward to the orchestral concerts they will broadcast next season.

"This thing has just begun. I wish I were twenty years younger to be in on all its developments. A few weeks ago it was enough to hear the stations close by. One gets ambitious. I want to hear the surf break on the South Sea Islands now.

"Yes, it costs money if you're very deaf. But who wouldn't pawn his watch to get to the gates of Heaven? His joke about those poor fellows who make excuses to slip off to the golf links or baseball. I sneak home early myself, but some day I'll do better than that. I'll have a set installed here in the office, and when work is slack there will be no time wasted."—*New York Times*.

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Radio Literature Wanted

Manufacturers of and dealers in radio apparatus and accessories are notified that literature and catalogues describing their products have been requested, through the Service Editor of RADIO WORLD, by the following:

Frank Barras, 1835 Sumdaro Blvd., Kansas City, Kans. (Manufacturer and retailer.)
 Harry Rood, 526 Comerford St., Esquimalt, B. C., Canada.
 Frank L. Hartzell, R. 1, Gilman, Wis.
 Bruce Cole, General Delivery, Glasgow, Mont.
 Milton Farber, 2866 Washington Ave., Ogden, Utah.
 A. L. Lacasse, 176 Fisher Ave., Roxbury, Mass.
 James E. Forr, 1212 Thirteenth St., Altoona, Pa. (Consumer.)
 T. W. Austin, P. O. Box 416, Greenville, Ala.
 W. L. Keifer, 430 North Sixth St., Lebanon, Pa. (Large consumer.)
 G. H. Turrell, Jr., Smithtown Branch, Long Island, N. Y.
 M. G. Hagerty, 403 Milock Lane, Brackenridge, Allegheny Co., Pa. (Wants a loud speaker.)
 Frank K. Annis, 453 Louisiana Ave., Baton Rouge, La.
 A. P. Beardsley, P. O. Box 246, Wheeling, W. Va.
 Horace Ballagh, 458 Henry St., Detroit, Mich.
 C. O. Palmer, General Delivery, Camp Sherman, Chillicothe, Ohio.
 Delbert Westover, Arlington, Wash. (Handles radio supplies as side line.)
 Eddie Smith, 688 South 39th St., Louisville, Ky.
 A. Wolfson, 273 West 131st St., New York City.
 L. A. Boyd, R. F. D. No. 1, Box 335, Hammond, Ind.
 S. H. Cliff, 1703 Tenth Ave., Greeley, Colo.
 Fred Dye, 2025 Dime Bank Bldg., Detroit, Mich. (Consumer.)
 W. R. Shiner, Chamber of Commerce Bldg., New Haven, Conn.
 M. H. Jones, P. O. Box 272, Oakland, Calif.
 William Craig, Jr., Room 727, City Hall, Philadelphia, Pa.
 Geo. H. Spies, 525 Locust Ave., Port Chester, N. Y.
 W. J. Moran, 2909 Orleans St., Baltimore, Md. (Builds and sells sets.)
 Robert H. Walters, Glidden, Iowa.
 Charles C. Fisher, 50 South St., Westboro, Mass.
 Gordon W. Fringer, 1766 Twelfth St., Milwaukee, Wis.
 John C. Skuse, 634½ Winslow St., St. Paul, Minn.
 William J. Rogers, 28 Willis St., New Haven, Conn.
 John Shutts, Box 175, Fort Hunter, N. Y.
 Reginald A. Foulds, 274 South Main St., Fall River, Mass. (Dealer.)
 Earl W. Riddell, 1925 Mt. Vernon St., Philadelphia, Pa.
 Gordon Stewart, 38 Albert St., St. Catharines, Ont., Canada.
 Arthur L. Straight, 203 Carnation St., Pawtucket, R. I.
 Louis B. Wood, 103½ South Grand Ave., Lansing, Mich. (Designs, repairs, dealer.)
 Lee Friedman, 1755 East 31st St., Cleveland, Ohio.
 Walter A. Thomas, Genesee, Idaho.
 A. K. Rittenberg, 153 Vendome Ave., Montreal, Quebec, Canada.
 Ralph Rambo, 30 South Morrison Ave., San Jose, Calif. (Consumer.)
 Robert Langer, 444 East Vine St., Schuyler, Nebraska.
 C. C. Ross, 717 Raleigh Ave., Norfolk, Va. (Consumer.)
 Laurence Moran, 127 Lake Ave., Greenwich, Conn.
 Henry N. Fullerton, Waterbury, Vermont.
 Otis Soudies, Lorenzo, Texas.
 F. B. Otten, Box 43, Amber, Iowa.
 McFadden Radio Shop, Box 15, Stafford, Kansas.
 H. B. Phinny, 310 West First St., Oil City, Pa.
 Russell H. William, Henrietta, Mo.
 J. Robert Hart, 1824 East Buckins St., Frankford, Philadelphia, Pa.

The first of these names were printed in Radio World dated April 21, and have continued in each issue since. Any copy 15c. Any 7 copies for \$1.00 Radio World, 1493 Broadway, N. Y.

Following R. C. A. Injunction DeForest Changes Its Dealer Policy

HEREAFTER the DeForest Radio Telephone & Telegraph Co., Jersey City, N. J., will sell directly to the public through exclusive agents only. Information from the DeForest Company is to the effect that an injunction has been granted to the Radio Corporation of America preventing the DeForest Company hereafter from selling radio merchandise through the usual trade channels of jobber and dealer.

This injunction is said to be based on a contract made by Dr. DeForest with the American Telegraph & Telephone Company, March 27, 1917, which stipulated that the DeForest Company would sell radio apparatus for amateur and experimental use only and to users who would purchase this apparatus only for in-

dividual use, and not for purposes of resale.

Complying with the court order the DeForest Company therefore announces that it will now sell direct to the public through exclusive agents, who will accept DeForest apparatus on a consignment basis only, in accordance with an explanatory letter which was sent out by the DeForest Company toward the end of last month.

The DeForest Company is now appointing these exclusive agents all over the United States. The agents' territory will be exclusive, and the new arrangement, according to the company, presents many advantages for DeForest agents which were not possible under the old arrangements.

Date Set for New York Radio Show

J. C. JOHNSON, manager of the American Radio Exposition, announces that the next show will be held in the Grand Central Palace, New York City, from October 6 to 13, 1923. Information may be secured from Mr. Johnson.

American Radio Prices Too High for Holland

AMERICAN radio manufacturers ask too much for their radio apparatus and materials to secure the Dutch trade, according to Consul Mahin, at Amsterdam. Competition from other countries, especially Germany, is reported to prohibit Dutch interests doing business with American exporters although the demand for radio telephone sets is good in Holland.

Canary Islands Considering Wireless

VICE CONSUL PHELAN, in the Canary Islands, reports active discussion in the Cabildo Insular de Tenerife of a proposal to establish in the near future wireless telephone stations at the various islands of the archipelago. The present cable service between the islands has been very inefficient and has given rise to the suggestion of using wireless telephony.

"Radio, the Third Year"

AN interesting booklet has just come to the reviewer's desk from P. C. Kullman & Company, of New York, entitled "Radio, the Third Year." It is a history of the growth and expansion that has come about in this most fascinating field in the past three years—from the time that wireless was spoken of, if at all, as something of a "freak" to the present, when few are

without some knowledge of its wonders. Two years ago there were no broadcasting stations. Today, in the United States alone, there are nearly 600. The Kullman book contains information as to the number of radio and wireless stocks, of the various companies engaged in allied activities, and other information illustrative of the magnitude of the industry that has developed with a rapidity hardly equalled in any other line.

Radio Lines Wanted for California

Editor, RADIO WORLD—We are anxious to get in touch with manufacturers of radio equipment, especially those who desire representation and distribution of their products in this territory. We have several very good lines which we are distributing and would like to add other lines to them. Anything you can do towards putting us in touch with such manufacturers will be greatly appreciated. Thanking you for your trouble, we are, Very truly yours,

YALE RADIO ELECTRIC CO.
 4816 South Vermont Ave.
 Los Angeles, Cal.

Radio in Hospitals Has Therapeutic Value

IT has been demonstrated more than once that music has a marked therapeutic effect on the spirits and general morale of hospital patients. In fact, a sixty-day test with phonographs has just been completed in the wards of the New York Nursery and Child's Hospital, 161 West Sixty-first Street, New York City. It showed that the waltz is good medicine and soothing. Well chosen music will now form part of the treatment of patients in that institution.

Here would seem to be an opportunity for up-and-coming radio dealers to increase their business in receiving sets. A systematic campaign among the hospitals, especially in the larger cities, should result in satisfactory sales.

How to Keep Dry Cells in Stock in Good Condition

DRY CELLS have become a part of the regular stock of the average radio dealer due to the fact that the dry cell tube has become popular. During the summer months quite a bit of trouble will be experienced by the dealer who carries a stock of these batteries, if certain precautions are not taken.

Due to a cell's chemical construction, it has a limited shelf life, after which it deteriorates. As the weather is getting warm a few simple rules will tend to not only increase the shelf life of dry cells, but will prevent the dealer from giving his customers batteries which will not last any length of time.

The first and foremost of these is to keep the cells in a dry place. During the summer months the humidity is high and frequently moisture gathers on the outside cover of the battery which helps to corrode the metallic lining of the battery, due to the fact that most of these metallic casings have chemicals on the outside, being handled and left in places where

dampness is almost sure to collect on them.

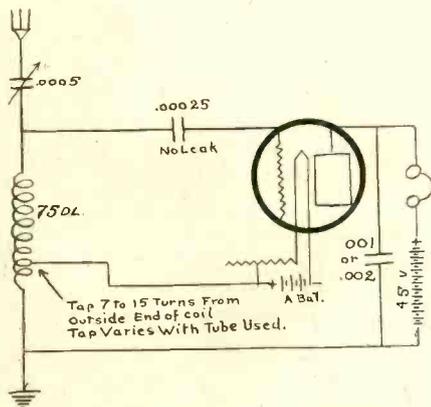
It is most important to keep the cells in a cool place. Heat has a very noticeable effect on dry cells inasmuch as it speeds the chemical action which eats away the active elements. One dealer had a habit of keeping his cells on the top-most shelf of his store, because he thought that it was dry up there, and also "it kept them out of the way and gave an instant visual check as to whether we had them in stock." He was surprised to find out that various of his customers kept complaining that the batteries did not last any length of time, and his competitor down the street made mention of the fact that he was giving his customers old batteries. The first dealer knew that this was not so as he generally got his cells in the same shipment or at the same time that his neighbor did. He complained to the manufacturer and stated that he had had a cell in the house three weeks, sold it, and two weeks later the purchaser came back and told him that

the cell was "breaking out" or was no good. The manufacturer sent a man up and he examined the dealer's stock and told him that it was a wonder that he had even kept the batteries that long. The temperature along the top shelf was 98 degrees at all times and when the heaters were going in winter or during a warm summer day it rose to as high as 110 degrees. This heat was continually wearing down the cells by speeding up the chemical action, much the same as a chemist heats a test-tube of chemicals to hasten the action, and not because the application of heat has any radical chemical effect on the constituents of the tube. Keep them cool, was the admonition of the expert, and you will keep them longer.

It is very easy for a space to be found near the floor where cells may be kept both cool and dry. If the stockroom is down below, it is much better to go to the expense of constructing a simple shelf on which to keep them off the floor and dry and cool at the same time.

A Modified "Pup" Circuit

EDITOR, RADIO WORLD: I have received best results with the "Pup" circuit when hooked up according to the diagram herewith. WOR was received when



Modified "Pup" circuit as worked out by Crumbaugh

weather conditions were considered bad here. You will readily see the departure from the regular "Pup" circuit.

Yours for better radio,
F. L. CRUMBAUGH.

Oskaloosa, Iowa.

Wireless Phone, Ship to Shore, in Denmark

THE United Steamship Company of Copenhagen, Denmark, plans to install wireless telephone equipment on all boats plying between Copenhagen and the provincial harbors for the traveling public's convenience. Travelers will be able to secure direct communication, through the land telephone service, with their own homes or offices similar to the service planned for the U. S. S. "Leviathan."

Radio to Be Used in Jersey Mosquito Campaign

NEW JERSEY has forty species of mosquitoes and some of them can travel at the rate of forty miles an hour, according to a statement made recently by Dr. H. H. Brinkerhoff, chairman of the Hudson County Mosquito Extermination Commission, which, he said, intended to employ radio in its 1923 war on this insect pest.

What Radio Fan Can Answer This?

EDITOR, RADIO WORLD—I am a regular reader of RADIO WORLD and like it better every time I get the latest issue. I can truthfully state that I have obtained more helpful information from RADIO WORLD than I have from all the various other radio magazines that I get. * * *

I don't remember ever seeing a column "open for discussion" in RADIO WORLD, but I am up against a proposition that I need some help on. The proposition follows:

During the week of May 14 to 20, I had my set, which is of the VT detector 2 stages AF regenerative type, installed on a steamer plying the Mississippi River. My aerial consisted of the usual two wire, inverted "L" type, about 100 feet long. This aerial was thoroughly insulated from the steamer but during the entire time that the steamer was under way there was an induced current in the aerial that was strong enough to break down from a one-quarter to a half-inch air gap. At one time while trying to tune in with the steamer under way the pilot blew a landing signal on the whistle. An extraordinary sparking, breaking down the air gaps on my 43 plate primary condenser, was observed. The sparking was correspondent to the signals, three long and one short from the whistle. There is one generator on the steamer supplying current for the lights and fans but this generator was not in operation during the day, and at night when the generator was in operation and the boat under way the induced current was not in the antenna. This same condition exists on one other steamer that I know of. The latter is equipped with wooden hull, while the one I was on was equipped with a steel hull. I would like to know *what set up the current in the aerial and what is the remedy?* I claim that it was due to the aerial cutting the magnetic lines of the earth. This has been disputed by some but so far I haven't been convinced as to the real cause. I would like to hear from any Radio Fan who has had the same experience or any that can offer a solution, as tuning in was practically impossible while the boat was under way.

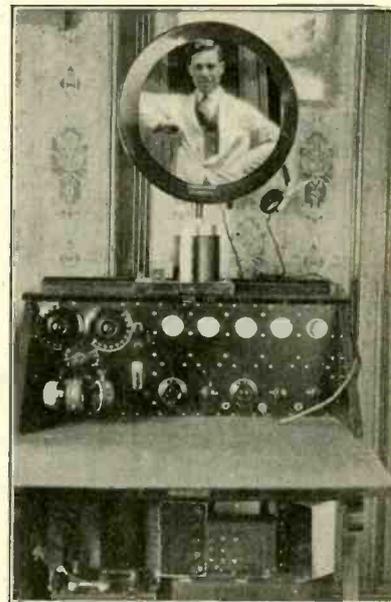
If you can enlighten me any at all on this subject I will certainly appreciate it. With best regards to RADIO WORLD and wishing it continued success,

E. M. PACE.

807 Cherry Street, Vicksburg, Miss.

A Good Home Made DX Set

EDITOR, RADIO WORLD—Some time ago I believe you said in RADIO WORLD columns that you would like to receive photos of home-made sets. Allow me to submit here-



Marchese looking out of the horn of his neat receiver

with a photo of my set which consists of two radio-frequency amplifiers, detector and two stages of audio-frequency amplification.

This set has an anti-capacity switch that cuts out the radio-frequency whenever you wish, thereby giving you the advantage of a common regenerative set. When you desire distant stations you have them by simply using the five tubes. For local work three tubes are sufficient to fill the house full of music.

The far off stations received with this set are: WSB, Atlanta; WOC, Davenport; PWX, Cuba; WDAP, Chicago; and about 50 others.

Very truly yours,
STELLARIO MARCHESE.

3709 Avenue I, Brooklyn, N. Y.

"Safety First" Via Radio

Calling a man a liar over the telephone was the zenith of vicarious courage until it became possible to say, when a man is making a tedious speech over the radio, "Shut up, you big stiff!"—F. P. A. in New York World.

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 - Regenerative Radio Frequency Circuit for 5 tubes.....March 24
 - Hazeltine Neutrodyne Receiver.....March 31
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ADDRESS SERVICE EDITOR, RADIO WORLD, 1493 BROADWAY, NEW YORK CITY

RADIO WORLD

TELEPHONE, BRYANT 4796

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DURING the last ten years commercial companies developed automatic printing telegraph equipment for the transmission over land wires of typewritten characters from one point to another. The present means of copying signals with the tape required the employment of two or three extra men for translating purposes. Due to the reduction in operating personnel in the Naval Service, it became imperative to devise means to operate stations with reduced personnel. Experiments conducted in 1922 prove conclusively that automatic printing equipment could be applied to radio as well as to land wire. So much faith was placed in this new method of transmission and reception that automatic recording telegraph equipment has been installed in naval high power circuits at San Diego and Washington.

They Backed Down

NOW that the radio people have called the music publishers' bluff, and won out, it behooves the motion picture people to get busy and "follow through."—Exhibitors' Herald.

Westinghouse WR 21

4 Volt \$3.50

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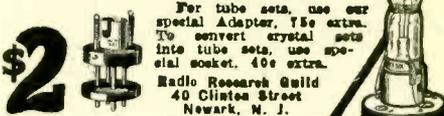
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For tube sets, use our special Adapter, 75c extra. To convert crystal sets into tube sets, use special socket, 40c extra.

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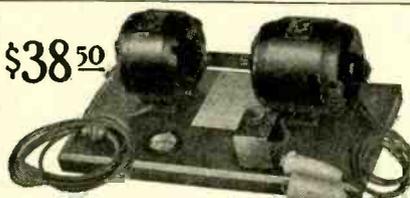
New York Office: C. B. Cooper, 1803 Tribune Bldg., 164 Nassau St.

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WHY pay out good money constantly for recharging batteries when the Ohio Motor Generator will do it quickly at a slight expense. This inexpensive home charging outfit keeps your Radio in service all the time and pays for itself—by charging your neighbors' batteries. It is noiseless, gives no trouble, and will even recharge totally exhausted batteries quickly. The set is made up of the celebrated Ohio A C motor and D C generator wound for 6-10 volts. The motor and generator have ball bearings and are of the highest grade construction. It has none of the troubles common to cheap charging sets and will last a lifetime. It will charge quickly any three cell automobile or Radio "A" battery. Furnished complete on a substantial base with ammeter and field rheostat to adjust the charging rate from one to twenty amperes. The motor is for 60 cycle, 110 volt service and is complete with ten foot cord and attachment plug ready for instant connection and operation. Full instructions provided.

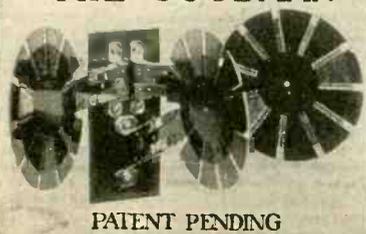
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The GOODMAN is really a high grade instrument, well and sturdily constructed. The PANEL and FANS are GENUINE BAKELITE—the best material known for the purpose.

Easy—Just Like That!

"Pap," said the colored youth, "Ah'd like you to expiate on de way dat de telegraph works."

"Dat's easy 'nuf, Rastus," said the old man. "Hit am like dis. Ef dere was a dawg big 'nuf so his head could be in Bosting an' his tail in New Yo'k, den ef you tromp on his tail in New Yo'k he'd bark in Bosting. Undestan', Rastus?"

"Yes, pap! But how am de wireless telegraph?"

For a moment the old man was stumped. Then he answered easily: "Jess prezactly de same, Rastus, wid de exception dat de dawg am 'maginary.'"—Tid-Bits.

A Voice from the Farm

(From Station WOC, Davenport, Iowa)

The broad, free prairies on which we dwell

Stretch far to meet the sky.

Few travelers come, the news to tell;

No restless throngs pass by.

We listen to wild blizzards roar,

While chill winds fiercely blow.

The wild beasts' tracks around our door

Tell stories in the snow.

But though we're isolated thus

From all the world around,

Through boundless space there comes to us

The miracle of sound.

Can lonely places be on earth,

Where human voice can't go;

Or intercourse have any dearth,

Since we've found Radio?

Across a listening continent,

Through weather hot or cold,

Great waves of harmony are sent,

And children's stories told.

Babes cradled where the frost elves sleep

And icy north winds blow,

Are lulled to slumber sweet and deep

By songs the palm trees know.

When God so wisely formed the ear

For His creatures here below,

He made the law which lets us hear

Through vast space, by Radio.

I thank, Thee, my Creator high,

That I have lived to know,

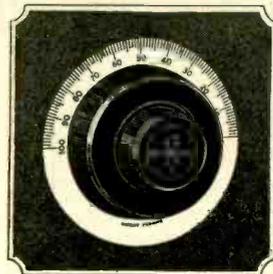
While life is fleetly passing by,

The wondrous radio.

Laboratory Lightning

A GOOD deal has happened in the electrical world since Benjamin Franklin drew down his first spark from a thundercloud over a kite-string wet with rain, says an editorial writer in the *New York World*. Out of this experiment grew the lightning-rod, now popularly discredited, and out of a century and a half of experiment has come a control over electrical forces so complete that a bolt of artificial lightning of 2,000,000 volts, representing 10,000,000 horse power, can be manufactured and handled in a laboratory. Incidentally, this test proved to the satisfaction of the scientists present that the lightning-rod did give protection after all.

But what is to be done with artificial lightning, now that we have it, is no more predictable than what was to follow Franklin's kite-flying. It may bore tunnels, dredge rivers or change iron to steel. It may turn out as handy as a pick and shovel and quite as harmless. And when the race gets accustomed to lightning as an every-day tool it may find a way to capture the voltage that goes to waste in any thunder-storm, may charge batteries with the weapons of Jove and hitch the dreaded thunder-stone to the belt-wheel of a power mill. Perhaps in time there won't be any thunder-storms, and artists will decry the commercialism that extracts the juice from the sky that used to make celestial fireworks. If these things don't come about, in all likelihood something more remarkable will.



*All the family can
tune-in with*

ACCURATUNE

MICROMETER CONTROLS

Granddad, dad, mother and little brother all agree that "it is real joy to tune-in now with Accuratures." A slight turn of the smaller knob operates the micrometer control for delicate tuning. Those stations you used to work so hard over, and others you could "just about get" are easily brought in clear and strong with Accuratures. Knobs are of genuine Bakelite, either black or brown. Dial is silvered with neatly engraved graduations. \$3.50 at your dealers' or by mail.

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Or send 25c for Neutrodyne Constructor, which shows "How to Make the Neutrodyne"

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W. D. 12 Tube	6.50
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COMPLETE SET

With Batteries, in 6½x14 Cabinet, Phones, 1½ Volt Tube, suitable for summer vacationists\$27.50

BACK PANEL MOUNTING SWITCHES\$1.00

- Aetaco Condensers, 48 plate.....\$1.75
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These condensers have special bushings.

WESTERN ELECTRIC MICROPHONES, with breast plates and Straps. Made for U. S. Army. \$0.75

BALDWIN SINGLE UNIT for Loud Speakers, Type C\$3.75

American Radio Stores
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Coming Events

ANNUAL HOME AND CITY BEAUTIFUL EXPOSITION, featuring radio exhibits, Atlantic City, N. J., June 16 to September 8, 1923.

PACIFIC COAST ELECTRICAL ASSOCIATION, San Francisco, Calif., June 19-22, 1923; S. H. Taylor, secretary, 527 Rialto Building, San Francisco, Calif.

CANADIAN ELECTRICAL ASSOCIATION, Montreal, Canada, June 21-23, 1923; Louis Kon, secretary, 65 McGill College Avenue, Montreal, Canada.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, annual convention, Swampscott, Mass., June 25-29; Pacific Coast convention, Del Monte, Cal., Oct. 2-5. F. L. Hutchinson, 33 West 39th St., New York.

Radio Set Presented to Veterans' Camp

Mrs. J. Christopher Marks, president of the Theatre Assembly, announced last week that the Assembly has just purchased an elaborate radio outfit for the Veterans' Mountain Camp at Tupper Lake, N. Y. The outfit, which is to be installed immediately, is a complete surprise to the residents of the camp who are confined there through illness.

Features of the Program at WGY

THISTLE DAY, the national holiday of Scotland, will be observed Sunday evening, June 24, with a special service at the State Street Presbyterian Church, Schenectady, N. Y. The entire program will be broadcast by WGY, the Schenectady station of the General Electric Company.

A minstrel performance will be presented by a group of artists from the Pittsfield, Mass., plant of the General Electric Company, Monday evening, June 25.

Tuesday evening the Albany Music Teachers' Association will offer a program of instrumental and vocal numbers. The orchestra will be directed by Mrs. Peter D. Schmidt.

Cyrus Temple Shrine Band of Albany, under the direction of W. Elmore Slack, will entertain from WGY, Thursday night, June 28.

The WGY Players will offer "It Pays to Advertise," a well-known play by Messrs. Megrue and Hackett, on the early program Friday night. At the late concert on the same evening, June 29, a trio of colored women will present a program of southern melodies.

KELLY WAVE SUSTAINING COIL

Eliminates Aerials, Loops and Danger from Lightning

Fit Inside Set

The Kelly Wave Sustaining Coil will work perfectly in any tube set. The coil being sealed under a vacuum, it eliminates STATIC and all interferences.

Price \$4 Each



Makes It Portable

Simple to connect. One lead to terminal marked aerial, the other to A or B battery—That's all.

Dealers, write for special terms.

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SAVE YOUR \$6.50 TUBES AND BATTERIES

FOR LOCAL RECEPTION USE

THE BURKE UNIVERSAL DETECTOR

FITS YOUR TUBE SET

NO CHANGE OF HOOK-UP NECESSARY

REQUIRES NO BATTERIES

CANNOT BURN OUT

TESTED AND GUARANTEED

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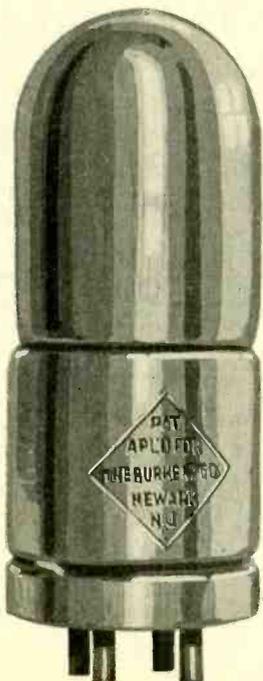
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ACADEMY SALES CO.

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Price \$2.50 Prepaid
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DUPLEX TRANSFORMERS

Something really new in Audio Amplification. (See article in RADIO WORLD, June 9, by C. White, on "A Super Amplifier.") We guarantee more volume and infinitely better quality than is possible with any other transformer on the market.

Sold only in matched pairs

PRICE \$12.50 PER PAIR

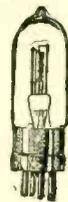
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168 DARTMOUTH STREET
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SEND US YOUR DEAD TUBES—

WE REPAIR



- Radiotron, UV-200, UV-201.....\$2.75
- Cunningham, C-300, C-301.....\$2.75
- WD-11\$3.50

Mail orders collected and Promptly Attended To.

We Put New Life in Them

GEO. H. PORELL CO., Inc.
The Vacuum Tube Hospital
SOMERVILLE (44), MASS.

AMATEURS! FANS! ATTENTION!

ALL BROADCASTING STATIONS—Complete with the call, location, wave length, frequency of the station, and power used started in Radio World of June 9.

This list is most complete, and no amateur or fan should be without it. It will be completed in following issues, and as revisions or changes are made the list will be kept up-to-date, so that you will always have an up-to-date list to which you can refer. Don't miss any issue. Send 15c to

RADIO WORLD, 1493 BROADWAY
New York City, or start your subscription with that number.

DO IT NOW—DON'T DELAY!

WANTED!

Old copies of RADIO WORLD for new copies. The publishers are short of the following numbers: April 22, May 20, June 24, October 21, December 2. Mail us these copies and we will send you a copy of a current issue, or extend your subscription one issue. RADIO WORLD, 1493 Broadway, New York.

**WD-11
WD-12
UV201A**

\$3.75

**Rebuilt Equal to New
Guaranteed**

IMMEDIATE DELIVERY

Mail Order Only

Radio Tube Service Co.
41 W. 32d Street New York, N. Y.

YOU CW BOYS!

Do You Want to Change Your Transmitter or Are You Planning to Build One? Then you will want these back numbers of Radio World: March 31, A Low Power CW Transmitter, by C. White. April 21, Haus Transmitter, by John Kent (circuit used by 2VK). May 5, Combined CW and Phone Set of M. Bebut, at Radio Central. May 26, A Simple CW or Phone Set That Works. R. W. E. Decker. 2UA. These numbers describe in detail all the various parts, with complete instructions as to how to operate. No up to date amateur should be without them. 15c. a copy. The four copies for 60c. or start your subscription with any number. Radio World, 1493 Broadway, New York City

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This binder is securely made, is attractive in appearance, and each copy can be added weekly without any difficulty.

This Radio World binder will be furnished to our readers at the reasonable price of

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RADIO WORLD

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New Radio and Electric Firms

George J. Levy, wholesale distributor, has moved to 6 Murray Street, New York City.

Star Electric Contracting Co., New York City, \$5,000; A. and B. Shulman, L. Seligson. (Attorneys, Littel & Seligson, 277 Broadway.)

Klein Radio & Electric Supply Co., New York City, \$50,000; E. A. and F. G. Klein. (Attorney, L. A. Rosen, 261 Broadway.)

Kentucky Hydro-Electric Co., Wilmington, heat, light and power, \$10,000,000. (Corporation Trust Co. of America.)

Smart Electrical Supply Co., Bronx, New York City, \$10,000; B. Kessler, H. M. Schaap, L. S. Lewis. (Attorneys, Lewis & Schaap, 299 Broadway.)

Gillig Electrical Corp., New York City, general contractors, \$10,000; J. V. Dicke, C. H. Walters, P. G. Gillig. (Attorney, H. A. Blumenthal, 233 Broadway.)

Westburgh Electric Service, Jamestown, N. Y., \$15,000; T. J. Turner, A. E. Westburgh, A. Hanson. (Attorneys, Van Vlack & Bargar, Jamestown.)

New Amsterdam Electric Co., New York City, \$20,000; S. E. Tepper, M. P. Plotkin. (Attorney, O. M. Lazrus, 38 Park Row.)

Pierce Electric Corp., Rochester, N. Y., contracting 1,000 shares common stock, no par value; active capital, \$10,000; B. S. and A. Pierce, A. Preston. (Attorneys, Warren, Shuster & Case, Rochester.)

C. and W. Electrical Co., New York City, general contracting, \$10,000; J. C. Cohn, S. Cohn, J. Moss. (Attorney, W. Klein, 152 West 42d Street.)

Hill, Brush Electric Service, Brooklyn, N. Y., \$5,000; J. V. and R. and M. Tierney. (Attorney, J. E. O'Reilly, 391 Fulton Street.)

Triangle Electrical Supply Co., New York City, \$18,000; D. Gold, I. Simon, M. J. Chester. (Attorney, B. M. Turkat, 44 Court Street, Brooklyn, N. Y.)

Robin Hood Radio Shop, Pittsburgh, Pa., has removed to larger quarters at 3602 Fifth Avenue.

The latest and most essential part of an efficient tube set



**Variable Resistance Leaks
FOR PANEL MOUNTING**

Mounted on any panel in a few seconds—2 screws serving as connections behind panel
Get stations you never heard before
No pencil markings—assure unbroken range of 180 degrees. Clarifies signals—eliminates hissing.

Complete with either .00025 \$1.00
or .0005 mfd. Micon Cond. \$1.00
Without Condenser 75c

At your dealer's—otherwise send purchase price and you will be supplied postpaid.

Chas. Freshman Co. Inc.
Radio Condenser Products
106 SEVENTH AVENUE, NEW YORK

D I S T A N C E

With one tube and a COAST COUPLER you can select at will any distant station. With each COUPLER we enclose our special Hook-Up, which we guarantee will surprisingly increase the efficiency of your set. This Coupler will be mailed anywhere in the United States \$5.00 upon receipt of

Dealers, Investigate!

THE COAST COUPLER CO.

245 East 7th Street, Long Beach, California

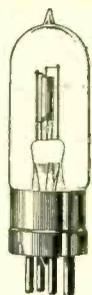
**RADIO
BROADCASTING MAP**

FOR the benefit of those interested in Radio and those who are becoming interested, Rand McNally & Company have prepared a publication containing a wealth of information of greatest value. It shows in the most comprehensive way, the location of the broadcasting stations, gives their classification, the call letters, wave lengths, ownership, etc., of each. The Rand McNally Radio Map of United States is 28x20 inches in size. The locations of broadcasting stations are shown by distinctive symbols. The call letters of each station are given, also the wave lengths of each. The Radio Districts with numbers are shown in red and the Radio Relay Divisions are in blue. Time zones are included. Alphabetical lists of stations and alphabetical lists of call letters are in the margins. Convenient pocket form with cover.

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WD-11, \$3.50**

AND POSTAGE

Also other vacuum tubes, excepting VT-1 and VT-2.

Mail orders solicited and promptly attended to.

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50 cents extra yearly to Canada.

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This department is intended for everybody who wants quick action on short announcements covering the buying, selling, exchanging or general merchandising in the radio field. Readers of RADIO WORLD will find that it pays to read these columns every week. Advertisers will get a ten-day service here—that is, copy received for this department will appear in RADIO WORLD on the news-stands ten days after copy reaches us.

The rate for this RADIO WORLD QUICK-ACTION CLASSIFIED AD. DEPT. is 5c. per word (minimum of 10 words, including address), 10% discount for 4 consecutive insertions, 15% for 13 consecutive insertions (3 months). Changes will be made in standing classified ads. if copy is received at this office ten days before publication. RADIO WORLD CO., 1493 Broadway, N. Y. C. (Phone, Bryant 4796).

CHEAPEST TO BUILD—Easiest to tune. Get particulars Rokay Single Control Hook-up. Describe your set. Rokay Electric Company, Ingo-mar, Ohio.

RADIO FANS! HAVE INVENTED STORAGE BATTERY CHARGER THAT OPERATES WITHOUT ANY COST FOR ELECTRICAL CURRENT. SEND FOR INFORMATION. R. H. McCONNELL, RAVENNA, NEBR.

OLD MONEY WANTED—\$2.00 to \$500.00 EACH paid for hundreds of Old and Odd Coins. Keep all old money. Send 10 cents for New Illustrated Coin Value Book, 4x6. You may have valuable coins. Get posted. We pay CASH. CLARKE COIN COMPANY, Ave. 83, Le Roy, N. Y.

ELEMENTS OF RADIO TELEPHONY, by Wm. C. Ballard, Jr. A standard book on radio telephony, the work of a recognized authority. Accurate, simple, clear, reliable and strictly up-to-date. For the technical man who wants to post himself on radio and for the radio enthusiast who wants the fundamental principles of radio and their application tersely and entertainingly presented. Price, postpaid, \$1.50. The Columbia Print, 1493 Broadway, New York.

WOULD YOU LIKE TO RECEIVE RADIO LITERATURE? Are you in the market for radio goods of any kind, either as a consumer, a distributor or a retailer? If so, send us your name and address on a post card and we will see that your name reaches the right people so that you will receive pamphlets, circulars, etc., regarding the goods you want. Address SERVICE EDITOR, RADIO WORLD, 1493 Broadway, New York City.

PATENTS—SEND DRAWING OR MODEL FOR EXAMINATION AND OPINION. Booklet free. Watson E. Coleman, Patent Lawyer, 624 F Street, Washington, D. C.

SALE—Exide 120 hr. Battery, \$12.50; Kellogg Sockets, 30c.; Transformers, \$1.90. All kinds. Guaranteed apparatus at proportionate prices. KENNETH JONES, London Mills, Ill.

RADIO DEALERS !!!

Have you seen the list of Camps and Camp Directors which started in the MAY 12 issue of RADIO WORLD? Here is a list of all the Camps and Directors of camps in the United States, and is of essential value to any Radio Merchant who is anxious to enlarge his summer business. Get these people interested in installing radio sets in their camps for the benefit of the campers. Any single copy, 15c.; or the four issues for 60c. RADIO WORLD, 1493 Broadway, New York City.

GRAM'S RADIO BROADCASTING MAP of the UNITED STATES AND CANADA. Scale 100 miles to the inch. In two colors, size 34x28. Printed on high-grade map paper, up-to-the-minute information, indicating all amateur and standard broadcasting stations with complete index to stations. 35c. postpaid. The Columbia Print, 1493 Broadway, New York City.

TUBE RADIO SETS, \$21.50 up. Parts sold at reasonable prices. Price list free. State whether interested in sets, part. McLean, 8103 Maryland Avenue, Cleveland, Ohio.

SUPER-SIMPLICITY CIRCUIT—1,000 to 1,500 miles on one tube, one control, 150 to 25,000 meters. No rheostat, storage battery, vario coupler, variometer, 3-coil mounting, variable inductance, taps or radio frequency. Nothing to guess about. Complete hook-up and particulars, \$1.00. No checks. Build your own. Save 50% and get better results. RADIO EXPERIMENTAL LABORATORY, Box 194A, Berkeley, Calif.

RADIO MANUFACTURERS—South America is the coming field. Have your catalogs, booklets and bulletins translated into Spanish by a specialist. Submit English originals for estimate. TECHNICAL, Box 126, Trinity Station, New York City.

CASH FOR OLD GOLD, Platinum, Silver, Diamonds, Liberty Bonds, War, Thrift, Unused Postage Stamps, False Teeth, Magneto Points, Jobs, Any Valuables. Mail in today. Cash sent, return mail. Goods returned in ten days if you're not satisfied. OHIO SMELTING CO., 337 Hippodrome Bldg., Cleveland, Ohio.

WIRING A HOUSE. By Herbert Pratt. Shows a house already built; tells just how to start about wiring it; where to begin; what wire to use; how to run it according to insurance rules; in fact, just the information you need. Directions apply equally to a shop. Sixth edition. COLUMBIA PRINT, 1493 Broadway, N. Y. C. Price, 35 cents.

ATTENTION! Is your set equipped with that new discovery, The Desert Cactus Cat Whisker? The Whisker that brings in the long distance. If not, order today—Set of two for 25 cents and get details on that new (Mars) long range crystal receiver—Address, Mars, Box 822, Needles, Calif.

Build your sets with quality parts and get sure results. Radio Parts Co., Box 56, Dunellen, N. J.

EXCHANGE JOLLY, INTERESTING LETTERS through our club. Stamp appreciated. Betty Lee, Inc., 4254 Broadway, New York City

THREE NEW 50 WATT TUBES. Never used. \$20 each. W. N. A. B., Bowling Green, Ky.

BUILDERS AND EXPERIMENTERS. Do you know that the Reflex circuit is one of the most interesting circuits to construct? You cannot guess how much fun you are missing if you fail to try out at least one of these circuits. See RADIO WORLD issues of Feb. 24 and March 3. They contain two fine articles by W. S. Thompson, with plenty of new Reflex circuits to experiment with. Don't miss these! 15c. a copy. RADIO WORLD, 1493 Broadway, New York City.

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WANTED—Omnigraph in good working condition. Box 435, Hardin, Montana.

MAGNAVOX TYPE R3—Latest curvex, improved acoustic models, in original sealed factory cartons. List \$35. Introductory offer \$25. RADIO CENTRAL, Dept. W, Abilene, Kans.

RADIO CRYSTAL SET, guaranteed to get local stations. Silicon crystal, 2 1/2 inch coil. Postpaid with instructions, 90c. Graham, 27 Warren St., New York.

EDISON Elements for making "B" Batteries, 6c per pair; tubes, 2c each. Nickel Wire, Insulators and Cabinets at reasonable prices. TODD ELECTRIC CO., 178 Lafayette St., New York City.

VACUUM TUBES REPAIRED. Reasonable. Send for our price list. Vacuum Electric, Station C, Toledo, Ohio.

FOR SALE—Radio receiving apparatus. Must be sold; half price. Owned by private party, not a dealer. Everything in perfect condition. State what you want, probably I have it. A. D. YOST, Fairmount, W. Va.

ARE YOU IN THE RADIO BUSINESS? If so, drop us a card for price list. If not, let us start you in a good paying business. We furnish everything and have a proposition that meets the needs of 90% of the public. Liberal discounts to agents. Immediate delivery. Write today. THE WILKENDA COMPANY, 500 Fifth Avenue, New York.

FREE CATALOGUE. Ebonite panels, 7x12, 50c.; 23 plate variable condensers, \$1.25; American No. 200 Tubes, \$3.00; Amplifying, \$3.75; W. D. 13 Peanut, \$5.75; Sockets, 25c. Stewart's Radio Supply Co., 3124 Cherokee St., St. Louis, Mo.

FOR SALE—Radio Receiver, Navy type, cost \$595. Good condition. Dealers invited to call and see. Also 8 genuine "Vario-perm" guaranteed .001 variable condensers. Columbia Print, 1493 Broadway, Room 326, New York City.

\$133 WESTINGHOUSE AERIOLA SR. with two stage amplifier complete with tubes and Brandes head set. \$98. \$125 Amrad No. 3500 four-tube receiver for \$98. The Radio Shop, Virginia, Minn.

MAGNAVOX TYPE R3. Latest nationally advertised models, in original sealed factory cartons. List \$35. Special introductory offer \$25. Radio Central, Dept. W, Abilene, Kansas.

EXCHANGE LETTERS with friends everywhere. Pleasant pastime. Information for stamp. Smith, Box 3125, M. Portland, Ore.

RECHARGE dry cell batteries. Cost, 5c. Instructions, 15c. J. Brent, 3 Stueben St., Bridgeport, Conn.

FOR SALE—Unwired 3 stage radio 2 audio receiver. Write for information. Andrew Timberlake, Hinton, W. Va.

FOR SALE—Two Myers Choke Coils, 8 Myers tube receptacles, three Cot-o-Coil Radio Transformers, all for \$15.00. F. T. Lesser, 85 Lincoln St., Ridgway, Pa.

BROADCASTING OUTFIT using five fifty watt tubes to be sacrificed. Everything complete. Make us an offer. Park City Radio Company, Bowling Green, Ky.

RADIO STORAGE BATTERIES, guaranteed, 50 amp. hr., \$8.00. While they last. Write JAMES G. WILSON, Gen. Del., Box 34, Benson Station, Omaha, Neb.

ELEMENTS OF RADIO TELEPHONY

By WILLIAM C. BALLARD, JR.

Assistant Professor of Electrical Engineering, Cornell University

This is a standard book on radio telephony, the work of a recognized authority.

It is accurate, simple, clear, reliable and strictly up to date.

The man with a technical background who wants to post himself on radio will find this exactly the book for his purpose.

The radio enthusiast will find in it an excellent presentation of fundamental principles and their application.

SENT POSTPAID ON RECEIPT OF PRICE, \$1.50, BY
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Construction of New Type Transatlantic Receiving Sets

By M. B. SLEEPER

Fully Illustrated. Price 75 Cents

In addition to the listening to ships and broadcasting stations on short wave lengths there is a peculiar fascination about listening to the high-power telegraph stations of England, France, Germany, Russia and Italy as well as those located in the Pacific Ocean and the Oriental Countries. It is much easier to do this than most people imagine. The sending is very slow, a feature of assistance to the beginner in telegraphy. Several types of receiving sets for this task are described. Detectors, amplifiers, oscillators, etc., for long distance reception are also described. Suggestions for the operation of relays by the signals and the reproduction of them on a phonograph are given. In addition there is some valuable data on home made wavemeters for testing and experimenting.

Sent P. P., prepaid, on receipt of price, by

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Inter-American Communication Conference Proposed

AN official résumé of the activities of the Fifth International Conference of American States, held at Santiago, Chile, recently, cites the recommendation for an Inter-American Electrical Communication Commission and a communications conference as follows:

"Inter-American Electrical Communication: The first part of this resolution recommends to the American States, as an essential part of the public service, the supervision of international electrical communication and also domestic electrical communication insofar as it affects or forms part of the system of international communication. As a part of this resolution provision is made for establishment of an Inter-American Electrical Communications Commission to consider the cooperation which may be established between the American states regarding electrical communications, and to prepare a convention which shall establish equitable proportional rates and uniformity of rules governing Inter-American Electrical Communications; this commission to be called at a place and date to be determined by the Governing Board of the Pan American Union. The conclusions of this Commission shall be submitted to the Governing Board of the Pan American Union in order that they may in turn be submitted to the states belonging to the Pan American Union."

Hears by Radio, Though Deaf from Infancy

DEAF from infancy, William T. Walters, aged 31, a resident of Cohoes, N. Y., was recently introduced to the sensation of sound through WGY, the radio broadcasting station of the General Electric Company at Schenectady, N. Y.

Mr. Walters was stricken with brain fever when sixteen months old and specialists said he would never hear. After nearly thirty years of silence, he has heard a human voice and has listened to music.

A friend who is a radio enthusiast read of the pleasure which the partially deaf are deriving from broadcast programs. It occurred to him that Mr. Walters might be able to share in the music of the air. He arranged a test. In a letter to WGY that friend, Myron J. Jackson, describes the test:

"I adjusted the machine to a good clear tone and, after some explanation, put the receivers on the young man's head. He had not been listening more than half a minute when to our surprise and amazement he pointed to an imaginary mustache on his face, meaning a man. At this his mother exclaimed, 'Will can hear!' We waited motionless as Will listened to an address. At the end of the discourse his mother asked him if he had heard and using his right hand he drew a cross on his breast which meant 'honest.' I asked him what the man had been talking about and he pointed to a cigar and blew imaginary smoke from his mouth. The address had been on tobacco."

Another appreciative "listener" who has been deaf a great many years wrote from his home in Hyde Park, N. Y., as follows:

"No one who has not been afflicted with deafness to the extent I have for over thirty years, enough to shut me out from all concerts and lectures and the theatre, can understand the new world radio has opened for them. While some of the smaller stations are not powerful enough for me to hear clearly, the larger ones are, and WGY is best of all. Had I been in the First Methodist Church of Schenectady last Sunday I would not have heard a spoken word and mighty little music, while here in my room I heard everything well enough to follow the whole service, getting nearly every word of the sermon. If you want to confer a blessing on deaf people, let them know what radio will bring into their lives."

Branly, French Scientist, Says Radio Vision Is Possible

ACCORDING to a newspaper dispatch from Paris a wireless eye, capable of vision at great distances, is forecast by the famous French inventor, Edouard Branly, known as the "father of wireless," on the occasion of a scientific jubilee in his honor recently. Branly, who was honored by Government officials, Cabinet Ministers and radio fans throughout France, announced he had succeeded in transmitting by wireless a luminous point, as well as a luminous circle, proving the possibility of seeing by radio at hitherto unimagined distances.

Radio at the Shrine Convention in Washington, D. C.

RADIO, like practically every other activity, took part in entertaining the Shriners at the Nation's Capital last week. Among the features was the reception and amplification by a receiver in the Garden of Allah of a broadcast message from the President read by an aviator in a plane flying over the parade.

A local engineer installed a receiving set and a large loud speaker on the roof of the Albee Building. This apparatus amplified music and other matter picked up from nearby broadcasters.

Part of the Army's night parade exhibit was the miniature radio controlled cart made by the Dayton Air Station, which was operated from an auto some distance in the rear.

NAA put on special programs for local consumption and events scheduled for the convention were broadcast on opening day.

Many visitors were fooled by the loud speakers erected along Pennsylvania Avenue by the local telephone company for amplifying dance music played in an auditorium and relayed by wire to the many horns; it sounded something like radio but was actually wire telephonic transmission from local sources.

YOU SAVE 50% OF THE USUAL COST

WORLD BATTERIES FOR RADIO

6 Volt 80 Amps.	\$10.00
6 Volt 80 Amps.	12.50
6 Volt 100 Amps.	14.50
6 Volt 120 Amps.	16.00

A Better Battery Cannot Be Built

The best of material—careful construction by skilled mechanics—makes a battery that will give a long life of hard service.

A written two (2) year guarantee. You take no chance with a World Battery—it is the most satisfactory battery you can get and you save 50%.

Mail Your Order Today

We ship C. O. D. subject to inspection, or will allow 5% discount for cash with order. All orders shipped same day as received.

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GUARANTEED 2 YEARS

GUARANTEED REPAIRS

Broken and Burned Out **VACUUM TUBES**

W.D.-11 not accepted for repair

Your dealer should know, but if he does not, send direct to **HARVARD RADIO LABORATORIES**
Boston 9, Mass.

Tubes returned parcel post C. O. D.



RADIO FANS Do you want to sell your old set?
Do you want to exchange anything for something?
Do you want to buy something?

If so, why don't you use the Classified Department of Radio World? You can get fine results for five cents a word, minimum ten words. Your message will reach thousands including other fans, dealers, etc., etc.

Try Radio World's Classified Department for your personal radio and other needs.

RADIO WORLD, 1493 Broadway, New York City

FILL OUT AND MAIL NOW
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RADIO WORLD

1493 Broadway, New York City

Please send me RADIO WORLD for months, for which please find enclosed \$.....

SUBSCRIPTION RATES:

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Six Months 3.00
One Year, 52 Issues 6.00
Add \$1.00 a Year to Foreign Postage: 50c for Canadian Postage.

Summer Static Overcome



ANTENELLA

No aerial or antenna needed

Eliminates aerial, outside wiring, lightning arrestors and other inconveniences inductive to static. Plug Antenella in any lighting socket and you can enjoy Radio in any room in your house. No current consumed.

New Improved Antenella
NOW \$1.25
ONLY formerly \$2.00

At your dealer's—otherwise send purchase price and you will be supplied postpaid.

Chas. Freshman Co. Inc.
Radio Condenser Products
 106 SEVENTH AVENUE., NEW YORK

Navy Favors Loop Antenna for Receiving

ONE of the good effects of the new broadcasting boom has been to bring to attention the great interference problems which exist, naval experts say. The loop antenna has been brought into great prominence for receiving purposes, as a means available for avoiding interference. Practically unlimited receiving ranges are possible with the loop when sufficient radio frequency amplification is used. One reads frequently of the enormous distances obtained on loops even as small as two feet in diameter. In solving Naval problems, it is very probable that the loop will be of service other than its use for direction finding. It is conceivable that all receiving may be done on loops sometime in the near future as is now done in Washington on the long circuits. Some of the advantages claimed for the loop are: sharp tuning; wide range of frequencies available in a single coil; one tuning adjustment; directive effect; easy portability and replacement; small space occupied, and little re-radiative effect when regeneration is used.

A REAL PORTABLE SET

Size 9 1/2 x 7 1/2. Weighs about 6 pounds, including batteries, phones, tube, etc. Complete, \$23.50. Capable Range 1,000 miles. New \$6.50 1 1/2-V. Det. & Amp. Tube, \$8.95.

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SPECIAL TEN-DAY OFFER
GENUINE WESTERN ELECTRIC
V.T.-2 TUBES
Only \$6.25
MANY OTHER BARGAINS—LIST FREE
GLOBE RADIO SHOP
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PATENTS

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FANS! Buy Your Summer and Winter Supply Now—Prices are Rock Bottom.

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 71 THIRD AVENUE NEW YORK

Radio Letters from Latvia

THE Latvian Main Post and Telegraph Administration announces that radio letters to the United States may be filed at all Latvian telegraph offices. The letters will be mailed to Berlin, whence they will be transmitted by wireless to New York, and from there to the addresses by post. The letters must contain text in English, French or German. The charges for radio letters are 35 centimes per word, plus 1 lat (equal to 1 French franc) ground fee per wire.

Six Months Subscription for Radio World and Popular Radio or Wireless Age for the Price of a Subscription to Radio World Alone

This Is a Special Offer for the Summer Only:

DO IT NOW!

Radio World for six months (26 numbers) is.....	\$3.00
Popular Radio at 20c a copy for six months would be.....	1.20
	\$4.20
or	
Radio World for six months.....	\$3.00
Wireless Age, at 25c a copy, for six months.....	1.50
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Send us remittance for \$3.00 and we will send you Radio World for six months and Popular Radio, or Wireless Age for six months, to one or different addresses.

This offer is good only for one month from date.

Take advantage of this offer today and send in the accompanying subscription blank. If you are already a subscriber you can take advantage of the offer by sending us \$3.00 and renewing your subscription for six months beyond your present date of expiration.

Special Combination Offer of Radio World and Popular Radio or Wireless Age

RADIO WORLD, 1493 Broadway, New York City.

Enclosed find remittance for \$3.00, for which send me Radio World for six months, beginning with issue dated and Popular Radio or Wireless Age for six months, beginning with issue dated and it is understood that there is to be no extra charge of any kind. Please mail copies to the following address:

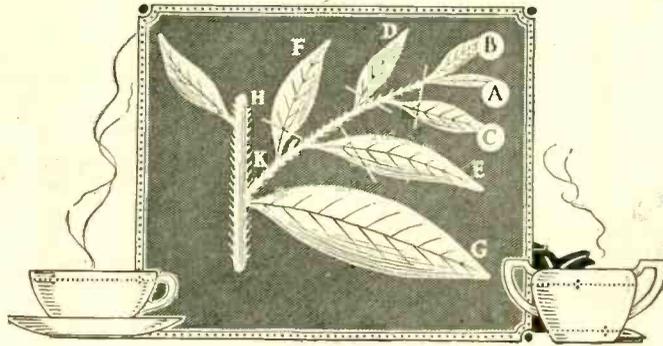
If you wish you may send us \$6.00 for Radio World for one year (52 issues), and Popular Radio or Wireless Age for twelve months, both postpaid. This offer good only if mailed by July 23, 1923.

Name

Street Address

City and State.....

The A.B.C. of Good Tea



THIS diagram shows clearly one reason for the superior flavor, strength and aroma of RIDGWAYS TEA.

The plucking season commences in the early Spring and continues right into the Autumn. At the commencement of the season, the plant sends forth its first tiny shoots. In order to get the very choicest pickings, only those leaves marked "A," "B" and "C" are gathered for Ridgways. These tender, young tip-leaves give to Ridgways Tea that rare quality of flavor

which distinguishes the famous Ridgway blends. The leaves marked "D," "E," "F" and "G" are coarser and less flavory and therefore *are never used by Ridgways.*

This carefully guarded Ridgway quality also assures more cups to the pound. When you buy Ridgways Tea you not only get the best tea, but actually more of it than is possible from inferior tea. As an example of rare good tea we suggest that you order Ridgways (GOLD LABEL), the *Genuine Orange Pekoe.*

Be Sure to Insist Upon

Ridgways Genuine Orange Pekoe Tea

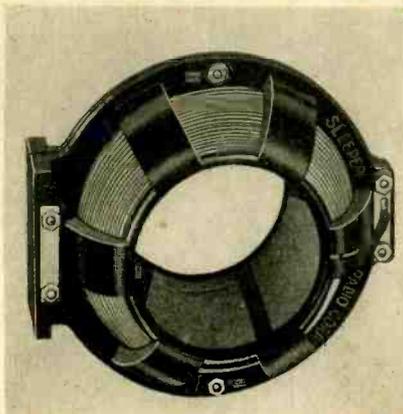
A GENEROUS SAMPLE
WILL BE SENT ON REQUEST

Address: Ridgway Tea Co., Dept. A., 60 Warren St., New York

INDIA-CEYLON
Ridgways Tea

The Famous Sleeper Twins

A pair of Sleeper products that has delighted the eye of every radio man who has seen them

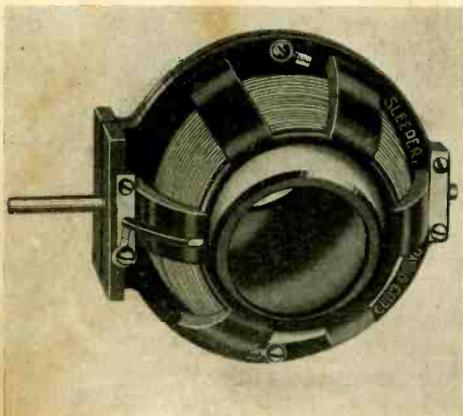


The Fixed Coupler—\$4.00

THE FIXED COUPLER

The Sleeper Fixed Coupler, built on the same lines as the beautiful Sleeper Variometer, requires no switches, has no taps to be soldered or to break off, has no coupling adjustment, yet it can be substituted for any variocoupler in any circuit where a variocoupler is used.

In addition to its simplicity of design and operation, it gives sharper tuning and louder signals than the variocoupler over a range of 150 to 1,000 meters. You can't imagine what a handsome set can be made with this Fixed Coupler and the Variometers until you use them. Such an outfit is shown in Radio and Model Engineering for June. Send 10c. in stamps and that issue will be mailed to you.



The Variometer—\$6.50

THE VARIOMETER

Endorsed by impartial engineers and testing laboratories as the most efficient molded variometer made in America bar none. The kind that makes the dealer in radio glad he is selling the best and the customer glad years later that he bought the best.

Dealers everywhere write for selling rights—give names of favorite jobbers.

SLEEPER

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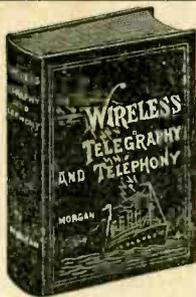
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