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1924

# RADIO WORLD

Title Reg. U. S. Pat. Off.



Joseph Alonzo, of New York City, blind builder of radio sets, exhibiting his work to admiring friends. He uses sticks of various lengths to get his measurements.—(Photo by Louis Zoul.)

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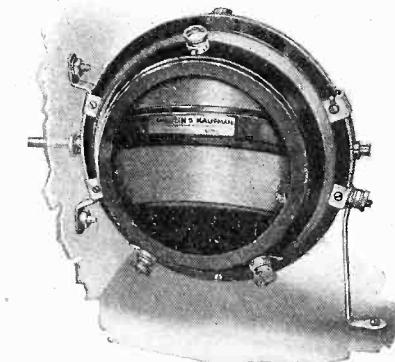


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VOLUME FOUR OF

# RADIO WORLD

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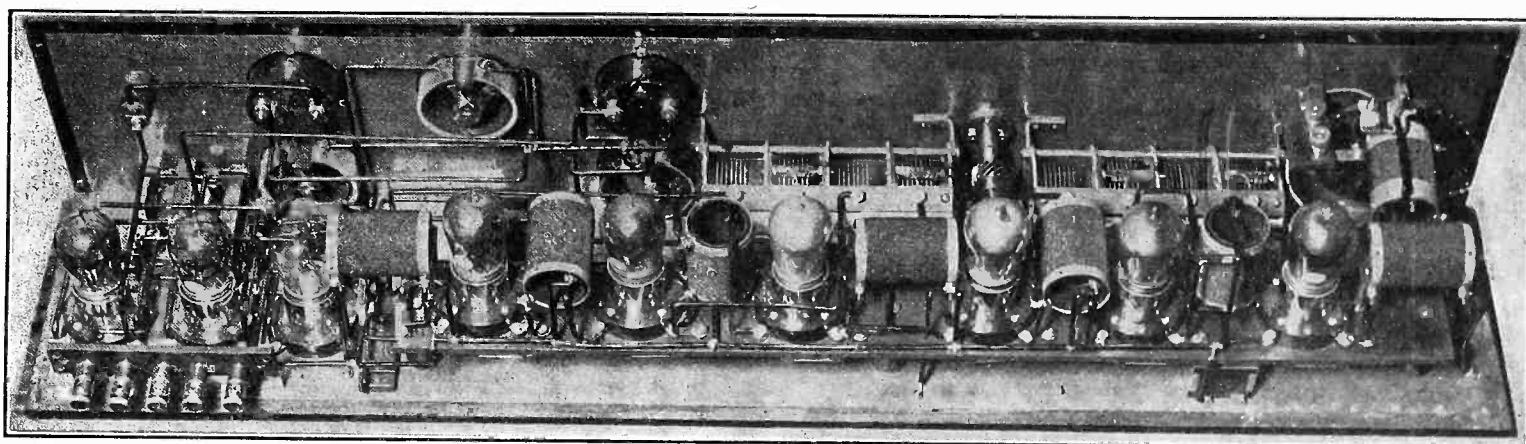
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## The Super-Pliodyne Nine-Tube Receiver Uses Six Stages of Tuned Radio-Frequency With but Two Controls



(C. Foto Topics)

Fig. 1. The new "Super-Pliodyne" receiver, incorporating six stages of tuned radio-frequency with but two tuning controls.

**A**CIRCUIT that promises to be one of the greatest advances in the field of radio reception was described by C. L. Farrand, Consulting Radio Engineer, in a talk given before members of the press and technical men, at Columbia University, on February 20. The receiver, which utilizes nine tubes, comprises six stages of tuned radio-frequency, detector and two stages of audio-frequency, with but two tuning controls.

The difficulty of using more than two or at the very most three stages of regulation tuned radio-frequency in ordinary receivers is well known. The controls are

so intricate in these cases, and the balance is so delicate, that it is almost a human impossibility to tune them. However, in this new receiver, all the drawbacks hitherto experienced are believed to have been done away with. It is only necessary to correctly adjust in the laboratory the condensers which tune the set, which takes a matter of a few hours, and the rest is simply a matter of diligent shop work on the part of the experienced shop constructors.

The "Super-Pliodyne," as it is called, is illustrated in Fig. 1. The receiver uses special air core trans-

(Concluded on page 10)

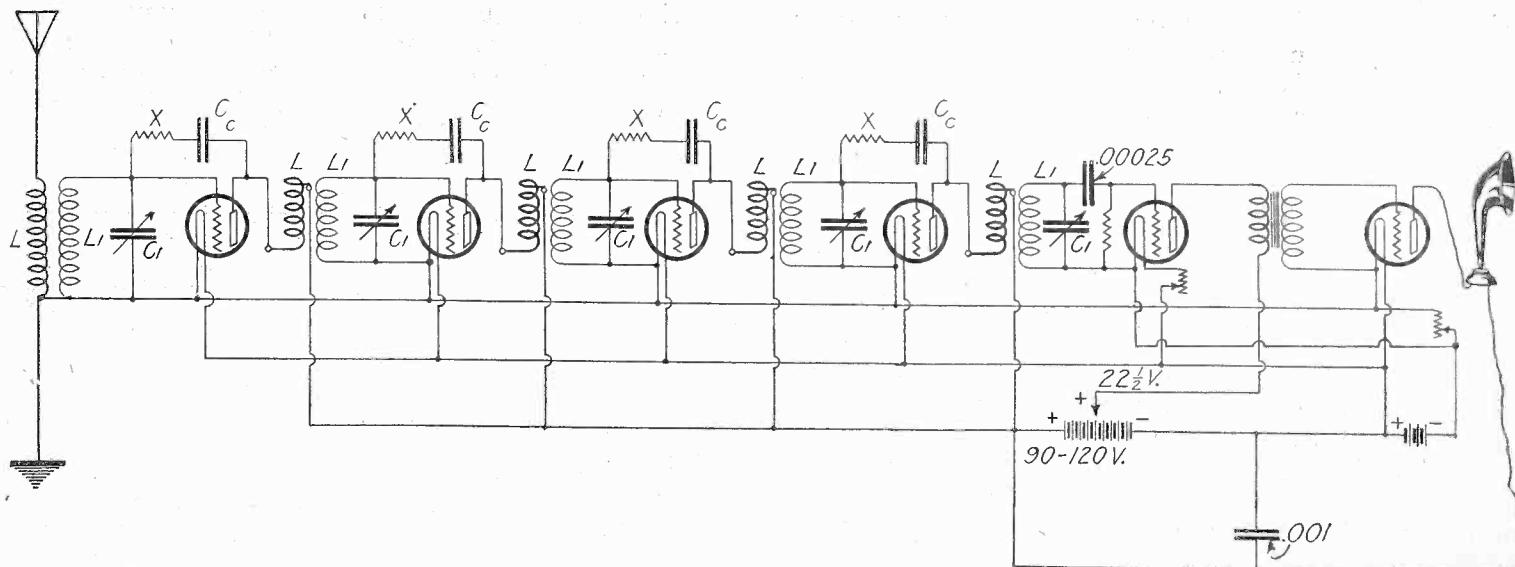


Fig. 2. Diagram of a six-tube set employing the "Super-Pliodyne" principle. L-L1 are the special radio-frequency transformers used, C1 are the shunting condensers all worked from one shaft, X are the high resistance couples, while Cc are the stopping or blocking condensers. This is the basic idea around which the nine-tube set, shown above, is made. For simplicity, only four stages of radio-frequency are shown in this diagram.

# Naval Academy Establishes Course in Communication

*By Carl H. Butman*

THE United States Naval Academy, at Annapolis, Md., added a new course to its curriculum last week. It is a course in communication, a subject which of late years has come to compare with such essential subjects as navigation, engineering and seamanship. Among the divisions of the newly prescribed course for the midshipmen is radio in its practical application to naval and military, war and peace time routine.

Previously, the students of the navy school learned only the principles of telephone, telegraph and radio communication as a part of their electrical course. Now communication has come into its own, and a new text book entitled "Notes on Naval Communication" has been introduced as part of the course of study.

In an address introducing the study of communications, Commander D. C. Bingham, Assistant Director of Naval Communications, outlined the new course and cited some of the problems devolving upon communications in fleet efficiency. He also reviewed progress and mentioned some of the possibilities hoped for in a perfect communication system.

His main theme showed the relation of communications in fleet efficiency to enable the midshipmen to achieve the best results from the newly-issued text book, compiled by Lt. A. C. Kidd, U. S. N., with the cooperation of the communication and engineering experts of the navy. Under radio, the book reviews both material and operation, touching on transmitting and receiving equipment, for the several types of naval sea and aircraft, installation, codes and procedure. Other chapters deal with shore and sea communications, including sound as well as radio, and the duties of a communication officer. One citation, perhaps will suffice to show the purpose of the new course: "The entire fabric of our national prosperity is erected upon a foundation of efficient communication." In another instance the text reads: "However important communications may be to the nation in time of peace, in time of war they are vital."

Commander Bingham pointed out the essential part of communication; with diagrams of the navy's fleets before him, he showed how necessary it was to have coordination of movement, which in turn depends upon perfect communication. Some of the problems within

the scope of naval communications mentioned were the operation and maintenance of the naval communication system afloat in a campaign in either or both oceans; the operation of radio facilities for mariners; the promotion of harmony between private and governmental radio systems; the guarding of United States radio, cable and compass systems; and wartime as well as peace-time operation in the interests of Americans.

As a civilizing factor, the new agency of communications, radio telephony, through its use in broadcasting, in the opinion of Commander Bingham, will have an influence equalling, if not exceeding, the discovery and development of printing. Owing to the range of radio and its rapidity, there is a tendency, he points out, to neglect and undervalue other means of communication, but the new course has been developed with the idea of showing radio's place, where it will augment rather than replace other means of intercourse. Every means of communication must be studied and developed, he insists, but he would reserve the air as free as possible, for important and urgent dispatches.

While it is not yet held imperative that naval communication officers be operators, they must know the types and capabilities of apparatus. Today a modern battleship has a main transmitter, two secondary transmitters, one auxiliary transmitter and one sound-telegraph transmitter. It also has one receiver for high-power shore stations, three receivers for information and orders, three receivers for division maneuvers and fire control, one receiver for battle-line signals, one radio compass and one listening device and sonic range finder. With this equipment, the battleship "Colorado" can, with proper personnel, simultaneously operate as follows: Transmit four radio messages, receive seven radio messages from vessels or shore stations, receive one message from a distant shore station, and obtain radio bearings on frequencies not being used by the ship for transmission.

The duties now assigned to communication officers of the navy require considerable knowledge of radio apparatus and experience in handling radio communication in naval operations. The navy is seeking to inculcate into the midshipmen the basic principles before they graduate as officers.

## Broadcasting Stations in Colleges and Churches

THAT educational institutions and newspapers have recognized the value of broadcasting is indicated by the February "Radio Service Bulletin," issued by the Bureau of Navigation of the Department of Commerce. And there is an increasing number of churches which have found radio an effective aid in their work.

The latest list of stations broadcasting weather reports, music concerts and lectures shows 95 broadcasting stations connected with universities, colleges, and other schools. The same directory lists 46 news-

papers or publishing houses which have their broadcasting stations; while 20 churches are shown in the lists. This does not, however, include a number of churches whose services are broadcast through some other station. Three of the broadcasting stations are handled by national guard regiments of as many states. Two states have broadcasting stations for their bureaus of markets, while nine municipalities, chambers of commerce or boards of trade have broadcasting stations, part of these being used for city police forces, and some others being community affairs.

# A New Application of the Superdyne Principle

New Circuit Devised by Richard Carlisle, President  
C. C. N. Y. Radio Club

By Charles Bucher

MANY and varied are the letters received commenting upon the Superdyne receiver. It was hailed as a receiver of wonderful performance, and created a name for itself overnight. Various deviations of the principle have been advanced and tried out, some successfully, some fair, and some not as good as the original receiver.

However, Richard Carlisle, a serious radio experimenter, and president of the Radio Club of the City College of New York, not at all satisfied to pronounce a receiver perfect until he had torn it all apart and rebuilt it in a dozen or so ways, finally produced what he claims is a receiver embodying the same principle, but in a much simpler manner. It does away entirely with all the constants heretofore used, using not even one of them, and besides that it uses but three variometers and no variable condensers, which simplifies matters considerably.

Before looking at the schematic diagram, the builder should study the illustration showing the inside of the receiver. The first thing that will be noted is that three variometers are used. It is by the use of these variometers that the coils and condensers that were used are rendered unnecessary.

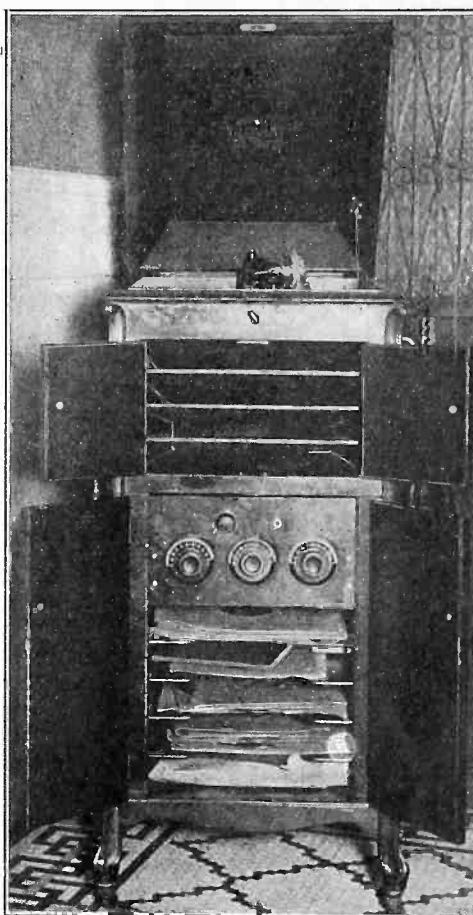
The first things, then, necessary are the three variometers. Get good ones, with as little insulating material in the active fields as it is possible. Note that the builder himself has used variometers that have small sections to support the windings. If possible, obtain the exact type used in the illustration, Fig. 3.

Preparing the first variometer is then in order. This is done by taking the variometer apart and separating the windings in the manner shown. One-half of the stator is for the primary winding, the other half for

the secondary or grid winding. The stator is used as the reverse feedback coil. This is plainly shown in the diagram. The two other variometers are then placed in the grid and plate circuits as shown, care being taken to keep them out of inductive relation with the primary of the first variometer. These two variometers are shunted with the three fixed condensers as shown, for wave lengths above 350 meters. If stations below this are wanted, they should be removed.

Arrange the parts in the circuit approximately as they are shown in the illustration, but taking care, of course, to keep the leads away from one another.

(See page 6)



(C. Foto Topics)  
Fig. 1. The completed Superdyne enclosed in the lower cabinet of a victrola, using the horn of the machine as the loud speaker.

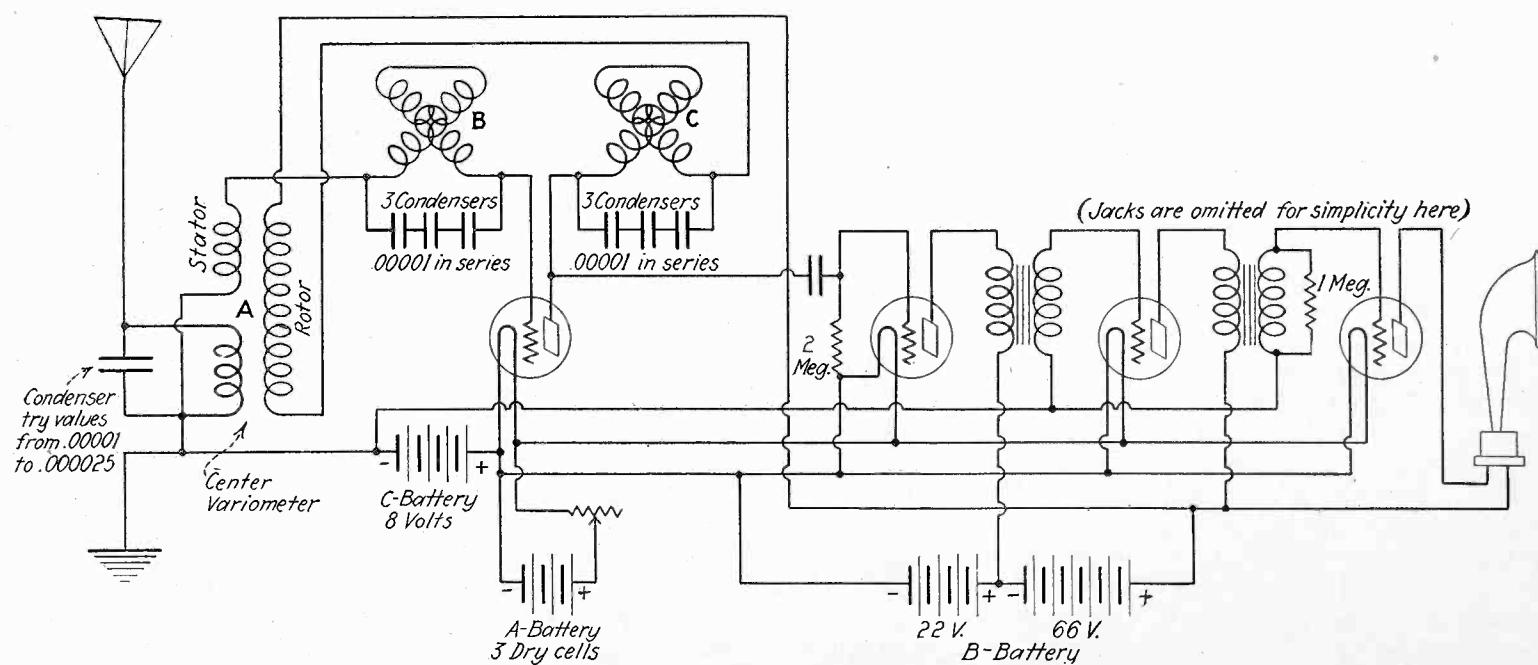


Fig. 2. Diagram of the Carlisle adapted Superdyne. The condensers shunted across the variometers should be cut out with a switch if waves below 350 meters are desired. The rotor of the first variometer is used as the reversed feedback coil, while the stator is split in two sections for use as primary and secondary.

A good idea would be to plan the entire receiver after that of the builder.

It is claimed that much greater selectivity and freedom from interference is thus gained by the use of the

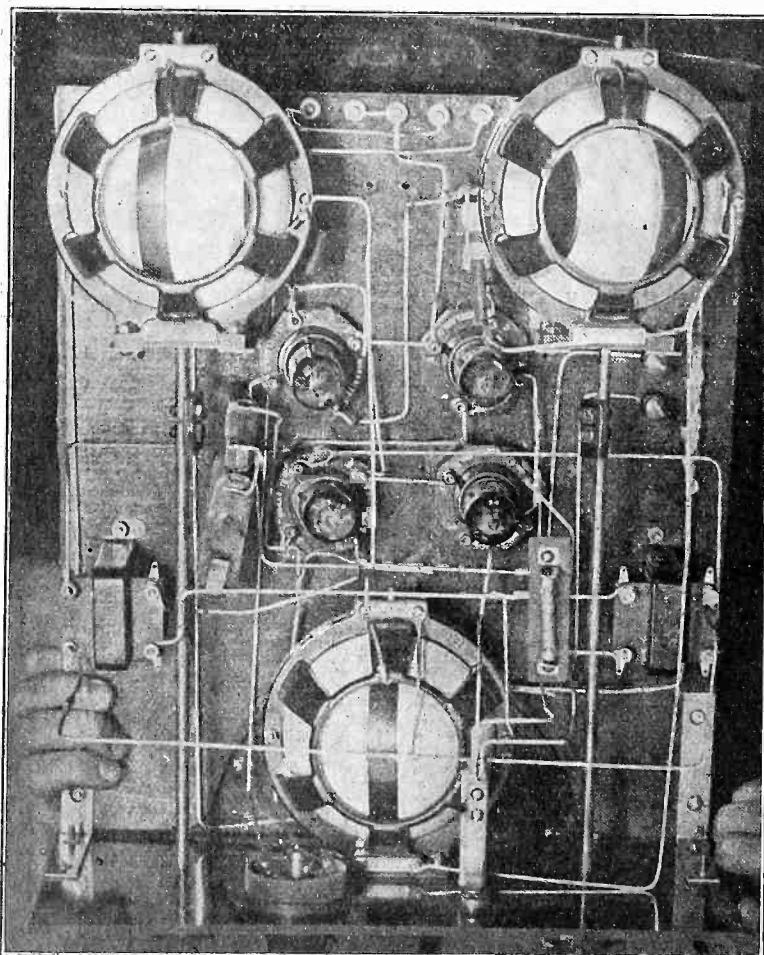


Fig. 3. Top view of completed receiver, showing the arrangement of the parts. Note the position of the three variometers. The front center one is the split-primary-reversed-feedback control.

variometers in place of the coils. Due to the grid circuit being tuned by means of the grid circuit variometer, exact resonance is obtainable. Control of the wave length is then done by means of the plate variometer, and the feedback is controlled by the third. This last variometer is the critical control of the set, as it is by means of this apparatus that the volume is increased up to the point of saturation, when the set spills over and the howls are heard. Tuning cannot be done with his set until the builder gets everything right, and is accustomed to the tuning. The two variometers are dependent upon one another for tuning, while the first variometer just controls the final tuning.

UV199 tubes are used throughout, and they are supplied by a bank of dry cells in series. The most economical way of doing this is to obtain three dry cells for each tube used, and connect them in series-parallel groups of three each. With this, and a vernier control for the detector rheostat no other controls are necessary. It is noted that there is one rheostat for all the tubes, but outside of experimental work this is not to be recommended. Rather have a rheostat for the detector and the cartridge controls for the other three tubes.

The illustration, Fig. 1, shows how the builder accommodated the set to his victrola. Note the simplicity of the complete receiver. But three dials, one rheostat and one jack. Jacks on the detector and first stages may be used if it is thought necessary, but for simplicity, and where the receiver is for use with a loud speaker, four tubes are necessary, so none but that in the last tube should be incorporated.

This makes a simply wired, simply controlled receiver which at its very worst stands among the best of other sets. It is a receiver which even the most skeptical of fans should build, because once they have built it they will no longer be skeptics, but rather ardent fans.

## New White Radio Bill Introduced

**T**HE new radio bill, repealing the 1912 act, authorizing all transmitting stations and operators to be licensed, but exempting government transmitting and all receiving stations from licensing, was introduced by Congressman White, of Maine, on February 28. It is said to have the approval of governmental departments, and to fully meet the present legislative needs. According to Mr. White, the bill confers upon the Secretary of Commerce broad and general powers of regulation and control over transmitting stations, in the interests of reducing interference to the minimum and the development of an orderly system of communication. Certain obsolete requirements have been eliminated, ambiguities clarified, and new provisions of importance introduced. The Secretary of Commerce, aided by an advisory committee of fifteen, is authorized to license, classify and supervise radio stations; control the nature of service rendered, and allocate wave lengths.

The President is given authority to close or take over any station in time of war or disaster. Station licenses may not be issued to aliens, and all licenses may be revoked or suspended by the Secretary of Commerce. Time limits for licenses are authorized, whereas present laws place no limitation upon the Secretary of Commerce; who could, if disposed, license a station for a thousand years. Special provisions seek to promote efficiency in mobile stations and make for safety of ships at sea. No licenses are required for receiving and no control over such sets is attempted. Transmitting amateurs are not specifically provided

for, but the limitations of wave lengths and power, set forth in the 1912 bill, are eliminated.

Under his general power to allocate wave lengths, the Secretary of Commerce may now assign amateurs such wave lengths as the importance of their work may make advisable. The secretary is directed to refuse to license any applicant who is seeking unlawfully to monopolize radio communication, either through control of manufacture, sale of apparatus, exclusive traffic arrangements, or other means. Revocation of licenses may be made when provisions of the bill or its regulations are broken, or whenever the Interstate Commerce Commission, or other body, in the exercise of authority under the law, shall find that a license has failed to provide reasonable facilities, or has made unjust and unreasonable charge, classification, regulation, or practice in connection with communication service. All laws relating to monopolies shall apply to radio apparatus and communication, the bill states, and in addition to other penalties, licenses may be revoked. The bill also provides for the application of the Cable Landing License Act to radio transmission to foreign countries. No mention is made of licensing fees in Mr. White's statement, although it is known that licensing fees were considered during the process of weaving the features of the bill into a whole.

A telegram from the Hudson Stack Hospital, Fort Yukon, Alaska, addressed to Station WEAF advises that its program was successfully heard on the evening of February 14. This institution is north of the Arctic Circle and represents the northernmost point at which WEAF's programs have been reported.

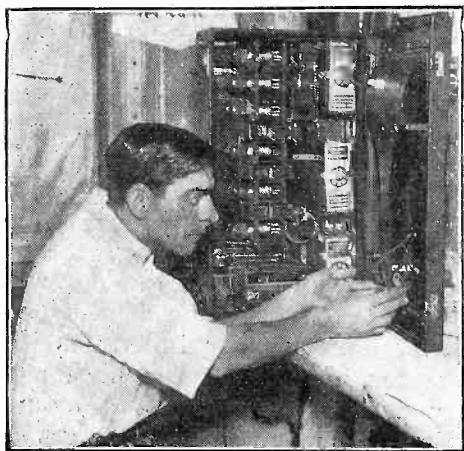
## No Limit to Radio

**A**PPARENTLY there is no limit to the uses of radio. Just when even the most ardent fan is about to say "Well, I'll be danged," something new happens.

The very latest is its use to rush trained relief workers to the scene of a disaster. Recently, when news of the great mine explosion at Crosby, Minn., startled the country with the report of 40 dead and many injured, efforts to reach American Red Cross relief workers in the immediate vicinity by the usual means proved futile. Heavy storms had paralyzed wire communication. There was only one way left—radio.

Red Cross officials wanted to reach Mrs. Marjorie Bell, the nearest relief worker, who was at Minneapolis. Immediately they received the cooperation of radio companies and four great stations in

## Cantor's Radio Set



(C. Kadel and Herbert)

Eddie Cantor, comedian, in his dressing room at the Earl Carroll Theatre, New York City, with his special six-tube set, comprising three stages of radio-frequency, detector and two stages of audio-frequency, with loud speaker and loop, all enclosed within the confines of a suitcase.

the Middle West began broadcasting every two minutes for Mrs. Bell. They were the Westinghouse Electric, KYW; the Chicago Daily News, WMAQ; The Great Lakes Naval Training Station, near Chicago; Sixth Army Corps Headquarters, and W. E. Schweitzer, an amateur broadcaster.

Within an hour Mrs. Bell had the message delivered to her by a neighbor who had picked it out of the air with his small crystal set and within two hours she was on her way to Crosby. Mrs. Leslie Gray, the nearest field representative of the Red Cross, was also notified by radio and joined Mrs. Bell at Crosby.

The result was that the trained disaster relief organization of the Red Cross, within a few hours had started to repair the effects of one of the worst mine disasters in recent times.

## Grandfather's Clock Set by Radio



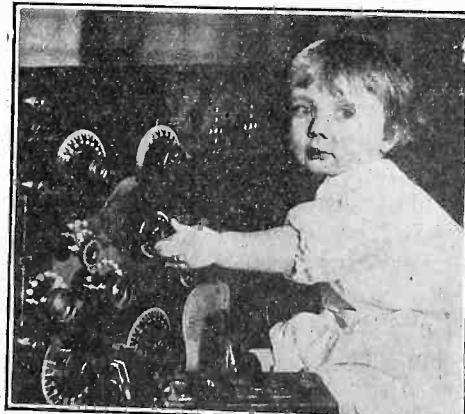
(C. Western Electric)

**N**OWADAYS the century-old clock in Frank Lindsley's home at Dreahook, New Jersey, ticks off the time right to the second—thanks to the time signals broadcast by radio.

Mr. Lindsley, like his forebears, has a reputation as a weather prognosticator, but he uses the modern method of forecasting. He no longer looks to the skies for indications of the morrow's weather conditions; he listens in to the weather reports that are "on the air."

"Radio," says Mr. Lindsley, "proves itself the farmers' friend by providing pleasures that otherwise would be unavailable in remote rural sections. Instead of having to travel to distant towns for an evening's entertainment, we have only to tune in to hear jazz bands, symphony orchestras, operas, organ recitals, singers and speakers. When I think of the time—and it wasn't so long ago—when there were few sounds to be heard on the farm except moos, neighs, barks, cackles and crows, I certainly am glad that I'm a radio fan."

## An Infant Radio Fan



(C. International Newsreel)

Little Miss Noreen Alley, not yet two years old, knows how to handle Daddy Alley's set, even if she does have to sit up on the table to reach the dials.

## A Radio Night School

**T**HE new radio night school, recently opened in Washington, D. C., said to be the first of its kind anywhere, has made a decided hit with local fans. Men, women, boys and girls are represented in the radio construction class of three hundred, which will meet three times a week at the McKinley Manual Training School. Twenty per cent of those enrolled are women, who seek to learn how to build their own receiving equipment. Radio experts L. M. Heron and H. P. Noble are in charge of the evening radio classes. Besides instruction on construction, methods of tuning, especially in regenerative sets, will be taught so as to avoid howling and reradiation. The general theoretical principles of radio in its many phases will also be covered in this unique course.

## Radio via Telephone



Leo Johnson, well-known radio amateur, very often calls up his radioless friends over the phone, to treat them to a bit of exceptional music or a special program by placing the transmitter in front of the loud speaker.

## British Radio Activities

**G**REAT BRITAIN has about 580,000 licensed "listeners in," compared with only 30,000 a year ago, and broadcasting is still increasing, reports to the United States Government state. This year manufacturers expect a large increase in their business. About 225,000 individuals who first took out temporary licenses were later given constructor's licenses, which apparently are permits to build sets. This type of license seems popular, as between 32,000 and 75,000 per month were issued toward the close of 1923. All told, 165,000 British broadcasting licenses were issued to owners of British manufactured sets, seventy-five per cent of whom are said to own crystal sets. Since the broadcasting stations are mostly located in populous districts, a large majority of set owners are satisfied with simple crystal sets.

# The Filament in Your Vacuum Tube— Its Purpose and Properties

*By Dayton Ulrey*

*Research Physicist, Westinghouse Electric & Mfg. Co.*

MOST people are familiar with some of the common facts of electricity. For example, perhaps you have noticed the peculiar behavior of the hair when combed with a hard rubber comb, and have heard, if not seen, the tiny sparks of electricity that pass between the two. This is fundamentally identical with the electricity which heats the filaments in your vacuum tubes. Each is made up of the same kind of electric particles, or electrons as they are called, and the difference in the two cases is much the same as the difference between a raindrop and a river. Both are made up of the same kind of molecules, but they manifest the energy tied up in them differently. In the same way all electrical phenomena are caused by the movements of electrons though the different phenomena may appear quite unrelated.

The electron is the smallest unit of electricity. We do not know absolutely its size and shape, but it is generally assumed to be a sphere of such size that if enough of them were laid in a row to make a line as long as the diameter of one of the hairs of your head, it would require more than seventy thousand million of them.

In spite of the minuteness of the electrons, the quantity of electricity associated with it has been measured so accurately that the error cannot be greater than about one part in four thousand—less than four hundredths of one per cent. This charge of the electron is, like its size, so small that a figure representing its magnitude is quite meaningless.

So much for the electron itself. We shall now consider its connections with the filament in a vacuum tube. It is now known that every atom of every element is made up partly of electrons and that, at least in metals, there are, in addition to the electrons tied up with each atom, other electrons which are free to move about. These "free" electrons, whether in a metal or outside in space always move toward a positively charged body and are repelled by a negatively charged one. A current of electricity in a wire is nothing more than the movement of these "free" electrons in the direction of a positive charge.

About 34 years ago Sir J. J. Thomson discovered that, although electrons could not be drawn out into space from a cold body by the attraction of a positive charge, electrons could be drawn out from a filament when it was heated. This opened the door to the interesting field of thermionics, the emission of electrons from hot bodies, and a great deal of work has since been done by other physicists in determining the laws governing this phenomenon. It has been found that the emission of electrons from heated metals is quite analogous to the emission of vapors from heated liquids. The rate of evaporation from liquids is known to increase very rapidly as the temperature is raised and the same general law has been found to apply in the case of the "evaporation," if we may call it such, of electrons from hot bodies. The number of electrons emitted at any given temperature is different for every different element, just as the number of molecules of vapor evaporated at any given temperature is different for every different liquid.

Just a word need be said as to how this property of hot bodies is made use of in the vacuum tube. The plate, being connected to the positive end of the "B" battery, attracts electrons emitted from the filament so that, when the aerial is disconnected or when no signal is coming in, a continuous steady stream of electrons flows from the filament to the plate, through the phones (or transformer, as the case may be) and into the battery. When a signal is coming in, each sound vibration at the transmitting station, even though there may be 10,000 of them in one second, causes a corresponding change in the charge on the grid, which, being in the path of the electron stream influences the electron current. The grid becoming more electro-negative would obviously tend to repel the electrons set free at the surface of the filament, thus reducing the number getting to the plate, while the opposite effect would be produced if the grid becomes more electro-positive. This varying current through the phones is responsible for the sounds we hear.

The electron current required in a receiving tube while very small in comparison to the current necessary to heat the filament, is still quite large in terms of the number of electrons reaching the plate in one second. In an amplifier this number may be as high as twenty quadrillions—20 with 15 ciphers following. In order to get this large emission from filaments of convenient size, very high temperatures must be employed for most metals and this introduces other difficulties. Filaments become weak mechanically at the higher temperatures and larger currents are required from the filament battery. Consequently the effort has been for years to develop a material which will emit electrons in sufficient quantity at relatively low temperatures, which at the same time will possess sufficient mechanical strength to enable it to withstand the treatment to which a vacuum tube is ordinarily subjected and which will maintain these two properties throughout a long life. Much improvement has been made along this line and tubes are now supplied with filaments requiring small currents, having sufficient strength and giving sufficient electron emission at temperatures but little higher than necessary to show a dull red glow. We are, however, still not satisfied that the ultimate has been attained and investigation will be continued until we have this satisfaction.

## UP-TO-THE-MINUTE BROADCAST LIST

A complete list of broadcasting stations in the United States and a list of those in Canada, Cuba, Mexico and Porto Rico, corrected to February 8, 1924, was published in RADIO WORLD for February 16, 1924.

Another list, corrected up to the minute, will appear in an early issue.

# A Non-Radiating One-Tube Reflex Receiver

By Byrt C. Caldwell

**A**T last something is being done towards the elimination of the howls and squeals that nightly spoil the radio concerts received in the more crowded districts.

The only certain way of combating this evil, is to eliminate the radiating sets. No matter how much the fans are educated to the proper use of their sets, there is always bound to be more or less interference if the sets are capable of radiating. And all regenerative sets radiate to some extent when they are adjusted to their most sensitive condition, whether it has been adjusted properly or not.

When we say "eliminate," we do not mean that the set should be gathered up in its entirety, and cast into the ash barrel. Practically all of the regenerative sets can be changed over into non-regenerative sets which are even more sensitive and efficient, or a "blocking tube," i.e., one stage of R.F. amplification, may be added.

This article has to do with the construction of a one-tube reflex, an extremely sensitive, selective, and non-radiating receiver, so that those who are contemplating the construction of a set at the present time, may do so, without referring to the old single-circuit regenerative hook-ups.

The set described here incorporates one stage of tuned radio-frequency amplification, detector, and one stage of audio amplification. The average loud speaker range is 50 miles, although some have reached as far as a thousand miles or more. Of course, these are extreme cases. If earphones are used, the average range is about 2,000 miles, and in many cases up to 3,000 miles.

The first things to make in this receiver are the radio frequency transformers. Two are required. They are made on radion tubing, 3" in diameter. The first one consists of a secondary of 55 turns wound on the tube, with a strip of wrapping paper wound on top of this, and the primary, consisting of 20 turns, wound on top of this. They are both wound in the same direction. The second one is made in the same way, but the primary consists of 30 turns. The secondary is the same as the secondary of the first transformer. No. 22 or 24 single or double silk insulated wire should be used. Mark the beginnings and the ends of the windings of these coils. The panel is 7" x 12". The coils are fastened to the end plates of the .0005 condensers at right angles to each other.

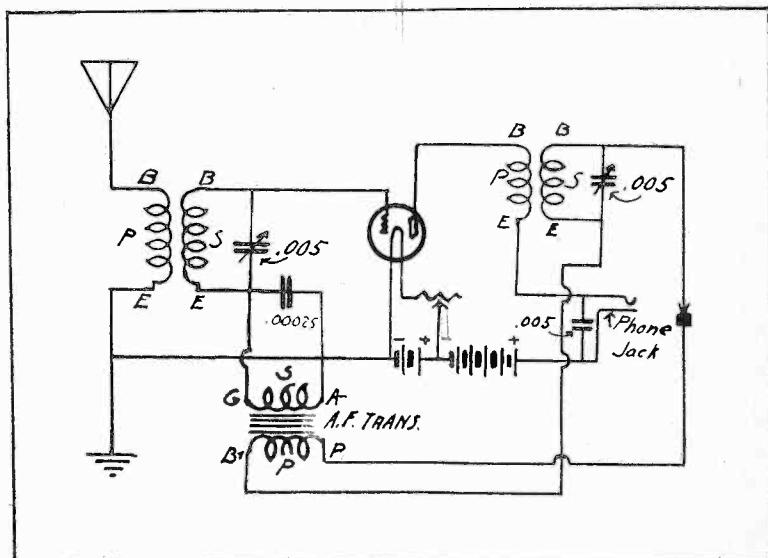
The audio transformer is fastened to the base in the center of the panel, and the tube is mounted on a strip of radion, which is fastened to the base over the transformer, with brass strips. The fixed crystal is connected to the P of the audio transformer, and one of .005 mfd. capacity across the phones. The binding posts are all mounted on a sub base on the rear of the panel, so as to eliminate connections to the front of the receiver.

When the instruments have all been assembled, take bus wire and soldering lugs and very carefully follow the hook-up diagram in connecting the parts. The arrangement of the parts is such that very short connections may be made. Do not try to alter them. At least No. 14 wire must be used, and the connections must be soldered, either to lugs placed under the bind-

ing posts, or directly to the binding posts. This latter method, however, is hard to do satisfactorily.

The tuning of this receiver is very simple. Tune carefully with the left-hand dial, and then use the right-hand dial to get maximum volume. It will be noticed that the dial settings are very nearly the same. The readings may be recorded, as the stations are always tuned in on the same settings. Tuning is very sharp, and there is no warning whistle, so a great deal of care should be used, always following the first dial with the second. No station will be picked up, if, for example, the first condenser is set at 10, and the second at 40 or 50.

If trouble is encountered, look over all the connections, and make sure that none of them have been loosened. Then look at the tube socket to make sure that the prongs make good contact. Make sure that



A one tube reflex set which is simple and inexpensive to construct and which gives good results if care is taken in the arrangement of the parts.

the crystal is sensitive. If the set is acting properly, and the crystal is good, the set should howl when the crystal is disconnected. If the trouble has not yet been found, make sure that the proper connections to the radio-frequency transformers are made. After this, the only places left for trouble are in the tube or the audio transformer. Try the tube out in another set, and test the transformer with a battery and a voltmeter, or your phones. If the phones are used, a loud click should be heard, as even if the windings are broken or burnt out, there will be a soft click.

The reflex is practically the only extremely sensitive one-tube non-regenerative set.

## The Japanese Schoolboy Defines Radio

Wallace Irwin, in his "More Letters of a Japanese Schoolboy," published by Putnams, thus describes a receiving set: "On Table before him sat one black suit case all covered with nickel plated science. It contained a window with electric blubs doing so inside. It contained silver pushers, pullers, arrows and Kodak supplies. It contained so many Wires that that I was sure it was connected with Edison somewhere. It had a Horn with its mouth wide open as if to speak. It had one of those Switchboards which enable Hon Telephone Operatress to get your number wrong 13 times out of 11. Taken altogether this was a Radio."

# The Super-Pliodyne Nine-Tube Receiver

(Concluded from page 3)

formers, so arranged that magnetic coupling between stages is impossible. These transformers are specially wound with litzendraught wire to keep the distributed capacity and resistance at its lowest point. Tuning is accomplished by means of a special bank of variable condensers coupled together and all turned at the same time. This is shown in the illustration. The radio-frequency control, which is plainly to be seen, as a worm gear controls this bank of condensers. This is connected with a dial on the front of the panel, and constitutes one of the two controls of the receiver. The remaining control is the antenna tuning, which is shown on the extreme right hand side of the set, back of the first air core transformer. The coil that is at right angles to the panel constitutes the antenna inductance.

In any tuned radio-frequency receiver, the tendency of the tube or tubes to oscillate has been the greatest bugaboo heretofore experienced. There are several means of stopping this, as outlined by various experimenters and engineers. Mr. Farrand, however, makes use of a new principle, which allows the use of any number of stages of radio-frequency desired. Between the grid and the plate of each tube there is connected a non-inductive high resistance, of the type now commonly used in both receiving and transmission circuits. This resistance changes the phase of the coupling current flowing between the grid (input) circuit and the plate (output) circuit, thus nullifying the greater amount of feedback caused by the capacity of the circuit and the tube, and absorbing what remains, as it is fed back.

The values of resistance are not found critical in the least. For ordinary use with six volt tubes, or tubes having the characteristics of the UV201A, a resistance of between 25,000 and 35,000 ohms has been found to be entirely satisfactory. For tubes using dry cells (UV199, etc.), however, a much higher value must be used. The value has been determined for these tubes as lying within the field of 100,000 ohms. For these tubes it is necessary to do a little experimenting to determine the best result. Values ten thousand ohms lower or higher may be tried as a test, and the best value used.

As noted in the illustration, special air core transformers are used in the radio-frequency circuit. A design that was found entirely satisfactory consisted of a secondary of 100 turns of 26 DSC wire wound on a two-inch tube, about three inches long. The primary in this case consists of 25 turns of the same wire, wound on another one and three-quarters inches in diameter and of the same length as the first. These are then slid into one another so as to produce tight coupling. The coils should be wound in opposite directions—one wound clockwise, the other wound counter clockwise, and all coils of one type (either primaries or secondaries) should be wound in the same direction.

The proper connections of the terminals of these coils is of importance, for the correct operation. The primary terminal, directly under the secondary terminal that goes to the grid, should go to the B battery, while the other connections follow as shown.

The secondaries of each of the coils are shunted by .00025 mfd variable condensers of high efficiency and low losses. These can be coupled together when set, so that they are all turned at the same time. This involves some hard work to determine the correct

arrangement of each condenser and is therefore the hardest part of the receiver adjustment.

Fig. 2 shows a diagram of a six-tube receiver, using four stages of "Pliodyne" radio-frequency, with detector and one stage of audio-frequency. This is depicted, as a nine-tube set would be somewhat confusing. However, the same system is used whether it is four stages or six or ten stages of radio-frequency that are to be used. Regeneration can be produced in the detector circuit by removing the condenser and resistance of the last radio-frequency tube, and placing the regulation filament-grid return on the movable arm of a potentiometer, shunted across the filament terminals of the receiver. This will give regeneration due to the tube oscillating.

It will be seen that there is a condenser connected in series with the plate-grid resistance. This is merely a blocking condenser and is used to prevent the passage of the high tension B current through the circuit, with consequent burning out of the filaments. It is not critical in value, and may range from .1 mfd down to .0001 mfd, as it simply serves as a blocking condenser which will effectually stop the passage of the B current, but will allow the high frequency currents fed back to pass through.

As to results, this receiver has shown remarkable possibilities. It is simple of control, extremely stable and sensitive and using as many as six stages of radio-frequency it is capable of extremely loud and long-distance reception on the loud talker on but a very short antenna. The receiver has been successfully operated on a single wire twelve feet long. A model of this receiver, embodying the circuit shown, was used in the recent transatlantic tests, alongside of a regulation super-heterodyne, and acquitted itself so creditably that the onlookers could not help but wonder as to its operation when it was fully perfected.

Mr. Farrand illustrated his talk by diagrams, showing how the principle that he used in this new receiver are arrived at, pointing out at the same time the various troubles experienced by other engineers who had attempted to make the present existing systems more sensitive by the addition of more tubes using radio-frequency amplification. Such things as tube capacity, interstage capacity coupling, and various technical problems were discussed and pointed out as stepping stones to the present receiver.

What the possibilities of this new receiver are it is hard to even imagine, as it is the only one outside of the super-heterodyne that is so simple in control, so capable of easily bringing in even the most distant stations on a loud speaker, and yet so entirely different in basic principle. However, it is a long step in the right direction toward simplification of control which is what is needed these days of multitudinous and varied controls on even the simplest receivers. This, coupled with the fact that it is a "howlless" and non-radiating receiver, should tend to make the circuit one that marks a distinct advance.

## Naval Radioman Officially Commended

Henry J. Reinhardt, radioman, third class, of Bridgeport, Conn., has been commended by the Navy Department, for a daring trip in an open boat during a storm, from the radio station at Kodiak, Alaska, to the village across two miles of open water, to obtain assistance for the steamship "Star," in distress at Malina Point. Reinhardt made his trip on the night of Dec. 9 last, when the steamer was being pounded to pieces and the loss of all those aboard seemed imminent.

# A Vacuum Tube Music Maker



(C. Bachrach)  
Hugo Gernsback, editor and inventor, who perfected the Staccatone, the new musical device making use of a radio tube circuit.

like note peculiar to itself and agreeably surprising.

In "Practical Electrics," Mr. Gernsback says: "The characteristic squeal rising in pitch from zero to a high note beyond the limit of audibility is familiar to us all. This range of frequencies runs much higher than can be obtained from any known musical instrument. If properly controlled we have a musical instrument that surpasses in tonal range any musical instrument. . . . With several vacuum tubes, harmonic chords can be developed."

This device makes use of the Hartley oscillator circuit. By means of correct capacities, inductances, and controlling keys, the full scale range can be obtained, and the instrument played through a loud speaker in the manner of a piano or an organ.

This Staccatone, as the device is called, is simple in arrangement and any experimenter can build and operate one. At the present time the inventor is installing a model in one of the moving picture theatres

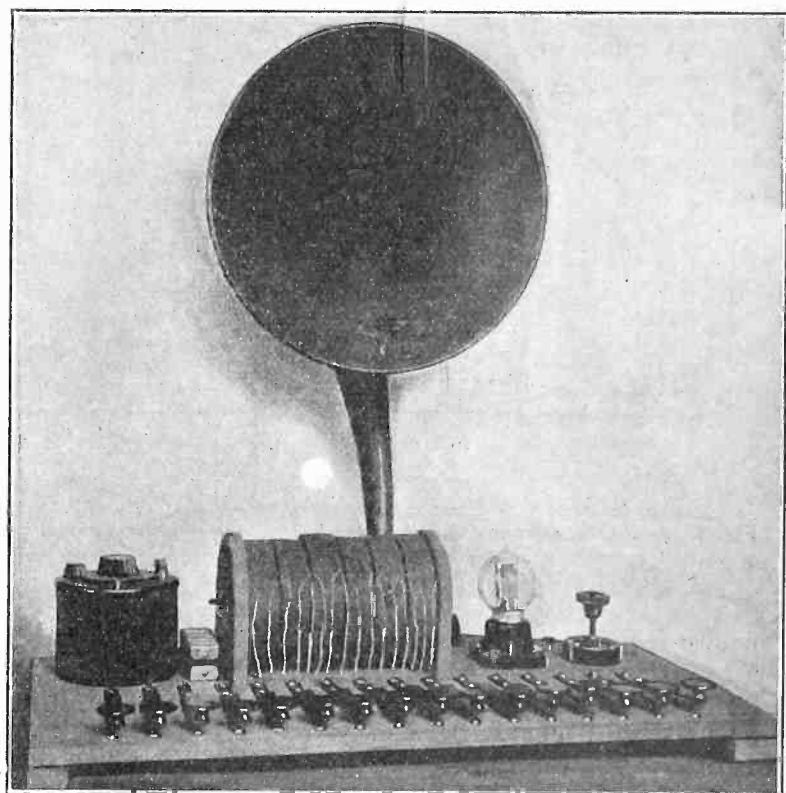
**E**VERYONE who has played with circuits calling for an oscillating vacuum tube has noted the bothersome howls and squeals produced by its improper manipulation. Mr. H. Gernsback, editor of "Radio News," "Science and Invention," and "Practical Electrics," is the originator of a circuit in which these once annoying noises can be made to produce music, much like an organ, but with a flute-

outside lead of one is connected with the inside lead of the other, and each coil placed in the same position as regards the direction in which the wire runs. The negative of the B battery is connected to the end of the first coil. The filament of the tube is connected in between the first and second coils, at the connecting juncture. Taps are then brought out and connected to the keys, as shown.

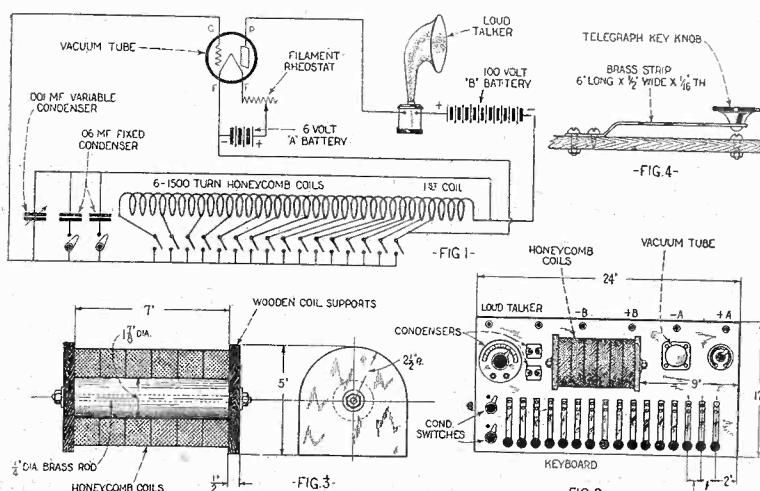
About twenty mica condensers of .006 mfd. each are required, with a 43-plate variable condenser of high efficiency. The variable condenser is included for tuning the instrument.

The fixed condensers are arranged in a double bank as shown. The extra capacitances will have to be experimented with when the tube is being tuned, as they vary with the tube used. The switches which form the keyboard are then connected at proper intervals so that one octave is covered, including all half notes. Cutting out the extra condensers increases the tonal frequency one octave.

Fig. 4 shows how the keys are made and arranged.



(C. Practical Electrics)  
Fig. 5. The completed Staccatone, as used by the inventor in his experiments.



Figs. 1, 2, 3, 4. Electrical circuit diagram used in the Staccatone, as well as various details of arrangement and construction.

with a view of demonstrating its usefulness in playing full orchestrations.

The circuit used is shown in Fig. 1. The inductances consist of six 1,500-turn honeycomb coils in series, clamped together as shown in Fig. 3. Care should be taken that their magnetic fields assist, rather than oppose. The coils can be connected properly if the

When everything is connected and the tube lighted, a loud howl which can be varied in pitch by varying the condenser should be produced. It is then necessary to tune the Staccatone. A piano is best for this purpose, or in a pinch a tuning fork. The lowest switch key (No. 1 in the diagram) is connected to the end of the last coil. Condensers are added until the desired note (G preferably) is produced. It will probably be necessary to vary the capacity of the variable condenser in order to get the exact tone frequency at this point. The next key is then tuned by tapping the next coil until G flat is obtained. In tapping this coil, do it near the end, rather than at the end turn. As there is no set method, it will simply have to be a matter of experiment. The remaining coils are tapped in the same manner so as to form the complete musical scale over one octave, from G to A flat. At this point, by manipulating the keys any musical selection can be played.

# Tips on How to Improve Your Radio Set

By C. White, Consulting Engineer

**N**EARLY every home-made or factory-made radio set can be improved in many ways. In the haste of assembling, the average radio fan neglects little details that materially affect successful operation. Soldering is one of the neglected points and many joints are just stuck together and although they have the appearance of a good contact, in reality are very poor electrically. Acid flux solder is to be avoided when possible because acid splashes and splatters over various parts of the radio set. The acid not only corrodes all metal it touches but also forms a good

could be doubled in many cases, and even tripled in a few, by the replacement of the proper size of grid leak. Any grid leak that is not properly sealed is of little value because all leaks are sensitive to weather conditions and, therefore, change in value. Take a strip of inked paper that is in no way protected from the surrounding air, measure the resistance every eight hours, and, nine times out of ten you will find that there is a marked variation each time, and seldom, if ever, will it measure the same any two consecutive times. If you have a paper style of combined grid leak and condenser take it off your set and throw it away. It will well pay to purchase a good type of grid leak and a good fixed mica condenser. The grid condenser has likewise been passed over with little attention. Still, it is equally as important as the detector tube itself. A poor or improper size grid condenser will cause muffled sounds and very unnatural tones. There has been much talk recently about variable grid leaks, but I am strongly in favor of a high grade fixed leak and a variable mica type of grid condenser. There are several firms placing variable mica grid condensers on the market and little trouble will be experienced in finding one in most any radio store. Use as high a value of grid leak resistance as possible

*Grid Condenser*

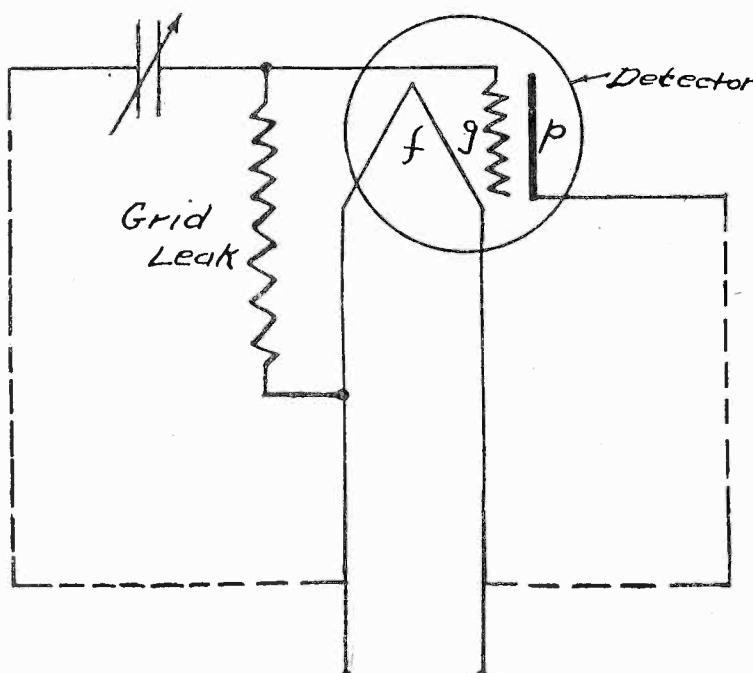


Fig. 1. A method of connecting the grid leak in the detector circuit which gives better results than the shunt method. This is especially true when a small variable condenser is used as the grid condenser.

radio frequency by-pass and often cuts down signal strength. Resin core solder is, therefore, looked upon as the better type of solder flux. But even this must be used with care. All excess resin should be cleaned from every joint with a rag dampened with wood alcohol. Most noise in radio sets comes from poor connections, either resulting from a poor contact surface or an excess of solder flux on the joint. A frying noise in the phones is generally the sign of an imperfect joint. Before soldering take a small file and clean every joint, then tin each surface with a little solder in preparation to the final joining of the surfaces. Some radio fans use standard bus bar wire which is tinned and assume that it is not necessary to clean all their joints. Of course, a connection can be made, but the dirt will still remain between the two surfaces and might set up small currents which will cause considerable noise in the phones since radio sets are sensitive to the most minute currents and voltages.

Another source of trouble in a radio set is the grid leak. It is regrettable that this important part of a radio receiver is literally jumped over, and it is said that anything of the general nature of a grid leak will do. In some of the earlier radio sets a little piece of paper with a few ink lines was called a grid leak. Such a thing worked—all that was required. In recent tests in my laboratory I have found that signal strength

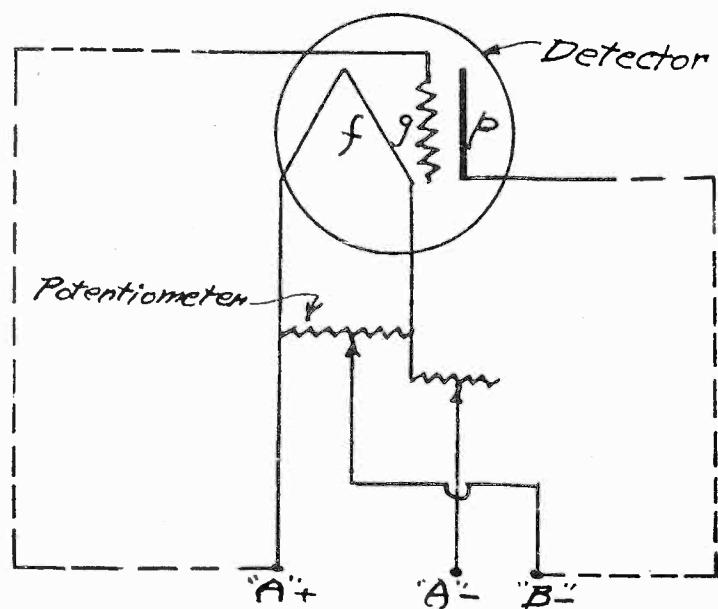


Fig. 2. Another method of improving the detector circuit, where hard tubes are used as detectors. It is possible to put this potentiometer on existing circuits thereby improving the reception and rendering the getting of distance signals much easier.

without causing distortion. A style of connections as illustrated in Figure 1 will render much superior results.

Another feature which will give much better control to any radio set is the potentiometer. Many radio fans are not at all familiar with the many uses this piece of apparatus can be put to. In Figure 2 is shown a connection of the potentiometer for the "B" battery voltage control. At present, however, this use of the potentiometer is growing obsolete owing to the fact that "hard" or high vacuum tubes are now commonly used as detectors. The original detector tubes were "soft" or gaseous in content and were exceedingly critical on their adjustment of "B" battery voltage as compared to the "hard" detector bulbs. If you are at present employing a "hard" tube this style of potentiometer connection will do you little good in the way

of refining the receiver control, but, if you still use a tube similar to the UV200 or C300 you will find the old "B" battery potentiometer capable of giving you a control which will enable you to pull in a few more distant stations. For a "hard" detector the grid potentiometer as shown in Figure 3 is ideal for control of oscillation and bringing in a few more stations. A general objection to this last method of use for the potentiometer is that it adds resistance to the grid circuit and thus causes greater losses. But, this is not quite the truth, because it adds stability to the circuit

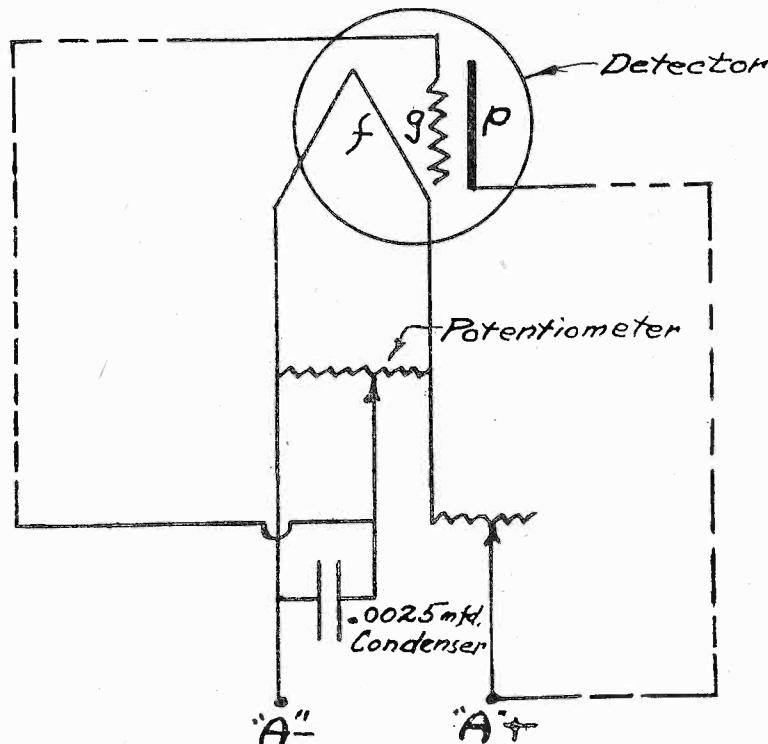


Fig. 3. Potentiometer connected in the filament leads of the detector tube which, by varying the grid potential in the filament-grid circuit, will help give much clearer and louder signals. This method is also applicable to stopping oscillation in the first radio-frequency tube of a receiver.

and prevents oscillation. If we could design and build a radio receiving circuit with no resistance, it would be impossible to stop such a circuit from oscillating, and very little control could be maintained. Sometimes it is of advantage to place a .00025 mfd. mica condenser between the negative leg to the filament and the sliding contact arm of the potentiometer. With some receivers that have a marked tendency to "spill over" very suddenly a potentiometer can be placed in series with the antennae lead wire. In this connection the potentiometer is connected in similar to an ordinary rheostat. The addition of resistance to the antennae circuit prevents sudden oscillation changes. Radio-frequency receivers that suffer along this line can be so cured by the use of a high variable resistance such as a potentiometer in the antennae lead.

Many of the two-step amplifiers in use are very

noisy. This is due to several things; poor transformers with too high ratios and poor electrical design, improperly soldered connections, and poor arrangement of apparatus. The first two cases can be generally altered by the judicious use of high grade fixed grid leaks. Then again, much noise can be removed, and at the same time "B" battery consumption lowered by the insertion of "C" batteries in the grid leads. An Eveready "3" battery can be used as a compact assembled "C" battery of variable voltage control. In Figure 4 is illustrated the assembly of an ordinary two-step amplifier for audio-frequencies using grid leaks for assuring quiet operation. The leaks D, E, F, and G should have the following respective values: .05 megohms, .2 megohms, 1.0 megohms, and, 4.0 megohms. These sizes are standard and can be readily procured. If a "C" battery is desired the same can be inserted for the first tube at the points marked XX, and, for the second tube at the points marked YY. In connecting in the "C" batteries be sure to see that the negative side of the battery is always towards the grid of the tube. The "C" batteries can be mounted directly in the circuit and not outside the cabinet. Mounting outside the cabinet necessitates long grid connections which are not considered good practice.

You can improve your set by shortening the grid wires wherever possible. The use of shielded "Belden

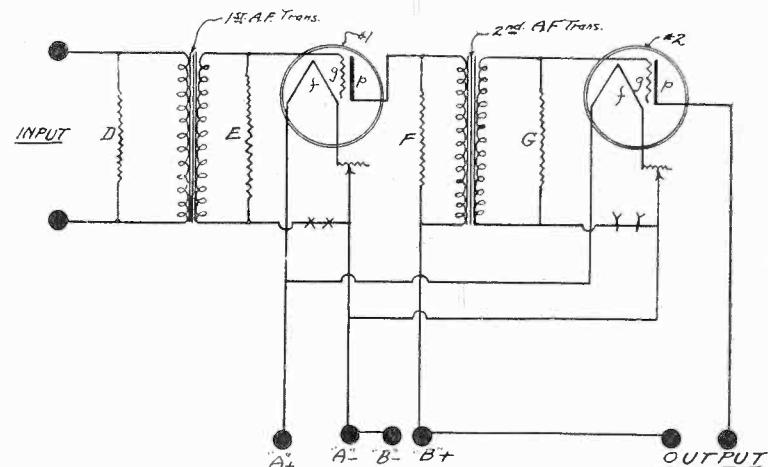


Fig. 4. A method of making an ordinary two-stage audio-frequency transformer quiet by the addition of grid leaks across both terminals of the transformers. This allows a by-pass for the interfering audio-frequencies of low period, taking out the rasp and crackles.

"Braid" wire for all grid potential connections is very good. This brand of wire is covered with copper braid outside which is connected to the ground terminal of the receiver. This wire is especially good for radio-frequency of reflex circuits, since, it maintains the leakage to ground at a constant value. In conclusion, by re-soldering bad joints, improving grid connections, and getting good grid leaks and condensers, your receiver can be improved at least 100% in its all around efficiency.

## The Radio Woman

WELL, here I am back again, after a little vacation in the land of the burning sun, all tanned up, feeling out of place in a fur coat and galoshes instead of a bathing suit and summer dresses. The south is a fine place—for sport, but is exceedingly poor for radio. Friend husband, who accompanied yours truly so that she would not get lost among the sand dunes of the sunny south, took along one of those portable receivers fixed up in a leather suitcase. It is simply a little dandy, and cannot be beat, but—try and

get anything except a lot of scratchy noises and an occasional word or two. Friend husband got pretty tired of standing around in white flannels evenings, listening to the ceaseless patter of a lot of "female phonographs," to use his expression, and used to wander off among the palms and the moonlight, and then after a while I would follow him and—Oh, it was just like fairyland, all silver and soft, with the deep rumble of the surf, or a wind-borne whisper of soft stringed music, and the laughter of the happy voices. But just the same, I am glad to be back among WJZ, WEAF and the rest, even if I do have to fight to keep the "big boy" in his place and outside of interference.

# The Most Popular Broadcast Entertainer Second Ballot Count

**S**INCE the ballot count in the contest for the most popular broadcast entertainer was published in RADIO WORLD for February 9, 1924, the votes have continued to come in to the Broadcast Manager. Several of the entertainers have crept up on the list. The second count of ballots below does not end the contest. Keep on sending your ballots in, as many as you wish and as often as you like. If you want your favorite to win out you must keep on voting for him or some other fellow will get the upper hand. Here is how they stand at the second count:

Roxy	WEAF	New York City.....	245
H. Snodgrass	WOS	Jefferson City, Mo....	212
Little Symp. Orch.	KDKA	East Pittsburgh, Pa....	191
Thornton Fisher	WEAF	New York City.....	187
Vincent Lopez	WJZ	New York City.....	163
Old Time Fiddlers	WOS	Jefferson City.....	143
Cafe Boulevard Orch.	WJZ	New York City.....	138
Wendall Hall	KYW	Chicago .....	131
Henry Field	WOAW	Omaha, Neb.....	129
Jerry Sullivan	WDAP	Chicago .....	128
Jack Nelson	WDAP	Chicago .....	123
McDowell Sisters	WFAA	Dallas, Tex.....	121

The Harmony Girls	WDAP	Chicago .....	120
Lucky Strike Orchestra	WEAF	New York City.....	117
The Nite Hawks Frolic	WDAF	Kansas City, Mo....	114
Howard Lannin's Orch.	WDAR	Philadelphia, Pa.....	113
Alabama Club Orchestra	WHN	New York City.....	105
Jack Chapman's Band	WDAP	Chicago .....	104
Eddie Smith	WGY	Schenectady .....	104
The Dance Orchestra	WDAM	Cleveland, O.....	103
Meyer Davis Orchestra	WWJ	Detroit, Mich.....	102
Bob Brown	WDAP	Chicago .....	100
Little Orchestra	WGY	Schenectady, N. Y....	92
The Hired Hand	WBAP	Fort Worth.....	90
Daddy Reimer	WLAG	Minneapolis, Minn....	86
Bob Miller	WMC	Memphis, Tenn.....	81
Ernie Rogers	WSB	Atlanta, Ga.....	79
Deseret Orchestra	KZN	Salt Lake, Utah.....	75
The Hawaiians	WFAA	Dallas, Tex.....	68
Coon Sanders Orchestra	WDAF	Kansas City.....	67
Mary Vogt	WOO	Philadelphia, Pa.....	50
The Prison Band	WOS	Jefferson City.....	50
The Hotel Astor Band	WEAF	New York.....	31
Dr. Cadman	WEAF	New York .....	28
A. E. Sonn	WOR	Newark, N. J.....	25
Eveready Battery Orch.	WEAF	New York.....	22
Uncle John	KHJ	Los Angeles, Cal.....	20
Happiness Boys	WEAF	New York.....	18

## Standard Frequency Transmissions

**T**HE Bureau of Standards is transmitting special signals of standard frequency about twice a month. The last previously announced schedule was published in RADIO WORLD for December 22, 1923. The next schedule is announced below. The signals can be heard and utilized in general east of the Mississippi River.

These special signals of standard frequency are of use to testing laboratories, transmitting station operators, and others in standardizing wave meters and adjusting transmitting and receiving apparatus. Their accuracy is better than three-tenths of one per cent. Information on how to use the signals is given in Bureau of Standards Letter Circular No. 92, which may be obtained, on application, from the Bureau of Standards, Washington, D. C.

All transmissions are by unmodulated continuous-wave telegraphy. A complete frequency transmission includes a "general call," a "standard frequency signal," and "announcements." The "general call" is given at the beginning of the eight-minute period and continues for about two minutes. This includes a statement of the frequency. The "standard frequency signal" is a series of very long dashes with the call letters WWV intervening. This signal continues for about four min-

utes. The "announcements" are on the same frequency as the "standard frequency signal" just transmitted, and contain a statement of the measured frequency. An announcement of the next frequency to be transmitted is then given. There is then a four-minute interval while the transmitting set is adjusted for the next frequency. The schedule of standard frequency signals is as follows:

### Schedule of Frequencies in Kilocycles

(Approximate wave lengths in parentheses)

Eastern Standard Time	March 20	April 4	April 21
11:00 to 11:08 P.M.	1300 (231)	166.5 (1800)	500 (600)
11:12 to 11:20 P.M.	1400 (214)	205 (1463)	600 (500)
11:24 to 11:32 P.M.	1500 (200)	260 (1153)	700 (428)
11:36 to 11:44 P.M.	1600 (187)	315 (952)	833 (360)
11:48 to 11:56 P.M.	1700 (176)	375 (800)	900 (333)
12:00 to 12:08 A.M.	1800 (167)	425 (705)	1000 (300)
12:12 to 12:20 A.M.	1900 (158)	500 (600)	1200 (250)
12:24 to 12:32 A.M.	2000 (150)	570 (526)	1400 (214)

This week's prize for elongated titles goes to the new relay studio of Station WBZ, just opened at Boston. Its official name is: "Boston Herald-Traveller-Westinghouse-Hotel Brunswick Studio."

\* \* \*

"Jolly Bill" Steinke, whose radio cartoon lessons have proved one of the popular features at Station WOR, Newark, N. J., continues to broadcast from that station on Monday evenings, accompanied by his hound, "Radio Chief." Bill's talks have uncovered an unusual amount of talent for drawing which has been latent in the radio audience. A feature of the motion picture, "Behind the Scenes at WOR," which was shown recently throughout the country, was a close-up of "Jolly Bill." The film was flashed upon the screen in a little Pennsylvania town where the radio artist's mother lives and it was all so unexpected that the dear old lady, in great surprise, called out loudly, "Goodness sakes! There's my Willie!" Nothing would do Bill's mother but she must remain in the theatre until the film was again shown and now arrangements are being made to supply her a print of the film showing "My Willie."

## Radiograms

The sound of human heart beats, broadcast by Station KSD, was heard in Marshall, Tex., 500 miles from St. Louis, Mo.

\* \* \*

The Duc de Broglie, a wireless expert and inventor of note has been elected a member of the French Academy of Sciences.

\* \* \*

Jack Binns, who has been in charge of the radio department of "The New York Tribune" for several years, has severed his connection with that paper.

\* \* \*

William G. McAdoo's plans to capture the Democratic Presidential nomination include the expenditure of \$30,000 in the construction of a broadcasting plant at his home in Los Angeles, Calif. Mr. McAdoo announced last week that he would make use of the radiophones broadcasting station instead of undertaking extensive speaking tours, if a permit requested of the Department of Commerce was granted.

# The Radio University

A Question and Answer Department conducted by the Technical Staff of RADIO WORLD for the information and instruction of its subscribers. A "trouble shooter" is always ready here to help new radio fans.

## INQUIRIES CANNOT BE ANSWERED OVER THE TELEPHONE.

RADIO WORLD cannot undertake to answer technical questions over the telephone.

Please communicate with the Radio University Department by mail, and your inquiry will be answered at as early a date as possible.

*What is the meaning of "dyne" as applied to radio terms? What type of circuit is employed in the Miraco receivers? What type of circuit is employed in the Atwater Kent sets? Please give me the names of two or three books which will give me the fundamentals of radio.—E. A. Dehoff, The Electric Theatre, Metaline Falls, Washington.*

This term is an appendix meaning power. The Miraco circuit is an adaptation of the Armstrong regenerative. The Atwater Kent apparatus is capable of several different circuits, namely the straight regenerative, combined radio frequency and regeneration, and an application of the neutrodyne circuits. The circuit used depends entirely upon the desires of the man building the receiver. Suggest the three following books: "ICS Handbook," "Radio-Frequency Amplification," by Harkness; a third, which is more for the circuits and their explanation, is Henley's "222 Circuits." It is also advisable to look through several of our back issues, and note the book reviews on radio literature. There have been several of these published within the last two months.

*I have a Neutrodyne, using all Fada parts. When I tune in a distant station there is always a very decided sharp snapping and cracking which spoils the reception of the programs. I am sure my set is O. K. Could the length of the antenna have this effect? Could I use a loop with this receiver?—O. F. Bartold, 45 Andrew Street, Rochester, New York.*

The snapping and cracking you note is present on all neutrodyne or other supersensitive sets. Figure that your set is so powerful that it will pick up all the minute current necessary to make audible a concert from a station over 1,500 miles away, and then figure the nearer causes, such as power lines and other current sources, and you will see the reason. The trouble does not lie with the set, but with the supersensitive circuit used. You may use a loop by attaching one side to the antenna and the other end to the ground.

*Will you please give me the make of rheostats that were used or are supposed to be used in the Superdyne receiver described in RADIO WORLD for Dec. 15, 22, 29, 1924? I have the panel drilled according to the diagram but am unable to find the type of rheostat that will fit the holes. I would also like to know if the double-pole, double-throw switch of the push-pull type is being made and where it can be obtained?—Ernest V. Olander, 1332 Milton Street, S. E., Grand Rapids, Mich.*

We cannot state through these columns the names of apparatus being sold in the competitive market. However, the rheostats used are widely advertised, and are of the precision or all vernier type. The switch you mention is also made and can be obtained in any radio store.

*Can UV201A tubes be used for radio frequency in the Ultradyne? Is ten turns sufficient for the primary of the antenna coil? What size wire is used? Are there no fixed condensers used?—Edw. H. Bitner, 1510 Catherine Street, Harrisburg, Pa.*

You may use these tubes. Yes. All details were given in a supplement published in RADIO WORLD for February 16, 1924. No.

*I am using two variocouplers with ten taps each, a 21-plate condenser, two UV201A tubes, one UV200 for a detector, and amplifying transformers, but cannot seem to get long distance or much volume. What can my trouble be?—J. Waiss, 150 Curtiss Street, Naugatuck, Conn.*

As you do not give us a circuit diagram of the set we cannot diagnose your trouble. Send in a hook-up and we will try to find your trouble.

*I have a Superdyne receiver partly completed as specified in your plans in RADIO WORLD for December 15, 22, 29. I am told that push-pull audio frequency transformers are the ones that give the least distortion with this circuit. Is it possible to use them?—D. G. Spinder, 1124 Milton Avenue, Swissvale, Pa.*

You could use this type of amplification, although with the four-tube set as specified you get more than enough volume to fill a large hall on a good loud talker. However, to make this a five-tube set, use just one stage of straight audio frequency, and then the stage of push-pull amplification.

*The articles on the Superdyne were read and accepted in good faith. Recently and since the*

*publication of them there has been published another series of articles in another paper stating that a variometer in place of the tapped coil gives much better results and sharper tuning. Is this so? Would it be advisable to change my Tuska set by the addition of a variometer?—C. G. Whitehead, 7559 Amboy Road, Tottenville, Staten Island, N. Y.*

Replacing the tuned coil with a variometer will not make any difference at all in either the battery consumption, the operation or the volume of the receiver, and as a matter of fact the set described in the article you mention is no more efficient than that described by RADIO WORLD. Stick to the original unless there is some good cause forwarded for a radical change of this sort. You must realize that there are freak sets that work, whereas if you tried the same thing, no difference or much lessened efficiency would show itself. Stick to the original data.

*I hear a continuous hum in my head phones which sometimes sounds like water dripping into a hollow dishpan. What is the cause of this?—Henry Westermeyer, Cleveland, Wis.*

You are using either a grid condenser which is too small or else your grid leak is the wrong capacity. Change them around until this stops.

*I have a triple honeycomb receiver with two stages of audio frequency and desire to add radio frequency if it is advisable. Can such an arrangement be made? Will such an arrangement cut out static?—Max H. Hopf, Box 21, Harper, Texas.*

The arrangement you suggest is possible, but you will find that it will be almost impossible to tune, as it is extremely unstable and the tuning really requires several times the patience that an ordinary set does. Do not attempt it. Suggest that if you desire distance reception that you use straight radio frequency with a non-regenerative detector and one or two stages of audio frequency. Such a circuit was published in RADIO WORLD for October 6, on the Answers to Readers' page. A loop is shown, as such a receiver does not require an outside antenna for distance reception. The loop will reduce static interference.

*Is the Autoplex receiver a satisfactory receiver for distance stations? Can it be used with two stages of audio frequency amplification? Is it selective enough to give satisfaction?—Ernest L. Brudos, Lake City, South Dakota.*

This receiver is of the super variety and is good for DX, if you do not happen to have any neighbors owning receivers within the immediate vicinity. Otherwise you will create a lot of noisy squeals and howls that will annoy them. It may be used with audio frequency amplification. It is selective when operated correctly.

*In reference to the Superdyne published in RADIO WORLD for December 15, 22, 29, I note that there is no grid leak called for. I have constructed the receiver and it gives but poor results on all four tubes. What do you suggest as my trouble?—H. J. Fisher, The Kenney Hotel, Pittsfield, Mass.*

This receiver is a very critical circuit. If you followed the directions, however, and are using the best of apparatus, you should get good results. One thing of importance is the relation of the reversed feedback coil to the secondary. It should be located at least  $1\frac{1}{2}$ " above the top turn of the secondary coil. Another point of importance is the arrangement of the plate coil. Place it at right angles to the secondary. This will stand it up, with the tube horizontal, and the windings

vertical. If you do not have success rewire it, and use short leads. Follow all the directions explicitly. The grid leak should be placed from the grid side of the second tube to the filament—not shunting the grid condenser.

*Referring to the Superdyne receiver described in RADIO WORLD for December 15, 22, 29, are coils L1 and L both wound on the stator of the coupler? Is the plate impedance coil wound on a separate former? In the list of parts needed you mention a DPDT anti-capacity switch. Where does the switch go? It is not in the circuit. On the panel layout you show a place for one switch lever, while in the hookup there is shown a switch lever for the coils L1 and L2. How come? Will the set work properly if I use UV199 tubes throughout? Can I use the C299 tubes? What ratio? All American transformers are best suited for this set? Where can I obtain one of these anti-capacity switches? Is colloidion all right to coat the coils in the set? How long should the formica tubing be for the coupler and coils? What size and kind of antenna should be used for best results? Where can I obtain a copy of the issue of the 29th, as I misplaced my own copy?—Charles Guesnel, 2830 Broadway, Los Angeles, Calif.*

The coils L and L1 are wound on the same former. L is the four turn primary and is wound directly over the secondary as told in the article. If you will look at illustrations 2 and 3 on page 4 of the December 22nd issue you will plainly see that the plate coil is wound separately, and placed back of the second condenser. If you will look at illustration 1, page 3 of December 29th issue, you will see that the DPDT anti-capacity switch is placed under the tickler and between the two condensers. It was shown as two separate switches in the diagram so as not to confuse the readers. Do not say it is not shown in the circuit, it was mentioned, and the tap off points shown—this should signify that it was in. You may use the UV199 or C299 tubes (they are identical) throughout with good success. Suggest that you use a 5-1 in the first stage and a 3-1 in the second. These switches may be obtained from any of the advertisers in RADIO WORLD. Look through the advertising columns occasionally. No binding material at all should be used. The article definitely stated this. Two pieces of tubing, one  $3\frac{1}{2}$  inches long and one  $2\frac{1}{2}$  inches long will do for both coils. A single wire 60-75 feet long will do very nicely. Write to RADIO WORLD, Subscription Department, enclosing 15c and a request that this number be sent to you. Your questions show that you did not digest the article thoroughly. Your solution lies in reading the article and looking at the illustrations until you understand it. Everything is as plain as it possibly can be, and so simple that a child should be able to read it and make the set—if he read it carefully.

*I have a three tube regenerative set, and get wonderful results out of it, being able to tune in stations on either coast and to hold them as long as I wish. My trouble is that when using dry cells, on the three UV199 tubes I can only get about 40 hours use out of them. I use three dry cells hooked in series. About how long should they last with average use?—George Schmoll, Hartley, Ia.*

You are putting an excessive drain on the cells, and that is why you do not get the proper use of them. You should use three dry cells for each tube you have. Therefore, hook nine dry cells up, three banks of three in series, and the three banks in parallel. With this connection you should be able to get about two months or more use out of the cells. Figuring about 4 hours daily use, you should get about two and one half months use, provided that the dry cells are all fresh when inserted, and that they are not abused in any manner.

*What would be the probable cause of a reflex set going "bad" after being in use about three months? I get signals but they come through much weaker than originally. I built the receiver myself from Acme parts, and it works but with about one-quarter the volume and distance that I used to get.—Nathan Bloomfelt, 120 Grand Street, New York City.*

Reflex sets have the peculiarity of deteriorating after being in use for some time. The apparent cause of this deterioration is not known, but it is suspected that the tubes, doing double duty as they most necessarily have to, lose the sensitivity due to the extra load. Also there is the possibility of the transformers going dead because of the voltage passed through the windings. They do not burn out, but adjacent turns and layers short circuit due to high current surges, and thus become inefficient. Replace the tubes, and if that does not work, replace the audio or radio frequency transformer that shows a burnt-out winding.

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While every possible care is taken to state correctly matters of fact and opinion in technical and general writings covering the radio field, and every line printed is gone over with a scrupulous regard for the facts, the publisher disclaims any responsibility for statements regarding questions of patents, priority of claims, the proper working out of technical problems, or other matters that may be printed in good faith and on information furnished by those supposed to be trustworthy. This statement is made in good faith and to save time and controversy in matters over which the publisher cannot possibly have control.

MARCH 8, 1924

## "Radio Rights" are Valuable

TWO facts significant of the rapid manner in which radio is entering into the regular affairs of men recently have been noted. One is the appearance at the beginning of newspaper despatches of something like this: "By radio via the Fort Worth 'Star-Telegram'—By the Associated Press." The news item in this instance happened to be from Mexico City. It was distributed to the members of the Associated Press by that organization—and had its origin in a wireless message. The other instance is quite different and has to do with the law of contracts. It seems that the National Security League is offering a series of money awards for articles relating to the Constitution of the United States. The league announces in its statement that it will retain "full publication, radio and motion picture rights" to the prize winning articles. "Radio rights" means, of course, the authority to broadcast the articles which the league evidently considers to be of value.

## Radio Business Statistics

ALL sorts of interesting figures and statistics about radio are constantly developed. For instance, Babson, the economic authority, estimates that \$300,000,000 worth of radio business will be done during 1924. A well-known manufacturer of insulating material expects to sell \$4,000,000 worth of panels, knobs and dials this year. One customer already has bought \$300,000 worth. It is the generally accepted opinion that about 80 per cent of the sales of radio dealers is radio parts and 20 per cent complete sets. One New York dealer says he sells several hundred amplifying transformers of a well known brand each week and another, who operates half a dozen stores, sells 1,200 every week. The largest manufacturer of complete sets has a factory capacity of 5,000 sets per day and recently has reduced prices on his entire line in view of factory economies due to large production. Radio progress is measured in minutes.

## What's In the Vacuum

THE precision and exactitude demanded of the research worker were well exemplified in the article published in last week's **RADIO WORLD** by Dr. W. R. Whitney, director of the General Electric Company's Research Laboratory, where he told some interesting things about the vacuum. He said that everybody pretends to know that "Nature abhors a vacuum" and then stated that probably no one in the world had ever produced a vacuum with less molecules of gas in a cubic inch of it than there are people in the world. We'll bet some folks were surprised.

## The Young "Radio Doctor"

THE "radio doctor" may be only a sixteen-year-old boy, but many of his kind are building up neat little businesses all over the country, not only in installing commercial sets bought by the layman, but in fixing up sets that have developed kinks due to batteries that have "gone dead," faulty connections and the like. Radio ability is not measured by age. Youth serves here as never before.

## Radio Keeps 'Em Home

RADIO recently has come in for much praise as an important factor in restoring the family circle, having demonstrated its power of keeping men, boys and even flappers home o' nights.

## What Set Shall I Buy?

ONE of the questions most frequently asked of **RADIO WORLD**, often several times a day, may be exemplified as follows: "Which of the following radio sets is the best and why? The Queriod, assembled in a radio store by a licensed mechanic, or the Minodyne four-tube set, or the Mentwell four-tube set? We do not know which of them to buy and will appreciate your advice."

Such inquiries are, on their face, as a little thought will demonstrate, impossible to answer with any degree of accuracy. There are cases where a \$20 single-tube set will give as much pleasure and satisfaction to the owner as more elaborate equipment costing \$200 will afford. There are other people who would not feel satisfied with anything less than a period console set costing \$1,000. "Chacun de son gout," as the French have it.

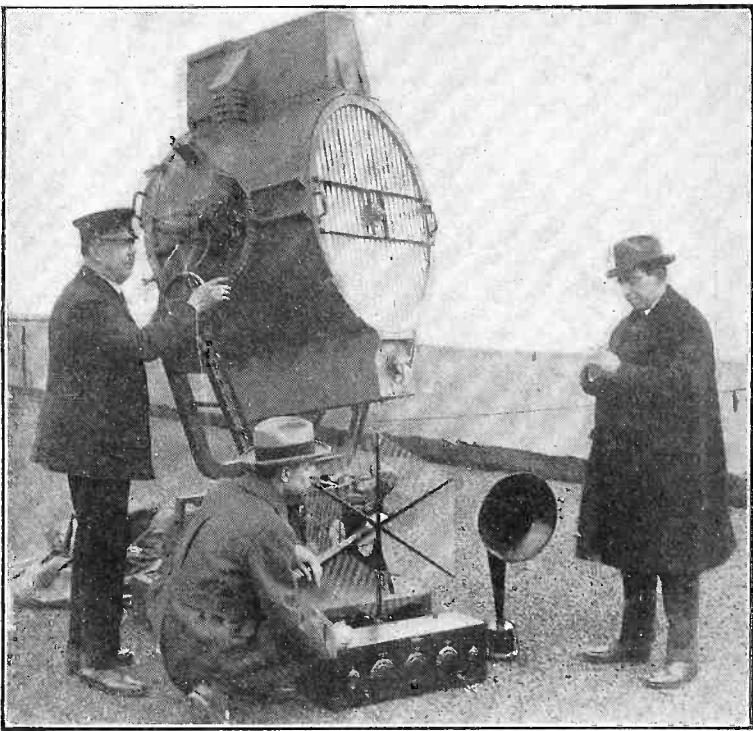
We are always glad to answer intelligent questions and to do our part in spreading the propaganda of radio. But no inquiry lacking essential details is possible of satisfactory reply by us or by any one.

In the first place, it is important to know what amount of money the would-be purchaser can afford to spend for a set. Is the set to be operated with an outdoor antenna or with an indoor loop? Is the location near an electric central station, alongside a trolley line, in an apartment building, in the country, adjacent to a broadcasting station? Will the user be satisfied with programs from local broadcasting stations or must the country from coast to coast and Canada to Cuba be combed every night? Must the set be portable? Shall it use dry batteries or storage batteries? If the latter, are recharging facilities available?

Fortunately, there is a radio set to be had suitable for any service—no one who has the price need be without radio. The advertising pages of **RADIO WORLD** give particulars of a great many kinds of sets. We shall be pleased at any time to supplement this information with further details if our correspondents will give us sufficient facts on which to base an intelligent answer to their questions.

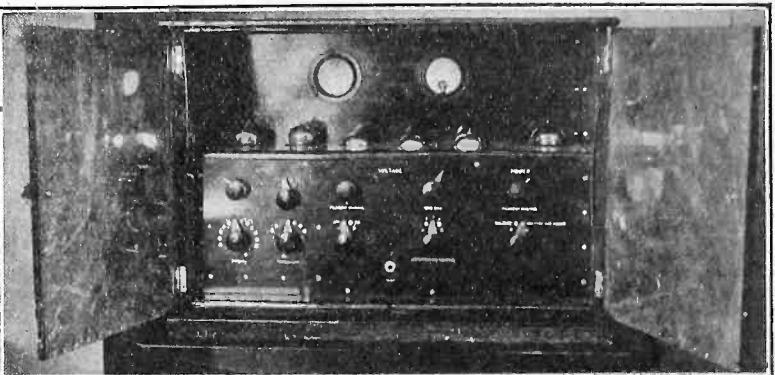
THE aspirant for political office who wishes to impress himself and his views on the radio public served by Station WEAF will have to call upon his campaign manager for \$100 for every ten minutes he uses their "mike"—provided he can manage to get a place on the program. We will next be hearing of the high cost of broadcasting.

# Radio News as the Camera Sees It



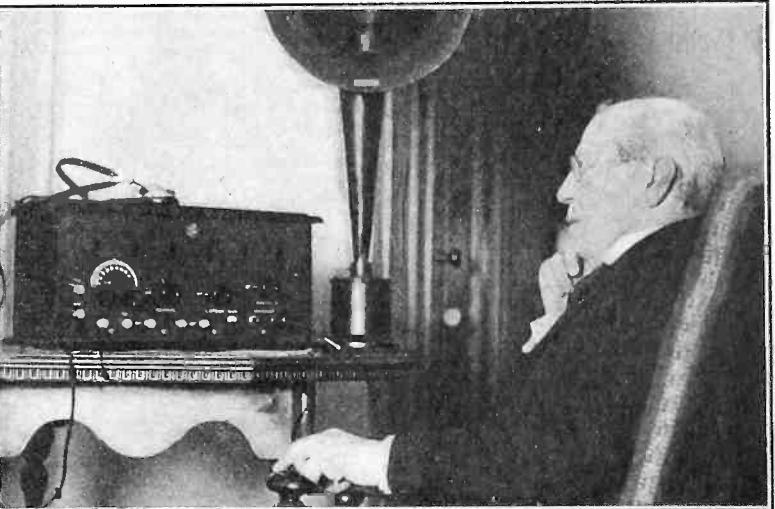
(C. Kadel and Herbert)

Radio was called to aid in recent tests of the new powerful Sperry searchlight, capable of throwing a beam over nine miles. Instructions for the pointing of the light were broadcast and received on the set shown, while the pointer followed directions, thus allowing those at a distance to observe the action of this powerful new light.



(C. La Presse)

The new Marconi amplifiers used by Station CKAC, of "La Presse," Montreal, Canada. This is part of the new installation placed in operation at the Mount Royal Hotel, making the station one of the most up-to-date Canadian broadcasters.



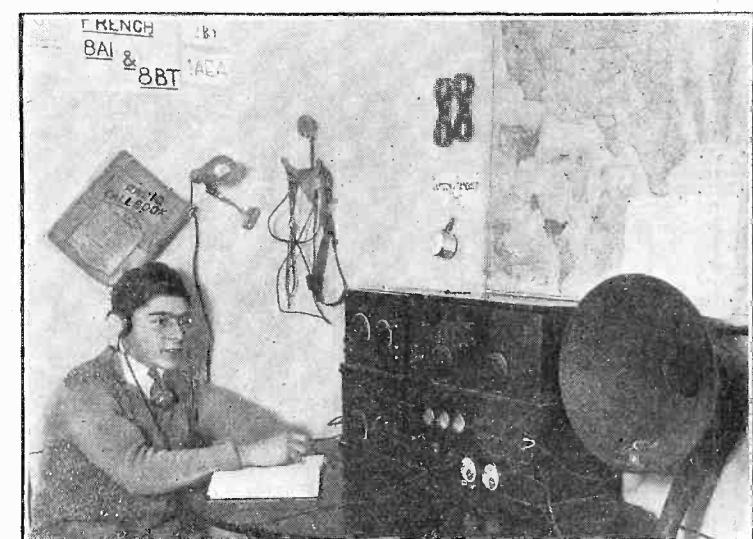
(C. Foto Topics)

Samuel Gompers, the well known labor leader, listening via radio to the first performance over the air of Paul Whiteman, while resting a few moments in his room at the Hotel Alamac, New York City. The set operating on a portable loop, Mr. Gompers finds no trouble in taking it with him on his travels.



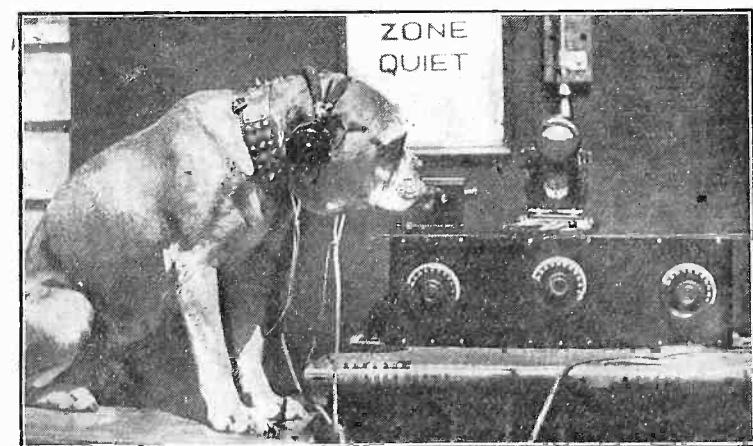
(C. International Newsreel)

Capt. Basil Davis, well known Londoner, who is the first business man to definitely link the various branches of his business up by means of a radio receiver and transmitter. Each branch has an equipment identical to the one pictured herewith and is capable of talking direct with the home office with no delay and very little trouble. Capt. Davis is shown operating the transmitter.



(C. Foto Topics)

David Tyneberg, 17-year-old New York radio enthusiast, is one of the few New York City hams who has heard French amateur stations. French 8AI and 8BT were copied the same evening while they were attempting to establish communication with other American amateurs. Two receivers are used by Tyneberg, a three coil honeycomb, and a regulation three-circuit regenerative with two stages of audio.



(C. Kadel and Herbert)

Prize bull dog owned by Edgar C. Cause, of Kennett Square, Pa., is not only a prize winner, but a good radio watch dog. When the set needs watching, master puts the phones on the pup's head, and woe betide the foolhardy adventurer attempting to disturb the set, no matter what the program happens to be, vocal, instrumental or just plain talk.

# Here Are Good Broadcast Programs

## Station WEAF, New York City

**492 Meters (610 Kcys.) E. S. T. March 7-11-12** A. M.—Talks by Country Life and Musical America. Consolidated market and weather reports by the U. S. and N. Y. State Departments of Agriculture and American Agriculturist. 4:50 P. M. Mabel Wright, soprano, and Adele Giordano, contralto; Elias Levy Cohen, violinist; Edna Berman-Tower, pianist. 7:30-10:30 P. M.—United Cigar Stores Daily Sport Talk by Thornton Fisher; Estelle Ashton Sparks, dramatic soprano, and Peter Bogart Sparks, pianist; Battery Instruction Talk by George C. Furness, head of Radio Division of the National Carbon Company; "The Happiness Boys"—Billy Jones and Ernest Hare; Talk by the Joint Coffee Trades Publicity Committee; B. Fischer and Company's "Astor Coffee" Dance Orchestra; Stellar Male Quartette.

**March 8-4:50 P. M.** St. George Brooklyn Orchestra; C. Ethel Altenbrand, mezzo-soprano; Joseph Kayser, baritone, accompanied by Frank Neff. 7:30-11 P. M.—Evan Davies, impersonator; Mme. Suzanne Gallien, French mezzo-contralto, accompanied by Yvette Bruyere; "The Chiclet Quartette" assisted by "The Chiclet Trio" of the American Chiclet Company; Talk by Sophie Irene Loeb; Anna Daly, violinist, accompanied by Anita Fontaine, with Genevieve McKenna, dramatic soprano; Lawrence Ballou, baritone; Carl Theodore Saul, pianist-composer.

## Station KFAE, Pullman, Wash.

**320 Meters (910 Kcys.) P. T. March 7**—"Cost of Careless Spraying," Dr. A. L. Melander, Dept. of Zoology. "Ductless Glands; Their Relation to the Human Body," Clairmont Sickerman. Vocal solos, Gladie M. Burnett. Violin solos, Wm. Just. Piano solos, Florence Carpenter. "Shelter for Swine," C. M. Hubbard, Extension Livestock Specialist. "Talk on New Books," Alice Lindsay Webb, News Editor.

**March 10**—"Analysis of Commercial Mixed Feeds," Dr. J. L. St. John, Station and State Chemist. "Hardening and Tempering Tools," Prof. H. Henton, School of Mines. Vocal numbers, High School Women's Sextette. Piano solos, Bernice Metz. "Better Dairying in Snohomish County and Its Effect on the State," R. M. Turner, Assistant Extension Director.

**March 12**—"Purchased Sires," Prof. R. T. Smith, Dept. of Animal Husbandry. "Sense and Nonsense About Vitamines," Prof. Vivian Garrett, College of Home Economics. Mandolin and guitar duets, Dorothy Gilbert and Rex Turner. Soprano solos, Muriel Holloway. "Alfalfa Growing," Prof. Leonard Hegnauer, Extension Soils Specialist. "Heart Disease," Dr. D. T. Ford. Cello solos, Vincent Hiden.

## Station CKAC, Montreal, P. Q., Can.

**425 Meters (710 Kcys.) E. S. T. March 7-11:45 P. M.** Rex Battle and his Mount Royal Hotel Concert Orchestra. 4 P. M.—Weather, news, stock reports. 4:30 P. M.—Dance program by Jos. C. Smith and his Mount Royal Hotel Orchestra.

**March 8-7 P. M.**—Kiddies' stories in French and English. 7:30 P. M.—Concert by Mount Royal Hotel Classic Orchestra. 8:30 P. M.—Special. 10:30 P. M.—Dance program from Mount Royal Hotel under Jos. C. Smith's direction.

**March 9-4:30 P. M.**—Sacred concert. Organ, violin, vocal quartet.

**March 10-1:45 P. M.**—Mount Royal Hotel Concert Orchestra. 4 P. M.—Weather, stock, news. 4:30 P. M.—Mount Royal Hotel Dance Orchestra.

**March 11-4 P. M.**—Weather, news, stock, Music. 7 P. M.—Kiddies' stories in French and English. 7:30 P. M.—Rex Battle Concert Orchestra from the Mount Royal Hotel. 8:30 P. M.—Dantes Belleau and his artists. 10:30 P. M.—Dance program by Jos. C. Smith and his Mount Royal Hotel Dance Orchestra.

## Station WGY, Schenectady, N. Y.

**380 Meters (790 Kcys.) E. S. T. March 7-11:55 A. M.**—Time signals. 12:30 P. M.—Stock market reports. 12:40 P. M.—Produce market reports. 12:45 P. M.—Weather forecast. 2 P. M.—Music and fashion talk, "Milady's Spring Footwear," Hall A. Brown. 6 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.—Drama, "If I Were King," by Justin Huntley McCarthy, presented by WGY Players. 10:30 P. M.—Special program of music and addresses.

**March 8-11:55 A. M.-U. S. Naval Observatory time signals.** 12:30 P. M.—Stock market report. 12:40 P. M.—Produce market report. 9:30 P. M.—Dance music by Romano's Orchestra, New Kenmore Hotel, Albany, N. Y.

## Station WBAP, Fort Worth, Texas

**476 Meters (620 Kcys.) C. S. T. March 7-7:30 P. M.**—Concert by the Texas Christian University, under the direction of Prof. H. D. Guileck. (E. L. O. announcing.) 9:30-10:45 P. M.—Concert by the Blue Devil Band of the Howard Payne College, Brownwood, Texas. (The Hired Hand announcing.)

**March 8-7:30 P. M.**—Review of the inter-denominational Sunday school lesson and radio Bible class by Mrs. W. F. Barnum.

## Station WJZ, New York City

**455 Meters (660 Kcys.) E. S. T. March 7-12:10 A. M.**—Hour of Music from Brick Presbyterian Church. 1 P. M.—Hotel Ambassador Trio, direct from Green Room of the Ambassador Hotel. 2 P. M.—New York Board of Education program. 3 P. M.—Organ recital by Leo Riggs on the Hotel Astor organ. 4 P. M.—Women's Wear. 4:05 P. M.—Georgia Melodians of the Cinderella Orchestra. 4:45 P. M.—"The Larger Aspect of World Affairs" by the International Interpreter. 5 P. M. John Page, tenor. 5:15 P. M.—"Systematic Psychology" by Dean James E. Lough, a New York University Radio Extension Course Lecture. 5:45 P. M.—Closing reports of the New York State Department of Farms and Markets; Farm and Home reports; closing quotations of the New York Stock Exchange; foreign exchange quotations; "The Conditions of the Leading Industries" by the Magazine of Wall Street Evening Post News. 7:05 P. M.—Memphis Five of the Rosemont Orchestra. 7:30 P. M.—Guy Hunter, blind entertainer. 7:45 P. M.—Looseleaf Current Topics. 8 P. M.—Guy Hunter, blind entertainer. 8:15 P. M.—Anne Lewis Pierce of the New York Tribune, "Lenten Fare." 10:30 P. M.—Dance program by Paul Specht's Alamac Hotel Orchestra, direct from the Congo Room of the Alamac Hotel.

**March 8-2:15 P. M.**—National Democratic Club Saturday discussion; address by Honorable Augustus Thomas, executive chairman, Producing Managers Association. 3 P. M.—Recital by Georgia Newman, pianist. 3:30 P. M.—Joint recital by E. McKnight, soprano, and M. Agnes Grogan, contralto. 4 P. M.—Tea concert by the Hotel Belmont Stringed Ensemble, Harry Lerner, leader; from the Hotel Belmont. 5 P. M.—Renato M. Coldora, baritone. 5:30 P. M.—Closing reports of the New York State Department of Farms and Markets; Farm and Home reports; closing quotations of the New York Stock Exchange; foreign exchange quotations; Bradstreet's financial report; Evening Post News. 7:30 P. M.—Margaret Frieda, soprano.

## Station WBZ, Springfield, Mass.

**337 Meters (890 Kcys.) E. S. T. March 7-11:55 A. M.**—Arlington time signals; weather reports; Boston and Springfield market reports. 7 P. M.—Dinner concert by the WBZ Orchestra. 7 P. M.—"The Lost Mine," a dramatized story prepared by the Youth's Companion. Current Book Review by R. A. MacDonald. 7:30 P. M.—Bedtime story for the kiddies. 9:55 P. M.—Arlington time signals. 11 P. M.—Program of Chamber music by the WBZ Orchestra; and Francis Doane, soprano.

**March 8-11:55 A. M.**—Arlington time signals; weather reports; Boston market report. 7 P. M.—Dinner concert by the Hotel Kimball Trio transmitted from the Hotel Kimball dining room; Jan Geets, director. 7:30 P. M.—Bedtime story for the kiddies. 7:40 P. M.—Concert by Mrs. J. Aronson, pianist; Mrs. Marguerite Boyd, soprano; Mrs. Charles A. Holmes, contralto. 8:30 P. M.—Story for grownups, by Orison S. Marsten. 9:55 P. M.—Arlington time signals.

## Station WOO, Philadelphia, Pa.

**509 Meters (590 Kcys.) E. S. T. March 7-11 A. M.**—Grand organ. 11:30 A. M.—Weather forecast. 11:55 A. M.—Naval Observatory time signal. 12 M.—Luncheon music by the Tea Room Orchestra. 4:45 P. M.—Grand organ and trumpets. 5 P. M.—Sports results and police reports. 7:30 P. M.—Dinner music from the Hotel Adelphia Concert Orchestra, A. Candelori, director. 8:30 P. M.—Address by Dr. Robert H. Bradbury. 9:30 P. M.—Grand organ recital by Mary E. Vogt. 9:55 P. M.—Naval Observatory time signals. 10:02 P. M.—Weather forecast. 10:03 P. M.—Kentucky Kernel's from the Hotel Adelphia.

## Station WHAZ, Troy, N. Y.

**380 Meters (790 Kcys.) E. S. T. March 7-9 P. M.**—Concert by Fifth Avenue Baptist Church Choir, Troy, N. Y. Readings by young elocutionists. 9:30 P. M.—Address, "History of Arctic Exploration," Dr. J. Lewi Donhauser; also talk on Forest Conservation. 12, midnight—Transcontinental concert by Rensselaer Polytechnic Institute Students' Symphony Orchestra and Glee Club.

## Station WLW, Cincinnati, Ohio

**309 Meters (970 Kcys.) C. S. T. March 7-10:30 A. M.**—Weather forecast and business reports. 1:30 P. M.—Market reports. 3 P. M.—Stock quotations. 4 P. M.—Half hour lecture recital.

**March 8-10:30 A. M.**—Weather forecast and business reports. 1:30 P. M.—Business reports.

**March 9**—Church services, 9:30 and 11 A. M.

## Station PWX, Havana, Cuba

**400 Meters (750 Kcys.) E. S. T. March 8**—Concert at the studio by Mrs. Nena D. Dubira, Misses Ana Maria and Ignacia Franca, Anita Perez Barbosa, Mr. Oscar Lopez; piano, violins and mandolins.

**March 12**—Concert at the Malecón Band Stand by the General Staff Band of the Cuban Army, Captain José Molina Torres, director.

## Station WOC, Davenport, Iowa

**484 Meters (620 Kcys.) C. S. T. March 7-10 A. M.**—Opening market quotations and household hints. 10:55 A. M.—Time signals. 11 A. M.—Weather and river forecast. 11:05 A. M.—Market quotations. 12 M.—Chimes concert. 2 P. M.—Closing stocks and markets. 3:30 P. M.—R. G. Maybach, P. S. C. Dept. of Anatomy, on "Structure of the Hair, Skin and Nails." 5:45 P. M.—Chimes concert. 6:30 P. M.—Sandman's Visit. 6:50 P. M.—Sport news and weather forecast. 7:20 P. M.—International lesson for next Sunday discussed by Dr. Frank Willard Court, pastor St. John's Methodist Episcopal Church, Davenport, Iowa. 8 P. M.—Musical program, Erwin Swindell, Musical Director. Program by First Methodist Episcopal Church Orchestra of Moline, Illinois.

**March 8-10 A. M.**—Opening market quotations and household hints. 10:55 A. M.—Time signals. 11 A. M.—Weather and river forecast. 11:05 A. M.—Market quotations. 12 M.—Chimes concert. 12:30 P. M.—Closing stocks and markets. 3:30 P. M.—C. C. Hall, P. S. C. Dept. of Chimes concert. 6:30 P. M.—Sandman's Visit.

## Station WFAA, Dallas, Texas

**476 Meters (630 Kcys.) C. S. T. March 7-12:30-1 P. M.**—Dr. Robert Stewart Hyer, Southern Methodist University, on the Sunday school lesson, "Reign of King Saul." 8:30-9:30 P. M.—Faculty recital, Southern University, music department.

**March 8-12:30-1 P. M.**—George F. Thomas, Southern Methodist University, on "The Political Situation in England." 8:30-9:30—Musical recital presented by Frank Renard, pianist. 11:30-12 P. M.—Dance music by the Adolphus Hotel Orchestra from the junior ballroom of the Adolphus.

**March 9-6:30-7 P. M.**—Radio Bible class, Dr. William M. Anderson, Jr., pastor First Presbyterian Church, teacher; half-hour Bible study and half-hour Gospel song. 7:30-9 P. M.—Service of First Unitarian Church, Dr. W. L. Sullivan speaking and choir and solo numbers broadcast from the church. 9:30 P. M.—Address, Dr. George W. Truett, pastor First Baptist Church, "The Growing Influence of Christianity in the World Today." 9:30-11 P. M.—Jack Gardner's Orchestra in popular music program.

## Station WBAP, Fort Worth, Texas

**476 Meters (620 Kcys.) C. S. T. March 9-11 A. M.-12:15 P. M.**—Services of the First Christian Church; Rev. L. D. Anderson, pastor. 4:5 P. M.—Organ concert by Miss Margaret Agnew White of the Rialto Theatre. 5:30 P. M.—Address by Rev. J. Frank Norris, pastor of the First Baptist Church. 11 P. M.-12 A. M.—Concert by Fred Cahoon's WBAP Southern Serenaders Orchestra.

**March 10-7:30-8:30 P. M.**—Concert by Guy Pittner, pianist, and Brooks Morris, violinist, with assisting artists. 9:30-10:45 P. M.—Concert by the 45-piece band of the Texas Agricultural and Mechanical College of College Station, Texas.

**March 11-7:30-8:30 P. M.**—Concert by the Texas Woman's College. 9:30-10:45 P. M.—Concert by the Municipal Band of Slaton, Texas.

## Station KPO, San Francisco, Calif.

**423 Meters (710 Kcys.) P. T. March 7-12 Noon**—Time signals. Reading of the Scriptures. 1-2 P. M.—Rudy Seiger's Fairmont Hotel Orchestra by wireless telephony. 2:30-3:30 P. M.—Organ recital by Theo. J. Irwin. 4:30-5:30 P. M.—Rudy Seiger's Fairmont Hotel Orchestra.

**March 8-12 Noon**—Time signals. Reading of Scriptures. 1-2 P. M.—Rudy Seiger's Fairmont Hotel Orchestra. 2:30-3:30 P. M.—Miss Louise Villinger, mezzo-soprano; Mill Helen Resnick, pianist. 3:30-5:30 P. M.—E. Max Bradford's Orchestra. 8 to midnight—Art Weidner's Fairmont Hotel Dance Orchestra. During intermissions KPO Trio will sing.

## Station WJY, New York City

**405 Meters (740 Kcys.) E. S. T. March 7-7:30 P. M.**—Harold Toft Wright, tenor, accompanied by Gladys F. Olsson. 7:50 P. M.—Frank Shevitt, tenor, accompanied by Gladys F. Olsson. 8:15 P. M.—Frank Shaffer, banjo. 8:30 P. M.—The Honorable Julius Berg, "The Work of the New York Assembly. 8:45 P. M.—Richard Douglas, "Songs with the Uke." 9 P. M.—"The Vegetable Garden." 9:15 P. M.—Brea and Tobias; Vincent Campbell Weston. 9:45 P. M.—Concert arranged by March 9-8:30-5 and 8-10:30 P. M.

## Station WRC, Washington, D. C.

**469 Meters (640 Kcys.) E. S. T. March 8-5:15 P. M.**—Instruction in International Code. 6 P. M.—Stories for children by Peggy Albion. 7:30 P. M.—George Bruce's Entertainers. 8:15 P. M.—Bible talk. 8:30 P. M.—Song recital by Hazel Hughes, soprano. 8:45 P. M.—"The Engineer of the New Era" by Allan B. McDaniel. 9 P. M.—Song recital by Carolyn Manning, contralto. 9:15 P. M.—Concert by Rosey's Concert Trio. 9:35 P. M.—Song recital by Carolyn Manning. 9:55 P. M.—Re-transmission of time signals and weather forecast. 10 P. M.—Dance program.

**Station WDAF, Kansas City, Mo.**

**411 Meters (730 Kcys.) C. S. T. March 7—**3:30-4:30 P. M.—Musical matinee, regular "request" program by the Leo R. Davis "Radio" Orchestra. 6-7 P. M.—Piano tuning-in number on the Duo-Art, marketgram, weather forecast, time signal and road report. Address, speaker from the Kansas City children's bureau. Address, Major M. G. Faris, Fort Benning, Columbus, Kan. The children's story and information period. Music, Fritz Hanlein's Trianon Ensemble, Hotel Muehlebach. 8:30-9:15 P. M.—Popular program given by the WDAF minstrels with Jack Riley's Plantation Serenaders. 11:45 P. M. to 1 A. M.—Nighthawk Frolic. The "Merry Old Chief" and the Coon Sanders Novelty Singing Orchestra, Plantation Grill, Hotel Muehlebach.

**March 8—**3:30-4:30 P. M.—The Riley Ehrhart Orchestra. 6-7 P. M.—Piano tuning-in number on the Duo-Art. Marketgram, weather forecast, time signal and road report. Address, Edgar A. Linton, twelfth of a series of travelogues. The children's story and information period. Fritz Hanlen's Trianon Ensemble, Hotel Muehlebach. 11:45 P. M. to 1 A. M.—The "Merry Old Chief" and the Coon Sanders Novelty Singing Orchestra, Plantation Grill, Hotel Muehlebach.

**Station KFI, Los Angeles, Calif.**

**469 Meters (630 Kcys.) P. T.—**March 7—4:45-5:15 P. M.—Evening Herald News Bulletins. 5:15-5:45 P. M.—Examiner News Bulletins. 6:45-7:30 P. M.—Bedtime story and concert. 8-9 P. M.—Evening Herald concert. 9-10 P. M.—Examiner concert. 10-11 P. M.—Myra Belle Vickers, concert. 11-12 P. M.—Ambassador-Lyman's Cocoanut Grove Orchestra.

**March 8—**4:45-5:15 P. M.—Evening Herald News bulletins. 5:15-5:45 P. M.—Examiner News Bulletins. 6:45-7:30 P. M.—Bedtime story and concert. 8-9 P. M.—Maude Reeves-Barnard. 9-10 P. M.—Examiner concert. 10-11 P. M.—Vocal and instrumental concert. 11-12 P. M.—Ambassador-Lyman's Cocoanut Grove Orchestra.

**March 9—**10-10:45 A. M.—L. A. Church Federation service. 4:5 P. M.—Federated Church musicians vesper service. 6:45-7:30 P. M.—Bedtime story and concert. 8-9 P. M.—Ambassador Hotel concert. 9-10 P. M.—Examiner concert. 11-11 P. M.—Theron Bennett's Packard Six.

**Station WOAW, Omaha, Neb.**

**526 Meters (570 Kcys.) C. S. T. March 7—**6:30 P. M.—Dinner program by Ackerman's Orchestra of Empress Rustic Garden Dance Palace. 9 P. M.—Program by Omaha Technical High School Orchestra, Will L. Hetherington, director. Auspices Stock Yards National Bank.

**March 8—**6:30 P. M.—Dinner program by Yost's Orchestra of De Luxe Dancing Academy. 9 P. M.—Program under auspices of Omaha Printing Company.

**March 9—**9 A. M.—Radio Chapel Service, conducted by Rev. R. R. Brown of the Omaha Gospel Tabernacle, minister of the Sunday morning Radio Congregation and his associates. 2:30 P. M.—Musical program by St. Cecilia's Cathedral choir. Dr. R. Mills Selby, organist and choir director. 6 P. M.—Bible study hour under Mrs. Carl R. Gray. 9 P. M.—Musical chapel service by Temple Israel, Frederick Cohn, Rabbi. Vernon C. Bennett, organist and choir director. Auspices Woodmen of the World.

**Station WAAM, Newark, N. J.**

**263 Meters (1140 Kcys.) E. S. T. March 6—**8 P. M.—"Star Spangled Banner." 8:05 P. M.—Margulies Trio. 8:15 P. M.—Victor Wilbur, tenor. 8:30 P. M.—"Guarding the Waist-Line," A talk on how to reduce weight while eating normally. 8:45 P. M.—Melodies by Schubert and Delibes, played by Margulies Trio. 9 P. M.—Johnson and Johnson, exclusive Cameo record artists. 9:15 P. M.—Benjamin Friedman's Gang of Imps, presenting song revue, "This Is the Life." 9:30 P. M.—"The Turn of the Wheel of Events," talk by Dr. Arthur W. Brooks. 9:45 P. M.—Carolina Ramblers' Orchestra, direction of Arthur Richter. Harold Christman, saxophone soloist. 10 P. M.—Trianon Melody Four. 10:15 P. M.—Martin Motenson, dansecopation exponent, "Piano Potpourri"—old masters with a sprinkle of paprika. 10:30 P. M.—Arthur Richter and his Carolina Ramblers Orchestra.

**Station WIP, Philadelphia, Pa.**

**509 Meters (590 Kcys.) E. S. T. March 7—**1 P. M.—Tea Room Orchestra. 1:30 and 6 P. M.—Weather forecast. 3 P. M.—Anna B. Scott, food expert. 3:15 P. M.—Review Club of Oak Lane, Pa. 6:05 P. M.—The Jordan-Lewis Dance Orchestra. 6:45 P. M.—Produce Market reports. 7 P. M.—Uncle Wip's bedtime stories and roll call for the children.

**March 8—**1 P. M.—Karl Bonawitz on Germantown Theatre organ. 1:30 and 6 P. M.—Weather forecast. 3 P. M.—Sax Fisher's Orchestra; Anna B. Scott, food expert. 6:05 P. M.—Greenwich Village Serenaders. 6:45 P. M.—Livestock and produce market reports. 7 P. M.—Uncle Wip's bedtime stories and roll call for the children. 8:15 P. M.—The Fortnightly Club. 10:15 P. M.—Cafe L'Aiglon Orchestra.

**March 9—**11 A. M.—Services from Holy Trinity Church. 4 P. M.—Meeting under auspices of Germantown Y. M. C. A.

**Station KYW, Chicago, Ill.**

**536 Meters (560 Kcys.) C. S. T. March 7—**9:30 A. M.—Late news and comment of the financial and commercial markets. (This service is broadcast every half hour during the twenty-four). 11:35 A. M.—Table talk by Mrs. A. J. Peterson. 12:30 P. M.—"The Progress of the World." 6:30 P. M.—Dun's and Broadstreet's weekly review of Chicago trade. 6:50 P. M.—Children's bedtime story. 7-7:30 P. M.—Dinner concert broadcast from the Congress Hotel. 10 P. M. to 2 A. M.—Midnight revue from KYW's studio.

**March 8—**9:30 A. M.—Late news and comment of the financial and commercial markets. (This service is broadcast every half hour during the twenty-four). 10:30 A. M.—Farm and home service. 11:35 A. M.—Table talk by Mrs. Anna J. Peterson. 6:30 P. M.—News, financial and final markets. 6:50 P. M.—Children's bedtime story. 7-7:30 P. M.—Dinner concert furnished by the Congress Hotel. 8:8-8:58 P. M.—Musical program. 9:05 P. M.—"Safety First" talk by Chicago Motor Club. 9:15 P. M.—"Under the Evening Lamp" service furnished by the Youth's Companion.

**March 9—**11 A. M.—Central Church service broadcast from Orchestra Hall, Chicago. Dr. F. F. Shannon, pastor. Musical program under direction Daniel Protheroe. 2:30 P. M.—Studio Chapel Service under direction of Chicago Church Federation. 7 P. M.—Chicago Sunday Evening Club Service broadcast from Orchestra Hall, Chicago. Musical program under direction Edgar Nelson. Speaker, Dr. Alfred E. Stearns.

**Station KDKA, East Pittsburgh, Pa.**

**326 Meters (920 Kcys.) E. S. T. March 7—**9:45 A. M.—Union live stock market reports. 11:55 A. M.—Arlington time signals. 12 M.—Weather forecast. United States Bureau of Market reports. 1:30 P. M.—Concert by Daugherty's Orchestra, from McCreery's Dining Room, Pittsburgh, Pa. 6:15 P. M.—Dinner concert by Lucile Hale, from the Cameo Motion Picture Theatre, Pittsburgh, Pa. 7:15 P. M.—"The Beginning of the Monarchy," the Sunday School Lesson for March 9, presented by Dr. R. L. Lanning. 7:30 P. M.—The children's period. 7:45 P. M.—Market reports. 8 P. M.—Radio Boy Scout meeting. 8:30 P. M.—Concert by the Monessen Volunteer Firemen's Band. 8:55 P. M.—Arlington time signals. Weather forecast. 10:30 P. M.—Massachusetts Institute of Technology meeting, broadcast from New York City.

**March 8—**9:45 A. M.—Union live stock market reports. 11:55 A. M.—Arlington time signals. 12 M.—Weather forecast. United States Bureau of Market reports. 1:30 P. M.—Concert by Daugherty's Orchestra, from McCreery's Dining Room, Pittsburgh, Pa. 6:15 P. M.—Dinner concert by the Westinghouse Band, T. J. Vastine, conductor. 7:30 P. M.—The children's period. 7:45 P. M.—"Bringing the World to America," prepared by "Our World." 8 P. M.—"Radio Receiving Helps," M. C. Batsell, radio engineer of the Westinghouse Electric & Manufacturing Company. 8:15 P. M.—Feature. 8:30 P. M.—Concert by the Westinghouse Band, T. J. Vastine, conductor. 9:55 P. M.—Arlington time signals. Weather forecast.

**Station WGI, Medford, Mass.**

**360 Meters (830 Kcys.) E. S. T. March 7—**12 M.—Selection on the Ampico in the Chickering Amrad Round Table. Selections on the Brunswick. 12:40 P. M.—New England weather forecast. 12:45 P. M.—Farmers' produce market reports. 3:00 P. M.—Talk by Miss Dorothy H. Goodwin. Musicals by the Brunswick. 5:30 P. M.—Closing stock market reports. Live stock market report. 6:15 P. M.—Code practice, Lesson No. 246. 6:30 P. M.—Meeting of the Big Brother Amrad Club. 7 P. M.—Boston police reports. 7:30 P. M.—Verses by Charles I. H. Wagner, radio poet. Red Cross health talk by Henry Copley Green. Musicals.

**March 8—**6:30 P. M.—Meeting of the Big Brother Amrad Club. 6:45 P. M.—Code practice, Lesson No. 247. 7:05 P. M.—New England weather forecast. New England crop notes. 7:30 P. M.—Talk on New England business industry by Arthur R. Curnick. Arthur Murray's course in ball room dancing. Musicals. 9 P. M.—Concert by Miss Louise Harrett, contralto.

**March 9—**4 P. M.—"Adventure Hour," by the Youth's Companion. Musicals. 8:30 P. M.—Talk on "World Unity." Musical by the Westminster Quartette.

**Station WOS, Jefferson City, Mo.**

**441 Meters (680 Kcys.) C. S. T. March 7—**8 P. M.—Musical program by students and faculty members of Synodical College, for junior girls, Fulton, Missouri.

**March 9—**7:30 P. M.—Service of the First Presbyterian Church, Jefferson City, Rev. W. Hooper Adams, pastor, Mrs. Mary Armstrong, organist, Mrs. John V. Jobe, Director of Vested Choir, by direct wire from the church.

**March 10—**8 P. M.—Dance program by Missouri State Prison Orchestra, Hugh C. French, director. Piano solos by the "King of the Ivories," Harry M. Snodgrass.

**March 12—**8 P. M.—"The First Week of a Young Animal's Life," E. A. Trowbridge, Professor of Animal Husbandry, College of Agriculture, Columbia, Mo. 8:20 P. M.—Old time fiddlers trio playing the old barn dance tunes, Louis Barfitt, lead fiddle, George Schrimpf, bass fiddle and Bryan Williams, guitar.

**Station WWJ, Detroit, Mich.**

**517 Meters (580 Kcys.) E. S. T. March 7—9:30 A. M.—"Tonight's Dinner" and talk by the Woman's Editor. 9:45 A. M.—Public Health Service bulletins and talks on subjects of general interest. 10:25 A. M.—Official weather forecast. 11:55 A. M.—Arlington time relayed by the Western Union. 12 P. M.—Dance music by Jean Goldkette's Orchestra from the Graystone Ballroom. 3 P. M.—The Detroit News Orchestra. 3:30 P. M.—Official weather forecast. 3:35 P. M.—Market reports. 7 P. M.—The Detroit News Orchestra; Anne Campbell, Detroit News poet; Gladys Allen, baritone; Leon Zanni, tenor; the Very Rev. Edward K. Cantwell, speaker.**

**March 8—**9:30 A. M.—"Tonight's Dinner" and talk by the Woman's Editor. 9:45 A. M.—Public Health Service bulletins and talks on subjects of general interest. 10:25 A. M.—Official weather forecast. 11:55 A. M.—Arlington time relayed by the Western Union. 3 P. M.—The Detroit News Orchestra. 3:30 P. M.—Official weather forecast. 3:35 P. M.—Market reports. 7:30 P. M.—The Detroit News Orchestra; Harold Kean, baritone.

**Station WOR, Newark, N. J.**

**405 Meters (740 Kcys.) E. S. T. March 7—**2:30 P. M.—Manly Price Boone, tenor. 2:45 P. M.—Gloria Marshall, composer-pianist-soprano. 3 P. M.—Eleanor Painter, star of "The Chiffon Girl," in songs and story. 3:30 P. M.—Manly Price Boone, tenor. 3:45 P. M.—Recital by Gloria Marshall, 6:15 P. M.—Lena Kievsky, pianist. 6:30-7:00 P. M.—"Man in the Moon Stories for the Children. 7:00 P. M.—Fred Whitehouse Song Revue.

**March 8—**2:30 P. M.—Mildred A. Watson, pianist. 2:45 P. M.—Catherine M. Lockwood, readings. 3 P. M.—Isaac D. Budd, on "Life Planning." 3:30 P. M.—Mildred A. Watson, pianist. 3:45 P. M.—Catherine M. Lockwood, readings. 6:15 P. M.—"Music While You Dine"—Paul Van Loan's Cinderella Dance Orchestra. 7:15 P. M.—Fred J. Bendel, on "Sporting News Up-to-the-Minute." 8:9 P. M.—Gene Ingraham's Bell Record Orchestra. 9 P. M.—Clyde W. Quick, baritone. 9:20 P. M.—Interview by radio of Richard Le Gallienne, famous poet, by Betty Ross. 9:40 P. M.—Clyde W. Quick, baritone. 10:11 P. M.—Gotham Entertainers.

**Station WHAS, Louisville, Ky.**

**400 Meters (750 Kcys.) C. S. T. March 7—**4:45 P. M.—Walnut Theatre Orchestra. Police bulletins. Weather forecast. "Just Among Home Folks," a daily column appearing in The Courier-Journal. Strand Theatre Orchestra. News bulletins. Alamo Theatre organ. 4:50 P. M.—Live stock, produce and grain market reports. 5 P. M.—Central Standard time announced. 7:30-9 P. M.—Worth's Novelty Orchestra. Piano solos. Theodore Richbourg, Reading; "An Interesting Historical Episode," News bulletins. Central Standard time at 9 o'clock.

**March 8—**4:5 P. M.—Strand Theatre Orchestra. Police bulletins. Weather forecast. "Just Among Home Folks," a daily column appearing in The Courier-Journal. Walnut Theatre Orchestra. Piano soloist. News bulletins. 4:50 P. M.—Livestock, produce and grain market reports. 5 P. M.—Central Standard time. 7:30-9 P. M.—Concert by the Sylvian Trio. Baritone solos, A. V. B. Sherlock, Soprano solos, Miss Hazel McClellan. Reading; "An Interesting Historical Episode," News bulletins. Central Standard time at 9 o'clock.

**Station WDAR, Philadelphia, Pa.**

**395 Meters (760 Kcys.) E. S. T. March 7—**11:45 A. M.—Daily almanac. 12:02 P. M.—Organ recital from the Stanley Theatre; feature from the Studio; Arcadia Concert Orchestra. 2-3 P. M.—Arcadia Concert Orchestra. 4:30 P. M.—Dance music. 7:30 P. M.—Dream Daddy with the boys and girls. 8 P. M.—Book review. 8:10 P. M.—Poets and authors corner. 8:30 P. M.—Sicilian Trio recital playlet. 10:10 P. M.—Howard Lanin's Dance Orchestra; studio features; stars from musical show now playing Philadelphia.

**March 8—**11:45 A. M.—Daily almanac. 12:02 P. M.—Organ recital from the Stanley Theatre; studio features; Arcadia Concert Orchestra. 2-3 P. M.—Arcadia Concert Orchestra. 4:30 P. M.—Dance music by The Cotton Pickers, under the direction of Wilbur DeParis. 7:30 P. M.—Dream Daddy with the boys and girls.

**Station KHJ, Los Angeles, Calif.**

**395 Meters (760 Kcys.) P. T. March 7—12:30-1:15 P. M.—News items; weather report; music. 2:30-3:30 P. M.—Matinee musical. 6:40 P. M.—Live stock and vegetable reports. 6:45-7 P. M.—Children's program presenting Richard Headrick, screen juvenile. Bedtime story by "Uncle John." 7-7:30 P. M.—Organ recital from the First Methodist Episcopal Church, Arthur Blakeley, organist. 8-10 P. M.—Program by the Kiwanis Club of Glendale, Walter F. McEntire, on "Early History of California."**

**March 8—**12:30-1:15 P. M.—News items; weather report; music. 2:30-3:30 P. M.—Matinee musical. 6:40 P. M.—Live stock and vegetable reports. 6:45-7:30 P. M.—Children's program. Bedtime story by "Uncle John." 8-10 P. M.—Program by California Institute of Technology Glee Club. 10-12 P. M.—Art Hickman's Orchestra from the Los Angeles Biltmore Hotel.

(Concluded on page 30)

# Latest Radio Patents

## Transmission System

No. 1,480,216: Patented January 8, 1924. Patentee:  
John Mills, Wyoming, N. J.

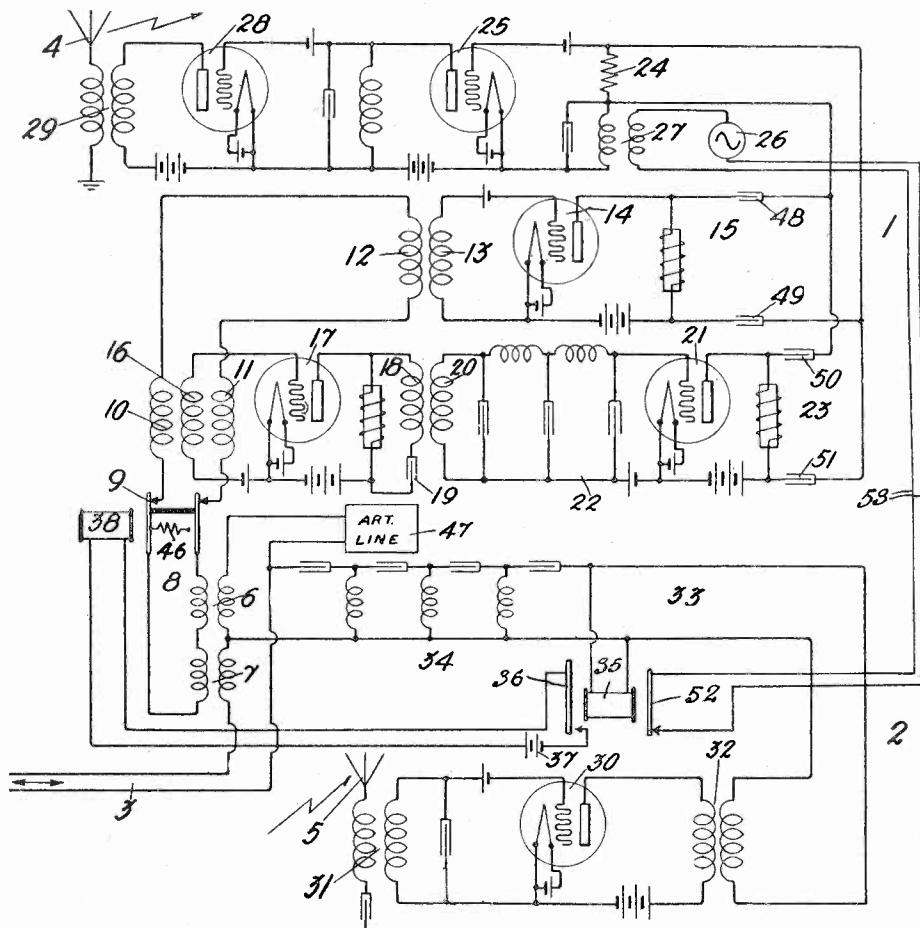
This invention relates to systems and methods of electrical transmission and in particular to telephonic or telegraphic transmission. The principles of the invention will be understood from the hereinafter contained description of one embodiment thereof comprising a wireless system in which each of a plurality of terminal stations comprises a wireless telephone transmitting and receiving system and a wire telephone system associated therewith.

It is an object of the invention to prevent a circulation of power between the local transmitting and receiving system or to insure that the signals received by a wireless receiving system will be transmitted along the line wire in such manner

local wireless transmitting apparatus by disconnecting the latter from the line wire. The local wireless transmitting apparatus is automatically rendered operative by being connected to the line wire upon the cessation of the detected control oscillations. Means are also provided to prevent the transmission of energy from the sending conductor or antenna while energy is being received by the receiving antenna at the local station.

A local circulation of power, or singing, is thereby prevented as the signal currents are confined to the line wire and cannot effect a transmission of energy from the local transmitting apparatus.

Another object of the invention is to provide method and means for generating the control tone by means of talking currents.



Arrangement of a transmitter allowing several novel controls, among which is a method of preventing interference between line and space currents, by the action of a sensitive relay.

as to not thereby effect the transmission of the same signal from the local wireless transmitting system.

The invention provides for generating at a transmitting station a control tone of a definite frequency outside of the usual talking range, preferably below, which shall be superimposed upon the original talking current impressed on the modulator of the wireless transmitter. The carrier wave transmitted is accordingly modulated by both the talking and the control tone currents. The transmitted wave is received at a distant station where it is detected. The detected signal currents are sent over the line wire and the simultaneously detected control currents operate a relay to render inoperative the

This is done by supplying talking currents of suitable intensity to a tuned circuit, the natural period of vibration of which is the control frequency. Along with the control currents thus generated will be transmitted some of the impressed talking currents. The latter are suppressed by means of a filter which selectively transmits only the control currents.

A further object is to provide novel means for and method of transmitting and utilizing control currents.

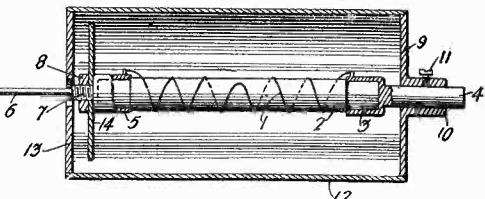
Another object is to provide means for and methods of simultaneously effecting a change in the condition of a distant station and translating message currents at that station.

### Impedance Element

No. 1,480,227: Patented January 8, 1924. Patentee:  
G. H. Stevenson, Rye, N. Y.

This invention relates in general to electrical impedance elements and more particularly to adjustable impedance elements adapted to be used in systems employing high frequency alternating currents.

Devices of this character are particularly useful where an accurate balance between two impedances is required. One



Method of making an impedance for use in radio circuits, which allows simple construction and accurate adjustment.

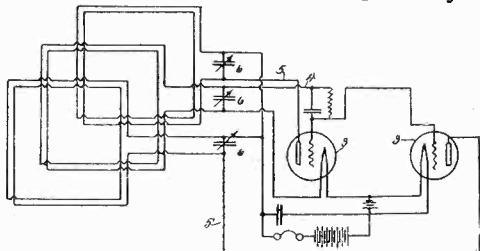
such case is a Wheatstone bridge adapted for making measurements with high frequency alternating currents where it is necessary that the ratio arm impedances be very accurately balanced. The resistance of such an element may be very accurately adjusted and will remain constant but the impedance will be variable at different frequencies since it is practically impossible to make the element non-reactive. In the preferred form of this invention a variable condenser is provided which has sufficient range of capacity to obtain an accurate balance of two such elements. A shield is provided to insure that the electrostatic lines of force emanating from the impedance element terminate always on one surrounding surface whose potential relatively to the impedance element is fixed. This gives definiteness and constancy to the effective reactance of the element. The shield so provided forms one plate of the condenser. The other plate of the condenser is a disk within the shield which is adjustable by means of a longitudinally movable shaft supporting the disk as well as the resistance winding.

# Multiple Regenerative Loop Antenna and Circuit

No. 1,479,638: Patented January 1, 1924. Patentee:  
V. K. Zworykin, Kansas City, Mo.

The present invention relates to radio receiving apparatus, and aims to devise a novel multiple receiving loop construction adapted to produce a regenerative effect and also to afford a simpler and more convenient means for tuning.

To this end I provide a plurality of



Receiving system using several loops so arranged that they are within the mutual field of each other, whereby tuning of a regenerative sort may be obtained without losing the directional qualities of the loop.

antenna loops, all designed to act as receiving loops and so arranged as to mutually influence each other for creating a multiple regenerative effect. The arrangement of the loops is also designed to enable the tuning of the receiving circuit to be carried out without affecting the directional properties of the loops or interfering with each of them receiving the maximum energy of the signals.

# These DX Nite Owls Keep Us Busy and On Our Toes

## DX Nite Owls, Attention!

THE DX season is now upon us.

All faithful DXers are requested to prepare themselves for the night vigil.

Send your records to the DX Editor of RADIO WORLD.

Write only on one side of the paper and write clearly.

Give full particulars of your location, your set, your aerials and other items of interest.

WJAR, Providence, R. I., 1,175 miles; WGY, Schenectady, N. Y., 1,165 miles; WOC, Davenport, Iowa, 1,160 miles; WCBD, Zion City, Ill., 1,100 miles; WDAP and WHB, Kansas City, Mo., 1,060 miles; WDAP and KYW, Chicago, Ill., 1,030 miles; WEAF, New York, N. Y., 1,025 miles; WOR, Newark, N. J., 1,025 miles; WCX and WWJ, Detroit, Mich., 1,015 miles; WOAI, San Antonio, Texas, 1,000 miles; WBAP, Fort Worth, Texas, 970 miles.

WCM, Austin, Texas, 960 miles; WDAR, WFI, WIP and WOO, Philadelphia, Pa., 950 miles; WJAX and WTAM, Cleveland, Ohio, 950 miles; WOS, Jefferson City, Mo., 940 miles; WFAA, Dallas, Texas, 940 miles; WWAC, Waco, Texas, 940 miles; KDKA, East Pittsburgh, Pa., 900 miles; WEAS and WRC, Washington, D. C., 840 miles; WLW and WSAI, Cincinnati, Ohio, 800 miles; WMC, Memphis, Tenn., 675 miles; WOAN, Lawrenceburg, Tenn., 590 miles; WSY, Birmingham, Ala., 470 miles; 6KW, Tuiucu, Cuba.

## Here Is a Neutrodyne DXer

From E. Comenzo, 845 East 219th St., New York City

As I am a regular reader of RADIO WORLD I have noticed some good DX records and I think I have a good one. Within the last three weeks I received the following stations:

WEAF, WHN, WJZ, WJY, of New York City; WOO, WFI, WIP, WDAR, of Philadelphia, Pa.; WOR, WBS, of Newark, N. J.; WGY, Schenectady, N. Y.; WDAP, KYW, WJAZ, Chicago; WOC, Davenport, Iowa; WTAS, Elgin, Ill.; WRC, Washington, D. C.; WMC, Memphis, Tenn.; WSB, Atlanta, Ga.; KDKA, Pittsburgh, Pa.; WWJ, Detroit, Mich.; KSD, St. Louis, Mo.; WNAC, Boston, Mass.; WTAM, Cleveland, Ohio; WLW, Cincinnati, Ohio; WBAO, Decatur, Ill.; WKAQ, San Juan, Porto Rico; WSAI, Cincinnati, Ohio; WCAL, Northfield, Minn.; WGR, Buffalo, N. Y.; WHB, Kansas City, Mo.; WDAF, Kansas City, Mo.; KFKX, Hastings, Neb.; WHAZ, Troy, N. Y.; WMAK, Lockport, N. Y.; WOAW, Omaha, Neb.; WABT, Washington, Pa.; HXD, Cleveland, Ohio; 2XB, New York City; WBAP, Fort Worth, Texas; WSAJ, Grove City, Pa.; PWX, Havana, Cuba.

I have a 5-tube Neutrodyne set using one UV200 tube and four UV201A tubes. Received all these stations on the loud speaker.

## Here Is Old Faithful Again

From J. E. Bradley, Justin, Texas

Had pretty good luck last nite and tried a little DXing. Was using a RDA12 set using timed R. F. detector and 2 steps. Thirty of the stations came in plain and distinct on Dictoground speaker. Started 5:50 P. M. and quit at 1:00 A. M. Following is a list of stations:

WEV, WEAY, WOAI, WLAG, WOC, KYW, WOAW, WRC, EAF, 5OT, KFJW, WMAQ, WWJ, 4CS, KFKB, WTAM, WOO, KDKA, KSD, WLW, WDAF, PWX, WHAS, WOS, WMC, KHJ, WCAE, CYL, WOI, WNAD, KFMZ, WGR, WFAH, WPAM, WDAF, KFI, WJAZ, KFNC, WCAR, WSB, KGW, WTAS, KLX, WWA, WHAA, KFFQ, KPO, all over 100 miles away, 14 over 1,000 miles away

## Another Single Tube Record

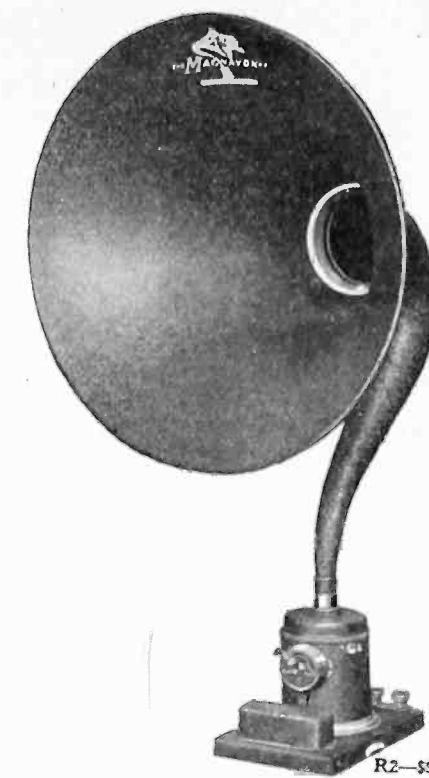
From Alfred E. Ritter, Floral Park, L. I.

I have been a constant reader of your excellent radio magazine the past few weeks and have taken particular notice of the DX records published. I have decided that some fans may be interested to know my one tube regenerative set employing the well known "Ambassador" tuning coil is quite satisfactory. I have an antenna 125 feet long including lead in. I have received the following stations in the past two months:

Pittsburgh, Pa.—KDKA, WCAE, KOV; Chicago, Ill.—KYW, WDAP, WJAZ, WMAQ; Detroit, Mich.—WWJ, WCX, KOP; Philadelphia, Pa.—WCAU, WOO, WFI, WDAR, WIP; New York City—WEAF, WJZ, WHN, WDT, WJY, WOAO; Providence, R. I.—WEAN, WJAR, WSAD; Cleveland, O.—WTAM, WJAX; Newark, N. J.—WOR, WAAM, WBS; Washington, D. C.—WRC, WCAP; Cincinnati, O.—WAAD, WSAI, WLW; Montreal, Canada—CKCS, CFCF, CKAC; Rochester, N. Y.—WHAM, WABO.

WGR, Buffalo, N. Y.; WGY, Schenectady, N. Y.; WHAZ, Troy, N. Y.; WOAW, Trenton, N. J.; WOC, Davenport, Ia.; WOS, Jefferson City, Mo.; WNAC, Boston, Mass.; WSAR, Fall River, Mass.; WFAF, Syracuse, N. Y.; WCBD, Zion, Ill.; WMAK, Lockport, N. Y.; WGI, Medford Hills, Mass.; KFKX, Hastings, Neb.; WCAB, Columbus, O.; WBZ, Springfield, Mass.; WIAO, Milwaukee, Wis.; WQAA, Parkersburg, Pa.; WHAS, Louisville, Ky.; KFDZ, Minneapolis, Minn.; WSAK, Middletown, O.; WHB, Kansas City, Mo.; WCAL, Northfield, Minn.; WRAW, Reading, Pa.; WRW, Urbana, Ill.; WSB, Atlanta, Ga.

# MAGNAVOX Radio Products



R2-\$50

## Electro-Dynamic Reproducer

IT is due to their construction on the *electro-dynamic* principle that Magnavox Reproducers (type R) have become a universal accessory for use with any good receiving set.

### Magnavox Reproducers

R2 with 18-inch curvex horn.....\$50.00  
R3 with 14-inch curvex horn.....\$35.00  
M1 with 14-in. curvex horn. Requires no battery for the field.....\$35.00

### Magnavox Combination Sets

A1-R consisting of electro-dynamic Reproducer with 14-inch curvex horn and 1 stage of amplification...\$59.00  
A2-R consisting of electro-dynamic Reproducer with 14-inch curvex horn and 2 stages of amplification...\$85.00

### Magnavox Power Amplifiers

A1—new 1-stage Power Amplifier, \$27.50  
AC-2-C—2-stage Power Amplifier, \$55.00  
AC-3-C—3-stage Power Amplifier, \$75.00

*Magnavox products can be had at Registered Magnavox Dealers everywhere. Write for new 32-page catalogue.*

### The Magnavox Company Oakland, California

New York Office: 370 Seventh Avenue

Canadian Distributors  
Perkins Electric, Limited, Montreal

Wade Through This One  
From Vincent P. Gianella, 429 Marsh Ave., Reno, Nevada

I am very much interested in the DX Nite Owls in the RADIO WORLD. Here is my record of stations, except those we consider as local here, that is within 200 miles. So far I have received over 110 radiophone stations. Those marked with a \* were heard in daylight. I have used various hookups and factory make sets, but the best results were obtained with two steps radio, detector and two of audio. I do not consider this record as exceptional, as I know Nite Owls who have heard many more stations with less equipment.

CFAC, Calgary, Canada; CFCB\*, Vancouver, B. C.; CFCJ, Victoria, B. C.; CFCN, Calgary, Alberta; CHCA, Vancouver, B. C.; CJCA, Edmonton, Alta.; DD5, Denver, Colo.; DN4, Denver, Colo.; KDBZ, Bakersfield, Cal.; KDN, San Francisco, Cal.; KDPT, San Diego, Cal.; KDYL, Salt Lake City, Utah; KDMY, San Diego, Cal.; KDYS, Great Falls, Mont.; KDYW, Phoenix, Ariz.; KDZA, Tucson, Ariz.; KDZE, Seattle, Wash.; KDZH, Fresno, Cal.; KDZI, Wenatchee, Wash.; KDZL, Ogden, Utah; KDZM, Centralia, Wash.; KDZZ, Everett, Wash.; KDFU, Fresno, Cal.; KFAU, Boise, Idaho; KFAC, Glendale, Cal.; KFAD, Phoenix, Ariz.; KFAE, Pullman, Wash.; KFAT, Denver, Colo.; KFAN, Moscow, Idaho; KFAT, Eugene, Ore.; KFAW, Santa Anna, Cal.; KFAY, Medford, Ore.; KFBJ, Boise, Idaho.

KFBL, Everett, Wash.; KFC, Seattle, Wash.; KFCB, Phoenix, Ariz.; KFCF, Walla Walla, Wash.; KFCL, Los Angeles, Cal.; KFDB\*, San Francisco, Cal.; KFDF, Casper, Wyo.; KFDJ, Corvallis, Ore.; KDZQ, Denver, Colo.; KFEL, Denver, Colo.; KFFE, Pendleton, Ore.; KFGH\*, Palo Alto, Cal.; KFHJ, Santa Barbara, Cal.; KFI\*, Los Angeles, Cal.; KFV, Yakima, Wash.; KGG\*, Portland, Ore.; KGN, Portland, Ore.; KGW, Portland, Ore.; KGY, Lacey, Wash.; KHZ, Los Angeles, Cal.; KFKX, Hastings, Neb.; KHO, Seattle, Wash.; KJQ\*, Stockton, Cal.; KJS, Los Angeles, Cal.; KLN, Monterey, Cal.; KLX, Oakland, Cal.; KLP, Los Altos, Cal.; KDKA, Pittsburgh, Pa.; KLZ, Denver, Colo.; 7AAB, Roseburg, Ore.; KMJ, Fresno, Cal.; KMO, Tacoma, Wash.; KNJ, Roswell, N. M.; KNT, Grays Harbor, Wash.; KPO\*, San Francisco, Cal.; KOI, Berkeley, Cal.; KQY, Portland, Ore.; KRE, Berkeley, Cal.; KSD, St. Louis, Mo.; KUO\*, San Francisco, Cal.; KUS, Los Angeles, Cal.; KUY\*, El Monte, Cal.; KWG, Stockton, Cal.; KWH, Los Angeles, Cal.; KYS, Los Angeles, Cal.; KZM, Oakland, Cal.

KZN\*, Salt Lake City, Utah; KZV, Wenatchee, Wash.; KVC, Portland, Ore.; WAAZ, Emporia, Kan.; WBAP, Ft. Worth, Texas; WDAF, Kansas City, Mo.; WDAP, Chicago, Ill.; WHAA, Iowa City, Iowa; WHB, Kansas City, Mo.; WJAZ, Chicago, Ill.; WOC, Davenport, Iowa; KLS, Oakland, Cal.; KFJC, Seattle, Wash.; WOAW\*, Omaha, Neb.; KYW, Chicago, Ill.; KFFQ, Colorado Springs, Colo.; KGO, Oakland, Cal.; WMC, Memphis, Tenn.; CKCD, Vancouver, B. C.; 7XAD, Walla Walla, Wash.; KFEC\*, Portland, Ore.; WJZ, New York, N. Y.; CFCK, Edmonton, Alta. My antenna is 38 feet high and 150 feet long. We are troubled here most every evening with a "RAZ" from the local power lines. When the air is clear it is common to get several stations 1,500 miles away most any night.

## This Fan Plays Mean Golf

From V. A. Adams, Tampa, Florida

As I have been reading the DX records I thought I would send mine in. As I have been camping out my antenna is only thirty-five feet long, one end is about twenty-five feet high the other end goes to my car door which makes it about six feet high. I have a four-tube set. I hear all these stations on the loud speaker. The forty-two stations cover seventeen States, Cuba, Mexico and Porto Rico, and a total of 38,165 miles. KHJ, Los Angeles, Cal., 2,200 miles; WOAW, Omaha, Neb., 1,225 miles; WKAQ, San Juan, Porto Rico, 1,225 miles; CYL, Mexico City, Mexico, 1,250 miles; WHAZ, Troy, N. Y., 1,175 miles;

# BUSINESS NEWS OF THE INDUSTRY

## Radio Sales Should Equal Phonograph Sales

VARIOUS estimates have been made by manufacturers, radio writers, and radio statisticians, as to the number of radio sets actually in use. These figures have run from a modest two million to what is perhaps an exaggerated four million.

Inquiries made by the Trade Editor of RADIO WORLD regarding the number of talking machines now in American homes, have led to a statement from the Editor of "The Talking Machine World." This editor, who should know, says there are no exact figures covering the precise number of machines in use, but that in all probability there are about ten million talking machines installed in homes in this country.

### New York Radio Show October 2-8

THE American Radio Exposition Company announces the dates of the third annual radio show at the Grand Central Palace, New York City, as October 2-8, 1924. The ground and mezzanine floors will be used for exhibition purposes. The show will be profit-sharing in character as between the exhibitors and the management.

### Federal Trade Commission To Hear R. C. A. et al

THE Radio Corporation of America and its component companies are scheduled to answer at Washington, D. C., on March 14, the complaint alleging monopoly in radio apparatus and communication filed against them by the Federal Trade Commission on January 28, 1924.

### R. C. A. vs. DeForest

THE hearing of the suit of the Radio Corporation of America, of New York City, against the DeForest Telephone & Telegraph Company, of Jersey City, N. J., claiming violation of an injunction against manufacturing vacuum tubes under certain patents, scheduled for February 25 at Paterson, N. J., was postponed to March 25, 1924.

## Who Is America's Most Popular Radio Entertainer?

Everybody is interested in this query: Who is America's most popular radio entertainer? You have your favorite. Who is she or he? Let us know your choice, whether a comedian, an opera singer, a jazz band, or a story-teller.

RADIO WORLD wants to be able to tell the world the name of the entertainer who stands highest in the regard of listeners-in.

Use the accompanying blank and mail to Broadcasting Manager, RADIO WORLD  
Cut off. Fill out. Mail today.

BROADCASTING MANAGER, RADIO WORLD,  
1493 Broadway, New York City.

Dear Sir:

My favorite entertainer is..... Station.....

Name.....

Street Address.....

City and State.....

## 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:

M. H. Posner, 630 Union avenue, Bronx, New York City. (Retailer.)  
Gus Kempin, Two Buttes, Colo.  
R. V. Hammer, 216 N. Walnut street, Creston, Iowa.

## Error in Golden Rule Advertisement

**I**N RADIO WORLD for March 1, in the advertisement of Golden Rule Radio Co., 59 Cortlandt St., New York, was advertised the Blaico regenerative 3-tube set model 2, and by typographical error the price quoted was \$18. The correct price on this Armstrong regenerative set is \$80.

## New Coupler of Unique Design

**T**HE Star Radio Products Co., Chicago, Ill., have placed on the market a coupler of unique design, which has several advantages claimed for it. It consists of two coils, placed one within the other, wound toroidal form, with a slider on the heavy or primary winding, making it possible to obtain single turn variation. It is so constructed that panel mounting is possible. It takes up minimum space and presents a good appearance. It is covered with rubber tubing highly polished, and gives good results in several circuits, both as coupler or tuning unit in a single circuit fixed coupling inductance coil.

### ANOTHER BOUQUET

"You have, to my thinking, one of the best journals on radio published today."—Frank A. Barmer, Albany, N. Y.

## Radio and Electrical Business Opportunities

Rate: 40¢ a line. Minimum, 3 lines.

**RADIO MFRS., JOBBERS** have wonderful store location, good window display, for demonstrating, selling radio machines and parts; commission or rental basis. Store, 433 Broadway, New York City.

**MACHINE AND ELECTRICAL WORK** wanted; special machines completely constructed; light assembling on contract; service of designing electrical and mechanical engineers. Leo F. Robertson, Inc., 540 West 22d St., New York City. Watkins 6371-8563.

**INVESTORS ATTENTION!**—Are you looking for first-class equipped machine shop? We develop inventions, make models, dies, tools, build special machinery, do metal stamping. Wilson Mig. Co., 137 Grand St., New York City.

**RADIO AND ELECTRICAL STORE**, 207 East 14th St., New York City, established 8 years, running business, Edison Mazda Lamp Agency, \$2,500 contract included in sale. Call at premises.

**AUTOMOBILE AND RADIO SUPPLY STORE**, stock and fixtures; inventories \$35,000; will sell for cash or easy terms; good opportunity for some one to acquire a well-established business. Scharff Sons, 1324 Myrtle Ave., Brooklyn, N. Y.

**BE A GOOD RADIO FAN**

Have some applause cards on your radio table, in the blank spaces as program comes in, and they are ready to mail. 12 for 25c, 28 for 50c, 60 for \$1.00. Sent prepaid, stamped, ready to mail. Satisfaction or money refunded.

**RETAIL AND WHOLESALE**

The Powell Radio Applause Card  
PRESCOTT, ARIZONA

**PANELS**

7x10...\$0.95	7x18...\$1.65	7x26...\$2.40
7x12...1.10	7x21...1.95	7x28...2.60
7x14...1.30	7x24...2.25	7x30...2.75
9x14...1.75	9x18...2.25	9x21...2.50
12x14...2.25	12x18...3.00	12x21...3.50
8/16" thick—BLACK—1/4" add 25%		

Send money order or pay Postman.

UNION RADIO COMPANY

144 N. Union Street Akron, Ohio

**SOME SUNBEAM SAVINGS**

12 Years  
in the  
Same  
Spot.  
From  
Wholesaler  
Direct  
to You.

**SUNBEAM**

A SUNBEAM SPECIAL  
Westinghouse Vocarola Loud Speaker. List  
Price, \$20.00; Our Price, \$12.50  
Hercules 6 ohm Rheostat..... .45  
Cockaday Coils..... 1.85  
Electrahot Soldering Irons..... 2.65  
FREE WITH EVERY ORDER, OUR HANDY  
RADIO RECORD BOOK  
SUNBEAM ELECTRIC CO.  
71 Third Avenue New York City

**KELLOGG**  
USE-IS THE TEST

Build Your Radio Set With

**Kellogg**

**Guaranteed Parts**



KELLOGG Head Sets assure clarity and volume, a requirement for long distance reception. The magnet is of special tested steel and hardened by our own method and process, which controls the heat and time, electrically and mechanically eliminating any possible variation. The magnet windings are of great accuracy. The mountings, end plates, wire and insulation are of the best materials suited for the purpose.

Kellogg head sets are the lightest—the most popular on the market, and used by both experts and amateurs for their all around superiority. Handling these sets while listening does not effect reception.

No radio receiver is complete without a Kellogg head set.

Be sure you get Kellogg so that you know you have the best.

If your dealer does not handle Kellogg communicate direct with us.

**Kellogg Switchboard  
& Supply Company**  
1066 W. Adams • CHICAGO

**USE-IS THE TEST**  
**KELLOGG**

**SPECIAL OFFER TO  
RADIO OPERATORS**

I will give you a \$1.50 hydrometer and a \$1 copy of Strickland's Battery guide, explaining the storage battery, all for (if ordered at once) \$1.50 postpaid. Send \$1.50 with this ad. C. J. Strickland, Box 542, Norfolk, Va.

**WE REPAIR  
RADIO TUBES**

WD-11 ..	\$5.00	DV-2 ..	\$3.00
WD-12 ..	3.00	DV-6A ..	3.00
UV-200 ..	2.75	UV-190 ..	3.00
UV-201 ..	3.00	C-298 ..	3.00
C-300 ..	2.75	UV-201A ..	3.00
C-301 ..	3.00	C-301A ..	3.00
DV-6 ..	3.00	Marconi ..	3.00
DV-1 ..	3.00	Moorhead ..	3.00
6 v. Plain Detector ..	2.75		
6 v. Plain Amplifier ..	3.00		

Mail orders solicited and promptly attended to.

Dealers and agents write for special discounts.

H. & H. RADIO CO.  
P. O. Box 22-B  
Clinton-Hill Station Newark, N. J.

**MAH-JONG**

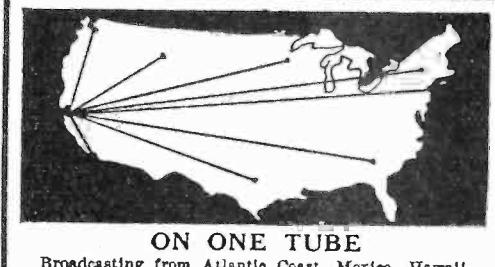
This wonderful fascinating Chinese game, complete with Instructions, characters, counters, racks and dice. Sent postpaid in attractive box on receipt of

**\$1.00**

Canada 25c extra

ATTRACTIVE PROPOSITION  
TO DEALERS AND  
DISTRIBUTORS.

Perfect Novelty Co.  
446 6th Ave., Cor. 27th St.  
New York City

**ON ONE TUBE**

Broadcasting from Atlantic Coast, Mexico, Hawaii, Canada and Cuba heard in California by users of CROSS COUNTRY CIRCUIT. Range due to simplicity of set and only one tuning control. Easily and cheaply built by any novice. Dry coil tubes may be used. All instructions, blueprint panel layout, assembly photo, etc. Postpaid 25c. Stamps accepted.

VESCO RADIO SHOP, BX RW-117, Oakland, Cal.

**FADA NEUTRODYNE**

**\$69.50**

**FREE** If you buy the complete parts for a 5-tube Neutrodyne Set, including MAHOGANY CABINET from us for \$69.50, we will make up the parts for you absolutely FREE and guarantee it to work satisfactorily. Only the best materials used, including genuine Fada Neutroformers and Fada Neutrodons. Please state whether you want Black or Mahogany Panel and Front or Rear connections.

"Distant stations are locals on a FADA NEUTRODYNE Set"

**Perfection Radio Corp.**

78 Cortland St.  
368 Livingston at  
Flatbush, Brooklyn  
59 Cortland St.  
119 West 23rd St.  
New York City

**"FRESHMAN SELECTIVE"**

Mercury Variable Condenser

For  
Transmission  
or  
Reception



It is the only variable condenser the plates of which vary in area—AN ENGINEERING FEAT NEVER ACCOMPLISHED BEFORE—making it most efficient for fine adjustment and selective tuning.

No Leakage.  
Absolutely Quiet.  
No Plate Vibration.  
Cannot Short Circuit.  
Will Stand 5,000 Volts.

.0003 MF (Equiv. to 17 pL)  
.0005 MF (Equiv. to 23 pL)  
.001 MF (Equiv. to 43 pL)

\$5 each  
At your dealer's, otherwise send purchase price and you will be supplied postpaid.

Ask your dealer or write for our free diagrams of Neutrodyne, Tri-Flex, Freshman and other good circuits.

**Chas. Freshman Co. Inc.**  
Radio Condenser Products

106 Seventh Avenue New York

ENGLAND  
LONDON

~did YOU  
get LONDON

When Philadelphia got London, loudly and clearly, two out of the three stations that tuned in were equipped with "Turn-It" Adjustable Grid Leak.

—a perfect grid control which has any resistance you need.

—no carbon or graphite.

**\$1.00**

If your dealer cannot supply you, direct upon receipt of price.

**TURN-IT RADIO SALES, Inc.**

Sole Distributors for Charles E. Bonine  
30 RW CHURCH STREET, NEW YORK  
Tel. Cortlandt 0930

DEALERS WRITE FOR DISCOUNTS

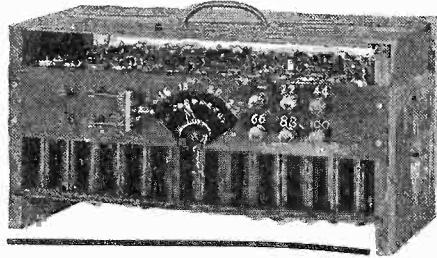
U.S.A.  
PHILADELPHIA

**TURN-IT  
ADJUSTABLE  
GRID LEAK**

**ACH**

**Sharp Tuner Dial**  
 3-inch size ..... \$2.50  
 4-inch size ..... \$5.00  
 1/4 3/16 bushings, 5c. ea.  
**Rough or Fine Tuning**  
 Mail Orders Prepaid USA

A. C. Hayden Radio & Research Co.  
 Brockton, Mass., U. S. A.

**GET A REAL "B" BATTERY!****Powerful—Durable—Rechargeable**

A swing of the switch lever gives instant voltage  
**BATTERY SATISFACTION AT LAST.** Hundreds of enthusiastic owners of Roberts "B" Batteries tell us: "Positively the best battery on the market—I have tried them all." "All my battery troubles are over!"

**Examine Our Battery Before Buying Any Other**

Manufactured by **W. ROBERTS STORAGE "B" BATTERY COMPANY**  
 1120 MYRTLE AVENUE, NEAR BROADWAY, BROOKLYN, N. Y.

Telephone Bushwick 6753

Open till 9 P. M. Daily

**BATTERIES CAN BE OBTAINED FROM THE FOLLOWING DEALERS:**

Brooklyn Radio Service, 573 Myrtle Ave., Smith and Livingston Sts., Brooklyn; 17 John St., New York City; 171 Broadway, New York City. Twentieth Century Radio Corp., 102 Flatbush Ave., Brooklyn. Sylo Lighting Co., 166 Flatbush Ave., Brooklyn. Romeo Storage Battery Co., 146 W. 68th St., New York City. Matthew Conroy, 147 W. 76th St., New York City. John F. Putlock, 878 Ninth Ave., New York City. Cortlandt Radio Shop, 77 Cortlandt St., New York City. Amaco Radio, 65 Cortlandt St., New York City. Liberty Radio Co. (4 New York Stores), 106 Liberty St., 22 Beaver St., 4 John St., 745 Sixth Ave. Liberty Radio Co., 905 F St., N. W., Washington, D. C., and 85 Washington St., Providence, R. I. Autoelectric Storage Battery & Supply Co., 201 Paterson St., Paterson, N. J.

**R. C. A. to Pay Dividend on Preferred Stock**

MAJOR GENERAL J. A. HARBORD, president of The Radio Corporation of America, makes the following statement:

"The Radio Corporation will this year pay the 7 per cent. dividend on its preferred stock, which is cumulative from January 1, 1924.

"It is anticipated that at the meeting

of the stockholders, to be held in May, the charter of the corporation will be amended so as to reduce the number of shares of authorized preferred stock from 5,000,000 to 500,000 and the authorized no par value common stock from 7,500,000 to 1,500,000 shares. The plan is to retain the capitalization of the corporation as at present authorized, but to create a par value of \$50 for the preferred stock, to be known as 'A' preferred stock, for which the present preferred stock will be exchangeable at ten shares of the present for one share of the new stock and to exchange the present common stock at the ratio of five shares of the present stock for one share of the new or 'A' common stock.

"The exchange in cases where the present stock is not held in multiples of ten and five shares will be facilitated by the issuance of fractional shares of the new stock.

"The 'A' preferred stock will be entitled to receive 7 per cent. dividends, payable quarterly, cumulative from January 1, 1924, the payment for the first two quarters of 1924 to be made in July. Shares of the present preferred stock not converted into the new, and fractional shares resulting from uneven multiples, will receive the 7 per cent. dividend, payable, as may be determined by the board of directors, but cumulative from January 1, 1924. Stockholders who have not exchanged their preferred stock in time for a particular dividend date on the 'A' preferred stock, will be entitled to any accrued and declared dividends on said 'A' preferred stock after they make such conversion.

"The dividend rights of the preferred stock over the common stock, and the voting rights of each, will be preserved in this arrangement."

For Maximum Amplification Without Distortion and Tube Noises use the well known

**Como Duplex Transformers**Push-Pull  
Send for literature**COMO APPARATUS COMPANY**  
446 Tremont St. Boston, Mass.**Save on  
Guaranteed  
Radio Equipment**Write us a post card—  
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and we will send you free this 52 page catalogue of radio sets and parts. It also contains explanation of radio terms, map and list of broadcasting stations and much radio information, including an explanation of successful hook-ups and circuits.

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This catalogue contains everything for the expert and amateur. Complete sets and every improved part for building sets, all the most up-to-date devices—at the lowest possible prices.

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The circuit that actually does operate a loud speaker on one tube.

**KNOCKDOWN COMPLETE PARTS**

(Tube and batteries not included)

**\$24.50****DIAGRAM AND INSTRUCTIONS FOR WIRING**

I 7x10 Drilled and Engraved Genuine Bakelite Panel  
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 I Millimeter Jack  
 I Amico 20 Ohm Rheostat  
 I Dubilier .00025 Mica Condenser  
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**Superior Radio Service Co.**  
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 New York City

## A Good Suggestion

**E**DITOR RADIO WORLD: I get a great deal of pleasure out of my radio receiving set after getting home at night from a busy day at work. I am very much interested in your campaign against re-radiation.

I have several suggestions to make that I think are in order and if put before the general public will be an aid in eradicating this great evil.

One of the most interesting things about by broadcast reception is the "log" I keep, showing the exact points on all dials for any station I get and everything connected with its reception, what it is, etc., etc. In this way I can recognize at once when hearing the faintest sounds, where they are being broadcast by looking at my "log" or the summary of stations I try to keep up to date.

I have had my set about a month and had to learn by experience what re-radiation is. There were no instructions with the set, nor was I told anything about

handling it. The gentleman who placed it in my home stayed there for perhaps an hour and then turned it over to me.

Why not have all manufacturers use a standard list of "Dont's" printed on black and gold cardboard and give them out with not only each set sold, but with all radio

parts that are retailed to the "hookers-up?"

I offer the above as suggestions, as before stated, I as a consumer of radio broadcast am vitally interested.

Yours very truly, C. N. Cone,  
Gibsonville, N. C.

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Baldwin Phones  
with  
**SHELTON LOUD SPEAKER**

COMPLETE \$10.00  
Postpaid. Use your head-set for 2 purposes—Exceptional combination value—Every pair of phones tested—Guaranteed to give results.

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New Tubes

Burned out or  
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paired and guar-  
anteed equal to  
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T. No. 7. Detector. 6 Volt Filament. 1/4 Ampere. Plate Voltage, 16-22 1/2.  
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Superior to any on the market for Volume, Clearness, Distance and lack of Tube Noise. Mailed Post Paid to any address in the United States at \$4.00 each.

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### ARE YOU GOING TO BUILD A SET?

Our specialty is—Making outfits of complete parts for the construction of all good sets.

Our sets contain only the best standard apparatus. No inferior material is used in order that we may reduce the cost of the set to us. Our prices are absolutely the lowest that it is possible to sell good reliable outfitts at.

By selling the complete outfit we are enabled to give a lower price than what the parts would cost if bought separately.

The outfitts are complete, with drilled panel, base, bus-wire, binding posts, best standard parts, and directions, all assembled, ready to wire, which takes but a few hours.

We pay transportation charges, and we guarantee satisfaction.

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|--|---------|
| 1. Autoplex. One tube. Operates a loud speaker. The simplest set that has yet been designed .....  | \$12.00 |
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| 4. Reflex. Two tube. 500 to 1000 mile loud speaker range .....   | 28.00   |
| 5. Reflex. Three tube. Up to 3000 mile loud speaker range .....  | 33.00   |
| 6. Neutrodyne. Five tube. Save \$105 by building your own Neutrodyne.....  | 45.00   |
| 7. Ultradyne .....   | 45.00   |
| 8. Superdyne. Four tube. The Wonder Set. The set just described in Radio World. Results equal those obtained on an eight tube super-heterodyne.....  | 38.00   |
| 9. Major Armstrong's Radio Flyer. Two tube. This set is the most powerful ever made. In actual tests, using only a loop, this set has given greater volume than a regenerative set, using an outdoor antenna, three stages of audio frequency amplification, and three stages of power amplification. Slightly harder to operate than an ordinary set at first, but it is well worth while ..... | 25.00   |

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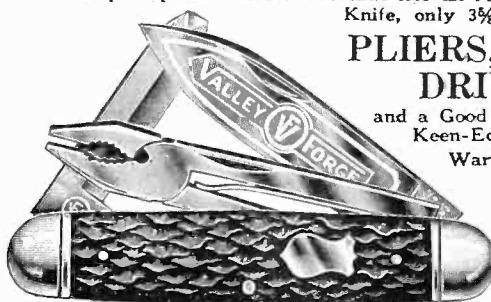
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191 GREENWICH STREET, N. Y. CITY

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The Compact pocket size outfit that fits all requirements. Folds up to the size of an ordinary Knife, only 3 1/2 inches over-all.



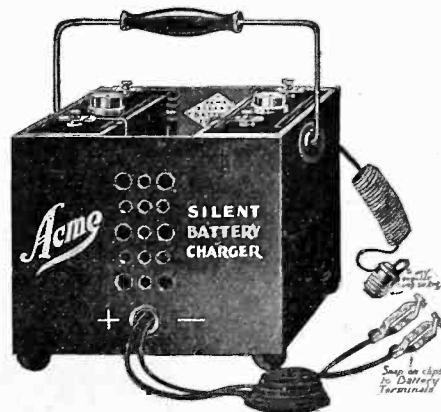
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DRIVER, WIRE SCRAPER  
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CUTTING BLADE

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With stubs on which records of Radio Artist are kept after card is detached and sent, a Log Book and Card combined, all for 1c.

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**THE IDEAL AUDIO FOR  
NEUTRODYNES**

Every Neutrodyne Receiver requires audio transformers which are especially built for this circuit. Build right by selecting SUPERTRANS first! Greatest volume. Least distortion.

Works equally well with  
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made under Hazeltine patents.Complete parts for three tube Neutrodyne tuner,  
(tubes, batteries, or phones not included), drilled  
panel, tube sockets, rheostats, fixed condensers, jack,  
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HELENA, MONTANA**VACUUM TUBES  
REPAIRED**WD-11, WD-12, UV-201A, UV-199  
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for \$3.00Quick service. All tubes repaired by us  
guaranteed to work as good as new.  
Send your dead tubes. We prepay parcel  
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511-519 ORANGE ST. NEWARK, N. J.**IT'S A FRAME-UP  
CAST ALUMINUM FRAMES**FOR YOUR RADIO SET  
MAKE IT RIGID and STRONGNO WARPING NO SPRINGING NO SHORT CIRCUITS  
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NO MORE CABINETS

JUST APPLY FLAT MAROON OR PLATE  
GLASS COVERS TO THE FRAMES

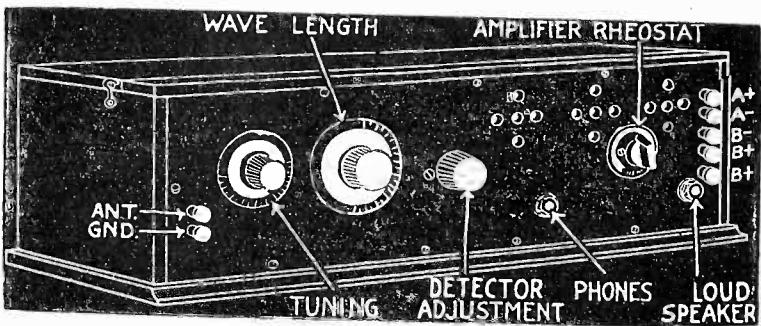
A SIZE FOR YOUR SET. PRICE ..... 85c. Each

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keeps right up to the minute on all radio news—  
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**THE  
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CIRCUIT"**

FOR DX RECORDS!

REAL SIMPLICITY!  
No experience is required  
to build and operate this  
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supplied simplifies every-  
thing. Just insert parts  
and connect according to  
our clear instructions. It  
is exceptionally easy.  
Turn the wave length  
dial and choose your sta-  
tion. Works excellently  
on a loud speaker.**PHONES**Knock Down.....\$21.50  
Built to Order...\$30.00**CROSLEY**

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Describes fully the complete line of radio frequency sets, regenerative sets (licensed under Armstrong U. S. Patent No. 1,113,149) and parts.

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Down Town 80 Cortlandt St. Up Town 149 W. 23rd St.

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Do You Want the Best for Least Cost ? ? ? ?

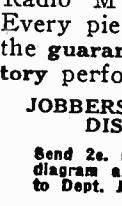
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**5 TUBE SET NEUTRODYNE** for \$44.75Includes a beautiful engraved panel.  
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As Good as Any Set Valued to \$150.00

Complete parts for the above  
set with drilled and beauti-  
fully engraved panel.....  
All Other Merchandise at Lowest Prices.

MAIL ORDERS PROMPTLY FILLED

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6 1/2 Ohm Rheo-  
stat ... \$1.10  
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tiometer ... \$1.50  
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Multi Terminal  
Receiver Plug.  
Installs a tandem  
connection for  
as many as six  
pairs of stand-  
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meter Rheo-  
stat ... \$1.50  
25 Ohm Micro-  
meter Rheo-  
stat ... 1.50  
40 Ohm Micro-  
meter Rheo-  
stat ... 1.50  
Patd. July 10,  
1923Send 2c stamp for wiring  
diagram and folder  
to Dept. J.

## Dr. de Forest to Make Elaborate Talking Films

DR. LEE DE FOREST, of the De Forest Phonofilms, the talking pictures of which he is the inventor, and famous as well for his radio and long-distance telephone inventions, announces the formation of De Forest Phonofilms, Inc., of which he is president. William E. Waddell, former manager of the Thomas A. Edison Kinetophone Studio and general manager of the American Talking Picture Co., has been made general manager of Phonofilms.

Dr. de Forest also announces that work will be started immediately on a series of most pretentious talking motion pictures. This series will include dramas, comedies, condensed versions of famous operas, scenics (in which nature's sounds, the singing of birds, roaring of animals, dashing of waves, etc., will of course be brought out) news pictures, famous vaudeville acts and comic cartoons with the characters' words actually spoken instead of being printed in "balloons." J. Searle Dawley, one of the foremost directors in the motion picture industry, will direct the larger productions. Mr. Dawley directed the De Forest "Lincoln" talking picture.

## The Convert

By James A. Munro, Jr.

Mr. Edson Cross was a live wire. Everybody said so—even his wife admitted it. He had the first radio in his section of the city and had a mah jong set before half the people in the city knew there were such things. Oh yes, if there was anything new out Mr. Cross had it. He liked bridge and golf but he liked the newer things, mah jong and radio better.

Mrs. Cross was different. She took little interest in mah jong but played bridge. "Just a passing fad," she said, "in ten years from now mah jong will be out of existence."

"That's exactly what you said of bridge ten years ago," said Mr. Cross, deftly turning the dial of his radio with experienced fingers. "Why not enjoy the things of to-day now? Ten years from now something entirely new will be the rage."

"Oh, you talk such nonsense, Ed," rejoined Mrs. Cross, using the same old argument she had used for the last twenty years.

"Station GKMH, Newark, New Jersey, broadcasting," shouted the radio, "Miss Nelson will sing accompanied by the concert orchestra," continued the announcer.

"Aha! I've been waiting to hear her sing for some time," said Mr. Cross. "Let's see now. It was on January twenty-first she sang last," he continued, consulting a little notebook. Saying this he settled back in his chair in perfect comfort. "Ah, this is going to be a real treat," he murmured.

"Such foolishness!" pouted Mrs. Cross, leaving the room.

"You'll wake up within the next fifty years," quietly gurgled Mr. Cross, adjusting his head phones and planting his feet upon the sofa.

Three days later, Mrs. Cross was cleaning the "radio room," when the door bell rang. She set her mop quickly against the table the radio was on and hurried downstairs.

A few minutes later she again came upstairs and, behold, some one in the other room was saying: "—again I say to the housewife of America we owe the greatest tribute—" Mrs. Cross hurried in. It was the radio. The mop had fallen, hit one of the dials and the above had been heard.

Right then and there Mrs. Cross made up her mind and when Mr. Cross returned that afternoon he was met by his smiling spouse whose first words were "Ed, dear, let's get another pair of ear phones."

### Radio "Luxury" in Frankfort

GERMAN interests desiring a monopoly, or at least control of radio, assert that it is a "luxury," and should be subject to taxation, contending that it will only be possible to finance good broadcasting if the control remains with the government. Recently, however, the Post Office has granted permission to special companies to construct broadcasting stations, and given private persons licenses to buy receivers.

Those who approve of private operation say such control will discourage initiative, and that it will be impossible to enforce regulations without spying out home-made sets. The system of government control will, however, be continued temporarily, and those who listen in must use outside antennae and purchase sets stamped by the government, as well as possess a Post Office license, costing 25 gold marks a year. The first broadcaster licensed in Frankfort was the Sudwest-deutsche Rundfunkdienst, A. G., which will operate exclusively within a radius of 150 kilometers.

## PATENTS

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**FREE INVENTION RE-**  
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## The Goodman

For best reception you need  
The niftiest short wave tuner on the market. Great for present broadcasts, local and DX. Used in all parts of the world. Certificates of merit from testing laboratories. Pamphlet on request.  
L. W. GOODMAN, Mfr., Drexel Hill, Pa.



## Adv. Proof Corrections Not Later Than Thursday Noon

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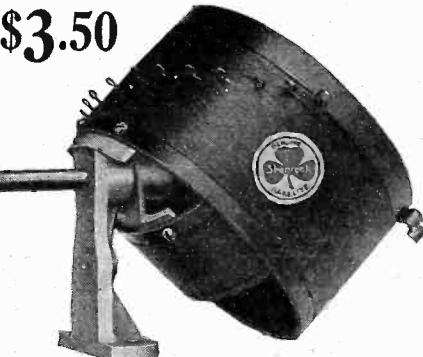
The circulation of RADIO WORLD is increasing every week to such an extent that the present mechanical facilities of production are nearly at their limit.

Advertisers, therefore are notified that it is absolutely necessary that corrected proofs be received by RADIO WORLD by or before THURSDAY NOON of each week for the last form of the following week's issues.

**BUSINESS MANAGER,  
RADIO WORLD**

1493 Broadway, New York City

\$3.50



## SHAMROCK Variocouplers

SHAMROCK engineers have designed an instrument that has won instant recognition with both radio experts and discriminating amateurs. There is no other variocoupler on the market that embodies both the following features:

(1) Pig Tail connections. This gives the Shamrock Variocoupler 50 per cent more efficiency than variocouplers with spring connections.

(2) Concentric Centers. This means that both the primary and secondary coils have the same center of rotation. This feature gives a balanced change of inductive field when the variocoupler is rotated.

Shamrock also makes a high grade variometer, which sells for \$3.50 list.

Mail coupon for information on both of these efficient instruments.

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Shamrock—for Selective Tuning

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Shamrock Manufacturing Co.,  
315 W. Market St.  
Newark, N. J.

Gentlemen:

Send me, without obligation, literature on the Shamrock Variocoupler and Variometer.

Name .....

Address .....



YOU can afford to have several at this price. Our guarantee protects you. Equal to any headset on the market in perfect reception of broadcasting. Send \$3.00 by registered mail or money-order. We will ship C. O. D., if you prefer. Prompt shipment—we pay postage. Ask for our

Free Catalog of Radio Parts  
EDSON RADIO SALES CO.  
13 Elmwood, Providence, R. I.

## OUT OF THE ETHER

### Chats About Broadcasting Stations

By Hirsch M. Kaplan

A station that comes through quite regularly these days is WRAX, operated by the owners of Flexon's Garage, located at Gloucester City, N. J. The station operates on a wave of 28 meters and the programs offered are pretty good. A few of their most popular performers whom

*Ackerman*

LOUD SPEAKER, \$9.50

Complete—Ready for Immediate Use  
Delivered Anywhere in the U. S. A. A Marvelous  
Speaker for the price of a headset.  
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## Reduce Tubes by Half With Erla Synchronizing Transformers

Vacuum Tubes  
in ERLA Duo  
Reflex Circuits

$$\left\{ \begin{array}{l} 1 = 3 \\ 2 = 4 \\ 3 = 5 \end{array} \right\}$$

Vacuum Tubes  
as Ordinarily  
Employed —



Increased amplification and elimination of distortion inevitably follow installation of Erla transformers. Reflex and cascade types. \$5



Erla audio transformers add tremendously to the purity and volume of any receiving unit in which they are used. Ratios 3½ and 6 to 1. \$5



Crystal troubles vanish on installing an Erla rectifier. No adjustment required. Proof against jolt and jar. Lasts indefinitely. List \$1

Jobbers—Sweeping success of Erla circuits fosters continually increasing demand for Erla products. Write for terms and discounts.

### Nation Wide Loud Speaker Reception With Only Three Tubes

Greater range and volume with fewer tubes than ever before are attained through Erla Duo-Reflex circuits, using Erla synchronizing radio and audio transformers.

In Erla circuits, tubes do triple duty, as simultaneous amplifiers of received radio frequency, reflexed radio frequency, and reflexed audio frequency currents. Through accurate superimposition of currents identical in phase and frequency, by means of Erla synchronizing transformers, this triple function is flawlessly performed, resulting in tremendously magnified amplification without distortion.

Even one tube provides excellent loud speaker reception over a wide range; two tubes blanket the zone ordinarily covered by four; while three tubes bring in stations on the loud speaker from coast to coast.

Other notable improvements, contributing vitally to the superiority of Duo-Reflex circuits, are the Erla fixed crystal rectifier and Erla tested capacity condensers. Combining advanced characteristics for reflex work with unduplicated uniformity, they are indispensable to complete stability and purity of reproduction.

Detailed diagrams and descriptions of Erla Duo-Reflex circuits are presented in Erla Bulletin No. 16. Ask your dealer, or write, giving your dealer's name.

Electrical Research Laboratories  
Dept W 2515 Michigan Avenue, Chicago

**ERLA**

we have heard are the West Philadelphians and the Peerless Dance Orchestra, two very good combinations which are above the average.

The Sacred Heart College band came through from Station WJAR with a very well liked program of classical selections. Besides, many of the individual members took part in saxophone, xylophone, and clarinet solos.

For those who enjoy organ music, we would suggest they watch the daily radio programs for Ralph Emerson, a regular performer at WDAP. Those who do will be rewarded. Since radio broadcasting has come into its present state we have heard many organ recitals, but few can be compared to those rendered by Mr. Emerson. When we tuned in on this recital we thought we were listening to a symphony concert.

Paul Whiteman's famous dance orchestra, known as the S. S. "Leviathan" Band,

(Concluded on next page)

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formers  
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ESTRU LATTICE COIL PRODUCTS have been designed so as to produce as nearly as possible IDEAL INDUCTANCE in various forms. It was not the intention in designing, to produce Miniature Apparatus, the small size being the result of careful electrical design with no UNNECESSARY Mechanical parts which would detract from the electrical efficiency.

YOU will appreciate those facts as set forth in our COMPLETE DESCRIPTIVE LITERATURE, which will be sent on request and in reading our GUARANTEE which goes with all ESTRU PRODUCTS.



2905 WEST MADISON STREET

## Out of the Ether

(Concluded from preceding page)

was heard rendering a program of popular numbers, which we greatly enjoyed through Station WHAM. This combination is only one of Whiteman's many auxiliaries and now we are waiting to hear the original jazz boys who, according to an inside tip, are to perform at one of the New York broadcasting stations in the near future.

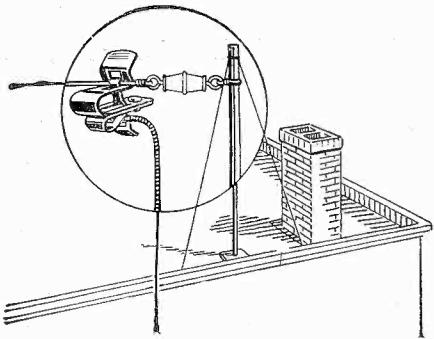
It's very seldom that the stations operated in New York City and thereabouts put a play of any sort on the air, but when they do, oh, boy! The other evening Station WJZ broadcast the entire performance of Arthur Hammerstein's musical show "Mary Jane McKane." If there was any means of having a movable microphone, one which could gather in every word, no matter what part of the stage the performer might be and means for eliminating all noises except those produced by the performers and orchestra, things would be much better. Those who listened in on this offering will know what is meant.

Twice in the past in this column on having heard representatives of the Canadian Royal Mounted and Philadelphia

Police Band perform, we asked why it was that the stations in New York City didn't book such noted performers as the Police Glee Club and Firemen's Band. We take it for granted that our short note did not go unheeded for the other evening WOR offered a very splendid program by the New York Fire Department Quartet. We hope this has started the ball a-rolling and that in the future many other municipal groups will appear at the various local broadcasting stations.

John B. Taylor, through Station WGY, delivered a short but very interesting talk on "Broadcasting, Ancient and Future."

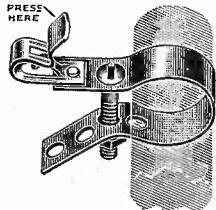
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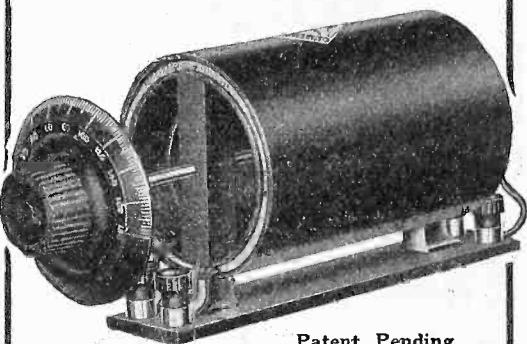
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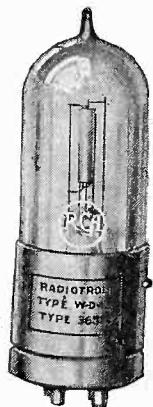
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Clearer tone, greater volume, increased distance and selectivity guaranteed or your money refunded! Improves any set, tube or crystal. A laboratory product, with capacity, resistance and strength calculated to give better results.

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**DETECTIVES NEEDED EVERYWHERE.** Excellent positions, cities, towns. Particulars free. Captain Wagner, 188 East 79th St., New York.

## Here Are Good Programs

(Concluded from page 19)

### Station KGW, Portland, Ore.

492 Meters (610 Kcys.) P. T. March 7-11:15 A. M.—Market basket. 11:30 A. M.—Weather forecast. 12:30 P. M.—Concert. 3:30 P. M.—Lecture by Esther B. Cooley, clothing specialist, Extension Service, Oregon Agricultural College; subject, "Texture and Pattern Effects." 7:30 P. M.—Weather forecast and market reports. 8 P. M.—Accordion solos by Johnny Sylvester. 8:15 P. M.—Studio program of dance music by George Olsen's Metropolitan Orchestra of Hotel Portland, Herman Kenin, director. 9 P. M.—Educational lecture provided by University of Oregon Extension Department. 10:30 P. M.—Hoot Owls. March 8-11:30 A. M.—Weather forecast. 3:30 P. M.—Children's program. Story by Aunt Nell. 10 P. M.—Weather forecast and dance music by George Olsen's Metropolitan Orchestra of Hotel Portland (2 hours).

### Station KGO, Oakland, Calif.

312 Meters (960 Kcys.) P. T. March 7-1:30 P. M.—New York Stock Exchange and U. S. Weather Bureau reports. 3 P. M.—Short musical program. An afternoon with the modern poets. 6:45 P. M.—Final stock exchange and weather reports, and news items.

March 8-12:30 P. M.—New York Stock Exchange and U. S. Weather Bureau reports. 8 P. M.—The San Jose Scots' Band; Etta Wilson, soprano, and Eugene Cowles, baritone soloist.

### Station KFKB, Manhattan, Kas.

286 Meters (1050 Kcys.) C. S. T. March 7-7:05 P. M.—"Farmstead Planning," Prof. W. G. Ward. 7:30 P. M.—"Selection of Farm Machinery," Prof. R. H. Driftmier. Musical numbers.

March 10-7:05 P. M.—"The Importance of Better Seed," Prof. H. R. Sumner. 7:30 P. M.—"Cattle Feeding," Dr. C. W. McCampbell. Musical numbers.

March 11-7:05 P. M.—"The Production of Wholesome Dairy Products," Prof. N. E. Olson. 7:30 P. M.—"Feeding, Care and Management of Baby Chicks," Prof. L. F. Payne. Musical numbers.

### Station WJAX, Cleveland, Ohio

390 Meters (770 Kcys.) C. S. T.—New schedule every week day: 9:9-15 A. M.—Review of yesterday's market. 9:30-10 A. M.—Women's program. 10:05-10:45 A. M.—Financial news, market quotations, etc.

### Station WBKR, Brooklyn, N. Y.

244 Meters (1230 Kcys.) E. S. T. Regular program daily, 8:30-10:30 P. M. Sunday, 3-5 P. M.

### Roxie to Appear in Providence

S. L. ROTHAFEL and his Capitol staff of broadcasting artists will appear in Providence, R. I., on Sunday evening, March 16, at a benefit performance held by the Shriners of that city. This program will not interfere with Mr. Rothafel's regular Sunday evening engagement with the radio audiences as special preparations are being made to pick up his program in Providence so that it may be broadcast by WEAF, WCAP and WJAR.

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These popular hook-ups use UV-199, WD-11 or WD-12 Tubes. One hook-up gives selectivity and 1,500 miles with absolutely no body capacity, while the other gives the remarkable distance of coast to coast. Both prints postpaid for 50 cents or any of the above tubes postpaid \$4.95. No stamps accepted.

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1.50	Voltmeters Blk	0-50	.98
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Your detector tube may be just lacking the close co-operation needed from its grid leak. Put on a variable RESISTRON—and pick your way through the field at will. Smooth operation, perfectly quiet, brings in those stations you've longed for time and again. Buy a RESISTRON today—and make your set go its limit.

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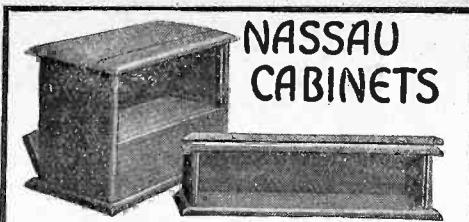
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**GUARANTEED UP TO DATE** radio repairing, rewiring and rebuilding. Send us that set which is out of order or will not work. Prices reasonable. **RADIO SERVICE SHOP**, Atwood, Kansas.

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Eliminates use of all variometers, variocouplers and loading coils. Permits building most efficient, sharp tuning, loud, long distance receiver at lowest cost.

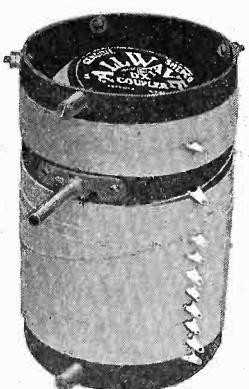
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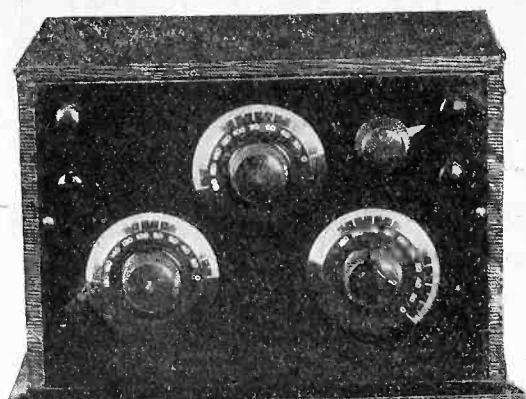
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This amplifier is considered the best that can be made for

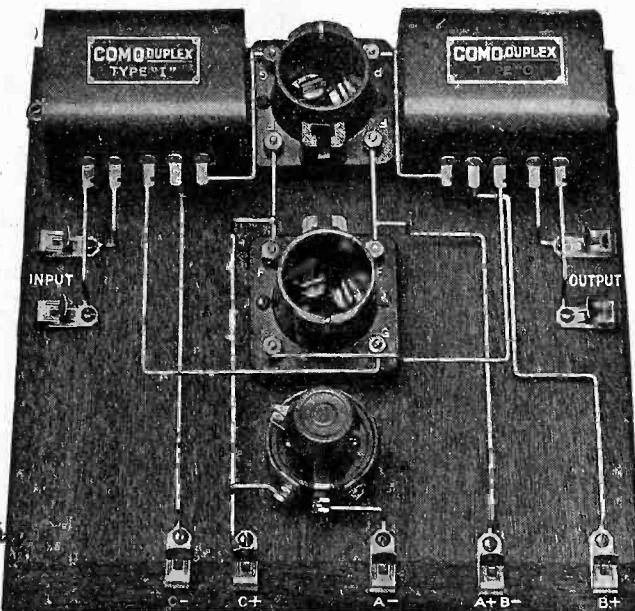
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- 1 Pr. Como Duplex Trans-  
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- 1 Rheostat
- 1 Mahogany Mounting Board,  
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Complete



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