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RADIO WORLD

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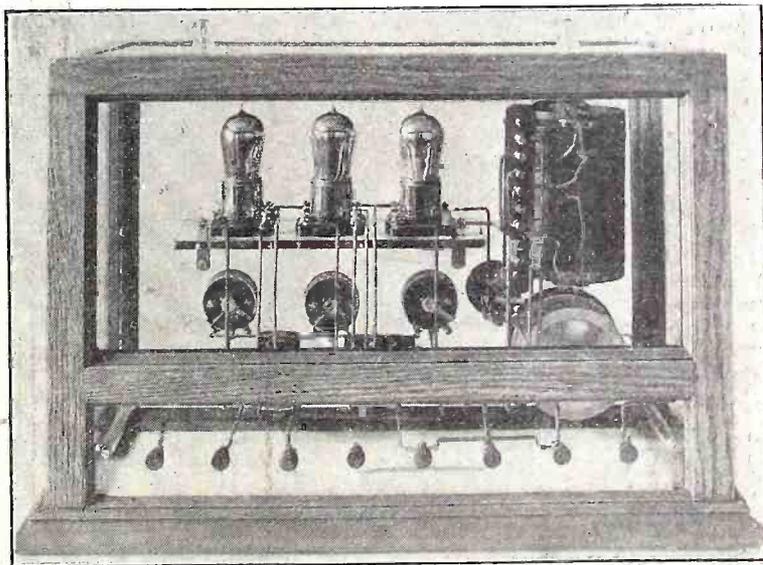
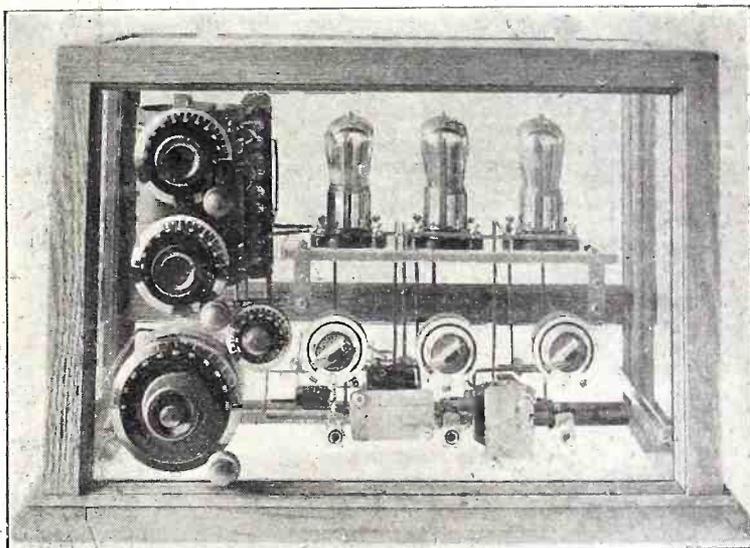
Vol. 4 No. 84 Nov 3, 1923

THIS AMATEUR'S RADIO RECEIVER LIVES IN A GLASS HOUSE

Not many amateurs would tackle a set such as has been designed and built by John J. Kuntz, 101 West 109th Street, Richmond Hill, Brooklyn, N. Y. The reason is perfectly obvious. No one wants to tackle the job of drilling glass. Mr. Kuntz intended to finish the set shown, in time to exhibit it at the recent Radio Exposition, and in his hurry he split the front glass panel after he had 32 of the 37 holes drilled. This made him think differently of trying to rush a glass drilling job and so he took his time and finished it after the exposition was over.

The set as shown is the same circuit as used in the Radiola II. The coils were all home wound on bakelite formers, exactly like the commercial product. All the beginnings and endings of the coils were brought to a separate bakelite panel, shown next to the coil. This makes it possible to change the circuit very easily. The receiver consists of detector and two stages of audio-frequency amplification, and took two days to wire up.

The interesting part of



Front and rear views of the three-tube set built by John J. Kuntz and enclosed in a glass cabinet. This is an excellent example of careful and painstaking amateur work.

the receiver is the fact that all panels, even the bottom supporting panel, and the small sub-panel upon which the sockets are mounted are of plate glass. In order to accomplish this it was necessary to drill 37 holes in the front panel for the tuning controls, 10 holes in the supporting shelf, and 10 holes in the rear panel for the binding posts and the shelf support. Every hole was drilled by Mr. Kuntz with an ordinary breast drill, using turpentine as a lubricant. The tedious part, of course, was locating the exact position of every hole. With a glass panel everything must be letter perfect. You cannot have a hole a fraction of an inch off. There is no such thing as reaming out a hole in a glass panel because of a slight inaccuracy of register.

An interesting feature of this receiver is that the entire front panel and instruments can be lifted out of the set by simply loosening the front moulding around the edges. Every one of the tuning controls has a vernier button for fine control.

A TWO TUBE REFLEX LOOP RECEIVER—(see inside)

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RADIO WORLD

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Power Amplification for Everybody

By Leroy Western

TO the average amateur there comes a time when he desires to get more volume out of his radio receiving set. Such a desire is usually followed by the purchase of additional amplifying apparatus and a distinctly noticeable loss of temper among the members of the family of the individual. This loss of temper is very readily traced to numerous squeaks, howls, groans, shrieks, etc., which emanate from the loud speaker attached to the receiving set of the hard working novice.

type of tuner, detector and two-stage amplifier. Several unusual points will be noticed in connection with this diagram, the main one being the use of a separate "B" battery. This has been found by actual experimental work to clear up much of the noise and howling manifested in a third stage of ordinary audio-frequency amplification where a common "B" battery was used. This little kink was come across while experimenting with a three-stage amplifier which gave very good results on the second stage, but on the third stage the signals were distorted so that they were almost unrecognizable. When the connections to the fourth tube were changed so that a separate "B" battery voltage of 150 volts was applied to the plate of this tube, much of the trouble was cleared up. Then by the addition of a 30 to 45-volt "C" battery in series with the grid return, still better signals and less distortion was obtained. A further refinement was made by connecting the iron core of the A F transformer to the side of the primary, which was in turn connected to the positive of the "B" battery. This eliminated a difference of potential which is ordinarily found between the core and the windings and gave very much better results. When experimenting with the voltage of the "C" battery it was found that with certain types of compar-

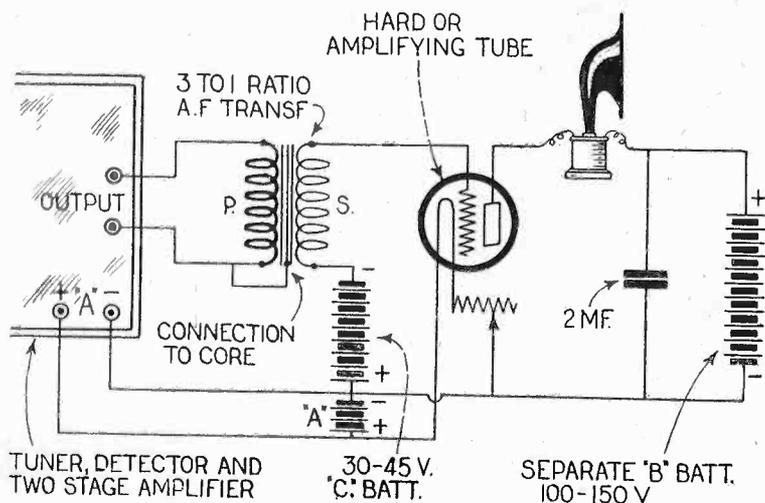


Fig. 1. Schematic diagram of a third stage of audio-frequency which may be added to the conventional detector and two-stage. Note that a high voltage C battery is used, and that the plate battery is entirely separate from the common B battery circuits of the other tubes.

The object of this article is to point out some of the simpler ways in which an amateur can increase the volume obtainable from his receiving set with a minimum of distortion and noise. In order to do this work, it is absolutely necessary that one particular point be borne in mind and that is that only first class, tested apparatus be used. You may be able to save a few cents by buying an inferior make of transformer, but you will fully pay for it in the end by inferior results and, in all probability, ruined apparatus. Even though comparatively small currents are handled in radio work, still in two or three stages of audio-frequency amplification, these currents build up to such an extent that they are very liable to damage cheap and inefficient apparatus.

For this reason it is recommended that only the very best make of audio-frequency amplification transformer be employed, for this is usually the weak link in a cascade amplifier.

Referring to Fig. 1, we see an additional stage of audio-frequency amplification added to any standard

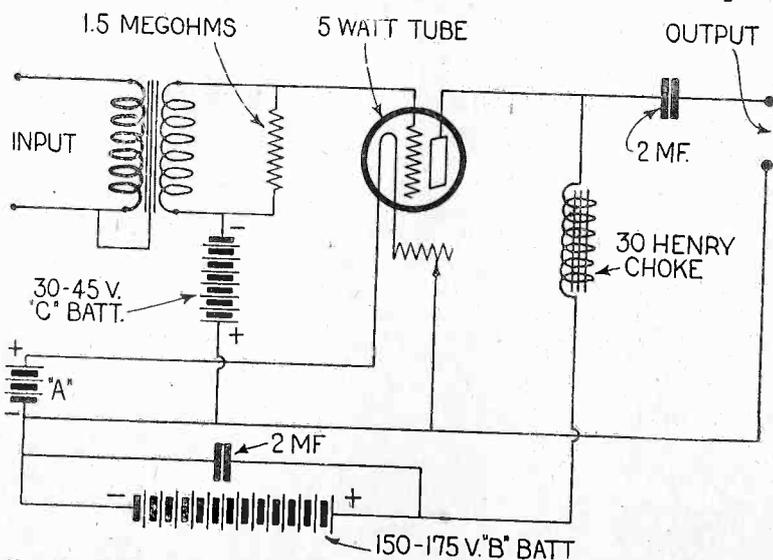


Fig. 2. Schematic diagram of a single stage power amplifier that gives exceptionally good volume. Note the choke coil in series with the plate circuit, and the fact that the output circuit has a heavy condenser in series with one of the plate leads.

tively soft amplifying tubes, the voltage could be kept as low as 3 to 8 volts. The harder tubes, however, gave the better degree of amplification. The UV201A tube will give excellent results in this circuit.

(Concluded on next page)

Impromptu Canadian Test Smashes Radio Records

MONTREAL, P. Q., CAN.—That radio amateurs in Canada may soon have a system for relaying private messages across the continent, which is equally efficient as that of American operators across the border, was indicated here with the announcement that five crack stations had sent an eight-word message from ocean to ocean and completed the return in an hour and ten minutes, beating all previous Canadian records.

The peculiar feature of the incident is that the test was entirely impromptu and was made on the suggestion of an amateur in Toronto. It is regarded as a coincidence that several of the best stations in the Dominion were "on the air" at the same time, otherwise the test would have been a failure, for coast to coast work is still uncommon.

Soon after a transcontinental radio test was suggested at 1:30 A. M. by a member of the American Radio Relay League, the operator of amateur station 3NI at Toronto received a message from Canadian 4DY,

addressed to 1AR, and relayed it to amateur station 2BN, which is operated by J. M. Miller of this city. The message read as follows: "Greetings from Nova Scotia, success to the test." This was relayed through to 5CT in Duncan, B. C., on Vancouver Island.

The stations are located at great distances from one another but once they had been lined up for the impromptu race, the flight of the message across the country was made without a hitch. Aware that the reputation of Canadian operators was at stake, all of the amateurs stood by for acknowledgments and the reply came back to 2BN here over the same route in about ten minutes.

This test is considered good evidence that the Canadian operators are thoroughly capable of holding up their end of the amateur radio network that now extends over the North American continent like a cobweb binding isolated sections of the Canadian mountains and the Rockies into contact with more populated centers.

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If greater volume is desired from any two or three-stage audio-frequency amplifier which is now in constant use with fairly good results, it may be obtained by the use of the circuit shown in Fig. 2. This is

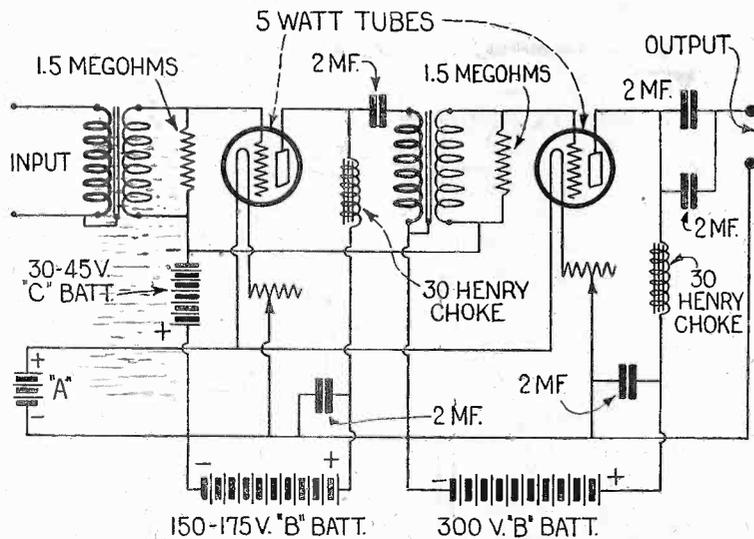


Fig. 3. Diagram of a two-stage power amplifier, using the regular transformers instead of the split secondary type. This puts a power amplifier within reach of every one. If this is carefully constructed according to the constants given, it will enable the user to fill a large hall with music from detector and one stage of regular amplification.

known as a single tube power amplifier and if properly connected will give excellent results.

The remarks appertaining to the audio-frequency transformer in Fig. 1 apply here as well and it was found that a resistance of 1.5 megohms shunted across the secondary of the transformer gave excellent results.

It will be noticed that in this circuit, the high voltage "B" battery does not go to the plate through the loud speaker or other reproducing apparatus. In fact, it is applied to the plate through a 30 henry iron core choke coil. By keeping the high potential out of the loud speaker, clearer results were obtained. It is also necessary that the two mfd. condenser be inserted in series with the loud speaker.

Where it is desired to fill a large hall or give a good demonstration of radio on a public street, two stages of power amplification such as illustrated in Fig. 3 will do the work. This is just another stage of power

amplification added to the circuit shown in Fig. 2 with the exception that two 2 mfd. condensers are used in parallel in the plate circuit of the last tube.

It may be that some amateurs will have difficulty in procuring 30 henry choke coils. If so, they will find that the primary winding of the Wayne bell ringing transformer, manufactured by the General Electric Company, will give a value of approximately 30 henries. Even though this is not exact, still such a winding will give the desired results in the circuits given herewith. If the amateur desires to wind his own choke coils, he may do so as follows: On an iron core, 4" long, start a winding of No. 38 wire, continuing for 3½". Keep winding over this even layers of wire until the total outside diameter is 2½". The core should be ½" in diameter, composed of a bundle of fine iron wires. This should be provided with wooden ends to keep the wire from slipping off the core.

A few hints on the operation of a high-powered audio-frequency amplifier will, no doubt, be of value. After the set is hooked up and ready for use, the filament should be turned on and the degree of volume tested. The filament should never be burned at a higher brilliancy than is necessary in order to obtain the volume desired and if you cannot get as much noise from the tubes as you would like to have, add more amplification, but don't force the tubes; by doing so you are liable to burn them out.

If an intermittent crackling sound is heard in the loud speaker, you will undoubtedly find your trouble in your batteries, either the "A" or the "B." If these are both strong, look for the source of trouble in a bad contact somewhere in the amplifier unit. Sockets are a frequent cause of this trouble as is also the oxidization of the prongs on the bases of the tubes. These should be cleaned frequently. If when you hook up your amplifier you do not get the degree of volume from it that you expect, go over all connections carefully and make sure that each one is soldered in its proper place. If soldering is not used, great leakage may result which will cut down the volume considerably and in some cases even render the set inoperative. In short, go about everything methodically and with a little care you will be able to obtain the results from your power amplifier that would be expected from a manufactured unit.

A Two-Tube Reflex Loop Receiver

*More Selective Receivers
Must Be Perfected*

*By C. White
Consulting Engineer*

AS I have said in many previous articles, the future of radio depends solely upon eliminating interference and securing quiet and distortionless amplification from any station that is desired. Quiet operation is entirely dependent upon sharp tuning and efficient amplification. As far as amplification goes the problem has virtually been solved, but at present all efforts are bent toward perfecting more selective receivers. The loop receiver is paramount in the field of quiet operation, especially when it is used in conjunction with radio-frequency amplification. Owing to the high cost of vacuum tubes it is still advisable to economize on the number of tubes in your set.

The efficient application of the reflex principle has now come into common use. Although a great deal of care must be exercised in constructing a reflex circuit, still the results so obtained are worth the trouble involved. All joints must be well soldered, wiped clean, all connecting wires must be kept as short as possible and insulated with spaghetti tubing. Before starting to assemble a reflex circuit these rules must be constantly borne in mind and carried out to the last degree. I have often examined reflex circuits which failed to work solely because one joint, which had the appearance of holding well, was in reality a poor electrical connection.

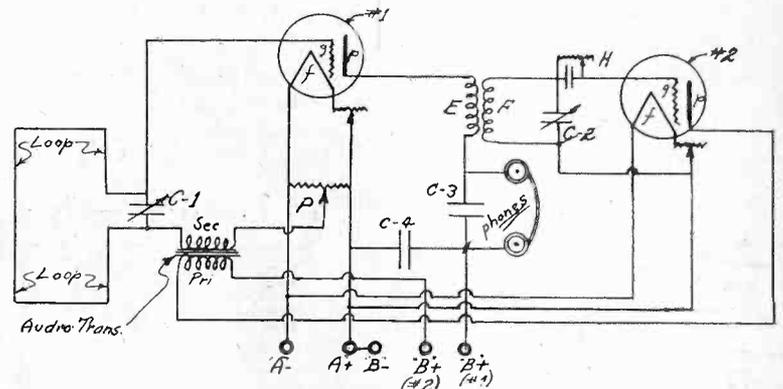
In the receiver shown herewith two tubes are employed. Tube No. 1 performs the function of both a radio and audio-frequency amplifier, while tube No. 2 is the detector. The loop not only acts as an aerial to pick up the radio-frequency energy, but also performs the purpose of a tuning inductance. After the wave has been tuned in by means of the loop and condenser C-1 it passes through tube No. 1 amplified to the plate circuit. From the plate circuit of tube No. 1 it passes to the tuned grid circuit of tube No. 2. There it is rectified and is passed on to the primary of the audio-frequency transformer, which passes it on to the secondary back through tube No. 1, which amplifies it again as audio-frequency waves. It is this double use of the first tube that saves in additional tube expense and more wiring trouble. Those who have experienced considerable difficulty in assembling and operating successfully reflex circuits that have heretofore used an outdoor aerial will find that the loop type of reflex gives far better results.

In order to save time and many useless adjustments in turning the loop it will be well to equip the loop base with an indicating device which shows the direction in which the loop is pointed. This device is nothing more than a pointer on the bottom of the loop axis and a dial fastened to the base of the loop. To secure the proper position in which to fasten the dial a compass can be used. A broadcasting map of the United States, with locations of the leading stations, will come in handy to give you the correct position to place the loop, thereby eliminating the uncertainty that has heretofore existed when no compass dial was used. No difficulty will be experienced in pointing the loop to receive from local stations, although their exact location, or rather direction, is not known.

The specifications for the set are as follows: Loop has 10 turns of stranded copper wire and is 3' on the diagonal. Since this wire is not insulated it must be supported on bakelite strips to prevent leakage.

The wires running from the loop to the set should be well insulated and flexible. The loop should be mounted on top of the cabinet and the flexible wires should run direct to the terminals of the condenser C-1. This condenser should have 11 plates and be equipped with a reliable type of sharp tuning dial for minute, or vernier, adjustment. Better results are secured if the movable plates of C-1 and C-2 are attached to the filament side of their respective tubes. The potentiometer P should have a resistance of 300 ohms or more and should be of the carbon pile type, since this type of potentiometer is smooth and noiseless in adjusting. The filament rheostats for each tube should have a resistance capable of giving perfect filament current control throughout their entire range.

If you intend to use several types of tubes in this receiver it is better to equip the set with 30 ohm filament rheostats so as to take care of all conditions. Any good reliable make of audio transformer will work very satisfactorily in this circuit. Sometimes, and with some makes of transformers, better results are



A two-tube loop reflex that is selective, sensitive and easily handled, having but three controls. Gives good volume on a small sized loop and is good for distance reception.

secured when .002 mfd. condensers are placed across the primary and secondary terminals. The unit E-F consists of two coils wound on 3½" and 4" tubes respectively. The coil E should have 40 turns on 3½" tube, and the coil F should have 60 turns on 4" tube. No. 22 gauge (S. C. C.) magnet wire is used for both coils. And the coil E is slipped inside the coil F. The condenser C-2 is the same type and size as C-1. C-3 is a .0025 mica bypass condenser. A 1.0 mfd. condenser, C-4, adds stability to the circuit. A variable grid leak and condenser (H) of some reliable make will greatly aid clarifying signals.

The operation of this receiver is simplicity itself. As I have explained before, the direction to point the loop can be easily ascertained. Then C-1 and C-2 are adjusted to tune in the desired station. After a station has once been tuned in a log can be kept of the condenser settings. The potentiometer P serves to control oscillations. It is adjusted until the maximum volume or clarity is obtained. It will be noticed that the filament rheostats play a great part in determining the quality as well as the volume.

This set will operate a loud speaker fairly well on signals from stations not more than 300 miles. Local stations will give very good volume on a loudspeaker. If, however, more amplification is desired for loud

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The Radio Woman

I WONDER if mothers realize what a real blessing their radio sets are in connection with the youngsters? One thankful mother wrote me the other day saying that if it weren't for the radio in the evening, she don't know what else would get her flock into the house at a decent hour. Of course, the children must think of their school home work first, but after that, what is to keep them from staying in the streets until all hours? Radio! And it does!

* * *

It's so nice to see the dear things proudly sitting around the set, faces all beaming with happiness, and their best friends who have been especially invited to the house to hear the radio. A picture of perfect contentment, is it not?

* * *

Now that a little high school friend of mine is the possessor of a set (made entirely by himself), he has bestirred himself to join the radio club in his school. He tells me it's a very good club, too, because any time he is in doubt about anything, it is always to the club he goes for information. He has found out lately how to change a two-bulb set into a three-bulb set and has added an amplifier.

* * *

The boy's father, by the way, did not put much stock in his son's efforts along this line, but you ought to see the change in Mr. Father now. Call on him almost any night as late as 11 or 12 p. m. and you are almost sure to find him seated at his boy's radio. Incidentally, his opinion of sonny has gone up tremendously.

* * *

A letter addressed in care of RADIO WORLD reached me the other day from a little lady way out in Nome, Alaska. It seems that she has been a cripple for many years, due to an earth bank caving in on her when she was a little girl and depriving her of the use of her legs. She says in part: "We have no powerful stations up here, so you can readily see that any receiver has to be pretty powerful to get anything. Dad is pretty old, but even though he is not supposed to move around much, he constructed a receiver from plans in RADIO WORLD and I can hear nearly all the broadcasters in California, and one night was lucky in hearing one of the Canadian stations. It is not much fun going around in a wheel chair, and I do not like to impose on people, so I rely upon my radio set (it has three tubes and a crystal detector) more than most people do, and I take turns with daddy in seeing who can tune in the most

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speaker operation on distant stations a straight audio-frequency amplifier can be added in place of the phones as indicated on the diagram. Under such conditions it is advisable to use a separate A and B battery for the set and the amplifier. Although, under some circumstances rather good operation is secured using the common A and B battery. But, for those amateurs who are desirous of using more than two tubes I would advise that they use a reflex circuit throughout. It is my intention to describe in a forthcoming issue of RADIO WORLD a circuit using more than two tubes and incorporating the reflex principle.

For portability, versatility, as well as ease of construction and manipulation many fans will find that this two-tube reflex will fill their needs very well, because it affords good loud speaker action on powerful stations up to 300 miles and good volume for earphone reception on weaker stations and those farther away.

stations in fifteen minutes. It's sort of a gambling game that we both like, because sometimes a station is off for a few minutes and then will come on just after the fifteen minutes is over. The next listener, or tuner, is the lucky one. I enjoy your columns immensely, as does dear old daddy." Then she goes on to tell me of all the funny uses she can put her radio set to. Proving that radio is wonderfully useful in bringing relief to remote places.

New Broadcasters

FOLLOWING is a list of Class A broadcasting stations licensed during the week ending October 13:

Call	Station	Frequency Kcs.	Wave Length Meters	Power Watts
WTAY	IODAR-Oak Leaves Broadcasting Station, Oak Park, Ill.	1,330	226	15
WABA	Lake Forest University, Lake Forest, Illinois	1,130	266	100
KFKZ	Nasour Bros. Radio Co., Colorado Springs, Colo.	1,280	234	10
KFLB	Signal Electric Mfg. Co., Menominee, Mich.	1,210	248	20
WFAV	University of Nebraska, Lincoln, Nebraska	1,090	275	500
WTAX	Williams Hardware Co., Streator, Illinois	1,300	231	20
Transfer Class C to Class A				
WGR	Federal Tel. & Tel. Co., Buffalo, New York	940	319	500
Transfer Class C to Class B				
WLAV	Electric Shop, Inc., Pensacola, Fla.	1,180	254	15
KFCY	Western Union College, LeMars, Ia.	1,190	252	50

Week October 20, 1923.

WSAY	Irving Austin, Chamber of Commerce, Port Chester, N. Y.	1290	233	100
WSAZ	Chase Electric Shop, Pomeroy, O.	1160	258	50
KFLD	Paul E. Greenlaw, Franklinton, La.	1280	234	20
Transferred from Class C to Class A				
WIAH	Continental Radio and Mfg. Co., Inc., Newton, Ia.	1160	258	10
WFAH	Electric Supply Co., Port Arthur, Texas..	1270	236	150
KFHA	Western State College of Colorado (formerly Colo. State Normal School), Gunnison, Colo.	1190	252	50

To Owners of Standard Receivers

MANY amateurs and fans who own sets of standard manufacture occasionally run into little troubles, or would like to improve their receivers in a certain way. The manufacturers have a most complete technical department that is constantly on the lookout for little ideas of that type, and would welcome any questions and even ideas that you may run across in manipulation of the receiver. Drop them a line if you are in trouble, or give them your little idea. It might help them out in some particular way that would benefit not only yourself but the thousands of other users of that type of set.

German Motorcycle Patrol Uses Radio

KEEPING abreast of the times, even though approaching internal chaos, seems to typify the old German stolidity. The



(C. P. and A. Photos)
Two Berlin motorcycle policemen and their radio equipped motorcycle with side car.

latest reports and photos from that country show these once progressive people have equipped their motorcycle police with up-to-date loop radio receivers. The reason for their doing this is not stated, but the supposition is that it was done to enable the police to mobilize rapidly in the event of a crisis, such as is now taking place.

The accompanying illustration shows two of their motorcycle squads on patrol duty, receiving orders from headquarters. Both officers are equipped with head phones so that in case of an error there will be two parties to check up on the orders.

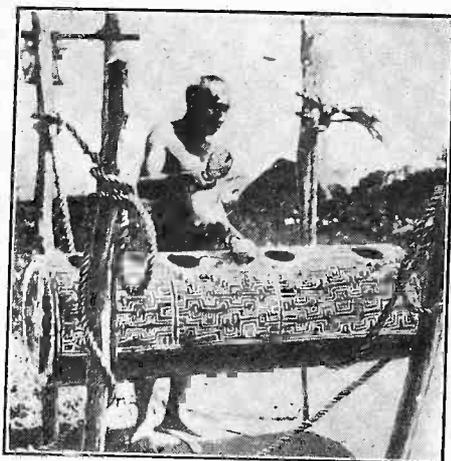
The receiver which operates on the loop shown is located in front of the officer sitting in the side car. The operator-officer is taking down notes in his book.

Broadcasting Is Ancient

PEOPLE are wont to consider broadcasting as a new art. Scientists, however, tell us that the basic principle is the same as that used for many ages among primitive savages. The only thing that has changed is the method used. The Mulford Biological Expedition recently returned to the United States from South America, bringing back with them the appa-

ratus used by the Tucano Indians for their broadcasting. It consists of a section of a tree, hollowed out, and with a number of holes along its length. Its tone depends upon the number of holes, and the length of the log, which is the distinguishing feature of each "station" just as the wave length and call are the distinguishing features of our broadcasting stations.

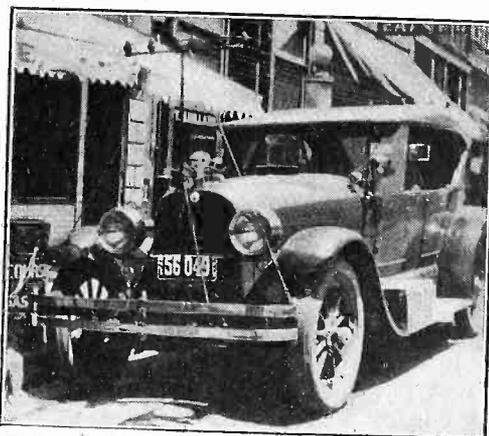
These primitive savages have definite codes which they pound out on the drums. Messages are transmitted between villages four days' journey apart, or figuring on the average "trek" as 20 miles per day,



(C. Underwood and Underwood)
Native of Tucano, South America, using his primitive broadcasting device. Note the decorations. The operator is generally a man of high rank in the tribe.

these stations have a range of about 80 miles.

In a description of these drums it was stated that when one is near them they do not make a very loud sound. Rather, a low, vibrant car-



(Radio World)
A well-equipped radio automobile. Note the method of fastening the posts by means of guys, much the same as a regular antenna.

rying tone, which can be heard at very great distances and read very easily when one understands the "code" they use.

Automobiling De Luxe

ONE particular Oklahomian decided that he wanted to equip his Jordan with a radio set. Moreover, he wanted to

make a complete job of the thing, so he erected a regular antenna on the car, guyed the mast to the bumper, and placed his rear mast over the spare tire rim.

No matter how it is considered, the job is a most complete one as a glance at the illustration will show. No expense or trouble has been spared to make it as efficient as possible. The receiver while not visible is located in the rear of the car, so that it can be manipulated while the driver listens—and tends to the business of driving. The antenna is constructed in such a manner that the eight strands of wire are used as one single length, thereby giving a total length of wire of about 75 or 80 feet, which is no mean antenna.

Battling Butler Broadcast Briefly

FANS who listened in to WJZ Tuesday, October 23, were given a treat in the form of the broadcasting of the new musical comedy "Battling Butler," which was broadcast direct from the Selwyn Theatre, New York City. Miss Helen Ely, the prima donna of the performance, was especially delightful, and it is a sure thing that her songs "got over" if reports up to the present time are any criterion.

The broadcasting of the popular musical shows, comedies and even dramas is proving a very popular form of entertainment over radio. While the fans cannot visualize the



(C. Radio Corp. of America)
Miss Helen Ely, star of "Battling Butler," who made her radio debut through Station WJZ.

performance as well as they can when a radario is broadcast, it leaves an agreeable impression.

Radio in Commercial and Private Life Grows Rapidly

By Washington R. Service

WASHINGTON, D. C.—As a means of direct communication and for the entertainment of people of practically every race, radio is rapidly taking a place in world affairs unprecedented and unanticipated by forecasters, not excepting the visionary Jules Verne, who predicted several time and space eliminators.

Many new commercial radio circuits have been opened within the past two months, while further construction is announced nearly every week. Broadcasting, born in the United States as recently as September, 1921, has spread rapidly, and is coming to be a necessary feature of practically every country, stations being operated either by the governments or private companies. But America still leads in commercial radio enterprises, broadcasting and in the manufacture of equipment which goes to forty or more countries.

One of the latest developments is the formation in Italy of a huge radio manufacturing and operating organization at Rome, similar to the Radio Corporation of America and the Marconi Company in England. The new company is to be known as the "Societa Annonima Italo Radio per Servizi Radioelectrici," and is understood to be a consolidation of two older organizations. The authorized capital is seven million lire, part of which is to be used for the purchase of the Italian rights to German and French patents and for the purchase of existing equipment in Italy.

Previous to the organization of this national body—and it is agreed that at least 55 per cent. of the stock must be held by Italian citizens—Italy depended upon England, France and Germany for her international radio service. In view of its large colonial possessions situated at great distances from Rome, the need for a high-powered radio communication service is as great as in any country, except perhaps Great Britain.

Another recent radio incorporation, known as the Wireless Telegraph Company of South Africa, Ltd., plans to provide international telegraph service for that dominion within 18 months. The chief high-powered station will be situated at Klipheuvell, Cape Province, about 30 miles from Cape Town. The power is to be 750 kilowatts, and the wave length will be about 16,000 meters, it is reported. Sixteen towers, 800 feet in height and arranged in circular form will support the aerials. Since the circle will be approximately a mile and a half in diameter, some idea of the size of the station is gained.

This project, together with stations planned in Canada, Australia and India and existing British stations, forms part of an Empire wireless system, each station of which is designed to communicate directly with the mother country and other British possessions.

Municipal broadcasting is planned by the city of Cape Town, South Africa. Recently Sir David Graaff, a prominent citizen, made a present to the city council of a 6-KW broadcasting station built by the Marconi company. With the exception of some experimental tests made by South African newspapers in broadcasting, this will be the first permanent venture. The council, it is said, plans to control the matter sent out for a period of fifteen years, fearing misuses by private owners.

Bulgaria has just approved the erection of a wireless plant at Constanza to cost approximately 800,000 lei, and take the place of the present station there, which handles little except shipping intelligence. Bankers, business men and shippers are said to back the project, desiring to communicate with Western Europe, Constantinople, the Piraeus and Odessa.

A combination to control broadcasting in Sweden has been formed, but until the Swedish law forbidding private individuals the use of radio receiving sets is modified by the Riksdag, general broadcasting cannot progress very far. The king has authority to permit the use of receiving sets, and to date 300 such permits have been issued, it is understood.

A change in the existing law granting private use of sets will be presented to the parliament early in 1924, the Minister of Communications announced recently.

Judging from the importance of some firms in the broadcasting combination, called the Svenska Rundradio Aktiebolag, it is believed it will be able to secure sole rights to broadcast in Sweden for ten years. The capital stock of the organization is said to be about 300,000 kronen; headquarters will be in Stockholm. It is the plan of the company to license receiving sets, the king to fix the rates, suggested as 20 crowns a year. An amount equal to five per cent of the fees will go to the government. The gradual building of governmental sending stations is planned, each station to be at the disposal of the broadcasting company for five hours a day, for which the company will pay the government. Wave lengths and interferences are to be controlled by the government. On its part, the company binds itself to broadcast news, weather reports and various kinds of entertainment, also urgent and important news, free of charge to the government.

This company also plans to sell apparatus and parts. Discussion as to the kinds of apparatus to be licensed for reception is under way, the authorities insisting that the public sets should be such that listening-in on naval communication is impossible.

Work on a new government radio-telephone station at Vardo, on the north coast of Norway, to cost approximately 95,000 kronen, is reported as under way, by Consul Ifft, at Bergen. It is expected that this station will soon be in communication with the telephone broadcasting stations at Ingo, Tromso and Spitzbergen. The main object is to maintain communication with the fishing fleets.

Radio fans in the Lille district of France are manifesting interest in American-made equipment, Consul Squire reported recently, pointing out that as permits for receiving sets may now be obtained from the government, there is no reason why the use of radio should not increase steadily. Broadcasting from Paris, London, Cardiff and Glasgow can be heard in Lille regularly, he adds, the Paris concerts coming in on 1,000 to 1,500 meters and the British stations on 200.

Direct radio communication between New York and Warsaw, Poland, was established on October 4, the Department of Commerce has been advised by the Radio Corporation. This exchange of messages heralded the opening of the new government station at Warsaw, and makes the seventh direct radio circuit to be operated from New York to Europe.

How to Build An Output Transformer

By James F. Benton

IN THE olden radio days when broadcasting and radio-*phone* work were the future dreams of but few amateurs, audio-frequency transformers were made at home. Indeed, there were but few amateurs who could afford to have even one tube, to say nothing of three such as is now common with nearly every fan. Certain radio men used to pride themselves on the quality of their home-made transformers, but now since radio has become so very popular you can purchase audio-frequency transformers vastly better and cheaper than you could ever make

age type of radio tube used. While this principle is quite right still too much emphasis should not be placed on it, since only an approximate match is necessary. I mean to say that if a transformer approximately or exactly matches the plate circuit impedance of the WD tubes it will operate satisfactorily with the UV201As, and other non-power tubes. In the modern system of amplification we are not concerned with actual energy development until we get to the plate circuit of the last tube. In all the tubes before the last tube we are primarily concerned with voltage amplification and not energy amplification, but when we finally reach the last tube we want energy amplification, and the maximum efficiency from the last tube as a producer of energy. It can be proven definitely that to obtain maximum efficiency and power output from the last tube we must match as nearly as possible the plate constants of that tube with the constants of the final receiving or sound transforming apparatus. Of course, power tubes are designed to give a large variation in plate current for a small variation in grid potential. Such tubes naturally, and from the constants of design, have a low plate impedance and a low plate resistance.

To make an output transformer, procure several small sheets or pieces of silicon-steel or "transformer sheet" laminations about 10 mils thick (that is .01" thick). Cut from this sheet or pieces of sheets L shaped laminations, having 1/2" as the width of a leg and 3 1/2" by 4" as the length. It will be necessary to cut or punch out at least 80 or 90 such laminations. This seems like a long job without special punch and dies but it is not since the sheet is very thin.

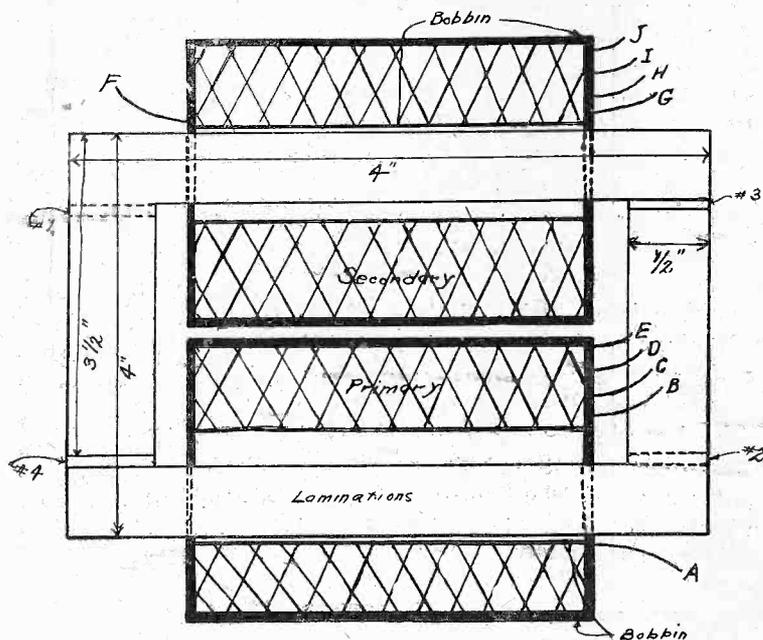


Fig. 1. Sectional diagram of the construction of the output transformer. The manner of winding and tapping is fully explained in the accompanying article.

at home. Still, it is to be regretted that the output transformer has not been developed along with the customary interstage transformer. In France and England, however, the use of an output or telephone transformer is quite common.

An output transformer allows you to adjust the impedance of your phones or loud speaking unit to that value best suited to the plate impedance of the last tube used. While it is true that our phones and loud speakers are built to have an impedance to match that of the tubes now in common use still it is often desired to use a low impedance or power tube in the last stage in order to get the maximum power output. To get anywhere near the maximum benefit from the use of such tubes it is very essential that the loud speaker impedance match the internal impedance of the tube plate circuit. For instance, take as an example the Western Electric 216A tube which is an excellent power amplifier but has a plate impedance about one-twelfth that of the average amateur non-power tube. It is no more than natural to predict that we can not obtain good efficiency by using a high impedance instrument with a low impedance tube.

The output transformer is the exact solution to the problem. By means of this transformer you can step the impedance of the sound producing instrument up or down just as the plate impedance of the last tube may demand. Recently there has been quite a lot of talk about matching the impedance of the ordinary interstage transformer to that of the aver-

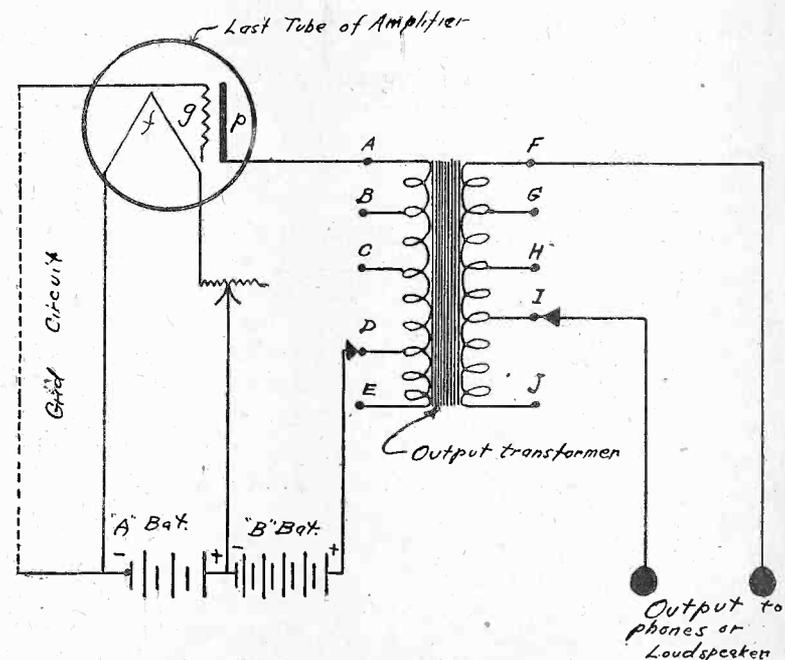


Fig. 2. How the output transformer is used. This makes possible the use of certain types of loud speakers which cannot be used with audio-amplifiers at the present time, due to being in the direct plate circuit. This transformer may also be employed to advantage in the output circuits of power amplifiers.

After this has been done, it is next necessary to prepare bobbins upon which to wind the coils. Red or black fiber is the best material to make these bobbins out of, in order to keep down the construction cost. As a center for the bobbins 3/4" fiber tubing will suffice and for ends fiber washers can be
(Concluded on next page)

RADIO PRIMER—

For the New Army of
Radio Beginners

THE IMPORTANCE OF GOOD JOINTS IN RADIO

—There are several different types of joints. In general mechanics a joint has simply to be strong, rugged and able to withstand a certain amount of abuse. This type of joint is necessary when considering the fastening of an antenna to the pole, or the guying of an antenna pole. It does not have to be electrically perfect as long as it will hold a certain mechanical strain. Generally a very good mechanical joint may be made by twisting the ends of two wires together in the form of a double spiral. This constitutes a good joint as far as the number of pounds strain it will resist, but electrically it is a poor joint.

Success in radio depends more upon perfect electrical joints than mechanical joints. The electrically perfect joint is a welded one. By this means each component part of the circuit is wholly one, and the set wired this way is virtually wired with one connection. This, however, is impossible as welding is a hopeless task around a radio set. The next best thing to a welded joint is either a soldered joint or a riveted joint. The latter is also impossible so radio fans have to be content with soldering. But when soldering, make each joint a perfect one. A poorly soldered joint is as bad if not worse than a poor mechanical joint. A poor mechanical joint has some strength. A poor electrical joint instead of helping the receiver actually hurts it.

To thoroughly understand this statement consider the fact that the energy flowing through the circuits in any receiver is exceptionally small. It is so minute that the mere bringing of your hand near the circuits can induce enough capacity effect in the circuits to

kill the signals. This is not so noticeable in local signals as it is in distance work. If your receiver does not seem to function well on distant work and the local signals come in fairly strong examine your connections. See that they are all well soldered. Do not take any chances on the weak currents being dissipated by a single high resistance joint.

Make your joints as neat and solid as possible, and under no consideration use acid flux. If acid flux is used, even though the acid is "killed" there is corrosion after a time, and this corrosion forms dirty looking joints which collect dust and dirt and cause no end of trouble. The best flux is resin or resin in combination with alcohol which makes a paste.

If you use a soldering paste make sure that it does not spread. This can be avoided by first thoroughly tinning each part. Then, using a very light coat of the paste, apply the hot iron and when the solder has thoroughly flowed around in the joint, wipe off the excess paste with a piece of cotton waste dipped in alcohol or ammonia.

Just because there is a large lump of solder on the joint does not signify that it is good electrically. The solder must flow into every crevice, making a smooth appearing joint before it is perfect. A little solder will hold wires and bus bar just as well as a large lump, and form a much neater looking joint as well as a better electrical connection.

To be absolutely sure that your set is working at its maximum, solder every connection and joint. A set may work without soldered joints, but a lot of the small current is being lost in overcoming high resistances.

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cut and attached to each end of the tubing. A small slot should be cut in each washer to allow for bringing out the end turns or taps. There are two bobbins in all, one for the primary coil winding and the other for the secondary coil. The over-all dimensions for the same are:—inside diameter $\frac{3}{4}$ "", outside diameter $2\frac{1}{2}$ "", length of bobbin or spool $2\frac{3}{8}$ ". No. 36 enamelled magnet wire is used for both the coils, and a spool of about six ounces will be sufficient for the whole job. The lead A is the start of the primary coil, and the lead F is the start of the secondary. For winding, a lathe of some sort is needed and a Veeder counter for keeping tabs on the number of turns or shaft revolutions of the lathe spindle. In bringing out the taps do not break the wire but loop the wire out through the slot already cut in one of the bobbin ends for that purpose. If you have not a lathe or winding spindle at your disposal, most anyone who has a lathe will do the job for you at a very reasonable cost. Many radio fans are able to get this done at manual training schools where a lathe can be had gratis. The primary coil should contain 12,000 turns in all with a tap at every three thousandth turn approximately. The secondary coil has the same specification as the primary. This is done so that it will not be necessary at any time to reverse the transformer in order to step the turn ratio up or down, because the primary and secondary are the same and both are provided with taps.

Fig. 1 illustrates an assembly of the transformer showing a section or view with the coils cut in half. The L shaped laminations should be so stacked that

a rectangular structure is formed. Each adjacent set (that is, two laminations) should be stacked or piled up around the coils so that the butt joint occurs at the other two diagonal corners of the rectangle. This is shown on the illustration by the figures 1 and 2 which show the ends of the first layer, and the figures 3 and 4 which show the butt ends of the next layer. The joints are so alternated until all the laminations have been piled up. A piece of tape can be used to tie them securely together at each end. Longer wire can be soldered to the leads A, B, C, D, E, F, G, H, I and J for making final connections to switch-points and switch-arms. It will be good to securely fasten the last turn of each coil and mount the transformer in a wooden box. This box should be filled with hot paraffin which will prevent moisture from getting inside the windings.

In Fig. 2 the transformer is shown in a schematic hook-up in the plate circuit of the last tube of an amplifier. As I have previously said, the adjustment of the taps on this transformer allows the relative impedance of the sound transformation instrument to be adjusted to that value best suited to the circuit. You can use a low impedance power amplifier tube in the last stage of your amplifier and get the best results by so adjusting the taps on this output transformer. It will be soon discovered that even for non-power amplification this transformer can be used to clarify and improve the quality of reproduction to a most marked extent. For the amateur who likes to experiment and build things for himself I heartily recommend that he play around with this output transformer.

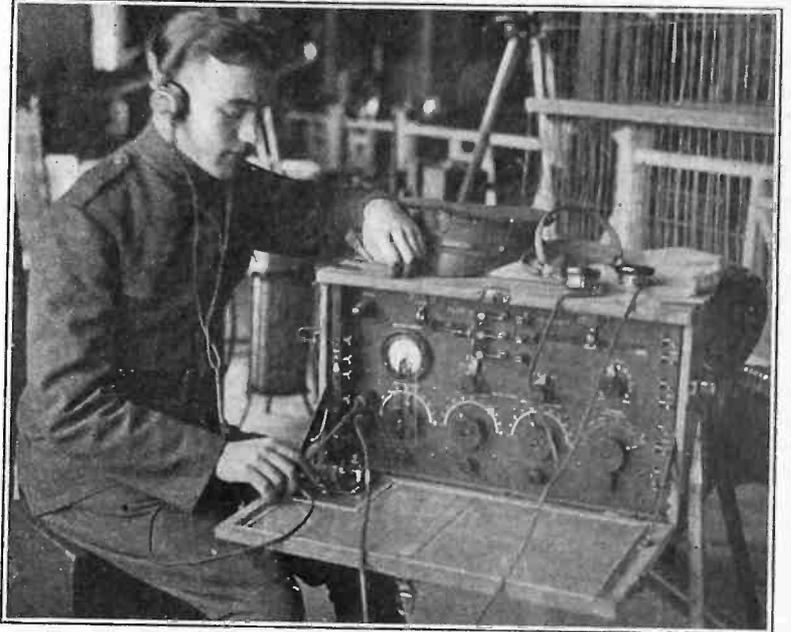
Radio at the N. Y. Electrical Show

THIS year's Electrical Show at the Grand Central Palace, New York City, broke all records for attendance. It was expected 100,000 people would attend, but just two and one-half times as many evinced their interest in the electrical and industrial exhibits on display there. Until this year, the record attendance was 164,031 admissions in 1916.

The show occupied the first three floors of the Grand Central Palace and each booth was a revelation in itself. The management of the show attributed the extra large attendance to the fact that now the people do not attend these exhibits mainly out of curiosity. Electricity has come to be such a necessity in daily life that the people feel that it is their bounden duty to attend these exhibitions to find out what this mysterious force is, and what it can do. They certainly found out plenty from this year's show.

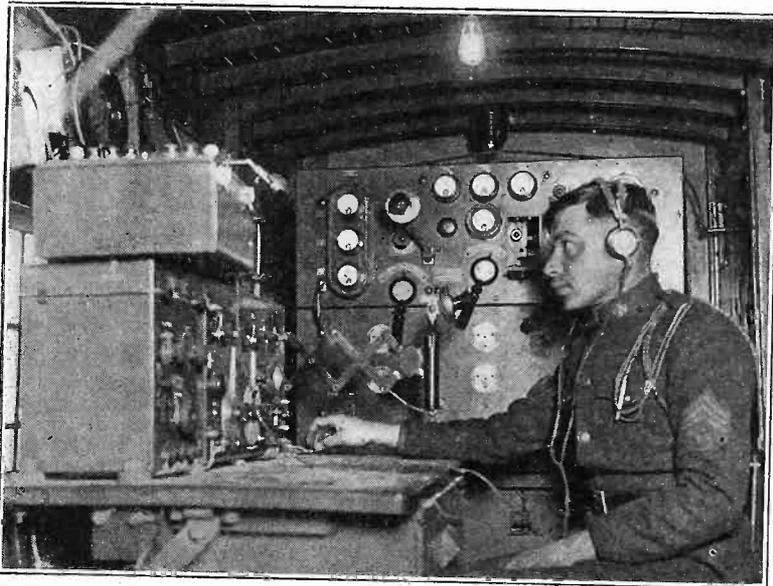
The Signal Corps of the U. S. Army had a very interesting radio exhibit of both foreign and American apparatus—French field sets, captured German apparatus and everything pertaining to the Signal Corps work in the field. Of especial interest was the mobile field station. It is a complete 2KW transmitter for CW, ICW or phone, and is one of the most powerful portable transmitters designed. The current for the running of the apparatus is derived from a generator driven by the motor of the truck itself. There were plenty of signal corps men on hand to explain the apparatus to innocent bystanders, of which there were plenty, ranging in age from school boys to grandfathers. The U. S. Navy also had a very interesting exhibit along maritime lines.

The New York Edison Company have inaugurated a new service for their customers. They have established a department devoted to the radio amateur or prospective amateur. Free and impartial advice is available to the man who wants to install a receiver, or one who has a receiver in and wishes advice. The purpose of this Radio Bureau is duo-fold. First, it helps the dealer by bringing his wares before those most interested; secondly, it aids the prospective radio fan by saving him many weary hours of guess work and worry about



(C. Kadel and Herbert)

Compact combination radio transmitter and receiver as used by the U. S. Army Signal Corps, which was displayed at the New York Electrical Show. The instrument is portable, being designed as a pack train set. The receiver is a regenerative receiver with two stages of audio-frequency, and the transmitter utilizes the Colpitts oscillator circuit. Change-over is made by means of the double throw triple pole switch located in the upper center part of the panel.



(C. Fotograms)

The mobile Signal Corps radio station. The truck is a complete receiving and transmitting station. The transmitter located in the background is a 2 KW phone, ICW or straight CW transmitter, operating on wave lengths from 1,000 to 3,000. Power is furnished by a special generator coupled to the engine of the truck. The receiver is a combination radio-frequency, regenerative receiver, with a separate heterodyne inductively coupled. Nine tubes in all are used, and a range of 5,000 miles is possible with it. The wave length is from 600 to 3,000 meters, with convenient binding posts to load it up to any desired wave length. Sgt. J. Diminick, of the Signal Corps, is operating the transmitter.

The Bureau of Standards of the Department of Commerce, as their part of the radio exhibit, showed some of the original models which have been described in their various bulletins. They also had exact models of the original apparatus used in all fine electrical measurements and tests. The 10 meter transmitter was on exhibition also, and charts showing the results of life tests of different vacuum tubes proved of great interest.

things pertaining to radio. These men will give impartial advice as to what type of radio receiver they think the particular party should own or get. The service is a regular department of their Irving Place office, and Mr. P. S. Case, radio expert of the New York Edison Company, is in direct charge of it at that address.

One of the special radio features of the show was enacted on Navy Night, October 27, the closing night. Miss Edith Bennet, the well-known concert soprano who has won fame for her marvelous singing voice over radio, sang several songs for the benefit of the audience, to the accompaniment of a pianist who was over a mile away. This novelty was accomplished in the following manner: Mr. Rodney Saylor, the accompanist, was playing at Station WHN. This accompaniment was broadcast, received by one of the naval receivers located in the Palace building, passed through power amplifiers and loud speakers while Miss Bennet was singing in person. People watching the performance could not realize that the entire performance was not being enacted as an integral part until convinced by investigation, and many were dumbfounded by it. To say the least, it is rather amazing to have a person sing to you, while the instrument and player doing the accompaniment are miles away.

Plans were formulated for the rebroadcasting of both the singer and the accompanist, but due to lack of time and proper facilities it could not be accomplished. It is hoped that at next year's show this will be done.

An Improved Triple Circuit Receiver

By A. D. Turnbull

NOTE: The builder of this circuit is not limited to two turns of wire around the secondary coil. Any number of turns up to ten will give the desired selectivity. Of course,

NOW that Winter is approaching the up-to-the-minute amateur will want to design a receiver that will not be troubled by the re-radiation of numerous receivers in the crowded municipal districts. It has been estimated that over 75 per cent. of the

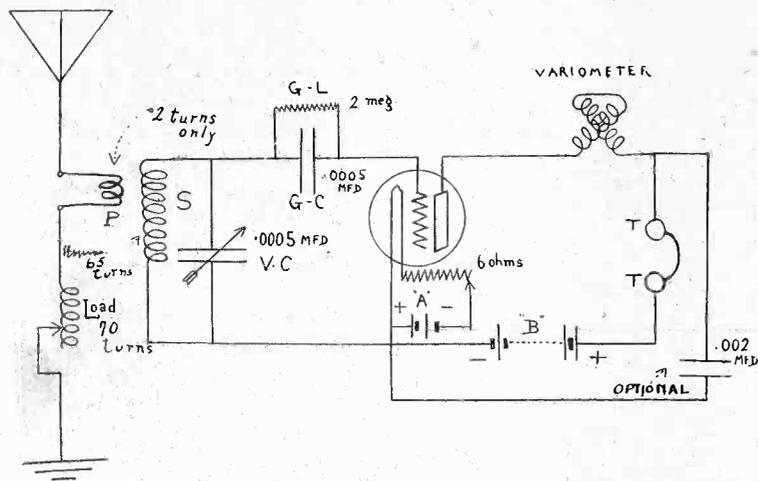


Fig. 1. Diagram of the improved triple circuit using the untuned primary and secondary coupler. This method allows greater selectivity than if the old type coupler was used.

receivers in use are single circuit receivers. Among those causing squeals and howls are the Colpitts oscillator, the Hartley oscillator, and the single circuit tickler feedback regenerator. These are noted for their propensity to re-radiate even in the hands of those who understand their operation.

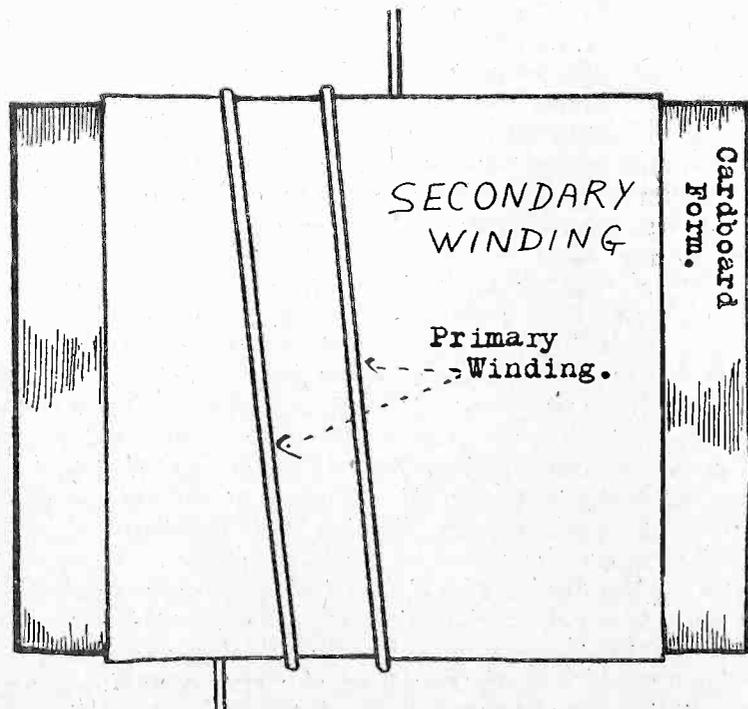


Fig. 2. The method of winding the special coupler. Two turns of heavy wire over the flat wound secondary are all that are necessary, although any number up to ten turns may be used without any detrimental effect on the final results.

Bearing these facts in mind, I designed an improved triple circuit receiver. By means of a specially constructed coupler and its triple circuit it combines the selectivity of one with the volume of the other and

the two turns give much sharper tuning, but, in most cases, where the set is properly made no loss in selectivity will be noted if ten turns are used.—Editor, RADIO WORLD.

does not cause the interference noted in the single circuit.

For long distance and selectivity, the Armstrong triple circuit cannot be excelled, that is, for the single tube receiver. It uses the tuned plate method of regeneration which is the best method and the most easily controlled. Furthermore, the advantage of a receiver using the tuned plate will be evident when we understand that the broadcasting stations operate between 230 and 550 meters. The tickler form of reaction being a fixed inductance, will give stronger signals on some waves than on others. This is due to the fixed inductance of the tickler whereas the wave length or frequency of the signals being received is constantly changing.

The main reasons for the lack of popularity of the triple circuit is that it is an extremely hard receiver to tune, on account of its multitudinous controls. Again, it uses inductive coupling between the primary and

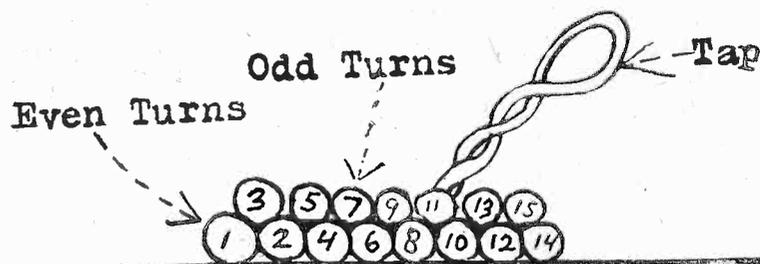


Fig. 3. Method of bank winding a coil, tapping it at the eleventh turn. When bank winding make sure that your windings are tight otherwise you will not meet with success.

secondary circuits. This does not give as loud signals as the single circuit or direct coupled receiver.

The circuit herewith uses a very high step-up voltage ratio from primary to secondary, which equals the single circuit tuner as regards signal strength without sacrificing the coupler which assures the greatest amount of selectivity. Also the variable control for the secondary is eliminated, giving considerably less trouble in tuning.

The following apparatus will be necessary to build this receiver: 1 vacuum tube and socket; 1 tubular grid-leak (2 megohm and .00025 mfd. condenser); 1 variable condenser .0005 mfd.; 1 rheostat, 6 ohms; 1 variometer; A and B batteries; 1 headset; 1 switch lever and contacts; 2 composition tubes 4"x3"; 1 pound of No. 18 SCC wire; 2 feet of No. 14 or 16 bare copper wire; 8 hard rubber or brass binding posts; insulating tubing, foil for shielding, and bakelite panel 18"x7"x3-16".

The construction of the primary loading coil comes first. As the primary proper consists of only two turns wound over the secondary the loading coil must be well constructed. On one of the tubes wind 70 turns of the No. 18 SCC wire in a double bank as shown in Fig. 2. Taps are taken off at the 11th, 21st, 31st, 41st, 51st, 61st and last turn. This makes a total of seven taps and as the coil is double bank wound, it takes up little space and is easily tapped.

The secondary consists of 65 turns of the same wire wound on the other tube, in a plain flat winding. This winding is not tapped and if sharp tuning is wanted do not use any shellac or binder, but wind the wire on

tightly enough in order to assure its not working loose.

The primary is next wound. Take the small length of large gauge wire and mark off a point 5 inches from the end. Leaving this for a connection, wind the two turns, about $\frac{1}{4}$ " apart directly over the center of secondary winding. The larger wire is specified because of the lower resistance, whereas the distance they are separated lessens any chance of distributed capacity.

The ends of the primary winding are both fastened by means of a drop of melted sealing wax which will hold them firmly in place. If sealing wax is not available, the melted top of a dry cell will suffice.

Fasten the coils to the base by means of brass angles such as are shown in the base mounting depicted in Fig. 4. The panel mounting and other instructions are not given as each amateur has his own plans. One thing of importance is that the two coils must not be placed in inductive relation to each other. To get around this it is best to mount them in the manner shown.

Shield the panel and ground it to the ground terminal of the set, taking care when doing this to carefully mount the condenser so that it does not short on the shielding.

The antenna best suited for use with this circuit is about 100 feet long, including the antenna lead and the ground wire. It will not hurt if the antenna is 150 feet long.

If when operating, the set does not seem to oscillate properly, place the optional condenser in the circuit.

All the tuning is done with the secondary condenser and the variometer, the primary loading coil being used to select the various wave lengths.

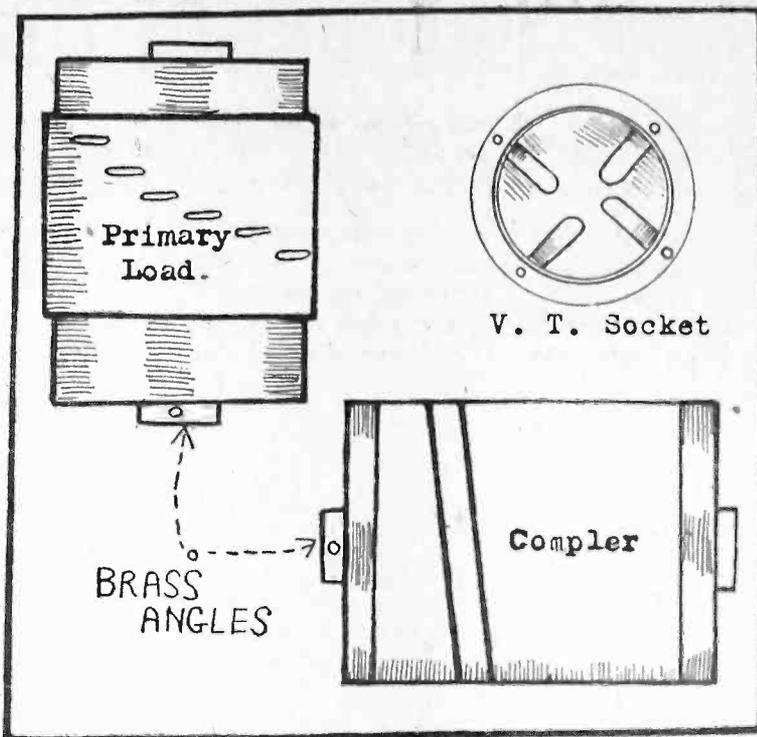


Fig. 4. Base layout of the receiver described.

A Manufacturer's View of Broadcasting

By *Powel Crosley, Jr.*
Crosley Mfg. Co.

*Address at First Convention
National Ass'n of Broadcasters*

IT IS quite obvious that if there were no broadcasting there would be no demand for radio receiving apparatus. Recognizing this fact, it would seem that the manufacturer of radio receiving sets should feel an obligation to furnish his share of the broadcasting. Of course, many other institutions find it to their advantage to maintain stations, but the fact remains that every radio manufacturer should do whatever he can to aid this work. The Crosley Manufacturing Company has maintained a broadcasting station for nearly two years. Of course the value from advertising is one inducement for the continuation of such a station, but it must be remembered that the advertising value of a broadcasting station is dependent entirely upon the quality of the service rendered by it.

Broadcasting poorly handled is a liability rather than an asset. If the station maintains a quality of service that meets with the approval of the listening public, the good will accruing is valuable. Outside of any activities by a manufacturer who is directly operating a station, he should be vitally interested in everything pertaining to the problems of national and even international broadcasting. This association is doing a great work. It is hard to conceive all of the many ways that it can help on the problems of broadcasting. Brought together as it was, by what its members considered unfair demands being made upon them in connection with the broadcasting of certain music, it is not only handling this matter successfully but is daily finding new things to do. It is not only accumulating and supplying tax-free music to its broadcasting station members; but it is now preparing to supply the same music to hotels, theatres and other institutions that have heretofore been taxed for popularizing music.

Matters of legislation in reference to broadcasting have been handled by the association—ways and means discussed for a provision of a source of revenue for the maintenance of broadcasting stations are being considered. I do not believe that the question of maintenance cost is a serious one at this time, for I believe that any institution maintaining a good station providing popular entertainment will find it worth all its costs in the development of good will.

Broadcasting is new, less than three years old, and yet wonderful strides have been made. I believe in the use of more powerful stations, especially during the summer months. A 500-watt station in the winter time has ample range, but it takes more power than that to reach out consistently, cutting through static for a thousand miles or more during the summer months. Several stations using higher power were in operation during this last summer. Their consistent range was great and I believe that they greatly assisted in the maintenance of interest and the early fall awakening of radio enthusiasm. I hope to see more of them next summer, and that we will be using more power than ourselves.

Have you never stopped to wonder what broadcasting will be ten years from now? Where we are now using watts we shall probably be using kilowatts. Where the consistent range of a 500-watt station is several hundred miles today, the waves from our broadcasting stations will some day be reaching to the far corners of the globe nightly.

The progress of the world's civilization has advanced in direct ratio to the speed of communication; so, with universal broadcasting, civilization will advance more rapidly than ever before.

Corrected Official List of Broadcasting Stations in the United States

FOLLOWING is the fourth installment of a corrected list of commercial broadcasting stations in the United States as issued by the Department of Commerce. The list will be continued in next week's RADIO WORLD.

Call	Station	Frequency Kcya.	Wave Length Meters	Power Watts
KFDL	Knight-Campbell Music Co., Denver, Colo.....	833	360	5
WPAZ	Koch, John R., Charleston, W. Va.	1,100	273	10
WNAW	Kunzman, Henry, Fort Monroe, Va.	833	360	5
WKAV	Laconia Radio Club, Laconia, N. H.	833	360	100
WABO	Lake Avenue Baptist Church, Rochester, N. Y.....	1,190	252	30
WGAL	Lancaster Elect. Supply & Const. Co., Lancaster, Pa.....	1,210	248	10
WABA	Lake Forest College, Lake Forest, Illinois.....	1,130	266	100
WABH	Lake Shore Tire Co., Sandusky, O.	1,250	240	100
WGAL	Lancaster Elect. Supply & Const. Co., Lancaster, Pa.....	833	360	75
WHAL	Lansing Capitol News, Lansing, Michigan.....	1,210	248	20
KFIC	Laskowitz, Philip, Denver, Colo....	1,340	224	15
WABB	Lawrence, Dr. John B., Harrisburg, Pa.....	1,130	266	10
KFBL	Leese Bros., Everett, Wash.....	1,340	224	10
KFGH	Leland Stanford, Jr., University, Stanford University, Cal.....	833	360	500
WNAT	Lennig Bros., Co., Philadelphia, Pa.	833	360	250
WSAH	Leonard, A. G., Jr., Chicago, Ill...	1,210	248	500
WGAU	Limb, Marcus G., Wooster, Ohio...	1,330	226	20
KFJI	Liberty Theatre, Astoria, Ore....	1,190	252	10
KMC	Lindsay, W. W., Jr., Reedley, Cal...	833	360	100
WKAS	Lines Music Co., L. E., Springfield, Mo.....	833	360	50
WDAR	Lit Bros., Philadelphia, Pa.....	760	395	500
WGAN	Lloyd, Cecil E., Pensacola, Fla....	833	360	50
WKAD	Loeff, Charles, East Providence, R. I.....	1,250	240	10
KWH	Los Angeles Examiner, Los Angeles, Cal.....	833	360	150
KFCL	Los Angeles Union Stock Yards, Los Angeles, Cal.....	833	360	500
KFGC	Louisiana State University, Baton Rouge, La.....	1,180	254	100
KMO	Love Electric Co., Tacoma, Wash...	833	360	10
WWL	Loyola University, New Orleans, La.....	1,070	280	100
WOAR	Lundskow, Henry P., Kenosha, Wis.	833	360	100
WOAO	Lyradion Mfg. Co., Mishawaka, Ind.	833	360	50
WKAX	Macfarlane, Wm. A., Bridgeport, Connecticut.....	833	360	50
KFCV	Mahaffey, Jr., Fred, Houston, Tex.	833	360	50
KFFQ	Marksheffel Motor Co., Colorado Springs, Col.....	833	360	10
WBAW	Marietta College, Marietta, Ohio...	1,220	246	100
WHAD	Marquette University, Milwaukee, Wisconsin.....	1,070	280	100
KFJB	Marshall Electric Co., Marshalltown, Iowa ("A").....	1,210	248	10
WDAG	Martin, J. Laurence, Amarillo, Tex.	1,140	263	100
WOAC	Maus Radio Co., Lima, Ohio.....	1,130	266	100
WBS	May, D. W., Inc., Newark, N. J....	833	360	20
KFAD	McArthur Bros. Mercantile Co., Phoenix, Ariz.....	833	360	250
KFHH	McCue, Ambrose A., Neah Bay, Wash.....	1,060	283	50
WKAX	Macfarlane, W. A., Bridgeport, Conn.....	1,300	231	15
KFHY	McEwan, R. S., Trinidad, Col....	1,240	242	50
KFFX	McGraw Co., The, Omaha, Neb....	1,080	278	250
KFEC	Meier & Frank Co., Alder St., Portland, Ore.....	833	360	5
KFDB	Mercantile Trust Co. of California, San Francisco, Cal.....	590	509	750
WHAZ	Mercer University, Macon, Ga....	1,120	268	50
WKAR	Michigan Agricultural College, East Lansing, Mich.....	1,070	280	100
WBAF	Middleton, Fred M., Moorestown, New Jersey.....	833	360	100
WOAE	Midland College, Fremont, Neb....	833	360	20
WDAP	Midwest Radio Central, Inc., Chicago, Ill.....	833	360	200
WQS	Missouri State Mktg. Bureau, Jefferson City, Mo. ("B").....	680	441	500
WFAQ	Missouri Wesleyan College & The Cameron Radio Co., Cameron, Missouri.....	833	360	50
WEAP	Mobile Radio Co., Inc., Mobile, Alabama.....	833	360	10
KLN	Monterey Electrical Shop, Monterey, Cal.....	1,150	261	10
KFCF	Moore, F. A., Walla Walla, Wash.	833	360	50
WQAE	Moore Radio News Station, Springfield, Vermont.....	1,090	275	50
KFCQ	Motor Service Station, Casper, Wyo.	833	360	50
WABF	Mt. Vernon Register News Co., Mt. Vernon, Ill.....	1,280	234	250
KGU	Mulrony, Marion A., Honolulu, Hawaii.....	833	360	100
KFKZ	Nasour Bros. Radio Co., Colorado Springs, Colo.....	1,280	234	10
KFLE	National Educational Service, Denver, Colo.....	1,120	268	10
KFGJ	National Guards Missouri, St. Louis, Mo.....	1,130	266	100
KFJF	National Radio Mfg. Co., Oklahoma City, Okla.....	1,190	252	20
KFDU	Nebraska Radio & El. Co., Lincoln, Nebraska.....	1,250	240	20
WCAJ	Nebraska Wesleyan University (Lincoln, Neb.), University Place, Neb.....	833	360	20
KFHS	Nelson, Robert Washington, Hutchinson, Kan.....	1,310	229	50
WAAM	Nelson Co., I. R., Newark, N. J....	1,140	263	250
KDZK	Nevada Machinery & Elect. Co., Reno, Nevada.....	833	360	25
WBBA	Newark Radio Lab., Newark, O....	1,250	240	20
KOB	New Mexico College of Agri. & Mech. Arts, State College, N.M.	833	360	500
WLAW	New York Police Dept., New York, N. Y.....	833	360	500
WEAG	Nichols Hine Line Bassett Lab. Edgewood, R. I.....	1,200	231	10
WIAT	Noel, Leon T., Tarkio, Mo.....	833	360	15
WLAC	North Carolina State College, Raleigh, N. C.....	833	360	750
KFIO	North Central High School, Spokane, Wash.....	1,190	252	50
WPAK	North Dakota Agricultural College, Agricultural College, N. D....	833	360	250
WEAM	North Plainfield, Borough of North Plainfield, N. J.....	1,190	252	50
WRAL	Northern States Power Co., St. Croix Falls, Wis.....	1,210	248	100
KJR	Northwest Radio Service Co., Seattle, Wash.....	1,110	270	100
WGAY	North Western Radio Co., Inc., Madison, Wis.....	833	360	50
KGN	Northwestern Radio Mfg. Co., Portland, Ore.....	833	360	50
WMAK	Norton Laboratories, Lockport, N. Y.	833	360	500
WPG	Nushawg Ptry. Farm, New Lebanon, Ohio ("A").....	1,280	234	50
WIAD	Ocean City Yacht Club, Ocean City, N. J.....	1,180	254	10
WAAD	Ohio Mechanics Institute, Cincinnati, Ohio.....	833	360	25
WEAO	Ohio State University, Columbus, Ohio.....	833	360	250
KFAH	Olesen, O. K., Hollywood, Cal....	833	360	100

(To be continued. Readers who preserve these installments as they appear in RADIO WORLD will have a complete and up-to-date list of broadcasters in the United States. The publication of this corrected list began in RADIO WORLD for October 13, 1923.)

RADIOGRAMS

WORLD NEWS HAPPENINGS BRIEFLY
PHRASED FOR OUR BUSY READERS

A broadcast appeal for a subject for blood transfusion has resulted in a woman volunteer giving half a pint of her blood to another woman in a London hospital. The operation was successful.

* * *

Broadcasting of the new English translation of the New Testament by Dr. Edgar J. Goodspeed, head of the New Testament department of the University of Chicago, began last Sunday night from Station KYW, Chicago.

* * *

The resumption of diplomatic relations with our neighbor republic to the south has perhaps influenced broadcasting and better press relations. A recent dispatch reaching Washington states that a new 500 watt radio station has been installed by "El Universal" a daily paper published in Mexico City. The range of this station will probably carry to our Southern States.

* * *

An eloquent instance of radio's influence in obliterating sectional lines and creating a national community spirit throughout America is cited in a visit paid to Station WSB, Atlanta, Ga., not long ago by a Pennsylvania fan, Harvey S. Rahiser, a Pittsburgh, Pa., architect, who made the trip solely to further a friendship fostered via the ether for more than a year. The Quaker State fan was met by a delegation at the train, was officially welcomed by the Mayor of Atlanta, listened at first hand to a concert in his honor, was dined profusely on fried chicken and left Georgia three days later singing the praises of the home of "The Voice of the South."

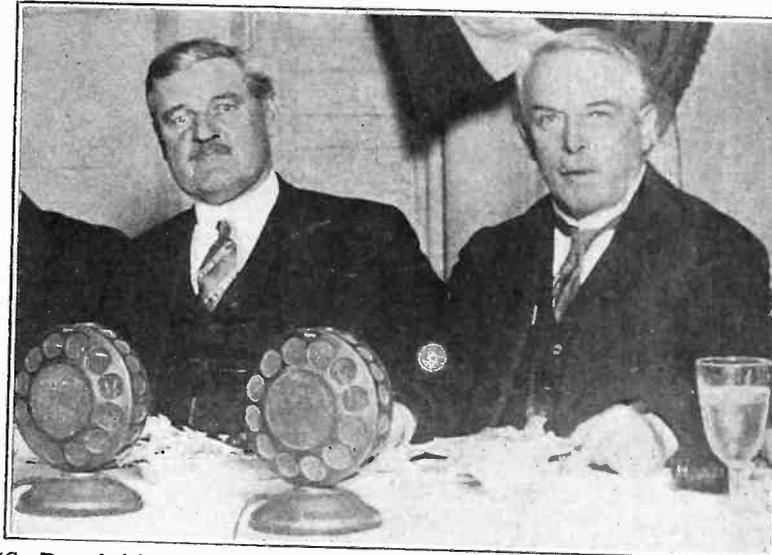
A powerful radio broadcasting station has been inaugurated in the Mexican federal capital, Trade Commissioner McKenzie reports from Mexico City.

* * *

Bishop William Fraser McDowell's watch ticked so loudly last Sunday night in addressing the Sunday Evening Club of Chicago that radio transmission of his remarks was affected, according to complaints from New York State and Milwaukee received by the club. Presumably the bishop laid his watch on the speaker's desk too near the microphone.

* * *

Before a large delegation of members of the Pittsburgh Section of the American Institute of Electrical Engineers, voltages in excess of 1,000,000 volts were made to play tricks at the High Voltage Laboratory of the Westinghouse Electric & Manufacturing Company, located at Trafford City, Pa., recently. One of the experiments was the forming of a 42-foot arc at a potential of 1,000,000 volts. This was the largest controlled arc ever made artificially and set a world's record for laboratory work. The length of the arc, the tremendous voltage behind it and the deep roar that accompanied it, combined to produce a peculiar feeling of awe at the mighty electrical forces under the control of a man's finger. Manifestations of high voltages of electricity produce a sensation which witnesses find hard to define. The 42-foot arc, in making a world's record also rendered the entire delegation speechless. Instinctively they shrank from the enormous flame.



(C. Foto Topics)

(C. P. and A.)

One of New York's newest and largest hotels, The Alamac, located at 71st Street and Broadway, which opened Nov. 1, 1923, has many modern improvements. This is the first hotel where it is possible to reserve bookings by radio. Simply get in touch with the nearest radio amateur and give him your message, and your room will be ready and waiting when you get there. You can also have "rooms with radio service." The picture shows Worthing Carter taking a radio reservation for a suite of rooms from a Chicago man starting on a trip East. This is a convenience not to be overlooked by the man from out of town.

Mayor Dever and the Hon. David Lloyd George, the human dynamo of Great Britain, seated at a luncheon tendered to the noted visitor on his arrival at Chicago. The speeches of all who spoke at this dinner were broadcast by radio. Note the microphones in front of Lloyd George and Mayor Dever in the illustration. Lloyd George also spoke from Station KDKA on the evening of October 24, and his speech was heard over practically the entire eastern section of the United States. His final address from the Metropolitan Opera House, New York City, on November 2, was broadcast by Station WEAJ.

A Radio Shack Is Not An Aviary

RADIO rooms on vessels must be used solely for the transaction of matters affecting communication, and not as aviaries, if the suspension of the radio operator on the vessel "Bird City" is taken as an example.

When a radio inspector visited this ship recently, he found that the radio operator had practically given over his shack and stateroom to a number of birds as a habitat which, despite the name of the vessel, is against the rules. The inspector declared that the room was filthy through the operator permitting a

parrot and other birds unrestricted use of his quarters. The inspector's report stated that when he entered the shack he found a parrot roost suspended from the deck above. After a search, he found the parrot perched on a bus bar in the rear of the switchboard. Polly food was all over the floor and chairs. In the sleeping quarters were found four canaries.

The shack, it is understood, was thoroughly cleaned and the bird tenants ejected from their quarters. When the "Bird City" again goes to sea she will have an operator who is not a bird fancier.

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IMPORTANT NOTICE

While every possible care is taken to state
correctly matters of fact and opinion in technical
and general writings covering the radio field, and
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regard for the facts, the publisher disclaims any
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NOVEMBER 3, 1923

National Radio Week

EVERYBODY connected with radio should show the deepest interest in National Radio Week, which takes in the period from November 25 to December 1. Interest should be expressed in something besides mere words. This annual event should mean a great deal more than the jotting down of dates and a resolution to accomplish something useful if the opportunity presents itself. Make the opportunity. There is big work to be done—and naturally there is nothing more important than to add to the roster of radio enthusiasts. In other words, bring new names and new facts into radio. Increase the interest of those who are now in but who are lagging behind. Give radio parties. Write letters. Telephone. Do your share towards awakening the thoughtless, the ignorant, or the lazy to the amazing possibilities of radio as a science, an entertainment, an art, and a business.

You know that radio is a wonderful thing. Make others know it. And use National Radio Week as the pivot around which your enthusiasm may work.

Radio and Church Attendance

CLERGYMEN of several denominations have voiced mild protests against the increasing broadcasting of church services on the assumption that it may interfere with church attendance. The fact that no sustained campaign has been made by any of them weakens the argument.

It is the belief of RADIO WORLD that the church-going habit cannot be appreciably diminished by the advent of radio or any other scientific or secular advance. A man or a woman who has formed the habit of attending church is not easily to be turned aside from the practice.

On the other hand the hundreds of thousands of letters received by the broadcasting stations from invalids and other shut-ins, are living proof that the comforts and blessings of religious services are now enjoyed by multitudes who heretofore have been debarred from them. Some of these letters exhibit strongly the intense emotion and thankfulness of the writers at again being able to hear the word of God preached from the pulpit of a church.

Another phase of the question has not received the attention it deserves. That is the proselytizing influence of radio-transmitted religious services. People who are not accustomed to attending church often own radio sets. By chance, or by choice, they hear church services, good music, the reading of the Scriptures and a sermon, often by a world-famous preacher. Such listeners are bound to be influenced and it is not conceivable that thus they might be led to attend church in person.

But the benefits conferred on the shut-ins by the radio broadcasting of religious services are beyond computation.

Selling Incomplete Radio Sets

LAYMEN who contemplate buying radio receiving sets have complained to RADIO WORLD that the prices quoted in the advertisements of many firms specify an amount qualified by the phrase "tubes and batteries extra." This leaves the uninformed purchaser "up in the air" as to just what the set will cost him.

At least one manufacturer we know has devoted much time and study to the question of properly packing all the parts of a set in one or two cartons in such a manner that safe shipment around the world is possible. Everything, even to screws, is included. The

merest tyro, by following the directions packed with the set, can erect the apparatus successfully. The prices quoted for such receiving sets at once informs the purchaser that there is nothing else to buy, that the transaction is complete.

The wonderful growth of radio is one of the marvels of the world. If the pace is to be maintained, the laymen who will constitute the bulk of future buyers, must constantly be borne in mind. Everything within reason must be done to make buying easy for them.

The manufacturers who supply complete radio receiving sets have an obvious advantage over those who omit vital and necessary elements.

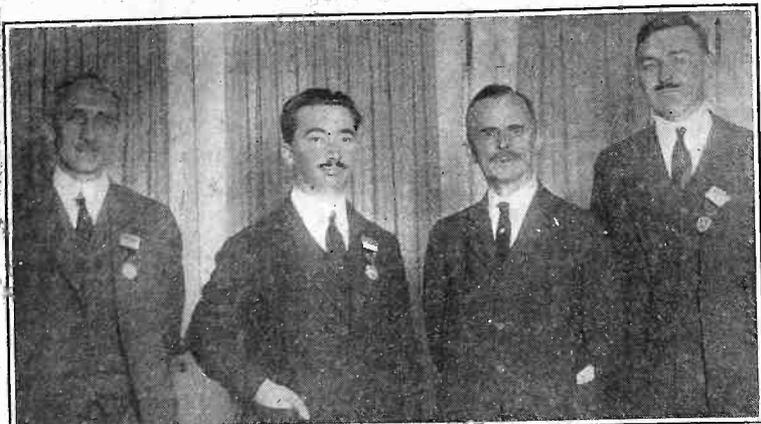
Use Tubes Properly

HOW many times has a set refused to function correctly and the blame been laid to the set itself? Times without number. However, the chief cause of the failure of the set can oftentimes be laid to the improper use of the tubes employed. With every tube purchased comes a little printed slip, showing the different important points which should be taken into consideration if the proper efficiency is to be gotten out of it. A certain approximate plate voltage must be used. A certain filament voltage must be supplied. A certain method of connecting the filament-grid leads must be used. A specific grid capacity and leak value has been found to be the best. A certain make of tube works at its highest efficiency in certain capacities, either as radio-frequency amplifier, detector, audio-frequency amplifier, or power amplifier. If you want to get the maximum efficiency out of your set, accommodate it to the type of tubes that best fits the case and follow the directions the manufacturer has taken the trouble to prepare for you.

A Popular Announcer

MAJOR J. ANDREW WHITE, the very competent describer of sports for Station WJZ, has endeared himself to all broadcast fans in the eastern half of the United States and some outside that territory. It is seldom that a man so successfully projects an agreeable personality across the ether. Major White does it to perfection. This faculty, coupled with his accurate knowledge of sports in general, enables him to give most entertaining accounts of the game in hand. He is a successful pioneer and exemplar in a difficult art.

Personages in the Radio News



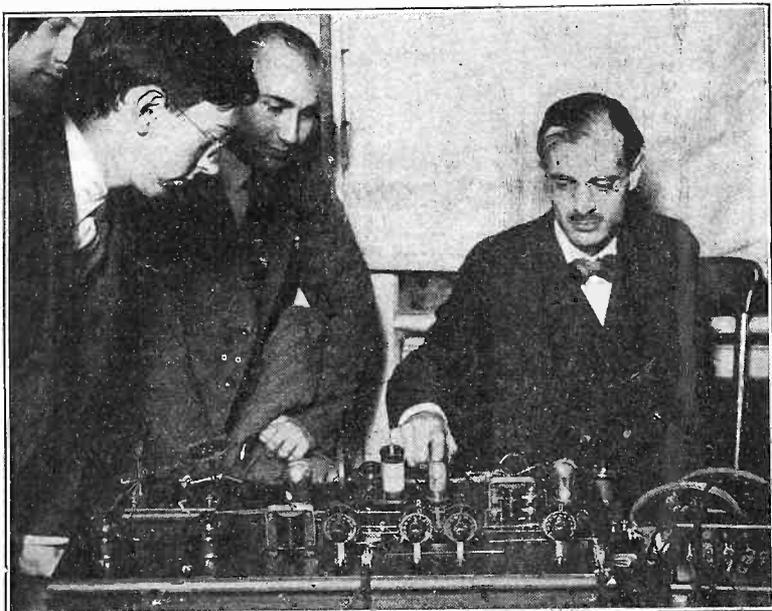
(C. International from A. R. R. L.)

An international aspect was given to the A. R. R. L. Convention held at Chicago by the presence of Monsieur Leon DeLoy, famous French amateur. He is here for the purpose of studying the American situation with a view of improving conditions in his native land. Left to right the persons in the photo are: A. H. K. Russell, Canadian General Manager; Leon Deloy, W. D. Terrell, Radio Supervisor, U. S. Department of Commerce, and C. Stewart, Vice-President of the A. R. R. L.



(C. Foto Topics from KV)

The Rothafel family, whose head is known to thousands of enthusiasts as "Uncle Roxy" and whose Sunday night radio concerts have become very popular with all who listen to them, are shown listening in to "Dad" while he is at the Capitol Theatre, New York City.



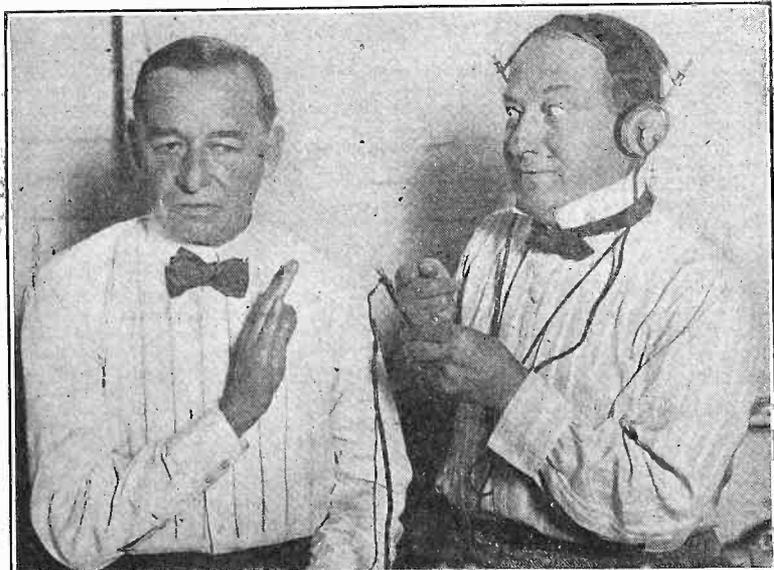
(C. Foto Topics)

H. P. Donle giving a demonstration of his new "Sodion" tube. The tube is the one he has his finger on. It is smaller than the regulation UV199 and is a detector only. The particular circuit that the tube is being demonstrated in is a three-tube circuit comprising a stage of radio-frequency, detector, and one stage of audio-frequency, reflexed. A special tuner was used as shown, tuning being accomplished by means of the Connecticut condensers and the coupling of the tuner. The tube is incapable of oscillating.



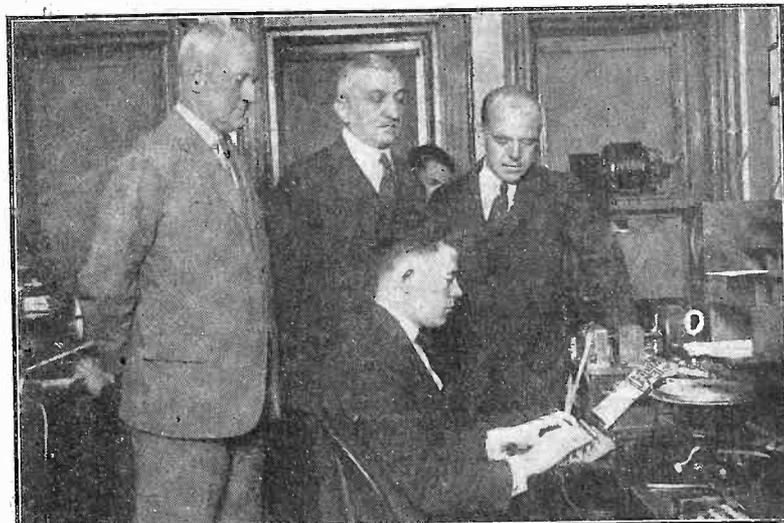
(C. Kadel and Herbert)

Dr. Lee DeForest, noted radio engineer and inventor, examining the radio equipment of the S.S. "Paris," on which he returned to America. Though most people think of an ocean trip as a sort of vacation, this illustration shows that Dr. DeForest simply cannot keep away from radio.



(C. Kadel and Herbert)

Sam Bernard trying to convince Willie Collier that it is possible to receive radio signals with a lead pencil receiver. Willie is very sceptical and refuses to let Sam think he is a hick, so he is telling him not to commit himself in the least. Willie must be one of those hard-boiled hams who did not get very good results out of his first set, and therefore thinks that every radio set is "the bunk."



(C. Foto Topics from KV)

Major General Harbord, president of the RCA; Dr. S. Grotowski, Polish Consul, and W. A. Winterbottom, traffic manager of the RCA, watching the sending of the first radio message direct to Poland. This is the first time that radio communication between the United States and Poland has been possible, and inaugurated the opening of traffic through the ether waves between these two countries.

Here Are Good Broadcast Programs

Station WGY, Schenectady, N. Y.

380 Meters. Eastern Standard Time. Friday, November 2.—11:55 A. M.—Time signals. 12:30 P. M.—Stock market report. 12:40 P. M.—Produce market report. 12:45 P. M.—Weather forecast. 2:00 P. M.—Music and household talk, "Hints on Buying Rugs" (Courtesy "Modern Priscilla.") 6:00 P. M.—Produce and stock market quotations; news bulletins. 6:30 P. M.—Children's program. 7:35 P. M.—Health talk, N. Y. State Department of Health. 7:45 P. M.—Radio play, "Daddy Longlegs," by WGY Players. Instrumental selection, "Childhood Hours," Leon. WGY Orchestra. Comedy, "Daddy Longlegs," Jean Webster. WGY Players. 10:30 P. M.—Musical program. Instrumental selection, "Danse Characteristic," Weidt. WGY Orchestra. Soprano solo, "The Wayfarer's Night Song," Martin. Bertha Lloyd. Gwen Lloyd, accompanist. Instrumental selection, "Iberian Serenade," Leigh. Orchestra. Cello solo, "Eventide," Gruenwald. Ernest Burleigh, with Orchestra accompaniment. Piano solo, "Woodland Echoes," Cizbulka. Kitty Meinhold. Instrumental selection, "Schottische," Phelps, Orchestra. Soprano solo, "When Celia Sings," Vernon. Bertha Lloyd. Piano solo, "Prelude," Porter. Kitty Meinhold. Instrumental selection, "Menuetto," Schubert. Orchestra. Soprano solo, "Through Sunny Spain," Mattei. Bertha Lloyd. Instrumental selection, "Scherzo," Schubert. Orchestra. Saturday, November 3.—11:55 A. M.—U. S. Naval Observatory time signals. 12:30 P. M.—Stock market report. 12:40 P. M.—Produce market report. 9:00 P. M.—Phil Romano's Rainbow Orchestra at the Kenmore Hotel (Albany, N. Y.)

Station WOC, Davenport, Ia.

484 Meters. Central Standard Time. Friday, November 2.—10:00 A. M.—Opening market quotations. 10:55 A. M.—Time signals. 11:00 A. M.—Weather and river forecast. 11:05 A. M.—Market quotations. 12:00 Noon—Chimes concert. 2:00 P. M.—Closing stocks and markets. 3:30 P. M.—Educational program, Lecture by C. C. Flanagan. (Musical numbers to be announced.) 5:45 P. M.—Chimes concert. 6:30 P. M.—Sandman's visit. 6:50 P. M.—Baseball scores and weather forecast. 8:00 P. M.—Musical program (1 hour), Erwin Swindell, musical director. Program by the choir of the Sacred Heart Church, Moline, Ill., under the direction of Phil Lochen.

Saturday, November 3.—10:00 A. M.—Opening market quotations. 10:55 A. M.—Time signals. 11:00 A. M.—Weather and river forecast. 11:05 A. M.—Market quotations. 12:00 Noon—Chimes concert. 2:30 P. M.—Closing stocks and markets. 3:30 P. M.—Educational program, Lecture by C. C. Flanagan. (Musical numbers to be announced.) 5:45 P. M.—Chimes concert. 6:30 P. M.—Sandman's visit. 6:50 P. M.—Baseball scores and weather forecast. 7:00 P. M.—Farm lecture, by Josephine Arnuquet, state leader of Girls' Club work, from Ames, Iowa. 9:00 P. M.—Dance program (1 hour), P. S. C. Orchestra, with V. B. Rochte, baritone soloist. Popular music released through the National Association of Broadcasters, of which WOC is a member.

Station WFAA, Dallas, Texas

476 Meters. Central Standard Time. Friday, November 2.—12:30-1:00 P. M.—Address, Dr. Robert Stewart Hyer, Southern Methodist University, on the Sunday school lesson. 8:30-9:30 P. M.—Shirley Lee Alley and his orchestra.

Saturday, November 3.—12:30-1:00 P. M.—Address, Professor J. D. Boon, Southern Methodist University, chair of astronomy. Piano airs by Redhead Girl. 8:30-9:30 P. M.—Sanger Bros. Orchestra and Choral Club. 11:00-12:00 P. M.—Mrs. O. Ledford, reader and pianist.

Sunday, November 4.—2:30-3:30 P. M.—Radio Chapel Bible Class, Dr. William M. Anderson, Jr., pastor First Presbyterian Church, Dallas, teacher; half hour Bible study and half hour Gospel song. 4:00-5:00 P. M.—Grand concert by the Orchestra, Don Albert, conductor, broadcast from the Palace Theatre. 7:30-9:00 P. M.—Service at First Baptist Church, Dallas, Dr. George W. Truett, pastor. 9:30-10:30 P. M.—Britling's Dallas Cafeteria Orchestra, Lou Goldberg, director.

Station WBZ, Springfield, Mass.

337 Meters. Eastern Standard Time. Saturday, November 3.—11:55 A. M.—Arlington time signals; weather reports; Boston and Springfield market reports. 7:00 P. M.—Dinner concert by the Hotel Kimball Trio, direct from the Hotel Kimball dining room; Jan Geerts, violinist and director; Angela Godard Lonergan, cellist; Paul Lawrence, pianist. 7:30 P. M.—Twilight tales for the kiddies. "Bringing the World to America," prepared by "Our World" Magazine. "This Week's Judge." 8:00 P. M.—Concert by Charles L. H. Wagner, poet and reader of Boston, Mass. 9:00 P. M.—Bedtime story for grownups, by Orison S. Marden. 9:55 P. M.—Arlington time signals.

Station KSD, St. Louis, Mo.

546 Meters. Central Standard Time. Friday, November 2.—8:00 P. M.—Broadcasting the play "Dulcy" as presented by the Woodward Players at the Empress Theatre.

Saturday, November 3.—8:00 P. M.—Orchestral concert, organ recital, vocal and instrumental specialties, broadcast direct from the Missouri Theatre.

Station KYW, Chicago

536 Meters. Central Standard Time. Saturday, November 3.—9:30 A. M.—Late news and comment of the financial and commercial markets. 10:00 A. M.—Market reports. 10:30 A. M.—Late financial news and comment. 10:58 A. M.—Naval Observatory time signals. 11:00 A. M.—Market reports. 11:05 A. M.—Weather report. 11:30 A. M.—Late news and comment of the financial and commercial markets. 11:35 A. M.—Table talk by Mrs. Anna J. Peterson of Peoples Gas Company. 12:00 M.—Market reports. 12:10 P. M.—Final market reports. 12:20 P. M.—Final stock reports. 12:30 P. M.—Late financial comment and news bulletins. 2:15 P. M.—Financial comment and news bulletins. 2:30 P. M.—Closing stock quotations, Chicago Stock Exchange 3:00 P. M.—Late news and sport bulletins. 3:30 P. M.—News and sports. 4:00 P. M.—Late news and sport bulletins. 4:30 P. M.—News and sports. 5:00 P. M.—Latest news of the day. 6:30 P. M.—News, financial and final market and sport summary. Financial summary furnished by the Union Trust Company and Chicago Journal of Commerce. 6:50 P. M.—Children's bedtime story. 8:00-8:58 P. M.—Musical program: Artists and program will be announced by radiophone. 8:58 P. M.—Naval Observatory time signals. 9:00 P. M.—News and weather reports. 9:05 P. M.—"Under the Evening Lamp" service furnished by the Youth's Companion, consisting of stories, humorous sketches and articles. News, sports and children's bedtime story furnished by the Chicago Evening American.

Sunday, November 4.—11:00 A. M.—Central Church service broadcast from Orchestra Hall, Chicago. Dr. Frederick F. Shannon, pastor. Musical program under the direction of Daniel Protheros. 6:30 P. M.—Excerpts from the New Testament—An American Translation by Professor Edgar J. Goodspeed; read by William Ziegler Nourse. 7:00 P. M.—Chicago Sunday Evening Club services broadcast from Orchestra Hall, Chicago. Special musical program will be given by the choir of One Hundred under the direction of Edgar Nelson.

Station KHJ, Los Angeles, Calif.

395 Meters. Pacific Time. Thursday, November 1.—12:30-1:15 P. M.—News items. Music. 2:30-3:30 P. M.—Matinee musicale. 6:45-7:30 P. M.—Children's program. Bedtime story by "Uncle John." Pasadena Fife and Drum Corps. 8:00-10:00 P. M.—Program presented by the Fuhrer String Quartet. 10:00-12:00 P. M.—Broadcasting Art Hickman's Orchestra, by line telephony from the Los Angeles Biltmore Hotel.

Friday, November 2.—12:30-1:15 P. M.—News items. Music. 2:30-3:30 P. M.—Matinee musicale. 6:45-7:00 P. M.—Children's program. Bedtime story by "Uncle John." 7:00-7:30 P. M.—Organ recital from First Methodist Episcopal Church. Arthur Blakeley, organist. 8:00-10:00 P. M.—Program presented by Beekman Mandolin Orchestra. Walter F. McEntire will talk on "Mission at San Diego." Professor John C. Shedd will talk on "The Method of Science." 10:00-12:00 P. M.—Broadcasting Art Hickman's Orchestra by line telephony from the Los Angeles Biltmore Hotel.

Saturday, November 3.—12:30-1:15 P. M.—Program presented by Franklin High School Boys' Glee Club. 2:30-3:30 P. M.—Matinee musicale, presented by Franklin High School Glee Club. 6:45-7:30 P. M.—Children's program.

Station WLW, Cincinnati

309 Meters. Central Standard Time. Monday, November 5.—10:30 A. M.—Weather forecast. Business reports. 1:30 P. M.—Business reports. 3:00 P. M.—Special music by Jennie Kehrt. Babson reports. 8:00 P. M.—Program under the auspices of the Editorial Staff of Sunday School Publications, Methodist Book Concern. 9:00 P. M.—The Roger Hill Dance Orchestra. 9:30 P. M.—Crosley theatrical reviews. Harry Burkhardt, baritone. Mrs. Burkhardt, accompanist. Mrs. Pilgrim Schwab, soprano. 9:45 P. M.—Concluding numbers by the Roger Hill Dance Orchestra.

Tuesday, November 6.—10:30 A. M.—Weather forecast. Business reports. 1:30 P. M.—Business reports. 3:00 P. M.—Special music by Jennie Kehrt. Babson reports. 10:00 P. M.—Artistic program arranged by Rose Boden. Finale: Ensemble of soprano, contralto, baritone, two violins and piano. Entertainment by the Circle Orchestra, and popular features to be announced by radio.

Station KDKA, East Pittsburgh, Pa.

536 Meters. Eastern Standard Time. Saturday, November 3.—10:00 A. M.—Music. Union Live Stock Market Report from the National Stockman and Farmer. 11:55 A. M.—Arlington time signals. 12:30 P. M.—Music. Weather forecast. 12:50 P. M.—United States Bureau of Market Reports furnished through the National Stockman and Farmer. 1:30 P. M.—Concert by Dougherty's Orchestra from McCreery's Dining Room, Pittsburgh, Pa. 3:00 P. M.—Pitt-Penn football game from Franklin Field, Philadelphia, Pa. 6:15 P. M.—Dinner concert by the Westinghouse Band under the direction of T. J. Vastine. 7:30 P. M.—"Bringing the World to America," prepared by "Our World." 7:45 P. M.—The Children's Period. 8:00 P. M.—Feature. 8:30 P. M.—Concert by the Westinghouse Band under the direction of T. J. Vastine, assisted by Norma Altwater, soprano. 9:55 P. M.—Arlington time signals.

Station WJZ, New York City

455 Meters. Eastern Standard Time. Saturday, November 3.—2:00 P. M.—Play-by-play description of the Washington-Jefferson versus Lafayette College football game, by direct wire from the Yankee Stadium, New York City; description by a noted sport writer and football authority. 5:30 P. M.—Closing reports of the New York State Dept. of Farms and Markets; Farm and Home reports; closing quotations of the New York Stock Exchange; Bradstreet's financial and business report. 6:00 P. M.—"Uncle Wiggily Stories," by Howard Garis. 7:30 P. M.—Recital by Olga Erika, soprano. 7:45 P. M.—"Big Business as It Isn't Run," by W. E. Woodwork. 8:00 P. M.—Recital by Olga Erika, soprano. 8:15 P. M.—"The Larger Aspect of World Affairs," by Frederic Dixon, of the International Interpreter. 8:30 P. M.—Concert by the Standard Oil Band of Elizabeth, N. J. 9:00 P. M.—The Cheerful Philosopher, Burr McIntosh. 9:30 P. M.—Concert by the Standard Oil Band of Elizabeth, N. J. 9:55 P. M.—Time signals and weather forecast retransmitted from the government station NAA at Arlington. 10:15 P. M.—Piano recital by Felian Garcia.

Station WDT, New York City

405 Meters. Eastern Standard Time. Friday, November 2.—12:00 M.—Dr. Arthur Brooks will talk on Astrology. 12:10 P. M.—Jimmie Clark's Broadway Melody Entertainers in songs. 12:20 P. M.—Jack Manion. 12:30 P. M.—Miss Panquita. 12:40 P. M.—Billy Stout. 12:50 P. M.—Mlle. Chico DePutron. 12:55 P. M.—Bob Schaeffer. 11:00-11:30 P. M.—Vaughan De Leath's Sherwood Orchestra will play a dance program. 11:30-11:45 P. M.—Jimmie Clark's famous White Way Entertainers in a song review, with Sibel Gray. 11:45-12 M.—Vaughan De Leath's Sherwood Orchestra will continue their dance program.

Saturday, November 3.—12:00 Noon—Edith J. Craine will read an installment of "Tinkaran and the Winged Taxi." 12:15 P. M.—Merle Hartwert, concert soprano, will sing. 12:30 P. M.—May Singhi Breen with her banjo orchestra will play. 12:45 P. M.—Eli Dawson and Victor Olwer will sing. 12:55 P. M.—May Singhi Breen and her banjo orchestra.

Station WGI, Medford, Mass.

360 Meters. Eastern Standard Time. Saturday, November 3.—6:45 P. M.—Code practice, Lesson Number 153. 7:05 P. M.—Boston Police reports, Boston Police Headquarters. New England weather forecast furnished by the U. S. Weather Bureau. New England crop notes furnished by V. A. Saunders, statistician. 7:30 P. M.—Evening program. 1. Thirty-first of a series of talks on New England business problems by Arthur R. Curnick of the New England Business Magazine. 2. Radio Drama by the AMRAD Concert Company, F. Chester MaDan, director.

Sunday, November 4.—4:00 P. M.—Twilight program. 1. "Adventure Hour," conducted by the Youth's Companion. 2. Musical program arranged by The Rictor Quartet of Tufts College, assisted by Henry E. Lewis, baritone. 8:30 P. M.—Evening program. 1. Talk on "World Unity," under the auspices of Massachusetts Federation of Churches. 2. Evening musical to be announced.

Station WOR, Newark, N. J.

405 Meters. Eastern Standard Time. Saturday Evening, November 3.—6:15 to 7:15 P. M.—"Music While You Dine," by the Dominant Orchestra. 7:15 P. M.—Fred J. Bendel, sporting editor of the Newark Morning Ledger, in his weekly talks on "Sporting News Up-to-the-Minute." 8:00 P. M.—Program of classical music. 8:30 P. M.—Richard Barthelmess, world known motion picture star, in a talk on his personal experiences. 8:45 P. M.—Continuation of program of classical music. 10:00 P. M.—Readings and monologues by Gladys Pabst, assisted by Blanche Pabst. 10:30 P. M.—Leon St. Clair, bass-baritone and well-known American composer, will give a program of songs by American composers, including his own.

Station WIP, Philadelphia

509 Meters. Eastern Standard Time. Saturday, November 3.—1:00 P. M.—Organ recital by Karl Bonowitz on the Germantown Theatre organ. 1:30 P. M.—Official weather forecast. 3:00 to 4:30 P. M.—Play-by-play report of the football games at Franklin Field. 6:00 P. M.—Official weather forecast. 7:00 P. M.—Uncle Wip's bedtime stories and roll call for the children. 8:15 P. M.—Concert by Al Zemsay, violinist; John Kenworthy, pianist; Billie Milligan, baritone, and some surprises. 9:15 P. M.—WIP male quartet. 10:15 P. M.—Charlie Kerr and his orchestra, from the St. James Hotel.

Station WTAM, Cleveland

390 Meters. Eastern Standard Time. Saturday, November 3.—9:00 P. M.—Dance program by the WTAM Orchestra. 10:00 P. M.—Cleveland Plain Dealer football scores.

Station WSB, Atlanta, Ga.

408 Meters. Central Standard Time. Saturday, November 3.—10:45 P. M.—Trans-continental Radiowl broadcast, presenting entertainment by Atlanta Lodge No. 78, B. P. O. E.

Latest Radio Patents

Radio Control System

No. 1,469,349: Patented Oct. 2, 1923. Patentee: A. L. Wilson, Edgewood, Pa.

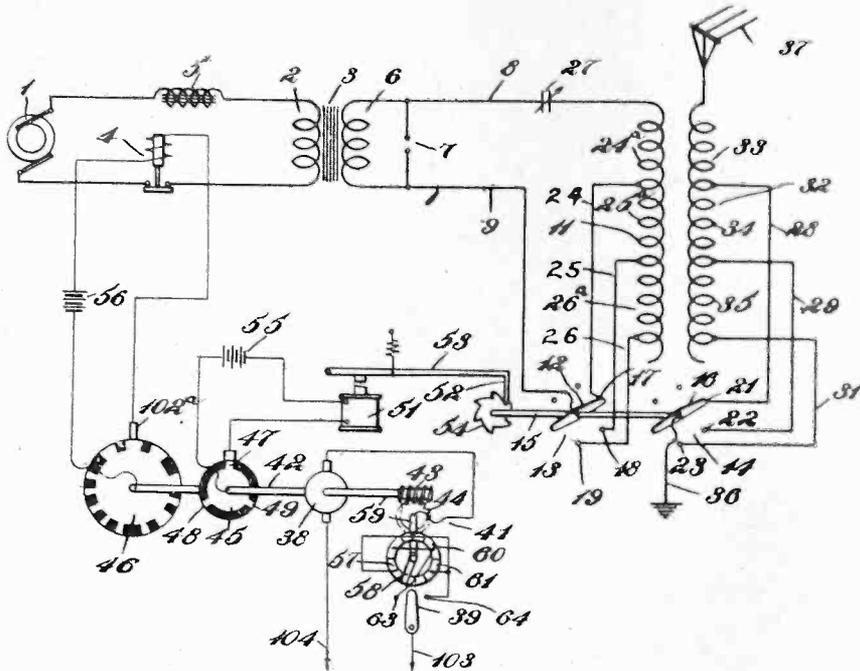
My invention relates to systems of control and more especially to remote-control systems which are adapted to be operated by radiant energy.

One object of my invention is to provide a remote control system whereby an electromagnet switch or a relay may be controlled from a distant point by means of electromagnetic waves.

for selecting a desired circuit; and those in which a specific type of impulse and a separate receiver and relay are employed for each circuit to be controlled.

A disadvantage, however, of the present radio, remote-control systems is the poor selectivity that may be obtained from interfering signals.

According to my invention, I provide a remote-control system which may be readily operated by the radiant energy from a wire-



Method of controlling relays by means of radio, furnishing a remote control system which is selective and immune from the common faults.

Another object of my invention is to provide a remote-control system which is highly selective, said system being practically immune from interfering signals.

In the present state of the art, remote-control systems, the operation of which is effected by means of radiant energy, may be divided into two classes: namely, those in which a single impulse controls a single relay, the latter controlling, in turn, means

less transmission system and which practically overcomes the difficulties heretofore encountered in providing protection from interfering signals.

The desired result may be accomplished by employing means for transmitting, progressively, predetermined sequences of signals at various wave lengths, and by further employing a receiving system which is selectively responsive to only such signals as are radiated by the transmitting means.

Circuit for Receiving Radio Energy

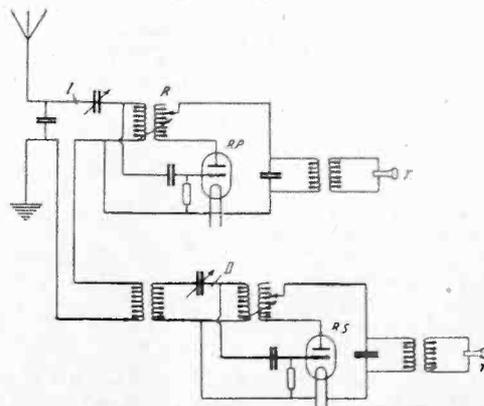
No. 1,469,328: Patented Oct. 2, 1923. Patentees: E. Mayer and A. Leib, Berlin, Germany.

In all secondary receivers, it is necessary to tune first the primary circuit and then the secondary circuit to the unknown sender by suitably varying the coupling of the two circuits. The present invention relates particularly to secondary receivers with cathode tubes and simplifies the tuning operation to a great extent. It has the further advantage that no switching of the cathode tubes is necessary and that during the final transfer to the secondary receiver, the primary cathode tube has the new and important function of reducing the damping in the primary circuit without any change in its connection with the primary circuit.

The single figure of the drawing is a diagrammatic representation of a simple circuit arrangement embodying the invention.

In accordance with the invention, the receiving arrangement consists of two tuned circuits, one of which I serves as a primary

and the other II as a secondary circuit. The circuits contain cathode receiving tubes RP and RS respectively, which are variably



Circuit for the reception of radio signals which has several new and novel points as described by the patentees.

back coupled. During the primary receiving the telephone or other suitable indicator T and the primary receiving tube RP are

employed, and during the secondary receiving the cathode tube RS is used. In changing from primary to secondary receiving with the present arrangement, in which the cathode tube RP of the primary receiving circuit is not switched off but is permitted to continue in operation, the primary cathode tube RP may be caused not to produce oscillations and the resistance of the primary circuit I and, consequently, the damping of the received energy may be materially reduced by suitably adjusting the back coupling R of the tube RP to the primary circuit. In the use of the invention, the primary receiver not only enables the arrangement to be tuned readily to the wave length of the incoming energy and thereby facilitates the tuning of the secondary receiver but the continued operation of the primary receiver during receiving through the secondary receiver reduces the damping in the primary circuit and thus improves the action of the secondary receiver. The secondary tube RS is differently back coupled to the secondary circuit, depending upon whether it is used for producing local oscillations or as a simple audion when there is a separate transformer. The use of the primary tube RP for the purpose of back coupling and reducing the damping makes possible the employment in all circuits of high resistance coils wound with thin wire. Such coils are cheap and consume only slight current, and the action of the tube RP in reducing the damping enables coils of such character to be used without detracting from the selectivity of the arrangement.

In accordance with the present invention, one may go even further and provide a similar third circuit which also comprises a cathode tube with variable back coupling whereby a tertiary receiver is obtained with damping reduction in all circuits, or the third circuit may be used as a wave meter. The variable back coupling makes it possible to use the cathode tube in this circuit as a simple detector, and in this manner the wave meter may be used as a receiver or, by using a second calibration scale, the back coupling may be made closer so that the tube operates as a generator and the sender becomes a sending wave meter.

Radio Inspector Hayes Goes to Seattle

THE Department of Commerce has designated Harold D. Hayes, of San Francisco, as Assistant Radio Inspector, to succeed Louis E. Richwein, of the Seattle office, who died recently. Mr. Richwein, who was transferred from Baltimore in 1922, served until recently at the headquarters of the Seventh District at Seattle, as assistant to Supervisor of Radio O. R. Redfern.

Temporarily Mr. Hayes is serving as an assistant inspector at San Francisco, but he will shortly go to Seattle. Inspector Hayes is well known in California, having founded the Y. M. C. A. Radio School in Los Angeles in 1912, one of the first radio schools to be established. In 1917 he joined the Naval Reserve and served until after the armistice as a lieutenant in the U. S. Navy.

Station WBAK, Pennsylvania State Police

C. M. WILHELM, Director of Wireless Communications, Pennsylvania State Police, informs RADIO WORLD that Station WBAK, Harrisburg Pa., operates on 400 meters, Eastern Standard Time, daily except Sunday, on the following schedule:

10:30 a. m., school program, police reports; 1:30 p. m., police reports; 5:45 p. m., educational, market; 12 midnight, police tests.

MAGNAVOX Products

EVERY condition in the art of radio reproduction is most successfully met by Magnavox apparatus.

Reproducers

R2 with 18 inch horn \$60.00

R3 with 14 inch horn \$35.00

M1 with 14 inch horn; for dry battery sets . \$35.00

Combination Sets

A1-R consists of Magnavox Reproducer with 14 inch horn and 1-stage Amplifier . . . \$59.00

A2-R same with 2-stage Amplifier . . . \$85.00

Power Amplifiers

A1-One-stage . . . 27.50

AC-2-C-Two-stage 55.00

AC-3-C-Three-stage 75.00

Radio users will be sent new 32-page Magnavox Radio Catalogue on request.



The new Magnavox Combination Sets A2-R [2-stage] and A1-R [1-stage] insure the utmost in convenient, perfect home radio reproduction.

A special device permits instant control of volume to suit the size of room, character of program, etc.

Current Events by Magnavox Radio

TODAY, as education comes to stand for growth, the schoolroom is no longer the student's world, but the world is the student's schoolroom—and we are all students.

A Magnavox in the home means a liberal education and daily entertainment for old and young.

For the requirements of those who own dry battery receiving sets, the new Magnavox

Reproducer M1 (semi-dynamic type) is supreme in its class. Where storage battery sets are used, the new Magnavox Combination Sets (as illustrated) give the utmost in appearance, adaptability and efficiency.

Magnavox Products are for sale by Registered Magnavox Dealers Everywhere

THE MAGNAVOX COMPANY, Oakland, Calif.

New York Office, 370 Seventh Avenue
Perkins Electric Co., Ltd., Canadian Distributors

MAGNAVOX PRODUCTS

There is a Magnavox for every receiving set

Radio Merchandising

Advertising Rates: Display, \$5.00 an inch, \$150.00 a page. Classified Quick-Action Advertising, 5 cents a word. Phones: Lackawanna 6976 & 2063

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:

- R. C. Ware, Box 413, Buffalo, Minn.
De Loss Booker, Lovington, Ill.
G. E. Moulton, B. & M. Freight Office, Laconia, N. H.
W. G. Stoddard, East Charleston, Vermont. (Dealer.)
George W. Whitaker, Box 325, Tarboro, N. C.
Charles T. Kirk, 138 Islington St., Toledo, Ohio.
Richard Ransom, Standard Motor Car Co., Queensboro Plaza, Long Island City, N. Y. (Wholesale.)
John Taylor, Fire Station No. 1, Brownwood, Texas.
T. E. Thomas, Box 86, Lakehurst, N. J.
Rev. Jno. Le Guemec, Box C, Chisholm, Maine.
G. H. Langley, Box 95, Tuckahoe, N. J.
Home Radio Co., Chestership Hotel, Chester, Pa. (Dealers and jobbers.)
James A. Able, P. O. Box 2, Mt. Vernon, Ill. (Dealer. Wants to receive retail price lists.)
Louie Z. Meffert, P. O. Box 133, Mt. Vernon, Ill.
R. A. Wilsey, 1209 R. R. Ave., Redding, Calif.
Irving J. Fink, Copper Hill, N. J.
Jno. R. Sutton, P. O. Box 1705, Orlando, Fla.
Lawrence W. Dobson, 1405 East Lafayette Ave., Baltimore, Md. (Retailer.)
William Peske, 608 South High St., Janesville, Wis.
Radio Research Laboratories, Radio Consultants, Carthage, Mo.
I. A. Greenwood, Prosper, Texas.
J. H. Bridwell, R. F. D. 1, Wichita Falls, Texas.
E. B. Frye, 954 Hoe Ave., Bronx, N. Y. City.
Charles R. Ballard, 824 Sylvia St., Louisville, Ky. (Retailer.)
Charles McCobb, R. R. 6, Valparaiso, Ind.
Frank Raley, Hubbard, Texas. (Retailer.)
S. E. Benning, 5848 Grace St., Chicago, Ill.
C. E. Williams, 162 Windham Road, Willimantic, Conn.
The Radio Shop, Cabot, Arkansas.
G. S. Lawrence, Hillsdale, Oklahoma.
E. A. Eaton, Box 105, Derry, N. H. (Distributor.)
J. P. Mahar, 23 Berry St., Norwich, N. Y.
H. Lukens, 1241 East State St., Trenton, N. J. (Wants distributor prices.)
Rupert H. Paul, Texico, New Mexico. (Wants wholesale prices.)
L. R. Howell, 12 Messervy St., Salem, Mass.
J. Bernard Fretz, R. F. D. 1, Birdsboro, Pa.
Kenneth Coop, Parkersburg, Iowa.
Orville J. Easter, P. O. Box 1197, Breckenridge, Texas.
W. B. McNeely, Wheatcroft, Ky.

New Radio and Electric Firms

- Capitol Electric Novelty Corp., New York City, \$10,000; H. Grossman, M. Levy, S. Wiener. (Attorney, S. R. Stark, 299 Broadway.)
Unique Electrics, Wilmington, Del., manufacture, \$300,000 (Colonial Charters Co.)
Radio Accessories Corp., New York City, \$2,000; I. Manheimer, J. and S. Kaufman. (Attorneys, Kaufman & Kaufman, 25 West 43d St.)
Handilite Electric Manufacturing Co., New York City, \$6,000; K. Simon, I. Goldstein, I. J. Koppel. (Attorney, S. Goldstein, 217 Broadway.)
Whiz Electric Co., New York City, \$10,000; G. and M. Mueham, D. Wolper. (Attorney, J. W. Eidt, 849 2d Av.)

Features of Radio Week

NATIONAL RADIO WEEK, which has been set for the period November 25 to December 1, will see the best programs broadcast from radio stations in the United States in the history of the radio industry, according to recent announcement of the Radio Trade Association, which is handling this movement.

Powel Crosley, Jr., president of the Crosley Manufacturing Company, Cincinnati, who is chairman of the executive committee in charge of Radio Week, in a recent statement to the radio trade announced that practically every branch of the business had come forward with offers of assistance and co-operation. For the first time in the history of commercial radio have all factions of the industry been aligned in a single movement.

C. B. Cooper, chairman of the broadcasting committee of the Radio Trade Association, also recently issued a statement calling the attention of members of the association to the hearty response received from the broadcasters of the country in response to the appeal of the Radio Week committee. "Over half of the broadcasters of the country have already announced their intention of following

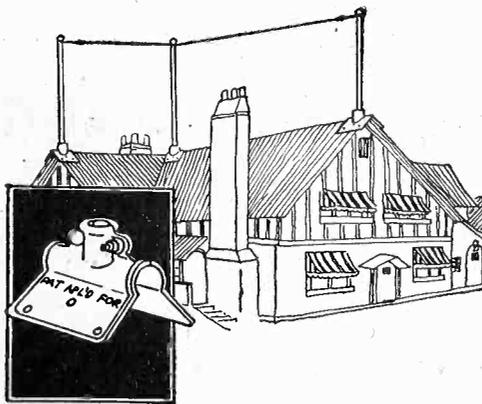
the Radio Week schedule, with letters from others coming in every mail," Mr. Cooper said. Mr. Cooper is Eastern representative of the Precision Equipment Company.

Henry M. Shaw, president of the Radio Trade Association, also recently commented on the progress being made by the Radio Week committee. "More than five hundred radio firms are behind this Radio Week movement," Mr. Shaw explained, "with dozens of others being added to the boosters for Radio Week every day."

Retailers throughout the country are planning special demonstrations during Radio Week, and it is believed the volume of local newspaper advertising carried during National Radio Week will be the greatest ever carried on radio in a similar period of time. Advertising assistance is offered to daily papers and retailers by Paul Weil, of the Kiernan Agency, 135 Broadway, New York City; L. M. Green, of the Evening Journal, New York City; R. L. Stayman, of the Crosley Manufacturing Company, Cincinnati, Ohio, and N. B. Zimmerman, The Radio Trade Association, New York City.

Solving the Aerial Mast Problem

EVERY problem has its solution. This is true in radio just as in mathematics. Up to the present time the locating of an antenna mast on houses in the suburbs or country, where flat roofs are scarce and peak or roll roofs are seen



The "Bull Dog" aerial mast seat and method of use.

everywhere, has been a problem. This problem, like many others, however, has been solved. The solution lies in the "bull dog" aerial mast seat, manufactured by the Mast Seat Manufacturing Company, 119 Fifth Street, S. E., Minneapolis, Minn. Their product is a substantial metal seat

which fits the peak of the roof, being fastened by means of long screws. It has ample surface so that it is very strong. It is made in several types, to conform with different styles of roofs, and is also made in a hinged type, to accommodate it to conditions where different angles of slope are present, such as some of the old-style peaked metal ridge roofs. It is also made in a flat base for flat roofs.

The hole to receive the mast is deep enough to afford a firm holding surface for any metal or wooden mast, and does away with the necessity of guying. It may be mounted on any roof that furnishes the least holding surface, and should prove a welcome solution to the amateur or fan who wants to keep his antenna within his own premises, yet who wants the elevation that can only be obtained by the use of a mast.

Coming Events

- NATIONAL RADIO WEEK, November 25 to December 1, 1923.
SECOND ANNUAL RADIO SHOW, Los Angeles, Calif., February, 1924.
SECOND ANNUAL RADIO SHOW, Coliseum, Chicago, November 20-25.
MERRIMAC VALLEY RADIO SHOW, Lawrence, Mass., November 8, 9 and 10, under the auspices of the Lawrence Radio Club. For particulars address J. C. Dowd, 353 Essex Street, Lawrence, Mass.

Are You Doing Your Share For the Success of
National Radio Week, November 25 to December 1, 1923?

Dr. Steinmetz Dies Suddenly

R. Charles Proteus Steinmetz, Chief Consulting Engineer of the General Electric Company, died suddenly at his home in Schenectady, N. Y., on October 14. He had been ill for two weeks following a trip to the Pacific Coast. His death was unexpected.

New Storage "B" Battery

THE Sidbenel Radio Equipment Manufacturing Company, New York City, traditionally known as battery manufacturers, have added a new type of improved storage "B" battery to their line. The new battery is constructed in a solid piece of genuine hard rubber with its compartment chambers molded into it. The plates are exceptionally large, measuring $1\frac{3}{4} \times 2\frac{1}{8} \times \frac{1}{8}$ in., giving approximately a discharge of over 2,000 milamps. Each cell has a separate cover to prevent acid creepage and is thoroughly sealed with asphaltum. A hard rubber tube screwed in the cover for filling purposes. The plates are connected with heavy lead terminals making an exceptionally neat and durable battery. The outside dimensions are $2\frac{1}{2}$ in. wide, $4\frac{7}{8}$ in. high, $3\frac{3}{4}$ in. high. A recharge, it is claimed, costs about one cent and gives several months' service when using more than three tubes. The life is said to be practically indefinite.

Another Phonograph Company In Financial Difficulties

ON the application of minority stockholders, Judge Edwin L. Garvin, in the United States District Court, Brooklyn, N. Y., last week appointed former Representative John B. Johnston as receiver for the Sonora Phonograph Company, Inc., of Oyster Bay, L. I. Mr. Johnston was directed to file a bond of \$50,000.

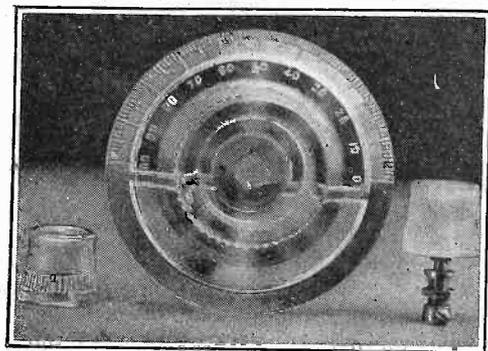
The receiver was asked for "in order to conserve the assets of the corporation and to reorganize its finances," according to the petition filed, which states that the

concern is solvent, but that recent business depression has resulted in cancellation of many orders, and that a receiver is desired to reorganize the finances of the corporation and to continue the business. The company is capitalized at \$6,000,000.

This is the second phonograph company to experience financial difficulties in the past two weeks. It is believed in the trade that the increasing popularity of radio has had a very serious effect on the sales of phonographs and records.

Glass Radio Parts

THE radio public is always looking for something new, improved, or novel. Under the head of improved might be

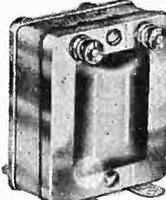
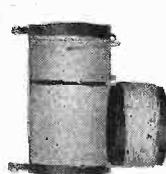
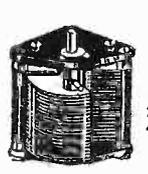
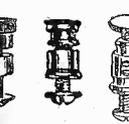
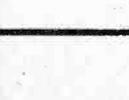


Dial, switch handle and knob made of glass.

classified three articles manufactured by Peterson & Hoffman. They are manufacturing a line of glass radio parts to take the place of the poor composition parts now sold. Glass is moisture proof and is a non-conductor of current. In other words, it is a good insulator. Working along these lines Peterson and Hoffman have turned out three principal pieces of apparatus made of glass—a dial, a switch handle and a knob. The numerals and lines cannot wear off, get dirty, or rub. The glass is the best possible, offering a very high dielectric value, hence good insulation. They are clean looking. They are made in various sizes to fit all the standard shafts and sizes of apparatus now manufactured. This firm has several more interesting parts of the same type, and are looking for distributors to push their products.

YOUR GUARANTEE

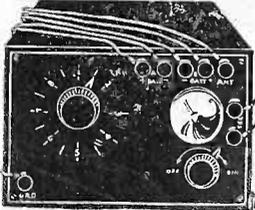
NO SURPLUS STOCK OR FACTORY SECONDS, Absolutely GUARANTEED FIRST SELECT grade stock. Every order, may it be ten cents or ten thousand dollars, carries our own guarantee of immediate replacement of any defective part or CASH refund if not found exact as represented. We are not a new Company, but an old Company, Established in 1910, RENOWNED FOR QUALITY MERCHANDISE AND SERVICE.

 <p>STA-FIX CRYSTAL DETECTOR The master Crystal of Scientific Construction, as shown. Adopted as standard equipment by manufacturers of all Reflex Circuits. Individually guaranteed. Price, one.... \$1.19 For six..... 5.00</p>	 <p>HEADPHONES SELCO, JR., \$7.50 Value, 2200 ohms—Price, one.. \$4.25 For six19.50 GENUINE MANHATTAN, \$8.00 Value, 3000 ohms— Price, one 4.30 For six 20.10 ORIGINAL BALDWIN, Salt Lake City, Utah, Make, Type C, Single Unit, 1500 Ohms, \$6.00 Value—Price, one..... 5.00 For six 22.50 All Phones complete with Standard Silk Phone Cords.</p>	 <p>NATIONAL TRANSFORMERS AUDIO 3 to 1 Ratio, \$2.65 AUDIO 5 to 1 Ratio, \$2.65 RADIO FREQUENCY .. 3.50</p>
 <p>GENUINE COCKADAY 4-Coil, TUNER Wound in white or Green Cotton Covd. wire. 750 meter range. Price, one, \$1.95 For six, 10.00</p>	 <p>QUALITY VARIABLE CONDENSERS Precision capacity. Plain 3-plate \$0.77 5-plate95 11-plate 1.20 17-plate 1.30 23-plate 1.40 43-plate 1.70 Vernier complete with Knob and Dials 11-plate \$2.35 23-plate 2.65 43-plate 3.00</p>	 <p>ERLA REFLEX TRANSFORMERS, \$4.65 Radio Frequency No. 1 and No. 2. ERLA AUDIO FREQUENCY TRANSFORMERS 3 to 1 Ratio..... \$4.65 6 to 1 Ratio..... 4.65 ERLA CRYSTAL DETECTOR (FIXED) Price each \$0.90 COMPLETE LINE OF ERLA PRODUCTS</p>
 <p>BINDING POSTS Type A Molded Per doz... \$0.75 Type B Per doz... .65 Type C Per doz... .50</p>  <p>SWITCH CONTACTS Double Nuted Per doz..... \$0.15</p>  <p>SWITCH STOPS Per doz..... \$0.15</p>  <p>SOLDERING LUGS Per doz..... \$0.06</p>	<p>We Pay Transportation Charges East of the Rockies PRESERVE THIS ADVERTISEMENT—ORDER FROM IT AND SAVE MONEY FAST SERVICE—TRY US AND BE CONVINCED THE PRICES QUOTED DELIVER THE GOODS TO YOUR DOOR</p> <p>OUR GUARANTEE PROTECTS YOU—We handle only the best goods carefully tested and checked by expert radio engineers. You are assured of getting guaranteed apparatus that will give superior results. And while our goods are best, our prices are lowest. Our goods equal or surpass the claims we make for them. We do not attempt to deceive or mislead. Our reputation for fair dealing is our most valued asset.</p> <p>HOW TO ORDER—Write your Order plainly, state Article, Description and Price of items wanted. Send Postoffice or Express Money Order, Certified Check or Bank Draft for Total of Order. Prompt Shipment is assured when these directions are followed.</p>	 <p>SWITCH LEVERS 1" Radius \$0.15 1/4" Radius15 FADA TYPE 1"-1/2" Adjust. .25</p>  <p>SOLID MAHOGANY WOOD VARIOMETERS Wound up to 600 meters \$2.00</p>
 <p>RHEOSTATS 6 ohm, each... \$0.40 20 ohm, each... .45 30 ohm, each... .50</p>  <p>POTENTIOMETERS 200 ohms, each... \$0.65 400 ohms, each... .75</p>	<p>ELECTRIC SERVICE PRODUCTS CO. 214 W. MADISON STREET CHICAGO, ILL. ESTABLISHED 1910</p>	<p>Orders Shipped Day Received. No Substitutions. No Back Orders. If it isn't listed here, we have it. Write for Our Bargain Sheet.</p>

2650 MILES

with ONE TUBE. Broadcasting from Atlantic Coast and Cuba heard in California by users of the CROSS COUNTRY CIRCUIT. This range is due to simplicity of set and operation as only one control is used for tuning. Easily and cheaply built. Dry cell tubes may be used. Complete instructions with panel layout, assembly views, etc., postpaid for 25c. Or further information for red stamp. VESCO RADIO SHOP, Bx. RW-117, Oakland, Cal.

FREE RADIO VACUUM TUBE SET



Receives 100 Miles or More. Send name and address. Learn HOW you can get a Vacuum Tube Radio Set **ABSOLUTELY FREE**. Write today for Free Radio Plan. **RELIABLE SALES CORP.** 434 Broadway, N.Y. City, D 576

Speculations On the Future of Radio

WHEN the telephone and telegraph first came into use their advent was hailed as "annihilating space." Yet now we realize that we never knew the meaning of the term until radio broadcasting began. Radio has proved the real space annihilator.

Radio telephone conversations have been held between New York, Paris and Honolulu. News of the greatest disaster of modern times, the Japanese earthquake, came to the rest of the world by radio. Broadcasting of music, sermons, news, sports, lectures and opera thousands of miles—the marvel of yesterday—is the commonplace of today.

And all this in spite of the fact that as recently as 1897 when Marconi was asked how far he thought a dispatch could be sent

by wireless, replied "twenty miles." Pressed for his reason in fixing this limit, he added: "I am speaking within practical limits. . . . The distance depends simply upon the amount of exciting energy, and the dimensions of the conductors from which the waves proceed."

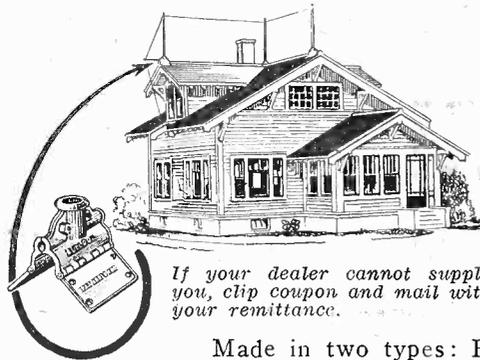
But amplification upset all his calculations. The range of modern radio communication is the result of amplifying or multiplying millions of times the electrical energy at the broadcasting station and again at the receiving station when it is changed back to sound energy.

Today the radio industry, with two million sets in use in the United States, is asking itself, "Where do we go from here?" Will there eventually be a receiving set in every home in the land—20,000,000 sets instead of the 2,000,000 today? No one can safely predict, but signs point that way. The other utilities which offer a basis for comparison—and that not the best—are the telephone, the automobile, and the phonograph. There are 14,500,000 telephones in the United States today, 12,000,000 phonographs, and 10,000,000 automobiles. In cost and utility, the radio ought to have even better chances for a phenomenal growth.

Every family in the land contains potential radio fans, and two factors especially point to the possibility of a radio development which may eventually result in something approximating an average of a set per family in the United States. One is the fact that amateurs need not buy expensive sets, but by a little ingenuity, aided by the practical help offered by progressive radio companies and publications (for instance, one company has issued a book called "Amplification Without Distortion," a complete treatise on the subject), can build their own sets. They get good results, save money, and have a lot more fun building their own than in buying them. Their chief need is caution to buy only reliable apparatus, especially the transformer, which is the heart of the set, so that they may get proper amplification.

The second factor on which the fullest use of radio in the homes of America depends is the elimination of interference, and the progress made in this direction of late indicates that this factor will not retard the expected development.

The BULL DOG Aerial Mast Seat Fills a Long Felt Want



If your dealer cannot supply you, clip coupon and mail with your remittance.

By enabling any one to install a firm and rigid aerial mast on either a peaked or metal ridge roll type of roof, with the ordinary tools found around the home, thereby eliminating the customary trouble, labor and expense and supplying neat, substantial construction throughout the entire aerial.

Made in two types: Hinged sides with holder for "lead in" support. Also plain peaked, without hinged sides and "lead in" support.

- Seat for 1½" mast, hinged type.....\$3.00
- Seat for 1½" mast, peaked type, plain... 2.50
- Seat for 1" mast, peaked type, plain..... 2.00
- Seat for 1½" mast, flat base type..... 2.50

Jobbers and distributors write for discounts.

MAST SEAT MFG. CO., 119 5th Street S. E., Minneapolis, Minn.

Gentlemen:—Enclosed is \$..... Send me Mast Seats to cover remittance.

Kind

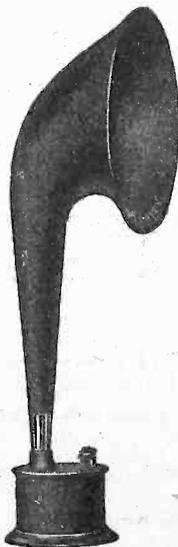
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City

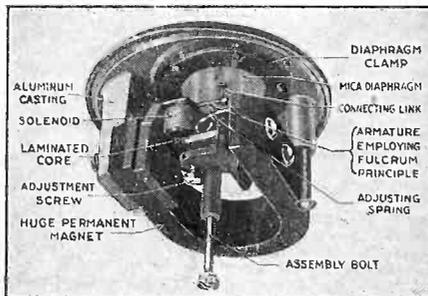
Check, Money Order or Bank Draft

THE TRINITY LOUD SPEAKER



TYPE "A1"
21" FIBER
HORN
\$25.00

TYPE "B"
(For Phonographs)
\$12.50



INTERIOR CONSTRUCTION

An ear phone is an ear phone no matter how fancy the horn that covers it may be, and, due to the delicate construction of an ear phone it is utterly incapable of giving true tone reproduction, especially, when relatively large currents are passed thru its coils, such as the output of a two-stage or power amplifier.

The Trinity Loud Speaker element embodies the well-proven and tested principles of the phonograph reproducer with the soundest principles of electromagnetic design best adapted for loud speaker operation. It is not an ear phone when placed on a head band and a loud speaker when covered with a horn. It is a sturdy loud-speaking element ALWAYS.

Send for Literature.

TRINITY RADIO CORPORATION

446 TREMONT STREET, BOSTON, MASS.

DUPONT MAKES PYRALIN SHELSTONE

Loud Speaker

With Complete

Nath. Baldwin Head Set Type C Perfect Results



Shelstone is made of Dupont's Pyralin, is transparent and one of the most attractive Loud Speakers on the market. It is built differently to take advantage of the most correct acoustic principles and reproduces music and speech with a clear tone.

Loud Speaker with phones...\$15.00
Loud Speaker postpaid..... 3.00

Satisfaction guaranteed. C. O. D. or cash with order. Dealers write for discounts.

Distributors for Nathaniel Baldwin, Inc.

THE SHELSTONE COMPANY
187 Clinton Ave. NEWARK, N. J.



ALL CAPACITIES—WRITE FOR LEAFLET

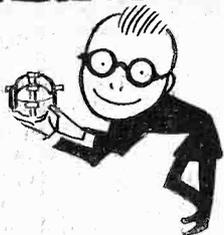
Station WLW Will Broadcast Marine Congress

WHEN the first American Marine Congress meets in New York City, from November 5th to 10th, the high-power radio stations of the country will take an active part in the proceedings. In appointing Station WLW, Cincinnati, as one of the important broadcasting stations to send forth the results of the big conference, Powel Crosley, Jr., was doubly honored, for he not only operates that station, but he is a member of the Associated Manufacturers of Electrical Supplies representing seventy-eight national organizations who are participating in the American Marine Congress.

The radio committee have been working upon programs for some time and the result of their work will be heard by the radio listeners during the week of November 5th to 10th.

"It is the desire of the committee of the American Marine Congress to let as many people as possible know about the wonderful work being done in the organization and they have selected the high-power broadcasting stations to radio the messages," said Powel Crosley, Jr., President of the Crosley Manufacturing Company and one of the members of the radio committee of the American Marine Congress. "The WLW radio broadcasting station is always at the disposal of all organizations and it is our aim to make it serve as many people in the world as is possible. A radio broadcasting station is but the servant of the public."

KELLOGG VARIOMETER



Very durable!

heavy Bakelite shell
—no sliding contacts

My! how they stand the racket! That's because they are housed in strongly molded brown Bakelite. Then there is just the right gauge of wire and number of turns to get the stuff hot and sassy right out of the "blue." No sliding contacts; nothing to wear or short. Rotor ball turns accurately on big husky bearings. A spring takes up the play—no back lash.

Built for heavy work, Brother Bug. The standard price is \$8.00—but you never think of that when you put this baby to work.

Use—Is the Test

KELLOGG SWITCHBOARD & SUPPLY COMPANY

CHICAGO

HAVE YOU SEARCHED FOR

Aeriala Sr. Style Tuner Unit 150-600 Meters
Hi-Power Transformer with Split Tapped Winding
Neutralizing & Tuned R. F. Cir. Transformers
Reinartz Coils "New Static reducing winding"
Resonance Wave Coils for Static Elimination
Wavemeter & Wave Trap combined 150-600 meter
Edison (Signal Corps) Batteries & Elements
New "Handy" Chargers for any voltage battery
30 Henry Power Amplifier Chokes with 4 values
Hi-Power Transformer with variable ratio
"B" Bat. Protectors—Prevent filament burn out
"B" Battery Voltmeters. 0-50 Volts
Nathaniel Baldwin New Loud Speakers & Phones
200-300-400-600-800 Ohm Potentiometers
6-10-30-50 Ohm & "Universal" Rheostats
Rheostat & Potentiom. Resistance Windings
Bishop "Phantom Super" Tuner Units
Variable Condenser Plate Cleaner
Liquid Copper for Shielding panels
Quality Precision Var. Grid Leak 0-10 Meg's
Rosin Core Solder (Never use acid or paste)
Hi-Quality Mica Fixed Condensers, best made
Outfits of parts for any circuit you desire
SEND FOR NEW DEALERS' LIST
QUALITY RADIO SHOP, Richmond, Ind.

Announcing Announcing

DX-ALENA

The Powerful Long-Distance Crystal

DX-ALENA is a phenomenal, all-sensitive, synthetic crystal that positively outclasses all others. DX-ALENA is broadcast tested and guaranteed absolutely without an equal for loudspeaking and long-distance reception. Fans report extraordinary success with DX-ALENA. Order one of these wonderful crystals today for your crystal or reflex set. By mail, 50 cents. DX-ALENA is made by The Chemical Research Co., Dealers and Jobbers. Write for prices.

Distributed by

EVERETT RADIO CO.

Radio Equipment of Quality

5207 Dorchester Ave.

Chicago, Ill.

Compare the Bel-Canto Adjustable Loud-Speaker with all other makes at any price. It will be a Bel-Canto. List, \$22.50.

BEL-CANTO MFG. CO.

Bensel-Bonis Co., Inc.

417 E. 34th St.

New York City

Guaranteed Radio Outfit

at Wholesale Price

The Greatest Radio Value of the Year

A complete outfit fully guaranteed to receive from all Broadcasting Stations upward of 2000 miles distance. Everything you need is included in the set.

Standard single tube long distance receiving set in fine cabinet, equipped with Bradley Rheostat—WD-12 tube—One set of headphones—"B" Battery—WORLD Storage Battery guaranteed to run 200 hours, rechargeable. And all other necessary equipment, aerial wire and insulators. You can install this outfit in less than thirty minutes, ready to receive from all Broadcasting Stations.

Regular Retail Value of this Outfit \$62.50

Our Special Price **\$29.50**

This is your greatest opportunity of the Radio Season to get all the equipment needed for less than the retail price of the receiving cabinet alone. All parts carry our full guarantee. SEND NO MONEY. We ship C. O. D. subject to inspection or will allow 5% for cash with order.

Complete stock of Radio equipment and parts at wholesale prices. Write for quotations.

World Battery Company

Radio Dept. Desk 11

60 E. Roosevelt Road

Chicago, Ill.

College Presidents, School Superintendents, Principals—!

The Haaren School, New York City, completed a series of tests on the advisability of installing radio and speech amplifying devices in the school in order to promote education. How it was done and the success it has achieved is clearly told in RADIO WORLD for April 21, 1923. 15 cents a copy, or start your year's subscription with this number. RADIO WORLD, 1493 Broadway, New York City.



Circuit FREE!

New Cockaday Circuit —and the DIODE

A revelation in reflex work. The Diode replaces the crystal and overcomes all former difficulties with reflex circuits. Requires no adjustments for change of wave lengths. Gives you the clear reproductions of a crystal with the sturdiness and reliability of a tube. No "B" batteries required. Operates on less than 1/2 ampere from single dry cell. Easily adapted to Erla circuits.

At your dealers or send purchase price and you will be supplied direct.

ELECTRAD, Inc.

428 Broadway, New York



YOU Are Interested in PRICES Here They Are!

	Retails	Your Price
Electric Soldering Iron	\$2.50	\$1.95
Reinartz Coils	1.50	.95
CRL Rheostat	1.10	.45
Adjustable Grid Leak and Condenser	1.50	.69

Cash with Order or C. O. D.

Write for our full list of Nationally advertised bargains.

North Shore Radio Works, Dept. 14
813 Mulford Street Evanston, Ill.

WD-11 and WD-12

TUBES REPAIRED

WD-11 or WD-12	\$3.50
C-300 or UV-200	2.75
C-301 or UV-201	3.00
C-302 or UV-202	3.50
C-301A or UV-201A	3.50
DV-6 or DV-6A	3.00
C-299 or UV-199	3.50

All tubes guaranteed to work like new.

Mail Orders Given Prompt Attention "24 Hour Service"

RADIO TUBE CORP.

70 Halsey Street Newark, N. J.
TUBES SENT PARCEL POST, C. O. D.

BRISTOL AUDIOPHONE

MORE THAN A LOUD SPEAKER

Bristol Audiophone, Sr., 15-in. Horn. \$32.50
Bristol Audiophone, Jr., 11-in. Horn. \$22.50
Bristol Single Stage Power Amplifier. \$25.00
Write for Bulletin 3006-W

The Bristol Company

Waterbury, Conn.

PATENTS

promptly procured. Trade Marks designed & registered RFE INVENTION RECORDING BLANK Phone Vanderbilt 7212

FREE MANUFACTURERS PATENT CO. INC. BOOK 520 FIFTH AVE NEW YORK

BUILD A QUALITY VACUUM TUBE SET AT HOME

Listen in on Fine Concerts and Good Stories Hundreds of Miles Away

Very Loud Famous Ultra-Audion Circuit, Wonderfully Clear

Highly polished, 7 by 10 insulating panel comes ready drilled. Simply fasten parts in place. DIAGRAM AND INSTRUCTIONS FURNISHED. RESULTS equal to or better than ready-made sets that cost much more. FREE—SCREW DRIVER AND PLIERS (the only tools needed).

Set without tube or phones only \$7.98. Postage extra, 20c.

Set with genuine WD-12 tube, A battery, 22½ UV battery and head set only \$19.98. Postage extra, 40 cents.

Beautiful polished mahogany finish cabinet for above set only \$2.98 additional. Postage extra, 20c.

Special genuine R.C.A. tubes UV-199, UV-201-A, WD-11 and WD-12, \$5.95; UV-200, \$4.75. Postage extra, 10c.

A. L. DUNN COMPANY

1 BETTS PLACE

SOUTH NORWALK, CONN.

DEALERS!

We handle only well known and nationally advertised lines. On top of that we give the kind of service you expect.

And—Our discounts are RIGHT.

Drop us a post card for our 36-page catalog just off the press.

Address Dept. 6

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Watch for Our Announcements

Beginning in RADIO WORLD

NOVEMBER 10

AND APPEARING EACH FOLLOWING WEEK

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CHICAGO

ILL.

Radiola Loudspeaker

New—a loudspeaker that brings music to the crowd as true and clear as one man gets it on the headphones. Nothing is lost—for its wide range gets all the overtones and partials. Nothing is added, for its horn is correct acoustically. The clear, rich tone of voice or instrument—pure and undistorted—with a knob to adjust the volume of tone at a touch. Have you heard it?



Radio Corporation of America
Sales Offices: Dept. 2094

233 Broadway, New York
10 So. La Salle St., Chicago, Ill.
433 California St., San Francisco, Cal.

Radiola

REG. U. S. PAT. OFF.

LOUD SPEAKER



Radiola Loudspeaker
Model U. Z.—1320

Price
\$36.50

Radio a Big Help to Police

IN Philadelphia and New York, as well as many other large cities, the radiophone has been made use of by the Police Department for apprehending automobile thieves and other crooks whose success depends upon a quick get-away.

The central police station is equipped with a radiophone transmitter of sufficient power output to be heard in any part of the city and suburbs, and the policemen on the force are supplied with small, portable receiving sets. When an automobile is stolen or other crime committed, a description of the car and persons is telephoned immediately to the central station, where it is broadcast to the entire police force. It is only a matter of a few minutes until the officer on duty on every street corner and on every highway leading out of the city is on the lookout for persons or cars answering the description; and it is a lucky crook who can thread his way out of the net work thus thrown around him.

Privately owned broadcasting stations are doing much to assist the police in a similar way. Radiophone Station WOC, The Palmer School of Chiropractic, at Davenport, Iowa, has just compiled a record of police reports broadcast in the eight months ending September 1, 1923, which shows that during that time 337 reports were broadcast at the request of police officials all over the Middle West. These reports covered not only stolen automobiles and lost individuals, but also assisted in locating tourists and traveling men whose exact location was not known, and who were wanted at home on account of death, illness, or other urgent business.

From the information available, it is conservatively estimated that the broadcasting resulted in the apprehension of from 10 to 12 per cent. of the persons or property called for. This is a fair average when one considers the very nature of this work. It is obvious that the percentage of results on police broadcasting varies in direct proportion with the amount of co-operation given by the individual radio listener. The fellow who takes off his phones or tunes in another station as soon as the police reports start is not doing his duty as a real enthusiast, or as a citizen of the commonwealth in which he lives.

Every radio listener, particularly those living on main highways where automobile thieves are likely to pass with their stolen cars, or living near a police station, should appoint themselves a committee of one to make a written record of police reports which they hear. When it is considered that one can scarcely place a fingertip on a ten-foot map of the United States without covering some point where radio listeners are to be found, is it not conceivable by 100 per cent. co-operation by the broadcasting stations and radio listeners that the job of an automobile thief, as well as that of many other types of crooks, could be made so uncertain that he would prefer to go into some other kind of business for a livelihood?

RADIO FANS

Tune in on station
WEAF (New York)

every Thursday at 8.50 P. M. and listen to a story or article selected from

HEARST'S
INTERNATIONAL

This is one of the most popular weekly features "on the air"

FREE

Write for Free Copy of the Latest Radio Reprint E. It contains a complete story from Hearst's International Magazine. Address

10c Brings you our new catalogue and radio information booklet illustrating and describing the Super-Regenerative and other latest and popular circuits. Our technical staff is at the disposal of our customers. Make use of their knowledge. Merchandise shipped immediately on receipt of order.
 U. S. Bureau of Standards "Radio Book." Special.....65c.
FREMONT RADIO SALES CO.
 227 FULTON STREET, NEW YORK CITY

OPERATE A LOUD SPEAKER ON ONE TUBE

We have a new wonder circuit that will efficiently work your loud speaker on a single tube on local stations. Over 2000 miles have been covered loud and clear with phones. Parts are few and inexpensive. Easy to build. Send 25c for hook-up and complete instructions.
LEUMAS RADIO LABORATORIES
 311 FIFTH AVENUE NEW YORK

BANKRUPT SALE OF VACUUM TUBES

Lower Than Manufacturer's Prices

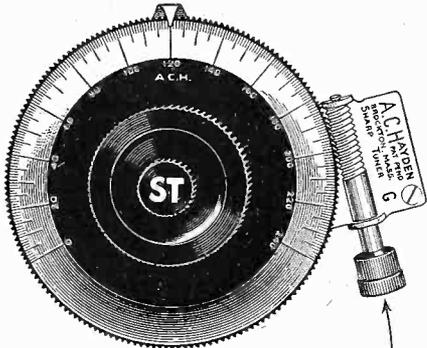
As Receiver for a Bankrupt Radio Co., I have for immediate sale a large number of NEW and UNUSED VACUUM TUBES

Styles and prices as follows:
 1½ Volts, ¼ Amp., Standard Base.....\$3.00
 3-4 Volts, .06 Amp., UV-199 Base.....\$3.50
 6 Volts, .22 Amp., Standard Base.....\$3.50
SAFE DELIVERY GUARANTEED. YOUR MONEY WILL BE REFUNDED OR REPLACEMENT MADE ON ALL TUBES THAT DO NOT OPERATE PERFECTLY. TESTED BEFORE SHIPPING.

Sent postpaid upon receipt of price. Twenty per cent. (20%) discount on all orders for 12 or more tubes in one shipment. These must be sold by Nov. 10th. Order today. Send check or money order.

WILLIAM E. GIBBONS
 535 Palace Bldg. Minneapolis, Minn.

USE A C H SHARP TUNER DIALS



Why the A.C.H. is different

- 3 in. DIAL (156-to-1)
- 4 in. DIAL (215-to-1)

Rough tuning with dial or one thousandth of an inch in either direction.

MONEY BACK GUARANTEE

Price ACH 3" Dial Complete.....\$2.50
 Price ACH 4" Dial Complete.....\$5.00
 Regular fitting 5-16" hole, ¼" and 3-16".
 Bushings, 5c. each extra. 10c. for all.

"Bought dial from you several months ago, and all I can say is, it is the best Vernier that can be put on any set, just one dial improved my set 50%. Would like to sell some." Telegram for 3 more.
 Mr. Winning, Beaver Dam, Wis.

Letter later from Mr. Winning says, "Use my name in advertising for I will back that dial against anything on the market. It cannot be beat."

To retain your good will you must be satisfied or money back.

The ACH will improve any set.
 Send for circular No. 3 on RV Loud Talker and Detector Set. A truly wonderful set.
 All ready for you to put together.

A. C. HAYDEN RADIO & RESEARCH CO.
 Brockton, Mass., U. S. A.
 Mail Orders sent prepaid in U. S. A.

Powerful New Army Radio Station

THE Army Signal Corps is busy installing a radio station at Fort Douglas, near Salt Lake City, Utah, which will be the largest radio telegraph station of the army. It will have but one tube, a new 10-kilowatt radiotron developed by the General Electric Company, which is building the equipment.

Another similar station is being erected at Leavenworth, Kan., but this station will operate with two tubes and will have a telephone circuit as well as the radio telegraph. The radio circuit between these two stations, the Arlington, Va., station and a land line from Leavenworth to San Francisco, will span the United States. Each of the two interior stations will be equipped with two 300' steel towers.

It is the plan of the army radio service not to use coastal stations, that part of the work being handled by the Naval Communications Service, and the army does not desire to interfere with ship to shore communication.

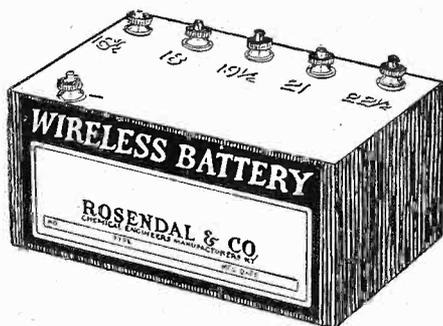
The Traveling Salesman Enjoys Radio

THE traveling salesman of yesterday was pictured by cartoonist and story writer as an ardent Kelly pool fan. The impression was created that he passed the lonesome evening hours draped over a pool table. Since the advent of radio broadcasting a new interest has been created for those who spend so many hours going some place on railway trains or stopping in hotels. A salesman visiting the Hotel Woodruff at Watertown, N. Y., recently wrote WGY, the Schenectady, N. Y., station of the General Electric Company, acknowledging his "appreciation for the wonderful benefit derived from your broadcasting, particularly these Sunday morning services."

He explained that he carried a radio set about with him and installs it in his hotel room. "When I arose this morning," he wrote, "the sixth Sunday since I have had word from my home and realized it was to be just another lonesome day minus the usual work of week days, you can well imagine the sincere feeling of gratitude I felt for Station WGY when I was able to listen in to hymns that were all familiar to me and to enjoy the service so vividly that the feeling was created that I was part of the church congregation instead of many miles away."

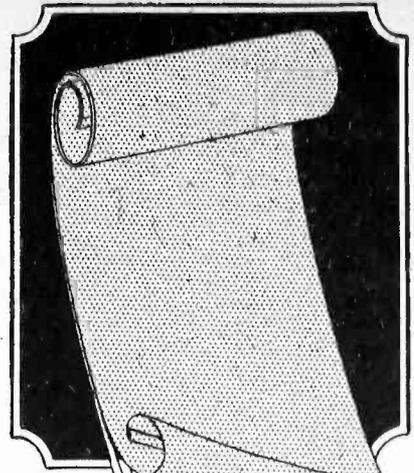
Send \$6.00 for RADIO WORLD and get 52 issues without a break.

WHAT'S IN A "B" BATTERY



	Large	Med.	Small
22½ V. Plain.....	\$1.25	\$1.00	\$0.70
22½ V. Variable 1.38	1.13	0.79	
45 V. Plain....	2.50	1.75
45 V. Variable 2.75	2.00	

Ask for Circular on other radio parts



Now \$1.50

A practical indoor aerial

Ideal for sharp tuning. Reduces static to a minimum. Contains 600 feet of wire. Instantly collapsible and portable. Can be hung on door or placed under carpet. Noticeable directional effect. Particularly effective in large cities where several stations are broadcasting at the same time. One INDORARIAL used as antenna and another as ground gives interesting results.

At your dealers, otherwise send purchase price and you will be supplied postpaid.

ELECTRAD, Inc.

428 Broadway New York

ELECTRAD

INDORARIAL

ALL LINES OF RADIO MERCHANDISE

ARE IN OUR STOCK
 New York Prices Direct to You
 Just Tell Us What You Want
GLOBE RADIO SHOP

115 West 23rd Street New York

CRAM'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.

NOTHING more than a number of small cells, wired together in series, each cell being composed of a zinc cup with a mixture of chemicals inside.

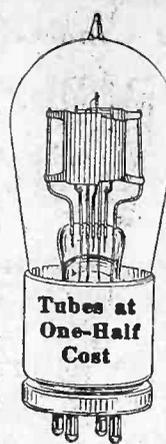
It took Rosendal years of painstaking analytical work to get that mixture just right—and it is RIGHT TO-DAY.

That's why a "Rosendal" is a good battery. Guaranteed money back if you're not satisfied.

Send M. O. or order for C. O. D.

ROSENDAL & CO.

Chemical and Radio Engineers
 2 and 4 Stone Street New York



IT HAS HAPPENED TO ALL OF YOU IN A FRACTION OF A SECOND!

WHEN the filament burns out, at least \$5.00 goes with it to put the set in operation again.

WHY not save nearly one-half the cost of a new tube by sending us your burned out or broken tube to be repaired?

WE REPAIR EVERY TYPE OF tungsten wire filament receiving tube. All our tubes are TESTED and GUARANTEED to function as well as when new. All tubes returned P. P., C. O. D.

HARVARD RADIO LABORATORIES
P. O. Box 1781
BOSTON MASS.

OUT OF THE ETHER

Chats About Broadcasting Stations

By Hirsch M. Kaplan

Exit baseball! Enter football! Baseball has had the air for the season and now that Babe Ruth and his team have triumphed, you can prepare to usher in the football season of 1923. By the way, WBAY on a wave length of 312 meters has already opened up the season by broadcasting the clash between Army and Notre Dame. This event came through in clear style and no less a person than Bill McNary, radio editor of the

Newark Sunday Call, described the great event.

WTAM, had a popular programme to offer that was "all to the mustard." We'd advise the announcer to speak a little clearer, else WAAM will get the credit.

The Copley Plaza Hotel Orchestra through station WNAC of the Shepard Stores, Boston, rendered another one of their popular programmes which sure was enjoyable.

The Harmony Male Quartet through WIP amused us with a splendid vocal recital.

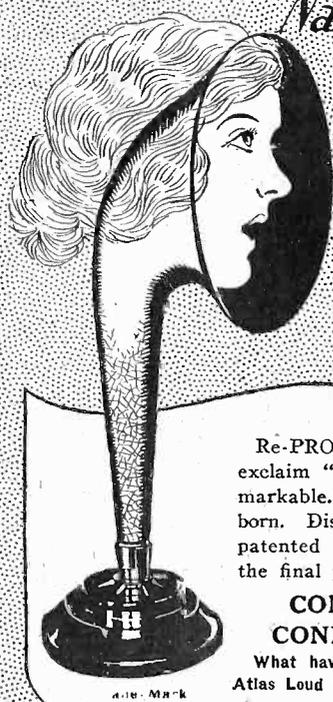
Our Canadian friend CKAC was on the air with a wonderful concert as offered by the Frontenac Breweries Band. This band convinced us that all good ones were not in the United States. Let us hope to hear more of them.

WBZ came through with a program by the Knights of Columbus which took place in their auditorium at Springfield, Mass.

Another station to join the long list of those already broadcasting "Radio Bible Class Lessons," is station WJY, who offers this program every Sunday afternoon at 2.30. This service is rendered at this station by the Rev. John Pearson.

The orchestra of the Pittsburgh Athletic Club helped to drive the blues away by rendering a charming program of classical music through Station KDKA.

I want to pause here to thank WDAP at the Drake Hotel, Chicago, for standing for a drop in its wave length. For now when the local stations get dull we can tune in any time on the excellent program provided by the Chicago Board of Trade. Station WDAP comes through easily as early as 8 P. M.



Natural Re-PRODUCTION

Atlas AMPLITONE LOUD SPEAKER

Re-PRODUCTION so natural that even experts exclaim "indeed a revelation," "nothing short of remarkable." Every voice inflection is faithfully re-born. Distortion made impossible by the marvelous, patented "double diaphragm." Ask your dealer for the final proof—a demonstration. Write for Booklet.

COMPLETE WITH CONNECTING CORD **\$25**

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(Patent Pending)

THE PERFECT SYNTHETIC CRYSTAL DETECTOR—SENSITIVE OVER ENTIRE SURFACE
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RUSONITE REFLEX CRYSTAL
Manufactured Expressly for Reflex Circuits. Will Stand Up Under Heavy Plate Voltage.

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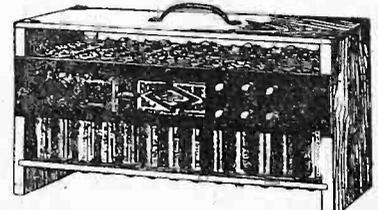
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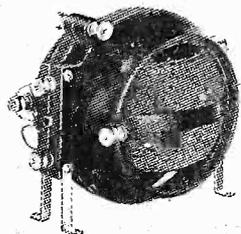
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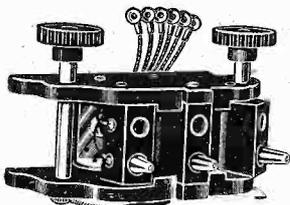
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Standard parts for this sensational circuit—panel, coils, condensers, verniers, variable resistance, vernier rheostat, socket, double jack, dials, switch, contact points, posts, busbar, wire, spaghetti, etc. (no tubes or phones).

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Sta-Fix Detector



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GUARANTEE

THIS Detector is guaranteed to be perfect in every detail and properly adjusted to be clear in tone and volume, and subject to FREE exchange if found imperfect.

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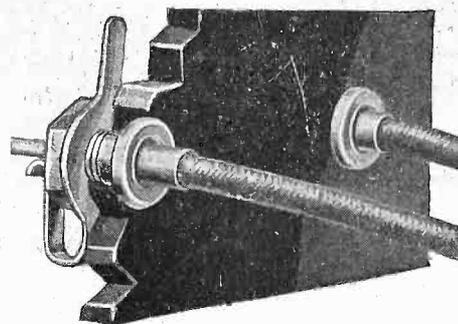
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Tube sockets of molded condensite highly polished. Phosphor Bronze contact springs. Reinforced bayonet slot prevents breakage. Accommodates all standard tubes. Price 75c.

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17 plate Bakelite Ends.....	\$2.25	\$1.75	Rheostats, 6 ohm Bakelite....	\$0.80	\$0.50
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S. C. Jacks (Carter make)....	.80	.60	Cockaday Coils, with hook-up for 3 bulb set..	\$2.50	
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Amertran Transformers (5 to 1)	7.00	5.85	V. Couplers with silk winding.....	2.25	
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Let Willie Do It

Papa bought a radio
Cost him "feefty-dollar";
Couldn't get a thing and so
He made an awful holler.

Willie had a crystal set—
One he'd put together—
He could hear the jazz, you bet,
News and sports and weather.

Papa cursed the blooming thing,
Threw it in the cellar.
Said ma'd give a better "sing"
Than the radio feller.

Willie found the set one day,
Took it to the attic;
Fussed with wires and battery
So he'd bar out static.

When pop heard the music come
Without crash or sputter—
"Beats the dickens, sure, I vum."
He was heard to mutter.

L'Envoi.

When the "blamed thing" won't go right,
Not a thing comes through it;
Ere you smash it up outright
Best "let Willie do it."

—C. A. S. in N. Y. Evening World.

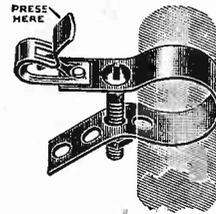
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Gives micrometric adjustment outside the field of inductivity.

Tested and approved by amateurs and experts. Enables you to tune distant stations easier and more clearly. Simple as A B C. Installed from outside, no dismantling of your set necessary. Audibility made more natural or less distorted by the fine adjustments obtained. One Hunt's Device handles all dials on set or several sets. Costs only one dollar, on guarantee of money refunded if not satisfied. Ask your dealer or order direct from Hunt Co., 486 Shrine Bldg., Memphis, Tenn.

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Mail a post-card today for 5-day examination of this new book by Kenneth Harkness. Send no money—just pay postman \$1.25 plus postage. If you are not absolutely satisfied return the book within 5 days for prompt refund. Mail a post-card now.

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WD-11...	\$3.50	UV-199...	\$3.50
WD-12...	3.50	C-299...	3.50
UV-200...	2.75	UV-201A...	3.50
UV-201...	3.00	C-301A...	3.50
C-300...	2.75	UV-202...	4.00
C-301...	3.00	C-302...	4.00
DV-6A...		\$3.50	

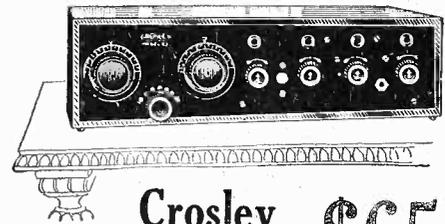
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H. & H. RADIO CO.

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For bringing in distant stations clearly and distinctly, no set can excel a Crosley Model X-J. It is a 4 tube radio frequency set, combining one stage of tuned radio frequency amplification, detector and two stages of audio frequency amplification.

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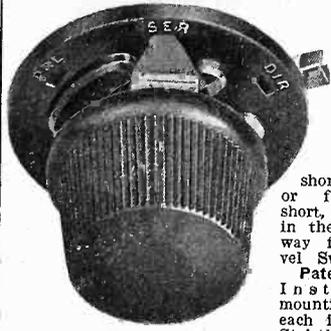
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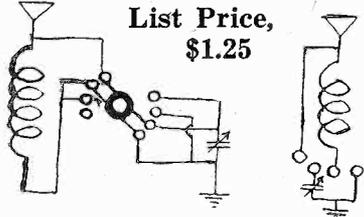
Series, Parallel, Direct-Ground
Receives long waves in the parallel position; short waves in the series position; and waves of medium length in the direct-ground by eliminating the condenser entirely.



You can't build a good set without an arrangement for switching from short to long waves, or from long to short, which you get in the most efficient way from the Marvel Switch.

Patents Pending
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Compare hook-up in the old two-way switch (left) with that of the Marvel three-way switch (right).



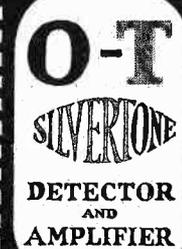
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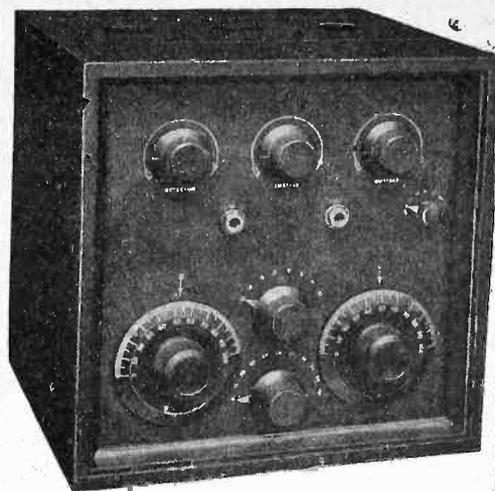


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OPERATES—on dry cell or storage battery.
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High class representatives wanted.



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A Set that is different. Detector and Two-Stage Audio Amplification. Local and Long Distance Reception. Easiest Tuned Set on the Market. Positively No Squeaks or Howls. Handsome Piano Finish Mahogany Case.

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Accommodates Head Set and Loud Speaker or Two Head Sets—permitting instant choice of Five Circuits without removing plug or changing tips.

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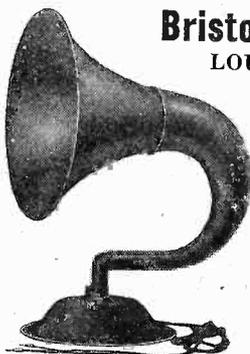
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No Battery Required.

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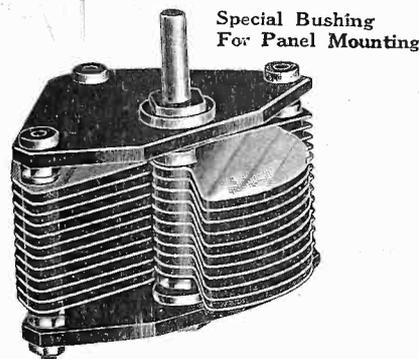
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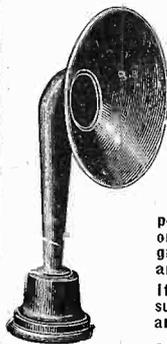
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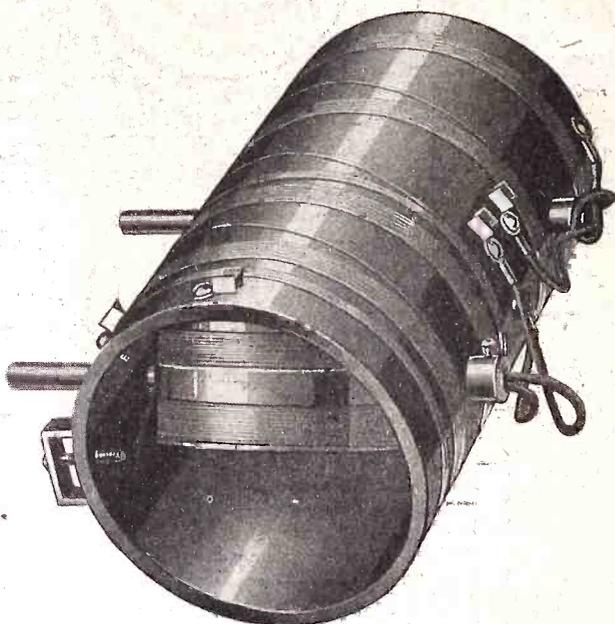
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This new type of receiver cuts out all interference. Gets the same station at dial settings every time. No vario coupler or variable condenser needed.

Station	Dial 1	Dial 2	Station	Dial 1	Dial 2
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KDKA	46	21	KGM	44	16

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