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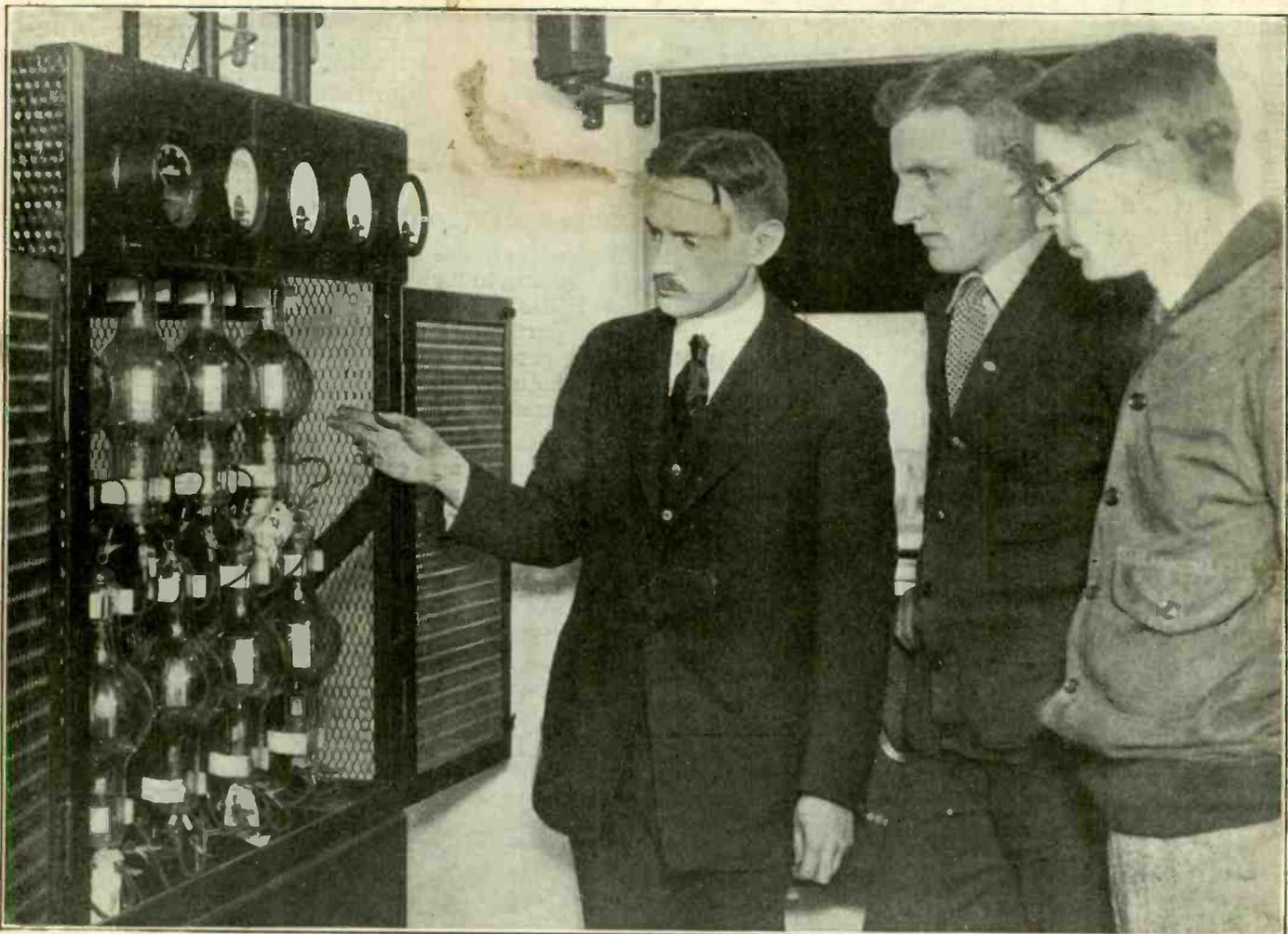
RADIO WORLD

Title Reg. U. S. Pat. Off.

ILLUSTRATED

EVERY WEEK

AIR MAIL OFFICIALS INSPECT FLYING FIELD RADIO STATION



(C. International)

R. L. Davis, radio engineer of the Westinghouse Electric & Mfg. Co., explaining the operation of the special transmitter used by the Air Mail Service to keep in touch with its mail planes to D. B. Colyer, superintendent of the Western Air Mail Division, and J. V. Magee, special assistant to the Postmaster General. The set was donated to the Postal Department by the Westinghouse Co. for these experiments and is located at the Omaha field of the Air Mail Service. It has a consistent range of 800 miles and can keep the station in constant touch with the planes throughout their 500 mile jump from Omaha to North Platte, Nebraska.

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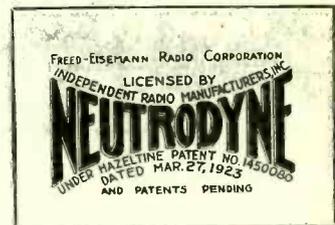
wiring diagram, so that it will hardly be possible for the amateur with ordinary care and skill to make an error.

Remember that here are licensed parts—not a collection of apparatus trusting to luck that they will assemble properly. Each part is designed and fitted to work with each other part in this particular set. The instructions are so complete and the parts so accurately matched that you will be grateful for the manner in which we have eliminated guess work in the amateur construction of this receiver.

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Front View KD-50 Neutrodyne Being Assembled



32-page illustrated book of instructions on "How to Build the Neutrodyne," with full size pictorial wiring diagram and full size panel and baseboard templates, \$1. At your Radio Dealers.

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BROOKLYN, N. Y.

RADIO WORLD

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Characteristics of Vacuum Tubes

By Walt. S. Thompson, Jr., E. E.

WITH so many different types of radio receiving tubes on the market, the fan is very often in a quandary as to what type to use for a particular purpose and how to get the best results from a particular tube. In order to help the fan settle these questions, the table accompanying this article was prepared by the writer, the values given being sufficiently accurate for this purpose.

In the following discussion of the table, each item will be taken up separately so that RADIO WORLD readers may be able to make the table most useful.

Immediately under the manufacturer's name the normal filament current for each tube is given. This value is very essential in selecting the type tube to be used, in selecting the proper rheostat for the tube and in deciding whether a dry cell or a storage battery is necessary. If the set is to be portable, a tube must be used which has a low filament current so that dry cells may be used. Any tube taking over 0.25 ampere requires a storage battery for economical upkeep. If two or more tubes are connected in parallel and controlled by the same rheostat, this rheostat must be able to handle the total current; hence it is necessary to know the filament current in order to determine the current carrying capacity of the rheostat.

The value of the normal filament voltage is most useful in selecting rheostats and filament batteries. As the difference in voltage between the battery and that necessary for the tube must be used up in the rheostat, the rheostat must have enough resistance so that the product of the resistance and the filament current will be greater than this difference in voltage.

The values for the filament battery voltage must be kept in mind when purchasing the filament battery. All voltages for tubes taking more than 0.25 amperes

are for storage batteries and all other values for dry cells.

The values for the resistance of rheostats applies for the values of the filament battery voltages given. In case a higher voltage filament battery is used the resistance of the rheostats should also be increased.

The amplification factor is sometimes useful in comparing amplifier tubes as the better tubes usually have higher amplification factors.

The proper B battery voltage is given by values for the normal plate voltages. These values represent those which in general will give the best results from the tubes using the grid bias potentials given as the next item. When the bias potential is not greater than 1.5 volts, no C battery is necessary if the rheostat is connected in the negative filament lead. Above 1.5 volts a C battery will be necessary to prevent distortion.

The values given for the output impedance are essential in purchasing audio-frequency amplifying transformers and head sets. The reader should be sure that the impedance, at audio-frequencies, of such apparatus is approximately equal to these values as this condition assures better results.

The figure of merit is not recognized by all the tube manufacturers, but the writer believes it to be one of the best indications of the worth of any tube as an amplifier. The better the tube, the higher the figure of merit will be as it is equal to the voltage amplification factor divided by the square root of the output impedance.

The last three items given in this table are the writer's opinion of the performance of each tube as a detector, as an audio-frequency amplifier and as a radio-frequency amplifier. These items will be found very useful in selecting a tube for a particular purpose.

COMPARISON OF THE CHARACTERISTICS OF RADIO RECEIVING TUBES

Type Letter	E	J	N	L	V	C300 UV200	C301 UV201	C301A UV201A	C299 UV199	WD11 WD12	DV1	DV2	DV6A
Mfrs. Code Letter	205-B	203-B	215-A	216-A	209-A								
Manufacturer	The Western Electric Co.					R. C. of A.							
Normal Filament Current	1.35	1.15	0.25	0.97	1.25	1.0	1.0	0.25	0.06	0.25	0.06	0.25	0.25
Normal Filament Voltage	6.5	2.4	1.1	4.7	3.0	5.0	5.0	5.0	3.0	1.1	3.0	5.0	4.0
Filament Battery Voltage	8.0	4.0	1.5	6.0	4.0	6.0	6.0	6.0	4.5	1.5	4.5	6.0	6.0
Resistance of Rheostat	6.0	6.0	6.0	6.0	6.0	6.0	6.0	20	30	6.0	30	6.0	6.0
Amplification Factor	7.1	6.0	6.0	5.9	28	—	6.0	7.25	6.25	6.0	6.0	6.5	5.5
Normal Plate Voltage	350	40	40	130	130	15	—	40	40	40	40	40	40
Grid Bias Potential	-22.5	-1.5	-1.5	-9.0	-1.5	24	40	80	80	40	80	130	90
Output Impedance	4,000	20,000	25,000	6,000	60,000	—	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.4
Figure of Merit	0.112	0.042	0.038	0.076	0.114	—	-4.5	-4.5	-4.5	-4.5	-4.5	-9.0	-4.5
Use as Detector	—	Exclt.	Good	—	—	9,000	25,000	13,000	16,000	25,000	20,000	9,000	20,000
Use as Radio Fre. Amp.	—	—	Good	—	—	—	—	0.048	0.043	—	—	—	—
Use as Audio Fre. Amp.	Exclt.	Fair	Good	Exclt.	Exclt.	—	Good	0.065	0.049	0.038	0.042	0.080	0.039
						—	Exclt.	Fair	Fair	Good	Good	Fair	Fair
						—	—	Good	Good	—	Fair	—	Good
						—	Good	Exclt.	Good	Good	Fair	Exclt.	Good

The Interference Problem in Radio

Universal Radiation Preventer Now Being Developed

By *E. F. McDonald, Jr.*

President, National Association of Broadcasters

IN analyzing the radio interference situation at the present time, it should always be remembered that while broadcasting is of paramount importance to millions of people throughout the country, there are other phases of the radio industry which must be considered and upon which depend much of the commerce of the world. Trans-Atlantic and ship-to-shore radio traffic are of vital importance. The work of the serious radio experimenter is also of the highest value in furthering the advancement of the radio art. In order that the broadcast listener may get the most out of his radio receiver, a thorough knowledge of the causes of the interference which he occasionally experiences together with the various means available for their reduction or elimination is essential.

There are, of course, various types of interference occasioned by different causes. The two most annoying at the present time are telegraph code interferences from ship and shore stations working on the low wave lengths of around 450 meters, and the re-radiation of radio receivers of improper design or improperly operated by unskilled users. It is to the interest of all participating in the radio industry to assist in correcting these conditions as well as the other causes of interference.

The National Association of Broadcasters have been in conference with the Hon. Herbert Hoover, Secretary of Commerce, on the subject of ship interference, and through his efforts and co-operation are arranging for international regulations providing for the carrying on of ship-to-shore traffic on wave lengths outside the broadcasting band. This article, therefore, treats only with the interference created by re-radiation from radio receivers.

It is a popular fallacy that all that is necessary to put a stop to any undesirable condition is the passing of legislation. Unfortunately this idea has occasionally taken root and grown into something that constitutes a real menace at the heart of our American civilization. There is nothing more detrimental to the morale of a nation than the adoption of legislation which is obviously impossible of enforcement and which, through the ease with which it may be ignored, teaches wholesale disrespect for not only the law but the authorities that make it. We have, at the present time, a startling example of an "iron-clad" law which so far at least has been impossible to enforce, and which has possibly worked a greater evil than that which it was designed to eliminate.

During the war the Navy Department undertook through its Intelligence Service to prohibit the use of transmitting and receiving apparatus throughout the country. The prohibition on transmitting was comparatively easy to enforce, but although every effort was made to eliminate reception, in the final analysis it came down simply and squarely to reliance on the loyalty and patriotism of the individuals which go to make up our great nation. Obviously the individuals who really desired to use radio for ulterior purposes had no such sense of loyalty and as a consequence, to a great extent, all that was accomplished was the prohibition of the use of radio receivers in the hands of those who would not use them in any case to the dis-

advantage of the country, whereas it was practically impossible to stop the use of such apparatus in the hands of those intent on serving their own ends.

For these reasons, the adoption of legislation prohibiting the use of receivers which feed back energy into the antenna is obviously absurd. The adoption of an act of this kind would be comparatively easy but the enforcement would require a greater force of officers and special agents than we have at the present time attempting to enforce prohibition. Certainly our government cannot afford such an expenditure even if it were possible to completely eliminate radio feedbacks by such means. It should be remembered that in the first place the locating of the offending receivers which feed back into antennae would be comparatively difficult, and even when they were located it would be a simple matter for the user of a set of this kind to disconnect the tickler coil or whatever means was used to feed back the energy, while the inspector was present, and attach it the moment he left. The enforcement of any such act would also be rendered extremely difficult because of the statutes prohibiting the entrance of private dwellings without search warrants.

Granting that the feed-back from radio receiving sets is harmful and that preventative legislation if not impossible, at least is impractical, what is to be done?

Obviously the solution to the problem is constructive action on the part of the radio manufacturer. At the present time the laboratories of eight of the largest manufacturers of receiving apparatus are at work night and day on the production of a simple device to be connected ahead of receivers feeding back which will not allow the passing of this energy out of the antenna. Such a device when developed and perfected will be put on the market by the manufacturers according to an agreement among them, at practically actual cost, so that the users of all types of sets will have the benefit of this type without undue expense. It is not fair or reasonable to expect the users of feed-back receivers to junk and throw away apparatus representing the investment of many hundreds of thousands of dollars, when by the addition of some simple device the harmful re-radiation can be entirely removed and reception improved.

The public will not be hard to persuade to use a device which will cost little and which will not only through reciprocity eventually eliminate all feed-back howls but will also improve reception and increase the selectivity of a receiver with which it is used.

It is often said that one of the most interesting phases of radio to the novice is its possibility of original experiment. Many of the more important developments in the radio field have been made by novices. From this standpoint then, the development of a one-way valve to prevent radiation from receivers certainly offers wonderful possibilities. With the general public interested in the development of a universal attachment of this kind, as well as with the well equipped laboratories of the larger manufacturers of radio apparatus earnestly working on the problem, it is safe to predict that not much time will elapse before there is available a universal radiation preventer which will be adaptable to all types of receivers.

One Way to Stop Radiation Interference

By C. White, Consulting Engineer

IN a recent issue of RADIO WORLD I set forth a type of radio muffler that was more complex than the type here discussed. Although this model is not as efficient as the former type, still it is more economical and can be readily converted into the better type if the need should ever arise.

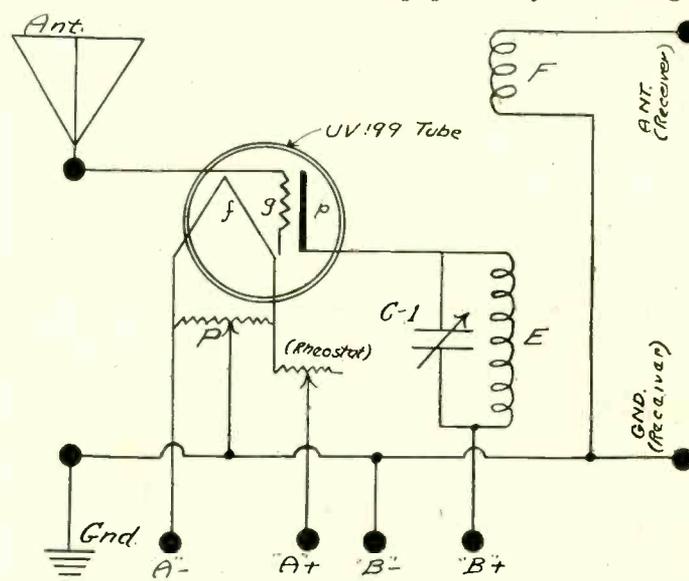
Do not consider that a radio muffler is simply and only a tuning element with a tube that is placed before your set in order to insure the comfort of the other fellows against your mistakes in tuning. It is this and more besides. It is also a filter and a wonderful clarifier of signals. For this last purpose alone the unit would be well worth the expense and trouble to construct.

Many radio fans will no doubt be interested to know why this tube will eat up the radiated energy effectively. It must be borne in mind that energy can only be radiated from a receiving set if the first tube in the set is in oscillation. Now if this tube can be restrained from oscillating the whole problem is solved, at least to a great extent. You may readily understand that fact, but how about the action of this tube if the detector tube in the regenerative set is in oscillation? Again we must go back to fundamentals and remember that a radio tube is nothing more than a valve that permits the travel of energy in one relative direction only; that is, from the grid to the plate and not from the plate to the grid. Of course, there might be a slight transmission of energy in the last mentioned direction but it must be explained by the capacity effect of the elements of the tube alone and not the electron emission theory. The reason the first tube in this muffler cannot oscillate is that there is no tuning element in the filament-grid circuit of this tube. The incoming signal is directly impressed on the filament and the grid of the tube and is passed on according to the law of vacuum tubes to the plate circuit. In the plate circuit of the muffler tube is placed a tuning system in order to help eliminate interference and create sharper tuning. With this muffler attached before your set you will be able to enjoy better and clearer concerts and at the same time have the satisfaction of knowing that no matter how you may be accustomed to tuning you are inflicting no punishment on your fellow radio listeners.

One of the best features concerning this addition to your set is that it is not very expensive and can be readily built in a very short time at home. A UV199 or C299 tube is used because a separate set of "A" and "B" batteries must be used. With this tube three flashlight cells, such as the Eveready "3" battery will suffice as an "A" battery and a 22½ volt "B" battery will furnish sufficient plate voltage to insure satisfactory operation. It is advised that a standard 199 socket be used and not an ordinary tube socket with an adapter. The potentiometer P has a resistance of 200 ohms or more and affords an adequate control of quality as well as volume. The filament rheostat should have at least 50 ohms resistance. The condenser C-1 is an 11-plate variable while the inductance coils E-F are wound at home with No. 22 DCC magnet wire on a 3½" diameter tube 3½" long. The coil E has 55 turns of wire and F has only 9. There should be at least ½" separation between E and F on the tube so as to give a very loose coupling effect. The whole unit can be assembled in a very small space and should be made as compact as possible. In fact the batteries

and the unit itself can all be neatly placed in one cabinet with a panel no larger than 6"x6".

The tuning of your set with this muffler is hardly any more involved than without the muffler. The tube is first turned on dimly and the condenser of C-1 placed at zero capacity (i. e. with no plates in mesh; dial should be set to read zero at this position). Then proceed to tune your set as though the filtering unit was not present. After tuning in a station you will find that C-1 can be employed to advantage to render your tuning sharper and that the filament rheostat and the potentiometer P can be used to improve volume and tone. Although the exact action and operation of this filter will largely depend upon the style of regenerative receiver with which it is used, still it will be almost equally adaptable to all types and equally as well operated with all. It is, of course, primarily intended for use with the familiar and popular styles of single



Simple and efficient radio choke tube that may be placed ahead of any tuning system, and which will effectively prevent the radiation of interfering oscillations, no matter how noisily the receiver itself is tuned. It is a variation of one suggested by Mr. White in RADIO WORLD for December 8, but being of the untuned type is simpler to construct and operate. It also acts as a wave trap, making tuning much sharper.

circuit regenerative receivers. This unit can be completely assembled in a neat scientific manner with good apparatus for much less than \$15.00, with tube, batteries and everything. When you stop to consider that you pay from \$7.00 to \$10.00 for just an ordinary filter circuit alone, this special muffler, filter and clarifier is really the ideal thing to make. Herewith is a list of the important items required to assemble the unit: 1 UV199 or C299 tube; 1 199 socket; 1 50 ohms or more rheostat; 1 200 ohms or more potentiometer; 1 11-plate variable condenser with dial; 1 3½"x3½" tube; 1 small spool of No. 22DCC magnet wire; 1 6"x6" panel (approximately); 1 cabinet to fit panel; 1 Eveready "3" battery; 1 22½ volt "B" battery; 8 binding posts (if batteries are mounted inside cabinet only 4 will be needed); bus wire and miscellaneous items.

There is nothing at all special in the above list and you may be easily able to get all of these items at your favorite store without delay. And in one evening's work you can assemble this unit without a hitch and be ready to use it before the night's broadcasting is over.

Bringing Back the Crystal Receiver

Construction Details of Extremely Selective Crystal Detector Receiving Set

By Leroy Western

THE crystal detector has slowly but surely lost ground in the radio receiving game, in most cases because of the facts that it does not give loud enough signals and that the circuits used with it are not very selective. However, a little experimenting with various grades and kinds of crystals will readily show that quite loud signals can be obtained with a crystal rectifier. Selectivity can also be increased so as to be very nearly as good as a standard regenerative tuner using a vacuum tube detector. With this point in view, the receiving tuner and circuit illustrated herewith was devised.

Bearing in mind the fact that inductive coupling, while giving rise to selectivity, reduces signal strength considerably, experiments were made to evolve a circuit

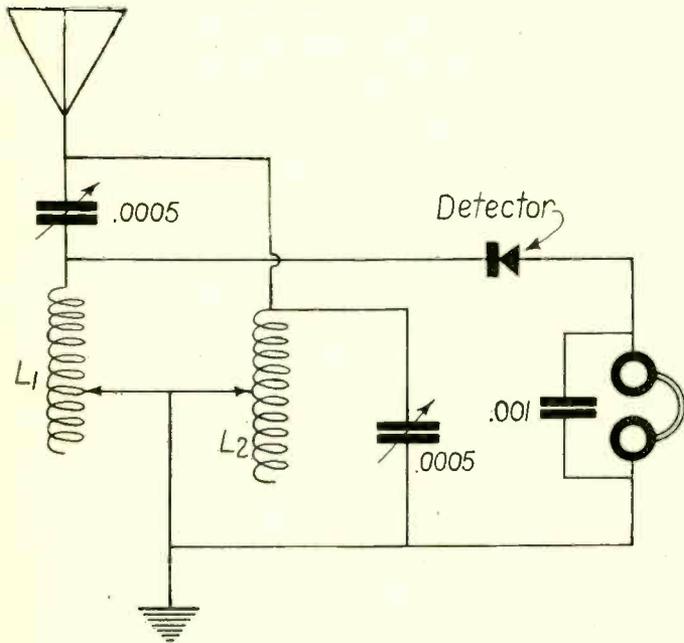


Diagram of a double tuned crystal set which is selective. It is a capacity coupled circuit, which accounts for its selectivity. A good crystal of either the synthetic or combination type should be used.

which would combine both selectivity and signal strength. It was decided in the first place, to use either conductive or capacity coupling and the ultimate circuit is a sort of combination of both.

In the diagram herewith, coils L1 and L2 are identical, both mechanically and electrically. They are both wound on cardboard or better still, radion or bakelite tubes, 3½" in diameter. In order to cover the entire broadcasting wave length range, the coils were both wound with 64 turns of No. 20 DCC wire. Forty turns were wound without taps and then the rest of the coil was tapped every other turn to the end of the winding. These taps were then connected to two sets of switch arms and the two coils were located quite a distance apart so as to prevent any electro-magnetic coupling between them. Five inches was found to be sufficient distance, but 7" gave even slightly better results. The signals were not found to be as good when the coils were closer together than 5" as a sort of interaction took place which reduced the strength.

Verniers are not necessary on the two .0005 mfd. variable condensers used, but they will very often

be found to be of advantage and it is a wise procedure to include them. However, if the set is mounted in a cabinet, the eraser on the end of a long wooden lead pencil will serve very satisfactorily for turning the dial. The eraser is to be placed against the panel with one side of it in contact with the edge of the dial. By turning the pencil at the opposite end, it will be found that the dial can be moved a very short space, in fact much finer adjustment can be obtained than would be possible by manual operation.

One of the greatest cries of the user of a crystal set is that he cannot tune out spark stations. With this set, no trouble was experienced in tuning out powerful navy and ship stations, while receiving broadcasting. This work was done when located 20 miles from Station WEAJ and approximately the same distance from the Brooklyn Navy Yard. The tuning procedure is somewhat as follows, although the operator undoubtedly evolves his own process after learning to handle the set: The first part of the tuning is done with the condenser across L2 set at maximum and the switch arm of coil L2 is set as high as possible. After the signal is tuned in by means of the series antenna condenser and coil L1, the condenser across L2 is reduced until maximum signal strength is obtained. Sometimes it will be found necessary to retune coil L1 as well as the series condenser, but this is not always necessary and in any case, only a slight variation need be made.

It will be found that fair signals can be obtained by using various combinations of settings, but after one is experienced in handling the set, one will find that there will be a certain combination of settings which will bring in the signals best. If during reception of broadcasting, spark interference is found, it can usually be eliminated by increasing the capacity of the series condenser and then readjusting the switch on coil L2. The switch arm on coil L1 sometimes will have to be changed in order to balance up with the circuit.

This circuit will be found to be a sort of wave trap arrangement used in connection with a crystal detector and will be found very efficient on wave lengths ranging from approximately 225 to 600 meters when used with the average sized amateur antenna.

The Radio Woman

FRIEND Husband and myself have been driven pretty nearly frantic during the last week or so, by a neighbor's son. The unknowing kid was given a "—plexy" receiver for Christmas, and evidently derives great pleasure from getting a squeal out of his set when looking for stations. He has been told by the man that installed the set—drat his shiny soul—that in order to get the station he must hear the tweet-tweet of the station. Therefore, day and night, until he is chased to bed, we hear the tweet-tweet of his little two-bulb receiver. Repeated offerings of showing him how to operate it correctly have nearly strained friendly relations, but if he doesn't stop, there will be a regular feud. To think that after all the months of receiving and everything peaceful and quiet, some little child has to spoil our evening's recreation.



(C Fotograms, N. Y.)
 "Smoky Joe" Martin, one of the most famous fire fighters in the world, who has been with the New York Fire Department for over 40 years, spending a few of his spare moments listening in over his radio set. Though he is officially known as Assistant Fire Chief Joseph B. Martin, the force all call him by his pseudo "Smoky Joe."

An Early Broadcast

BEFORE the days of the pioneer broadcasting station—in fact, eight years before KDKA went on the air, W. E. Downey, now Supervisor of Radio in the Department of Commerce, was at his key on board the S.S. "Mackinaw," steaming toward the Golden Gate, off California. All was serene, he was homeward bound and like all good operators, was listening in for his ship's call. Suddenly came the sound of music, apparently out of the air. He removed his head phones; the music ceased, so he readjusted his ear muffs. Clearer than ever came the strains of a popular orchestral piece. Closing his key, he left his seat and searched his shack for a concealed phonograph, thinking some of his mates were up to tricking him, but he found no phonograph—not even a music box. Doubtful of his own hearing, he listened in again. All was silent, but a few moments later he again picked up what seemed to be a piece played by a full orchestra.

Calling in the first mate, he told him of his experience and asked him to put on the phones. The mate, a bit skeptical, did so, but soon removed them to search the shack for a phonograph, while he charged the operator with trying to "hocus-pocus" him. The search availed nothing material, although the mate nearly tore the shack apart.

A few days later, after the ship was docked, Operator Downey took up the matter with friends and experts in San Francisco and learned that a radio company was experimenting in broadcasting the music of a local orchestra from the Fairmont Hotel over an arc transmitter and on a wave which was approximately that of the ship wave length in 1913.

To Relay President's World Message to Rotarians

HARTFORD, CONN.—A few minutes after President Coolidge has broadcast from the White House his message on the nineteenth anniversary of the Rotary Club movement, the evening of February 22, the complete text of the message will be started from this city and relayed by amateur radio stations to all Rotary clubs in this country and Canada.

If permission is obtained from representatives of foreign governments, the text will likewise be transmitted by amateur stations to Rotary Clubs in England, Holland, France, Italy and others of the twenty-seven countries where the Rotarians are prominently organized. Removal of the restrictions



(Photo Young & Carl)
 The first beauty contest to be held by radio will be in the Crosley Studio, Station WLW, Cincinnati, on St. Valentine's Night. Votes will be cast by telegraph from all over the world and the winner announced at midnight. Mary Costello, Helen Hamilton, Mathilda Brooks and Statira Childress are the contestants in the WLW broadcasting novelty.

governing international amateur traffic of this nature will be sought by George L. Treadwell, secretary of the Chicago Rotary Club from which the Rotary movement sprang.

The co-operation of the American Radio Relay League for the worldwide amateur relaying of the President's message was requested in the following letter from Mr. Treadwell to Hiram Percy Maxim, president of the A. R. R. L., who is now on his way to Europe:

"On Friday, February 22, President Coolidge will broadcast a message from the White House in the name of the Rotary Club of Chicago to commemorate the nineteenth anniversary of this international organization, which message it is planned to relay around the world (via the 1,600 Rotary clubs

now organized in twenty-seven countries of the world).

"President Coolidge will refer particularly to the birth of this idea in the Chicago club in 1905 and its spread in nineteen years to 500,000 members and 3,000 similar type clubs in these countries. He will refer to the Sixth Object of Rotary and its significance, namely 'the advancement of understanding, good will and international peace through a world fellowship of business and professional men.'

"Realizing that much of the present-day development of radio is due to the splendid pioneer work of the amateurs of America, the Rotary Club of Chicago believes that the members of the American Radio Relay League will be interested in co-operating by relaying President Coolidge's address as far and wide as possible in the United States and possessions. Permission will be sought to enable the American Radio Relay League to transmit abroad."

Static Knocks Out Forest Service Stations

TWO Forest Service radio stations in Wyoming have ceased operation due to static interference in that locality. These are WWD at Laramie and WWF at Medicine Bow Peak, Wyo., licensed by the Department of Commerce as point-to-point stations in the forest service last July, for use in reporting forest fires. The acting forester stated that the static proved to be so troublesome as to preclude the advantageous use of the set on Medicine Bow Peak. Before the installation it was thought this high peak would be ideal for the location of a transmitting station to send to Laramie, 50 or 60 miles distant.



John S. Daggett, announcer of KHJ, The Times, Los Angeles, Calif., better known as "Uncle John," seated before the microphone of the station. "Radio Kindness," the pet canary of the station, perched on the microphone giving the fans a treat to a silver throated song. "Uncle John" is known and liked from coast to coast.

The Boy Scout and Radio

By E. S. Martin

IN Boy Scout camps the use of radio and the interest in it are practically universal, and have been for some time; a Boy Scout troop not having a radio outfit is a rare exception. Furthermore, this may be applicable even to winter camps, as indicated by over six hundred Boy Scouts who last winter spent their holidays camping in the Interstate Park of New York and New Jersey. Radio sets were almost as thick as snowshoes and skis.

Many camps have "played" with the idea of radio but with the exception of the Boy Scout camps, there are very few so far that have gone at the subject in a really business-like way. The boys themselves have to some extent created the demand. A boy brings to camp a set that he has made at home and a goodly proportion of the rest of the crowd immediately wants to make a set like it; consequently in a number of camps, the construction of radio sets has become a recognized camp activity.

"Do a Good Turn Daily" is one of the mottos of the Boy Scouts. Radio is helping them to make the motto alive and real for themselves and for the people they aid and befriend.

Good turns are done daily by the scouts using radio receiving apparatus. Concerts and lectures are given in hospitals and similar institutions; invalids, the bed-ridden and the shut-in are cheered up, and in some cases funds are raised and receiving instruments purchased or constructed by troops to be given to those who may need them.

This is taking place everywhere. The Boy Scouts comprise the picked youth of the country—it is no wonder that in every state they have been quick to realize the advantages of radio broadcasting not only for themselves but for others, and have acted on their understanding. Only a few typical instances can be given. One is that of Troop 5, Providence, R. I., which began its radio work nearly a year ago and has been consistent ever since in doing good turns by radio. It managed to secure a Westinghouse tuner and amplifier, and a loud speaker which enabled large audiences to listen. After the outfit had been installed at troop headquarters and a radio expert had explained radio principles and operation in a series of lectures, the boys became familiar enough with the set to operate it. Promptly thereafter the troop offered to give concerts in the Rhode Island Hospital. The offer was accepted, the apparatus moved to the hospital where a temporary installation was made, and the first concert given in the hospital's largest ward, this being chosen as it afforded a large audience. Many patients from other wards were wheeled into the main ward for the concert.

Since then this troop has used its radio outfit on its hikes, has given other concerts to those needing cheer, and has taken considerable interest in the boys of the local reform school, using radio with them in an educational way.

Troy, N. Y., furnishes another example of the many humanitarian deeds performed by the scouts with the aid of radio. Troop 16 of Troy of the First Presbyterian Church decided that a receiving set was needed by an old lady whom they knew. She was an invalid and after a painful fall had been confined to her bed for two years, held in a plaster cast. The boys knew that nothing would be of greater service to her than the broadcast lectures, news and concerts, and after an enthusiastic meeting decided to raise funds to buy

the necessary parts and materials, and make a set for her. When the set was complete, other boys aided in installing the antenna and ground.

Racine, Wis., scouts erected a radio outfit and give concerts for the patients at a local sanitarium. In Washington, D. C., the local scout council has a radio class under the instruction of a member of the Army Signal Corps.

February 8 to 14 the scouts celebrate their fourteenth anniversary. Among the unique features are the radio programs. The broadcasting stations throughout the country have been most generous in making their facilities available to scouting. The American Telephone and Telegraph Company, Station WEAJ, has invited members and officers of the Executive Board to speak each evening from February 8 to 14, on some phase of scouting. This particular program will be simultaneously repeated through WCAP, Washington, D. C., and WEAN, Providence, R. I., and possibly through others simultaneously. Fifty or more stations will broadcast some feature on scouting every evening. The Amateur Radio Relay League will send a message to every scout executive and every scout commissioner in the United States.

As part of its program the Boy Scouts of America issues a pamphlet on radio. Every scout who meets the requirements of this pamphlet is entitled to wear a merit badge on his right sleeve. These are the requirements which test the scout's ability and, to obtain a merit badge for radio, a scout must:

1. Receive and correctly send not less than ten words a minute.
2. Demonstrate the correct form for sending a message.
3. Be able to tell in own words the principal laws regarding radio communication.
4. Demonstrate at least ten of the radiogram abbreviations. (Q signals.)
5. (a) Explain the purpose of a detector and adjust a crystal detector. (b) Name two minerals used as detectors.
6. Draw a diagram of a simple transmitting set, showing how the following instruments are connected: Dynamo or battery, spark coil, condenser, spark, gap, helix, key, antenna, and ground. Explain the function of each, or draw a diagram of a spark-tube set using a battery spark coil, condenser, vacuum tube, helix, key, antenna, ground.
7. Draw a simple diagram showing how to connect the following instruments: antenna, tuning coil or loose coupler, detector, fixed and variable condensers, phones and ground. Tell the use of the above apparatus.
8. Draw a diagram of three different types of aeri-als and tell their advantages or faults.
9. (a) Know how to properly ground a radio set during a thunder shower. (b) Demonstrate how to rescue a person in contact with a live wire, and have knowledge of the method of resuscitation of a person insensible from shock.

10. Write a brief essay on the development of wireless telegraphy. Explain what customs should be observed in operating a radio station.

So popular has radio become with the scouts that on the staff of *Boys' Life*, the official Boy Scout magazine, is a radio expert whose duty it is to answer the numerous inquiries submitted by radio fans. A department on radio is included in the magazine.

The Roffy Hetro-Trans One-Control Receiver

By Kenneth Carter

IT is the aim of every experimenter and radio enthusiast to develop a receiver which is powerful enough to receive long distance stations yet embodying the absolute minimum of necessary controls. Up to the present time the reflex receiver and one or two of the simpler regenerative circuits have worked along that line. But as things go, there eventually comes to light the probable solution of the problem.

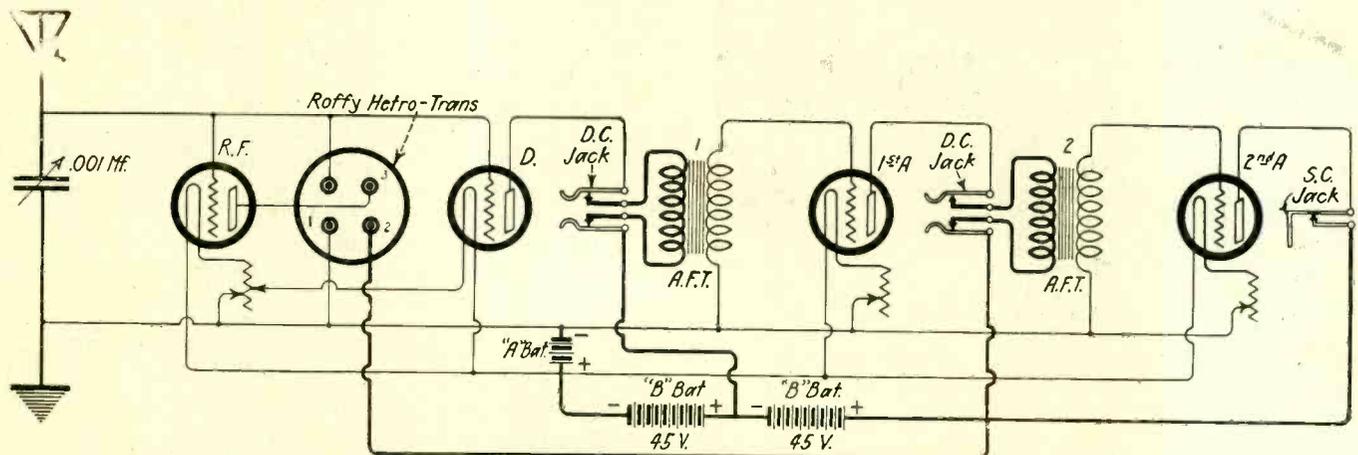
From all appearances it would seem that J. T. Roffy, of Huntington Park, Calif., has tackled the problem in the correct manner. A diagram of his receiver is printed herewith, and as can be seen, it has but one control, which is the condenser. In order to operate this receiver it is necessary to purchase one part that cannot be made. This is the Roffy hetro-trans, which is the heart of this new circuit. The circuit is simple and claims of great distances have been made for it. Due to the fact that nothing is variable about the circuit except the condenser across the filament and grid

ment. Since that time it has developed that two vernier rheostats give much better results, so for the best operation two separate rheostats should be used. The last two tubes may be easily controlled from a cartridge filament control such as the Amperite.

When purchasing the condenser it is necessary to get one that is of the best manufacture. Upon the efficiency of the condenser depends the entire work of the circuit, and it should be one that is known as having low dielectric losses. A vernier is advisable although one that has a vernier button on the dial may be used.

It does not seem to make much difference as to the placing of the apparatus on the panel, as long as there is no close coupling between the hetro-trans and the audio-frequency transformers.

The circuit shows a remarkable quality, it is claimed, in that the distortion that would be noticed in an ordinary four-tube circuit is not present. Three tubes



A circuit which is startling in its simplicity. It has but one tuning control, the .001 mfd. condenser in the antenna lead. The Roffy hetro-trans is the apparatus which makes this possible. The rest of the circuit is the conventional two-stage amplification circuit and needs no explanation.

of the first tube, it is pretty hard to believe that such performance is possible, but such is the claim.

In order to make this set it is necessary to have four tubes (UV201A preferably—the circuit will not function on dry cell tubes). The amplifying transformers may be any of the good standard popular makes, as may the rest of the parts. The hetro-trans is made by the Patterson Electric Co., of Los Angeles, California. It is advisable to have rheostats capable of fine adjustment on the first two tubes. The diagram shows one rheostat with double sliders, as that was the original manner of controlling the fila-

are all that are necessary for the operation of a loud speaker on local work, and at that it is not necessary to use an outside antenna. A wire 50 feet long laid along the floor.

For assembling the receiver, a panel 9"x12" is sufficient for the face panel, with a sub panel 8"x8" for the mounting of tubes and transformers. The entire set can be mounted on these two pieces of panel, and the condenser and rheostats arranged to have a symmetrical appearance on the panel. The two audio-frequency tubes may be controlled by one of the cartridge controllers, as they do not need adjustment.

Do Not Despair

SOMETIMES when the stores are closed, the dry cells will die down and with a convulsive shiver close the incident—and generally the program. When this occurs, just take off the battery cover, remove the zinc, taking care not to damage it too much, and be sure to leave the binding post intact. Get a mason jar and a cup of vinegar from the kitchen. Place the remains of the zinc coating (minus the black composition—scrape it off) in the jar, put the carbon rod in the center, pour the vinegar in with some water, and you have a battery that will last you till the store

opens next morning. This trick has pulled many a ham out of a hole. No more than one tube can be operated on it however.

Complete Broadcasters' List

A FULL list of broadcasters in the United States, Canada, Porto Rico and Cuba will appear in next week's RADIO WORLD.

RADIO WORLD for January 26 contained a complete list of radio broadcasters.

Next week's issue, dated February 16, will contain a list of broadcasters corrected up to the day of going to press. Be sure to order your copy of RADIO WORLD for February 16, so that you will have the latest broadcasting list published.

A Radio Slot Machine

D. J. RICHARDSON, of Washington, D. C., has just invented a machine which will, no doubt, help to popularize radio more than ever. It is a nickel-in-the-slot radio receiver, which will receive any programs desired by the listener, by simply placing a coin in the machine and tuning for the desired station.

It has been known for some time that the inventor was working on this device, but no information could be had. However, it has at last come to light, and has been tested in several public places, such as are shown in the illustration.

The machine is set up much the same as a candy slot machine, and the antenna and ground connections made. It is necessary, of course, for the programs of the day to be posted in a prominent place near the machine, so that the prospective listener may pick out his desired concert. The nickel is then inserted and the circuit is made and tuned like the regular radio receiver.

This device should prove popular, especially in places such as barber shops, hotel lobbies and restaurants,



(C. Keystone View Co.)

D. J. Richardson and his nickel-in-the-slot radio receiver being tested in a Washington barber shop. The nickel is deposited in the slot on the upper corner, the handle turned and the receiver is tuned. Before the time set by the machine is up, an indicator flashes, allowing the listener to place another coin in the box and thus enjoy his concert for another set period.

where people are sometimes at a loss as to what to do for five or ten minutes. In the operation of the machine the time of listening is controlled by a clock and a small indicator flashes a warning to the listener 20 seconds before it's turned off thus allowing one to enjoy an uninterrupted concert.

Radio Primer

TROUBLE SHOOTING ON RECEIVERS: Every once in a while even the most orderly and well behaved receivers will develop little troubles peculiar to themselves. At such times the average fan goes poking around the receivers wiggling this wire and that one, poking here and there, and in general taking a chance of causing more trouble than the original defect made.

There is no general rule that can be followed when a set gets finicky all of a sudden. If the tubes light up there is no need to worry about the A batteries, but the next inspection should cover the B batteries. For this purpose a voltmeter reading up to 50 volts should be used, and the batteries thoroughly tested. Any 22½ volt battery that shows less than 17 volts should be replaced with a new one. Any 45 volt battery showing less than 34 volts should be replaced.

If the batteries are tested and show life, the next point to consider is the battery leads. See that each battery is tightly connected to the proper point in the circuit.

Next test the tips and cord of the loud speaker and phones by the following method: Remove them from the plug, and connect them across a dry cell or one cell of the storage battery. A distinct click should be heard. If it is not there is trouble in the cord and it should be replaced.

The next place to look for trouble is in the sockets. See that all the tubes are making perfect contact. The nibs of the tubes should be bright and shiny. If not, brighten them up with a file or piece of sandpaper. If all these prove ineffective in locating the trouble, start at the antenna connections and examine every lead to locate either a short circuit or a loose connection. Do not be too strenuous in your testing of the wires. Be careful when testing condensers. See that there is no short circuit in either the fixed or variable.

To test the fixed condensers for a short circuit connect one post of a battery to one side of the phones, and place the condenser in series with the other post of the battery and the phones. A slight tick should be heard. If it is stronger than a tick there is a short circuit somewhere in the condenser. If it is a variable type of condenser look in between the plates to see if any plates are touching or if metal filings have been deposited in between two plates.

A direct open circuit in a receiver will generally show itself in a pronounced hum when the tubes are turned up, while a short circuit will produce either a squeal or no sound at all.

A Simple Miniature Receiver

By Washington R. Service

HAROLD LANE, a radio fan and one of the Washington correspondents, has what is believed to be the simplest complete radio receiver yet assembled. He carries it in his vest pocket, phone and all. When he is near anything which will serve as an antenna, he makes a contact, sometimes only with his hand, often neglecting to make a ground connection, and listens in.

To be sure, he takes what he gets—the nearest and strongest station on the air. The vest-pocket set comprises a single head phone, without leads, and a fixed crystal detector, connected in parallel with the phone by two short copper wires from the telephone terminals. Placing the phone to one ear and making contact with as good an aerial as he can find conveniently by means of his fingers, which, of course,

must touch one of the two terminals, is all he has to do. By this means he has heard NAA time signals and set his watch, and also whiled away odd minutes by listening to WRC or WCAP when they were on the air. One day he picked up KDKA. When convenient he also makes a ground connection at the other phone terminal, but he says it isn't always necessary. The particular crystal he uses is a compact unit about the size of a short thick lead pencil, with binding posts at each end convenient for connection with the phone terminals. He used to use a tuner, but as this bulky apparatus didn't improve incoming signals, he discarded it, as he also did his phone leads and wires for connection with aerial and ground. The result is believed to be the neatest, cheapest and smallest portable set in use.

RADIOGRAMS

WORLD NEWS HAPPENINGS BRIEFLY
PHRASED FOR OUR BUSY READERS



(C. Kadel and Herbert)

Dr. Lee De Forest, the man responsible for the three-electrode vacuum tube, or audion, was presented with a medal, in recognition of his work in the radio field, by the Institute of Radio Engineers. The medal was presented by Major General Squier. Photo shows Dr. De Forest with the medal and a model of his tube.

Establishment of nightly courses in agriculture, to be broadcast by radio, is announced by the Kansas State Agricultural College at Manhattan, Kan. The courses will begin February 11 and will be broadcast on a wave length of 286 meters.

* * *

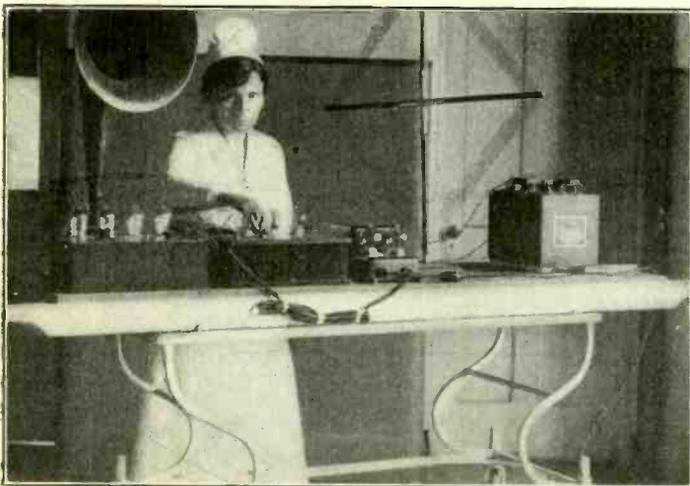
Definite assurance has been given that exhibits, never before viewed by the public, will be placed by the Army, Navy, Marine Corps, Department of Commerce, and the Bureau of Standards at the first annual radio show to be held at Washington, D. C., in Convention Hall, March 19-26.

* * *

General Arnulfo Gomez, commander of the Mexico City Federal District, in a statement to the press declares that radio apparatus is the worst enemy of the government, as it had been used in transmitting news of Federal troop movements. He stated that all owners of radio apparatus who failed to register with the government would be treated as spies.

* * *

Until E. B. Power made his first radio address from Station WJZ, New York City, under the title "Hidden Fortunes in Cancelled Stamps," philately and radio did not seem particularly congenial hobbies, but judging from the amount of mail which arrives at that station after one of Mr. Power's talks at least six per cent. of the radio listeners must keep stamp albums. So many radio fans have shown themselves to be stamp fans also that Station WJZ has given Mr. Power a series of dates.



(C. Underwood and Underwood)

Loop receiver with power amplifier and loud speaker, used in the Metropolitan Hospital, Welfare Island, New York City, to entertain the convalescent patients. The set is placed on a hospital stretcher table, and can be removed from place to place around the wards. The doctors find that such recreation helps the patients, and have called this their daily "pleasurepathy treatment." Nurse I. Hunter tuning in.



(C. International Newsreel)

The Fort McPherson, 4th Army Corps, radio station in Georgia which is one of the most up-to-date army post radio stations. The instrument located on the table is a six-tube radio-frequency receiver with separate heterodyne on the left hand side. On the right, back of the lamp, are the radio-audio-frequency amplifiers. The loud speaker is shown on the extreme right.

Dr. Walter K. Foley, chief of the medical service of the United States Veterans' Bureau Hospital No. 68, at Minneapolis, Minn., is quoted as saying: "A radio set will do more to cure tuberculosis than any other apparatus yet devised. The boys forget their troubles with radio. A worried, unsettled state of mind is the biggest obstacle we have to fight in the treatment of tuberculosis. I would rather give a patient suffering from tuberculosis, and other diseases as well, a radio set than a whole handful of pills. It does him more good."

* * *

A posthumous award of £1,000 from the Benjamin Franklin Fund, of London, to the late Dr. Charles Proteus Steinmetz, the eminent engineer, has just been announced by the trustees of the fund, as follows: "Award, Charles P. Steinmetz of Schenectady, who died October 26, 1923, privately published treatise, 'The Nervous System as a Conductor of Electrical Energy,' £1,000 and publication of the treatise."

When Benjamin Franklin was in England representing the Colonies from 1757 to 1762 he gave £100 to the members of the Society of Friends as a trust to be invested with accumulation, for not less than 150 years. Thereafter at the discretion of the trustees awards were to be made from time to time for the most valuable contributions to science, particularly in relation to surgery, the nervous system and the part "mind treating" has in the recovery and preservation of health. The awards now made are the first to be announced.



(C. P. & A. Photos)

Superintendent D. B. Colyer, of the Western Air Mail Division, and J. V. Magee, special assistant to the Postmaster General, following the course of Jack Knight's air mail plane between Omaha and North Platte by means of the neutrodyne receiver shown. Jack Knight, the pilot of the plane, reports his position every 15 minutes. The observers plot his course on the map and send him weather reports and other information, as well as orders.

Improved Wire Broadcasting Coming

By Carl H. Butman

WASHINGTON, D. C.—A new era in radio broadcasting, eliminating much apparatus, aërials and interference, is imminent, according to Secretary of Commerce Hoover and General Geo. O. Squier, formerly Chief Signal Officer. Following an announcement by Secretary Hoover that electric lighting companies would soon be broadcasting news and entertainment over their wires for their subscribers, General Squier announced in an exclusive interview, that this was already being done on Staten Island, N. Y. (See RADIO WORLD, September 8, 1923.)

The new system, which is the practical application of General Squier's wired-wireless broadcasting, first demonstrated 18 months ago in his office in the Munitions Building, Washington, consists of broadcasting by a carrier current of programs from a studio in a central electric lighting plant. The wires of the company reaching to practically every home in the community, make it possible for each subscriber to plug in a simple radio receiving set and receive dependable news and entertainment in any room in the house without any interference. A very nominal charge for the service, about half the charge for a telephone, will be made by the companies, it is understood. It is held that legally the companies can sue "wire tappers" for cutting in on the circuits.

Secretary Hoover sees in the innovation considerable relief in the radio interference now markedly present in the ether, while subscribers would be relieved from all interference, erecting aërials, establishing grounds, purchasing expensive sets, batteries and vacuum tubes. He further stated that this method would establish radio as a public service.

General Squier, who recently returned to Washington from inspecting the first system to be established on Staten Island by Wired Radio, Inc., says the operation was perfect and makes for reliability and cheapness, serving 365 days and nights in the year. The need for radio operators, tuning, and much apparatus

is eliminated, as there is no radiation, there is no interference. "Literally it is a one-way telephone service. But it does not do away with regular radio broadcasting in the ether, nor preclude those who desire from purchasing receiving sets and tuning in on distant stations," he said, pointing out that around large cities, the air will be all the clearer for DX fans.

The model system on Staten Island has three phases to its programs, he explained: First, through the use of a regular radio receiving set located in the plant, important broadcasts by pure radio can be picked up from the ether, automatically amplified and re-transmitted over the lighting circuits. Second, through arrangements made with a large news service (U. P.), news bulletins are received over a leased wire from a central office in New York, and broadcast by voice between other numbers. Third, a local program of music or other entertainment is sent out from a studio in the plant, with any special features desired by the community. The news feature, he believes, creates the first "radio newspaper" direct to subscribers.

Radio advertising, voluntarily banned in the ether, is made possible and practical in wired-radio broadcasting, he asserts. The operating company can assign waves for special use, general radio regulations not affecting wired-wireless systems; and one wave length could carry news, another advertising, a third information for the women, and a fourth entertainment, the subscriber selecting the desired wave by turning a selector switch.

The simplest crystal detector and phone will serve for plugging in on the light circuit, he says, but a loud speaker could also be easily employed for the whole family.

Several other electric companies are expected to start broadcasting in the near future under franchises from the North American Co., which through Wired Radio, Inc., controls the patents of what the General terms "the biggest thing in future radio broadcasting."

Who Is the Most Popular Broadcast Entertainer? First Announcement of Ballots from RADIO WORLD Readers

FOR several weeks past RADIO WORLD has published a ballot and a request to readers to cast it for their first and second choice among the many entertainers at the various broadcasting stations.

Below is the first summary made of the ballots received up to the time of going to press with this issue of RADIO WORLD. This does not mean that the contest is closed. Readers are requested to send in ballots right along—the more the merrier.

Here's the count to date:

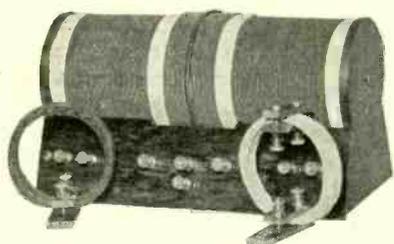
First Choice: Roxy, WEA, WCAP, 140; Little Symphony Orchestra, KDKA, 106; Wendell Hall (Red Hed), KYW, 105; Jerry Sullivan, WDAP, 103; Jack Nelson, WDAP, 103; Harmony Girls, WDAP, 102; Thornton Fisher, WEA, 102; H. Snodgrass, WOS, 102; Art Hickman's Orchestra, KHJ, 102; Little Orchestra, WGY, 99; Lucky Strike Orchestra, WEA, 99; Dance Orchestra, WTAM, 98; Meyer Davis' Orchestra, WWJ, 97; Captain Salisbury, KHJ, 96; Jack Chapman's Orchestra, WDAP, 96; Eddie Smith, WGY, 96; The Night Hawks, WDAF, 96; Howard Lennon,

WDAR, 93; Daddy Reimer, WLAG, 93; Freman's Serenaders, WBAP, 91; Bob Miller, WMC, 89; The Desert News, KZN, 85; Ernie Rogers, WSB, 84; Cafe Boulevard Orchestra, WJZ, 84; Hawaiians, WFAA, 82; Coon Sanders' Orchestra, WDAF, 82; Mary Vogt, WOO, 80.

Second Choice: Lucky Strike Orchestra, WEA, 107; Wendell Hall (Red Hed), KYW, 104; Thornton Fisher, WEA, 103; Little Symphony Orchestra, KDKA, 103; Alabama Club Orchestra, WHN, 100; H. Snodgrass, WOS, 100; Vincent Lopez Band, WJZ, 99; Jack Chapman's Orchestra, WDAP, 98; Entire Program WOAW 96; Bob Brown WDAP 95; McDowell Sisters WFAA 91; Instrumental Trio WGY 91; Harmony Girls WDAP, 90; Old Time Fiddlers WOS, 88; Announcer, WBAP, 85; The Daylite Announcer, WMC, 85; Dance Orchestra, WTAM, 80; Paradise Cafe Orchestra, WCAP, 80; The Hired Hand, WBAP, 80; Band at WOS, 77; Jerry Sullivan, WDAP, 74; Henry Field, WOAW, 74; Organ Recitals, WGY, 74; Detroit News Orchestra, WWJ, 73.

Receiver Uses Counter E. M. F. for Good Radio-Frequency Amplification

By Jonas Leet



The special tuning unit, loading coil and radio-frequency transformer used in the receiver invented by Captain Gollos, described herewith.

AT present radio fans are in a turmoil occasioned by the constant cry for "distance." Nothing satisfies the average fan who owns a radio set but the reception of distant programs. This is the reason the air is filled with squeals

and howls from oscillating receivers.

Captain Anatol Gollos, who has invented a circuit embodying a somewhat new principle, claims that long distance can be received on his four-tube set without regeneration. The set is incapable of regeneration and consequently cannot howl or squeal.

The principal item in this new circuit, which is known as the "Sun Circuit," is the counter e.m.f. tuning unit feeding the grid of the first tube. This tuner consists of inductances 12, 13, 14, 15, as shown in the diagram herewith, and capacities C5, C7, C8, C9, C10. As a most accurate balance must be kept between the windings this unit minus the capacitances, cannot be built by the amateur without the aid of a research laboratory, so it must be purchased from the manufacturers.

Before building the receiver it is necessary to have certain definite parts, which are herewith listed: 1 radion panel, 18"x9"x3/16"; 1 radion sub-panel, 17"x6"x3/16"; 2 audio frequency transformers; 2 25-ohm rheostats; 1 6-ohm vernier rheostat; 1 single-circuit filament-control jack; 2 double-circuit jacks; 1 General Radio variable condenser .0005 mfd; 2 General Radio variable condensers coupled together with bracket, both .00025 mfd; 1 General Radio variable condenser .00025 mfd; 1 mica fixed condenser .00025 mfd with 2 megohm leak; 1 mica fixed condenser .0005 mfd; 2 mica fixed condensers .001 mfd; 1 Sun tuning unit with loading coil; 1 Sun radio-frequency transformer (special); 3 dials; binding posts, bus bar wire, screws, etc.

It is essential to the working of the circuit to have the tuning unit and radio-frequency transformer. The arrangement of the parts is up to the builder, but precautions must be taken to keep the loading coil L1 and the radio-frequency transformer L6 at right angles to the tuning unit.

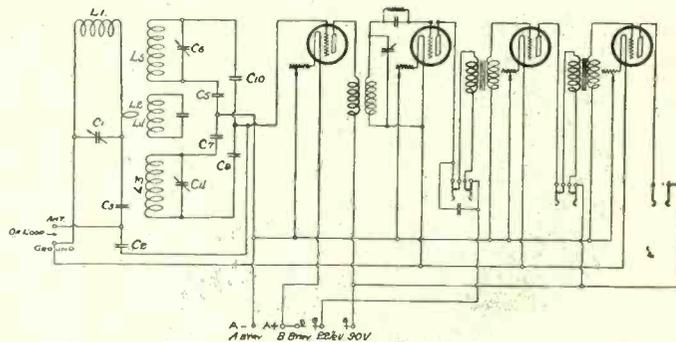
The two variable condensers C4 and C6 (General Radio .00025 mfd capacity) always require identical settings; therefore they should be coupled together on the same shaft. This may be done by drilling holes for two shafts (the inner end of one and the outer end of the other) in a piece of radion rod and inserting set screws to hold the ends together. For this reason, the General Radio condensers with inner shafts protruding should be purchased.

Connect the two fixed condensers C2 (.0005 mfd) and C3 (.001 mfd.) to the antenna binding posts as shown in the diagram. Connect the free end of C3 (.001 mfd.) to the fixed plates of variable condenser C1 (.0005 mfd.) and then to the binding post L on the tuning unit. Connect one terminal of the loading coil L1 to binding post A on the tuning unit and the other

terminal of loading coil to C1 (.0005 mfd.) and from there to the ground. This completes the primary circuit.

Connect the free end of C2 (.0005 mfd.) to binding post G on the tuning unit and from there to the grid of the first tube. Next connect binding post N of the tuning unit to the negative side of the filament circuit. Then connect the stationary plates of C4 and C6 (both .00025—coupled together as explained) to binding posts C1 and C2 on the tuning unit respectively. Connect the movable plates of these same condensers to binding posts 1C and 2C on the tuning unit. Check back to make sure that the two sides of one condenser are connected to binding posts 1C1 and the two sides of the other condenser to 2C2.

When this is finished, the secondary circuit is complete. The next step is to connect the binding post P of the radio-frequency transformer furnished with the unit to the plate side of the first tube, and binding post B to the positive side of the 90 volts B battery. The negative lead of the B battery is then connected



The circuit used in the receiver described herewith. It will be noted that all the tuning is done by means of condensers. Four variable condensers are shown, but as C4 and C6 are operated from the same shaft, there are but three tuning controls to the receiver.

to the positive lead of the A battery.

Connect the fixed plates of the C11 (.00025 mfd. variable) to binding post G of the same transformer, and connect the same binding post to one side of the fixed mica condenser (.00025 with two megohm grid leak). Then the other side of this condenser and grid leak is connected to the grid of the second tube as shown. Shunt the radio-frequency transformer secondary with the condenser C11, and connect the F side to the plus side of the filament of the second tube. Then connect C13 (.002 mfd.) across the jack contacts. This completes the wiring of the detector circuit, and the audio-frequency should be wired in the conventional manner as shown.

To tune the set, turn dial of condensers C4-C6 (coupled together) until a station is heard. Then turn the dial of condenser C11 to increase the volume, and dial of C1 (primary circuit) to clear up the signals. If no signals are heard, or they are indistinct, set condensers C1 and C11 at corresponding figures and after the manner of tuning a neutrodyne receiver, follow through the scale.

It will in all probability be found that the filament current of the detector tube plays a great part in the tuning, and should be manipulated after the signals are clear, to increase or decrease the volume. Should the signals be choked up, try another grid leak.

RADIO WORLD Reader Has Success with Superdyne

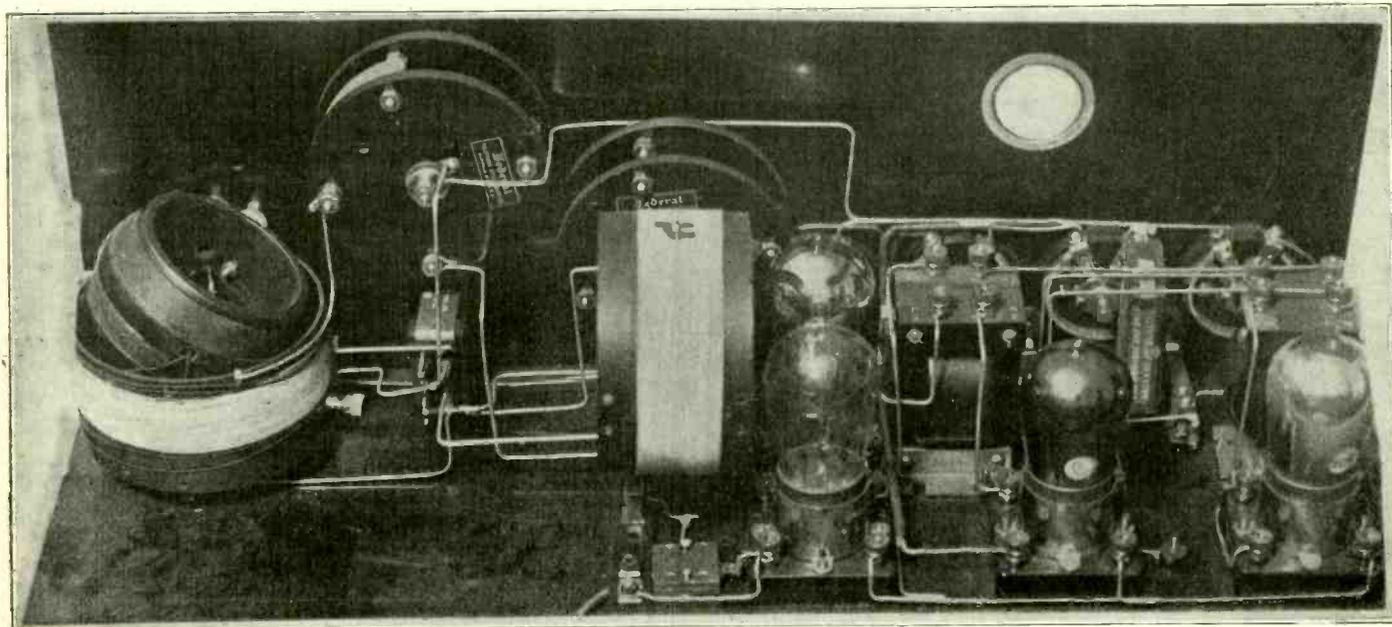
A READER of RADIO WORLD, one of those rare people who asks us to withhold his name, recently sent in the accompanying picture. It shows the new superdyne which has created so much talk. As the article mentioned was published in three issues of RADIO WORLD* he could not wait to get them all, so the moment he saw the hook-up, he designed his own layout and went ahead, with the result shown.

The illustration depicts plainly the layout of the parts, and little need be said of them. Even though the arrangement is directly opposite to the one recommended, excellent results are secured. The builder's own story runs as follows:

"After experimenting for quite a while with the regular circuits, and having just fair success with most of them, I decided that they all worked the same.

receiver. It always was a fairly hard job to get anything outside of Newark when the New York stations were pounding away, but with this little set, tuning right through the most powerful and broadest tuned stations in New York is a perfect cinch. Not only that alone, but when properly tuned it is one of the most quiet and well behaved sets I have ever made. Due to the fact that the tuned impedance condenser (that in the center looking at the picture) can be set for wave length, it is a simple job to log the various settings of the stations, and like the neutrodyne they will always be found at that same place. Tuning in the real DX stations (and that makes WDAP a local, by the way), can be done at any time you wish, simply by the correct dial settings.

"The set is not one bit critical except as to the nega-



Rear view of the Superdyne four-tube receiver built by a reader of RADIO WORLD. The layout is contrary to the one specified, but there seems to be quite a safe margin of liberty that may be taken in the placement of the parts, as long as good apparatus is used.

Noticing, however, the 'Superdyne' and the marvelous claims made for it, I injected a little enthusiasm into my work in building it. My first try was not exactly a failure, but something seemed to be wrong. I then found that it was the number of turns in the coils that had to be balanced, and that the connections must be soldered; so accordingly I got a bunch of small copper lugs and used them on the set. Then the results were quite different. I have played around with tuned radio-frequency before, and expected quite a little trouble, inasmuch as there is a feedback. But the surprising point of it all was that it was not so difficult to manage or build as a reflex—nor did it give nearly as much worry, as there was not the intricate connection of the transformers to be considered.

"The arrangement of the negative feedback gave me quite a little trouble for about half an hour, until I arranged the leads just so. The paragraph warning us to keep our plate and grid leads on the first two tubes separated presented quite a problem, but they were all satisfactorily solved.

"Now a word about results. I never in all my life was so surprised as the first evening I operated the

tive feedback, which of course has to be changed for every change in any of the other settings. I think that on three tubes, with the proper plate voltage, this set is as loud and clear as any five or six tube set that I have ever heard, and on four tubes you would think that a power amplifier was being used.

"As to the parts used, I happen to have great faith in Federal Tel. & Tel. parts, so used them throughout—sockets, coupler, condensers, transformers and everything. Federal 65 transformers were used and work fine, giving me all the amplification I can possibly use, and I believe that on certain stations they are too loud.

"I used the UV201A and UV200 tubes, as I happened to have them on hand, and while I agree that the UV199 is a good radio-frequency tube and fits admirably into the receiver, with a little additional care in the wiring, and choosing sockets that expose as little lug surface to each other as possible, that the above tubes used will give excellent results. The matter of the correct tubes to use seems to be a moot question among authorities, but like all other things of that sort, each man has his own favorite, and I like the tubes I used. Amateurs realize this when they build enough sets, and the strict rules about tubes are only for the uninitiated."

*Issues of December 15, 22 and 29, 1923.

The Radio University

A Question and Answer Department conducted by the Technical Staff of RADIO WORLD for the information and instruction of its subscribers.

Will the wave trap as outlined in RADIO WORLD for November 10, 1923, function properly if mounted on panel of set in close proximity to the other instruments, or should it be placed in an individual cabinet on the outside of the receiver?—E. C. Heyt, Bayard, Neb.

If care is taken to keep the coil out of inductive coupling range of the primary circuit and secondary circuit of the receiver, it may be incorporated in the set.

I have a receiver of the regenerative type which is very good for distance but code messages always seem to tear right in and rip the thing to pieces. Also KDKA when working properly often butts in and makes things unpleasant. Would the addition of radio-frequency to this receiver help out? I also desire to build another receiver and have in mind the neutrodyne or the superheterodyne, but am afraid that the latter is too complex. Will the first give me good satisfaction?—V. L. Glover, M.D., Oates Clinic, Martinsburg, W. Va.

The government is acting to remove the code or spark interference which you state bothers you. The receiver you now have is of the single circuit type which is rather broad in tuning, and will be bothered with interference. The addition of radio frequency would not help much in this matter. As to the two receivers, a well constructed super-heterodyne is much more efficient, but is rather hard for a novice to construct, so would advise the neutrodyne, which is also very efficient.

I have an Aeriola Sr. receiver and want to convert it to a reflex circuit but have been told that this is not practical. Why is this so?—Frank O. Pello, Duluth, Minn.

The inductances and capacities of the circuit you mention were designed for the specific purpose that they are being used for—a regenerative set. You would not put Ford parts in a Pierce Arrow car, so why try and save a few pennies in that fashion? Get the apparatus necessary for the construction of the reflex and forget using the Aeriola Sr. parts. A reflex is a good set when properly constructed, but can cause a lot of worry if spare parts are incorporated to save money.

Kindly let me know the name and address of the designers of the Superdyne receiver. Do they make the special couplers and coils necessary for use in this receiver? Can I use Amperites in the circuit in place of the rheostat?—M. Goldberg, 110 Lenox Ave., New York City.

C. D. Tuska, Hartford, Connecticut, manufactures the coils necessary for the use in this circuit. It is not advisable to use them on the radio-frequency tube or the detector, but they may be used in the audio-frequency amplification side.

I am very much interested in the "Superdyne" receiver as described, but find that 4" tubing and No. 22 DSC wire are not available in this city. Will you kindly advise where they can be obtained?—Oren R. Smith, 12 Waverly Place, Schenectady, N. Y.

Write to one of the advertisers in this issue of RADIO WORLD. Those who handle the goods will be glad to fill your orders. When you get the radion tubing, specify thin wall, otherwise you will run into trouble.

I have a three-tube receiver which until last month would tune quite sharply. I moved to a new location, putting up a longer antenna than I had. The new antenna is over 100 ft. as I used two coils of wire. My last antenna was not 60 ft. long and entered my window directly. Now I have a lead-in of over 40 ft. Would this cause my set to tune broadly, or is it my new location?—J. F. Bradfeldt, Bronx, New York City.

Your antenna is too long, and this is causing your trouble. Shorten it to about 75-80 ft. at the longest and you will find that your set will then tune as sharp as before. A long antenna gives greater volume, but broadens the tuning.

I constructed the storage B battery as described in RADIO WORLD and made a good job of it. Upon connecting a voltmeter to it it did not show any voltage. My electrolyte is as specified in the issue. How do I get current from it?—F. Riches, Mara, B. C.

To prepare this battery for service it is also necessary to form the plates by an initial charge, also to charge it. A charger and the methods of charging it were described in the issue following the one in which the description of how to construct the battery appeared.

Is the enclosed hookup of a neutrodyne correct? I made it according to the drawing, and have

had trouble, as I get the same volume of signals out of my three-tube R-C receiver, and more distant stations. I am using the same tubes as I use in my regenerative receiver and two Edison wet cells in parallel for the tubes.—K. M. Lenton, West Hoboken, N. J.

The drawing is correct for the four-tube neutrodyne. This circuit is the one that reflexes one tube to allow the use of four tubes instead of five. A word about tubes used will be of use. This circuit operates best on the UV201A tubes. It appears that you are using dry cell tubes. They work poorly in this circuit. Do not use them.

Which is more important to the proper working of a radio receiver, a good antenna or a good ground? I have the choice of an outside ground with a short antenna, or a hot air radiator for a ground with a good antenna about 100 ft long. Which position should I choose?—M. B. P., Alameda, California.

Would suggest that you choose the location for the good antenna and erect a counterpoise in place of a ground. A counterpoise is a wire or wires, the same size as the antenna, and about four or five feet under the antenna wires. This will allow you to operate without any ground at all and give as good results, and in some cases even better, as it tends towards sharper tuning.

I am thinking of constructing the "Superdyne" and accordingly have planned to use UV201A tubes. I have been told that this is impossible. Is this so?—J. Schwartz, Detroit, Mich.

You may use these tubes if you want and care is taken in the wiring.

Can two UV199 tubes and two UV201A tubes be used in the Superdyne as published December 15th? Can two double tap inductance switches be used in place of the anti-capacity switch specified?—R. L. Hilton, 2 Laurence Street, Waterville, Me.

You can do as you suggest, if care is taken to provide the proper voltage for the tubes. Yes, you may use the double tap inductance switches you specify.

Is a dry cell tube set as efficient for loud speaker work as a storage battery set? Will a Magnavox M1 operate on a storage battery tube set? What is a good 4 tube dry cell outfit of medium cost?—Mrs. Otto J. Baertich, Troy, Indiana.

The dry cell tubes do not give the volume that the storage cell tubes do, but from the point of efficiency of operation they are the same. Considering the fact that they do not need the storage batteries they are more economical. The M1 Magnavox will operate on any tube set that has at least one or two stages of audio frequency amplification. The Superdyne published in RADIO WORLD for December 15, 22 and 29, is a four tube set using UV199 tubes and is a very efficient receiver if handled correctly and care is taken in its building.

What difference is there in the four and five tube neutrodyne receivers? Which is the better, a three tube regenerative or a four tube neutrodyne receiver? Is it advisable to buy the parts for the neutrodyne and build them? Are they difficult to build? Do the home made ones work as well as the factory made ones? Who sells the best parts for these receivers?—M. Kelly, Robert Treat Hotel, Newark, N. J.

In the four tube neutrodyne receivers they reflex the audio frequency tube through the first tube to get the second stage of audio frequency. This saves one tube in the final assembling. The neutrodyne receiver is to be recommended because of the absence from squeals and howls, and it is a much better distance receiver. The neutrodyne is much more efficient than the regenerative receivers. It is advisable to build your own neutrodyne from plans furnished by reliable people, using the standard licensed neutrodyne parts

sold by reputable licensed dealers. Beware of unlicensed, bogus or home made parts. If the parts are good, the construction carefully carried out, the home made sets work very satisfactorily. They are not difficult to build. We cannot answer questions relating to competitive apparatus sold on the open market. All licensed parts are made according to certain standards and they all work well.

Would it be advisable to use a crystal detector in a portable one tube reflex receiver built in a suit case? Would this set work on a loop? Can dry cells be used? If the antenna is placed on top of the car, what will constitute the ground?—M. K. Lauffers, Chalmers, Indiana.

Such a combination would give good results if care is taken in the construction of the set. The set will work on a loop. Dry cells may be used. In that case it would be either a counterpoise or else use the frame of the car itself, which could be used.

What causes a constant steady buzz or noise in the second audio stage of a receiver? The detector and first stage work fine, but the second stage gives nothing but a constant hum or buzz without even a signal or a click except when the B battery is disconnected. The tube lights up.—C. L. Basson, Reeder and Co., Cincinnati, O.

You have an open circuit somewhere in your second stage. It may be that the transformer has been burnt out, or has an open circuit in it somewhere. Test out the transformer, and trace your circuit to see that there are no broken connections.

Is it possible to use French tubes in the neutrodyne receiver? I have four and have used them successfully in several circuits, including a reflex, but a dealer told me that they would not give any results because the plate and grid and filament are horizontal.—Albert Shapiro, New York City.

If you have the correct sockets for these tubes you may use them with the neutrodyne. One type of the French tube has a very high amplification factor and should prove efficient as amplifiers in this circuit. The dealer is wrong—the position of the elements has nothing to do with their proper working in this or any other circuit.

Will the use of a vernier rheostat of the Filkostat type give me better results than by the use of a wire rheostat? Should it be used on the radio frequency tube as well as on the detector or will the detector suffice?—Jos. Greenspan, 190 Knickerbocker Avenue, Brooklyn, N. Y.

The use of the rheostat you mention will improve the receiver. It is not absolutely necessary that you use it on the radio frequency tube. The detector requires the fine adjustment of filament current.

I recently purchased a crystal detector set, which uses a piece of greyish shiny crystal, resembling grey coal. I find that I can get signals only when the wire point is touching the one upper corner, and as it is extremely hard to adjust I wonder if it would be advisable to change the set? I get the local stations fine, once I locate the tiny spot, but nothing if it is not exactly on that place.—Herbert Prathin, 119 East 125th Street, New York City.

It is probable that you have a galena detector, which is not sensitive. Change your mineral for another piece, either synthetic or of the same type. Crystals are not sensitive over large surfaces, and have to be adjusted to find a sensitive spot.

I have an 8 tube super-heterodyne, using UV201A tubes throughout. Will the 216A tubes work as amplifiers in this set? Will I get better results with them than with the UV201A tubes? Does the U. S. Government have any data on these receivers?—George Roberts, M. D., Chester, Vermont.

You will get better results by the use of the tubes you mention in this set. They can be used very successfully, but they take more filament current than the UV201A. Write to the U. S. Bureau of Standards, for their list of Radio literature, enclosing 10c in coin. They have several data sheets which can be obtained from them at a cost of about 15c each.

I have read with much interest the article describing the Ultradyne receiver, in RADIO WORLD for January 19th. What gauge of wire is used in winding the coils? What is the dimension of the spider-web former? What is the size of wire used on the secondary winding?—C. L. Hintzelmann, 1893 West 71st Street, Cleveland, O.

Both primary and secondary of coils in this receiver are wound with No. 22 DSC wire. The outside diameter is 3 1/2" the inside core being 1 1/2".

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Editor

Roland Burke Hennessy

Managing Editor Technical Editor

Stephen L. Coles Robert L. Dougherty

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While every possible care is taken to state

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FEBRUARY 9, 1924

The Daily Newspapers and Radio

THERE never has been a technical development which has made so powerful an impression on daily newspaper owners and editors as has radio. This is doubtless because aside from its technicalities it has such a wide human appeal and, as we have before remarked, is rapidly becoming a public utility. Everybody is, or can be, interested in radio. Its effect on human education and entertainment is universal. Its influence is so big and broad that technical and class publications are not sufficient to carry its message far enough into the human family. Therefore the daily newspaper sees an opportunity and promptly grasps it—not only for its news value but as a source of advertising income.

The latest estimates indicate that there are more than 1,000 daily newspapers in the United States to-

day carrying either radio news columns, radio sections or radio programs, some of them all three. It also is estimated that 3,000 country weeklies publish radio sections. About 50 magazines carry radio departments. All this is in addition to the several periodicals devoted exclusively to radio and half a dozen radio trade papers.

In the metropolitan centers throughout the country the daily newspapers have seized upon radio with avidity. In New York City the "Herald" has recently established a radio section in connection with its Sunday edition. This brings into radio prominence the owner of the "Herald," Mr. Frank A. Munsey, who already owns "The Sun and The Globe" with an established radio section, and who has just purchased "The Evening Mail" with its radio section which is now combined with "The Evening Telegram," already under Mr. Munsey's ownership. Thus we find one newspaper proprietor in control of three radio sections in one city. Whether Mr. Munsey intends to maintain all three or to concentrate on one or two is unknown.

The dignified "New York Times" recently has taken to publishing more than a page of advance radio programs in its Sunday edition. For some months past the "Times" has published a radio page on Sunday and a list of skeleton programs on week days. Its latest expansion gives it two radio pages on Sundays.

At least one New York daily newspaper has been considering for nearly a year past the establishment of its own broadcasting station. So far it has been unable to figure out an adequate return on the large investment involved. Many newspapers receive a part of their news by radio and those along the Mexican border which have their own receiving stations have been scooping the others on news of the Mexican revolution now going on.

At least one thing can be said in favor of this wholesale entry of the daily press into a technical field—the movement provides jobs for many a young newspaper man with a knowledge of radio and also gives young radio engineers who can write passably well a chance to learn the newspaper business.

In the past the daily newspaper was notoriously hesitant to publish technical matter relating to any industry or science, not so much because it failed to recognize its news value as because the editors were afraid of making "bulls." Nowadays they seem willing to employ the necessary talent and the owners

are agreeable as long as the requisite amount of advertising revenue can be obtained to balance the cost and show a profit.

In the estimation of the radio fan, however, no daily newspaper can replace his favorite radio publication to which he has been in the habit of turning for authoritative information on his pet subject. The average listener-in doubtless will utilize the newspaper for his program information because of its daily publication, but the man who knows radio will never be weaned from his technical journal.

Do Your Best Always

THE most successful amateurs in radio are those who do the most careful work. The energy required in a receiving set is relatively so minute that to secure the desired results its path must be absolutely clear and unimpeded. A carelessly soldered joint, a loose connection, a deviation from the prescribed layout often causes failure. "Genius is the infinite capacity for taking pains" has been quoted so often as to have almost become trite. And yet it is an infallible rule for success in radio construction.

The great Abraham Lincoln once said: "I do the very best I know how; the very best I can; and I mean to keep doing so until the end." There could be no finer or more practical motto for the young radio constructor than this. It is astonishing how much better your best gets if you keep doing it all the time.

DON'T neglect to cast your ballot for your favorite broadcasting entertainer. The ballot form will be found in the back part of this paper and you are invited to vote as often as you please. You would be surprised if you could witness the eagerness with which entertainers of long experience on the theatrical stage await the written praise of the radio audience. That is the only way they have of knowing whether their efforts please. So relieve their anxiety and vote early and often.

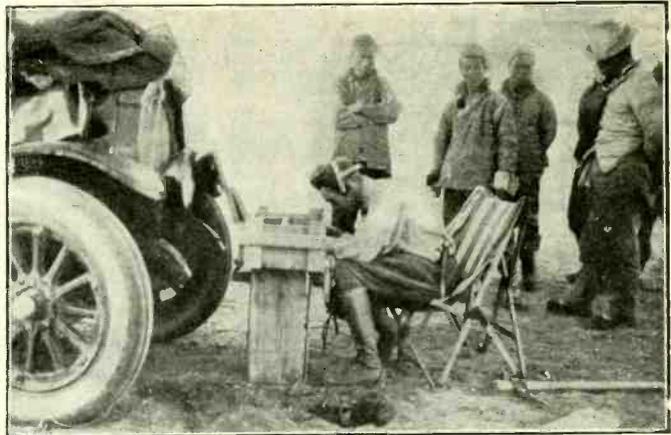
RADIO is being hailed in England as an important step in the solution of the servant problem, according to a daily newspaper writer. Nearly every servants' hall now has a radio set, and in the ordinary middle-class house in the suburbs it is recognized as a real inducement to make domestics remain. The inevitable result of progress will be that when all the servants' halls are radio equipped the domestic help problem will revert to its original status.

Six Interesting Radio News Pictures



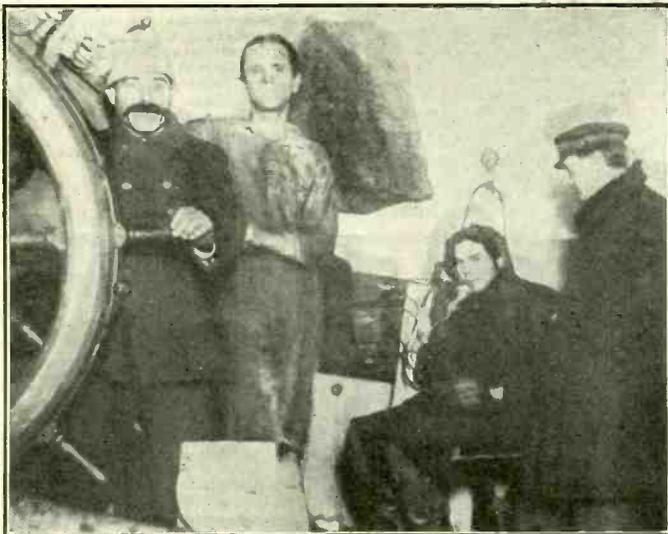
(C. Kadel and Herbert.)

Donald H. Ryder, radio operator of the S. S. "Henry R. Mallory," which raced to the aid of the Danish freighter "Normanna" saving the lives of 20 of the crew. Ryder picked up the SOS and the captain turned back over his course to save the lives on the fated steamer. Ryder is shown copying "msgs" while on his "trick" when his ship was nearing port.



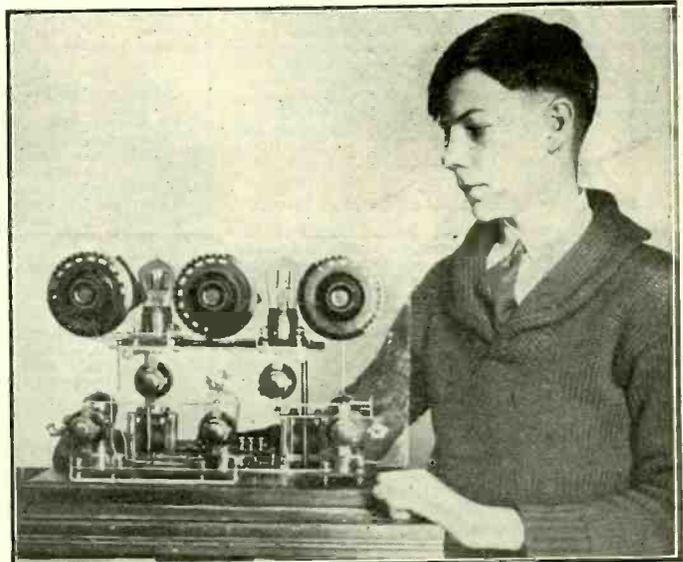
(C. Asia Magazine & Amer. Mus. Nat. History. Int. Newsreel.)

Members of the Asiatic Expedition exploring the Mongolian Desert for the American Museum of Natural History keep in touch with civilization through the radio station at Peking. In this vast unexplored area there is no way of determining their position except by the correct time, which is transmitted from that station.



(C. International Newsreel.)

When the seas swept away the bridge and navigating instruments of the "Alberta" she was kept on her course and guided safely to port by the aid of radio from a compass station, and the manual steering gear of the ship. Members of the crew are shown guiding the ship under advices relayed from the radio room of the vessel.



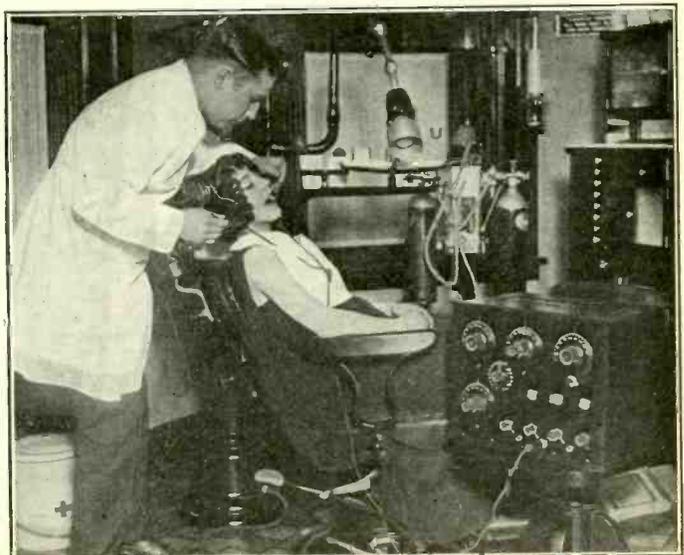
(C. Underwood and Underwood.)

James Morris Baker, 15-year-old Chicago fan, and his five-tube glass paneled neutrodyne receiver, which was exhibited at the recent radio show. Baker drilled the panel, sub-panel and base, without splitting the plate glass once. Nice work, to say the least, but for the present we will content ourselves drilling radion.



(C. Underwood and Underwood.)

Miss Alameda Fowler, who is taking an examination for commercial operator and expects to be the first woman radio operator licensed to hold the position of first grade operator aboard a ship. C. S. Rosenthal, chief operator of the S. S. "George Washington," giving Miss Fowler some tips on the working of a commercial receiving and transmitting station aboard ship.



(C. Wide World Photos.)

Dr. Howard G. Thompson, up-to-date Chicago dentist, tried out this new idea and found it works wonderfully. He installed a good five-tube receiver in his office, and when a patient comes for a treatment he lets her listen in while he works on her molars. Better not tune in a jazz band while fooling with a fidgety nerve, doctor.

Radio Monopoly Charged by Federal Trade Commission

Comments of Presidents of Companies Interested

THE Federal Trade Commission sent to the press from its offices in Washington, D. C., under date of January 28, the following:

Monopoly in radio apparatus and communication, both domestic and transoceanic, is charged in a complaint issued by the Federal Trade Commission today. Efforts to perpetuate the present control beyond the life of existing patents, is likewise charged.

Radio Corporation of America; General Electric Company; American Telephone & Telegraph Company; Western Electric Company, Inc.; Westinghouse Electric & Manufacturing Company; The International Radio Telegraph Company; United Fruit Company; and Wireless Specialty Apparatus Company, are named as respondents and are alleged to have violated the law against unfair competition in trade to the prejudice of the public.

In the language of the complaint "the respondents have combined and conspired for the purpose and with the effect of restraining competition and creating a monopoly in the manufacture, purchase and sale in interstate commerce, of radio devices and apparatus, and other electrical devices and apparatus, and in domestic and transoceanic radio communication and broadcasting."

To attain the present control alleged, the complaint recites that the respondents: (1) acquired collectively, patents covering all devices used in all branches of the art of radio, and pooled these rights to manufacture, use and sell radio devices, and then allotted certain of the rights exclusively to certain respondents; (2) granted to the Radio Corporation of America the exclusive right to sell the devices controlled and required the Radio Corporation to restrict its purchases to certain respondents; (3) restricted the competition of certain respondents in the fields occupied by other respondents; (4) attempted to restrict the use of apparatus in the radio art manufactured and sold under patents controlled by the respondents; (5) acquired existing essential equipment for transoceanic communication and refused to supply to others necessary equipment for such communication; and also excluding others from the transoceanic field by preferential contracts.

From the series of contracts referred to in the complaint it appears that the Radio Corporation of America has the right to use and sell under patents of the various respondents which relate to the radio art. It has also given to various respondents, the right to manufacture under these patents. Thus there has been combined in the hands of these corporations patents covering the vital improvements in the vacuum tube used in long distance communications and other important patents or inventions in radio which supplement this central device. Approximately 2,000 patents are involved.

The report of the Federal Trade Commission on the Radio Industry states that the gross income of the Radio Corporation in 1922 was \$14,830,856.76 and that its capital stock on December 31, 1922, was \$33,440,033.56. The holdings of the several respondents in the Radio Corporation of America are given as follows:

	Preferred No. Shares	Common No. Shares
General Electric Company	620,800	1,876,000
Westinghouse Electric & Mfg. Co.	1,000,000	1,000,000
American Telephone & Telegraph Co.	400,000
United Fruit Co.	200,000	160,000

It is further stated that up until 1922, the Radio Corporation had an absolute monopoly

in the manufacture of vacuum tubes and for the first nine months of 1923 sold 5,509,487 tubes. During the same period the only other concern having the right to make and sell tubes, sold 94,100 tubes.

In the communication field, while the Radio Corporation has some competition in ship-to-shore communication, it has a practical monopoly in transoceanic service. It controls all the high power stations in this country except those owned by the United States Government. Agreements of an exclusive character have been entered into with the following countries or with other concerns in control of the situation in those countries, namely Norway, Germany, France, Poland, Sweden, Netherlands, South America, Japan and China. Arrangements have also been made with the land telegraph companies in this country whereby messages will be received at the offices of the Western Union and Postal Telegraph Companies.

A summary of the contracts between the respondents as recited in the complaint is: First, the organization of the Radio Corporation of America in 1919, under the supervision of the General Electric Company, which company received large holdings in the stock of the Radio Corporation for capital supplied and for its service in connection with the acquisition of the American Marconi Co. An agreement entered into between these companies granted to the Radio Corporation an exclusive license to use and sell apparatus under patents of the General Electric Company until 1945; and the Radio Corporation granted to the General Electric Company the exclusive right to sell through the Radio Corporation of America only, the Corporation agreeing to purchase from the General Electric Company all radio devices which the General Electric Company could supply. Subsequently this arrangement was extended to include the Westinghouse Electric & Manufacturing Company, the business of the Radio Corporation being apportioned between the General Electric Company and the Westinghouse Company; 60% to the General Electric and 40% to the Westinghouse Company.

Meanwhile, in July, 1920, the General Electric Company, and the American Telephone & Telegraph Company, made an arrangement for mutual licensing on radio patents owned by each and providing for traffic regulations. The terms of this agreement were extended to the Radio Corporation of America and the Western Electric Company and thereafter to the Westinghouse Company.

The Radio Corporation in March, 1921, made an agreement with the United Fruit Company, which operated a number of long distance radio stations in Central and South America by which licenses under radio patents of the Radio Corporation and of the United Fruit Company and its subsidiary the Wireless Specialty Apparatus Company, were exchanged, and arrangements made for the exchange of traffic facilities, and the definition of their respective fields adopted between the Radio Corporation and the United Fruit Company. Provisions of the agreements between the Radio Corporation of America, the General Electric Company, the American Telephone & Telegraph Company and the Western Electric Company were extended to the United Fruit Company.

The respondents are required by the Federal Trade Commission to answer the complaint on March 14, 1924.

The report to Congress by the Federal Trade Commission on the radio industry

was published in RADIO WORLD for December 15, 1923.

Commenting on the complaint, Gen. James G. Harbord, president of the Radio Corporation of America, said:

"At the time the Radio Corporation of America was formed there were numerous radio patents in existence, but no definite development. Radio advancement would have continued to travel at a snail's pace had not the leading electrical companies of America mobilized their patents in the interest of more rapid progress and in order to end selfish and obstructive rivalry.

"Patents that were incomplete and inadequate in themselves, when used in conjunction with each other, removed the barriers to a great national development that has resulted in extensive commercial transmission of wireless telegraph messages and has given employment to thousands of men and women and has also given educational and entertainment facilities to millions.

"It is the very situation which the Federal Trade Commission describes in its complaint that has made possible the present commercial transoceanic wireless telegraph systems and also the existence of free broadcasting throughout the nation as well as the development of radio receiving sets at prices bringing them within reach of every home."

Gerard Swope, president of the General Electric Company, issued a statement in part as follows:

"The connection of the General Electric Company with the question of radio communication dates back to the time of the war. At that time the radio communications in the country were handled by the American Marconi Company, controlled by the British Marconi Company.

"A representative designated by the government sat on the board of directors of the Radio Corporation for some time after its organization. Officials of the Radio Corporation appeared before a Congressional committee on this subject, where all of these relations relating to the formation of the Radio Corporation were told in detail. Several months ago the Federal Trade Commission published their statement as a result of their investigation of the Radio Corporation of America and its relation to the various companies interested in it. There was no indication in this report of any adverse opinion or action on the part of the Federal Trade Commission.

"As stated above, all that has been done has been with the idea of making the Radio Corporation an efficient instrument of radio communication in the interest of the government and the American public."

H. B. Thayer, president of the American Telephone and Telegraph Company, said:

"We presume that the complaint, so far as we are concerned, rests upon a contract made by us with the General Electric Company, dated July 1, 1920. In the first annual report after the contract was made, that for 1920, we stated its purpose and scope, which, from our point of view, was to clear up a patent situation which might hamper our development. The effect has not been to restrain trade, but to expand it.

"We believe the contract is in the public interest and have been advised that it stands upon sound legal basis. If there is any doubt about either of those points we should be glad to have it resolved."

The statement of the Federal Trade Commission was published widely by the daily press throughout the country. Many of the metropolitan newspapers made editorial comment on the matter, most of which was favorable to the companies named in the complaint.

Radio Merchandising

Advertising Rates: Display, \$5.00 an inch, \$150.00 a page. Classified Quick-Action Advertising, 5 cents a word. Phones: Lackawanna 6974 and 6983

Sears - Roebuck Foundation Erects New Station for Farmers

A NEW type of forensics for radio is to be developed by Sears-Roebuck Agricultural Foundation for the new station, which is being erected in Chicago by the Foundation to broadcast exclusive agricultural programs.

Samuel R. Guard, director of the Foundation, states that this new type of forensics for radio, which is different from any now in use, will adapt the speeches to the medium. It will be developed specially for radio, because one cannot talk into a microphone as one would talk from a platform or a stage.

"It is no wonder listeners either fall asleep or tune in on a jazz number after listening to a speech over the radio for a few minutes," continues Mr. Guard. "It is my belief that the platform type of oratory is not specially suited to radio. The Foundation's station will adapt the type of delivery for this wonderful new medium."

The new station will be located on the main building, using the fourteen story tower for one aerial mast. Another mast of equal height will be erected on the opposite side of the building. The station will have a wave length of 448 meters, and will have the largest equipment made and sold by the Western Electric Company. It will carry a class "B" license. The studio will be located on the eleventh story of the tower, with the operating room on the fourteenth floor. In addition to the main studio, there will be a branch down town in the loop district, with special leased wires through the city to points of advantage for the entertainment features of the program, which will include the best music and theatrical talent. By having the station located in the open district and free from the absorption by tall buildings, it is estimated that it will be possible to put more energy in the air.

The programs broadcast by this station will be balanced agricultural programs, which will challenge the farmers' attention and hold it. Facts of real value to the farmer will be broadcast so far as the educational phase of the program is concerned. Theatrical stars will bring the stage to the farmers' parlor, and there will be bedtime stories for the country kiddies. An interpretation of market trends and a current events feature, explaining what is going on in agriculture all over the world will be given, according to Mr. Guard.

Freed - Eisemann Broadcasts Concert From WEA F

LAST week from WEA F, radio fans were able to enjoy an A-1 program broadcast under the direction of the Freed-Eisemann Radio Corporation, Sperry Building, Manhattan Bridge Plaza, Brooklyn, N. Y. This is the first time any manufacturer of radio products has undertaken to give entertainment through Station WEA F as a paid service. As the flood of complimentary letters testify, the selections were most enthusiastically received by the public. Freed-Eisemann gave a second concert from WEA F at 9:30 P. M., February 1.

New Radio and Electrical Firms

Rosendal & Co., New York City, make batteries, \$10,000; H. M. and A. Rosendal, Dan H. Olsen. (Attorney, W. Brunner, 220 Broadway.)

Adroit Tool Co., New York City, electric and radio devices, \$24,000; J. E. and E. Young, E. J. Beckley. (Attorneys, Beam, Callender & Cullen, 45 Wall St.)

Kelley & Phillips, Brooklyn, N. Y., radio and electric, \$10,000; J. S. and C. P. Kelley, J. S. Phillips. (Attorney, E. McShane, 49 Wall St.)

Ford Mica Company Moves Offices

OWING to the increased demand for its transformers and other products, the Ford Mica Company of New York, has found it necessary to move its offices to 33 East 8th Street. The telephone number is Stuyvesant 0548. The entire building at 14 Christopher Street, New York City, is now devoted to manufacturing.

Radio and Electrical Business Opportunities

Rate: 40c a line. Minimum, 3 lines.

ELECTRIC STORE, downtown Brooklyn, N. Y., section; best location; will sublet part of store for radio business. XX, Radio World.

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.

ATTRACTIVE OPPORTUNITY open to active man with capital from \$15,000 to \$25,000, for partnership in wholesale radio and sporting goods; going concern of many years standing in enviable location downtown New York City, CC, Radio World.

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.

DUE TO OTHER INTERESTS owner of profitable established radio business having exclusive Eastern rights on one of finest radio sets will turn over entire management to associate of executive and sale ability who can make small investment. AB, Radio World.

WANTED—Exclusive agency for electrical, radio, jewelry or other specialty of real merit. Address Room 911, 453 Washington Street, Boston, Mass.

Radio Literature Wanted

Manufacturers 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:

C. Denison, Prince George, B. C., Canada.
Daylo Electric Light Co., 40 East Second St., New York City.

C. Gipson, 1021 Gipson Pl., Far Rockaway, N. Y.
G. Johnson, 1016 Forest Ave., Far Rockaway, N. Y.

R. Moershell, Mt. Sterling, Ill. (Dealer.)
H. E. Sullivan, 27 William St., New York City.

The Radio Shop, Box 897, Wallace, Idaho.
T. R. McCracken, Mahaffey, Pa. (Dealer.)
J. E. Bell, 692 Hamlet St., Columbus, Ohio.
R. L. Morris, 248 N. High St., Columbus, Ohio.
W. H. Caffey, Box 115, High Point, N. C.
Chas. Waheman, 3385 Richmond Terrace, Mariners' Harbor, Staten Island, N. Y.

Second District Radio Show

THE Executive Council, Second District, A. R. R. L., will hold its fourth annual Radio Show and Convention March 3 to 7, 1924, in the grand ballroom of the Hotel Pennsylvania, New York City. This radio show will be strictly a manufacturers' exhibit. Many of the leading makers will display their latest models and the newest devices in radio will be shown. This is the fourth in a series of highly successful shows given by the Executive Council. Full information as to the show and the convention can be secured at the office of the Council, 120 Liberty Street, New York City.

Coming Events

SECOND ANNUAL RADIO SHOW, Biltmore Hotel, Los Angeles, Calif., February 5 to 10, 1924.

INTERNATIONAL RADIO & ELECTRICAL SHOW, Baltimore, Md., March, 1924.

RADIO will be featured at the electrical exhibition to be held at Melbourne, Australia, in September, 1924.

FIRST ANNUAL RADIO SHOW, Convention Hall, Washington, D. C., March 19-26, 1924.

SECOND DISTRICT A. R. R. L. FOURTH ANNUAL RADIO SHOW, Hotel Pennsylvania, New York City, March 3-7, 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.....
My second choice is.....

Name.....
Street Address.....
City and State.....

CROSLEY
RADIO CATALOG FREE

Describes fully the complete line of radio frequency sets, regenerative sets (licensed under Armstrong U. S. Patent No. 2,113,149) and parts.

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23 Plate ACE Vernier Condenser	ea. 1.98
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Acme Audio or Radio Transformers	ea. 3.75
Super-tran Audio Transformers	ea. 3.25

"Everything in Radio" (Add postage)

Write for Price List. Mail Orders Solicited.

ACE RADIO COMPANY
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1,000 MILES Guaranteed on Our New
ONE TUBE RECEIVER

Complete with tube, phones, batteries, aerial, insulators, etc. Ready to work. Quantity limited. Send money order for shipment by return mail. Money back if you want it.

\$17.50

Send for Price List

NATIONAL RESERVE RADIO CO.
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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.

RADIO BY MAIL

UV200, UV201A, UV199, WD11, WD12	\$4.24
GENUINE RCA RADIOTRON TUBES	3.94
"ACME" AUDIO & RADIO TRANSFORMERS	3.94
"ERLA" AUDIO & REFLEX TRANSFORMERS	3.89
"COMO" PUSH-PULL TRANSFORMERS (PR)	9.38
ALL AMER. PUSH-PULL TRANSFORMERS	9.87
2 Amp. BATTERY CHARGER WITH \$9.38	
"TUNGAR" BULB	4.69
\$6.00 BRANDES "SUPERIOR" PHONES	6.29
\$10.00 BRANDES "TABLE TALKER"	3.94
\$5.00 BREMER-TULLY "VER. TUNER"	4.76
WORK-RITE NEUTRODYNE TRANS.	1.49
\$3.00 SIZE 22 1/2-VOLT "B" BATTERY	3.19
\$5.50 SIZE 45-VOLT "B" BATTERY	

VARIABLE CONDENSERS

11-PLATE .30.94 VERNIER WITH DIAL	\$1.89
23-PLATE .1.19 VERNIER WITH DIAL	2.19
43-PLATE .1.34 VERNIER WITH DIAL	2.49
\$25.00 SET "FADA" NEUTRODYNE PARTS	19.95
\$65.00 SET "FADA" NEUTRODYNE PARTS	51.95
GE "TUNGAR" 2-AMP. BAT. CHARGER	15.69

Cash or C. O. D. Send for Complete List.

SIMPLEX RADIO COMPANY
1805 Lafayette Avenue St. Louis, Mo.

OUT OF THE ETHER
Chats About Broadcasting Stations

By Hirsch M. Kaplan

The other evening we tuned in station KDKA on an harmonic wave of about 460 meters and much to our surprise the musical selection that was being offered by KDKA's symphony orchestra at the time drowned out the program being offered through station WJZ.

Tuning down to a wave of 283 meters, we brought in the increasingly popular station, WPAB, which, although only on the air for an hour, furnished us with an enjoyable program by the Penn State Military Band. These boys certainly can play. They had us keeping step with

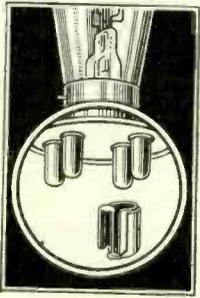
their playing from start to finish. Most of the stations from which we have heard band music seemed incapable of controlling the volume produced by such a gathering, and credit must be given this station for the splendid manner in which they handled this performance.

Continuing our experimenting on the low wave lengths we tuned in station WTAS, which was offering a very splendid program of string music as played by the Royal Banjo Club. For an hour they entertained with many popular selections.

We then decided to try our luck at gradually going up the wave length scale and try to tune in as many stations as possible. We have already told you of what success we had on 275 meters. Next we tuned in station WNAC which was offering a recital by the Merrymount Double Male Quartet. Male quartets always have made a hit with us, but this one was exceptionally good for all the members had fine voices and as a group they sure could harmonize.

We followed this by tuning in station KDKA which presented a program by the Westinghouse Community Double Quartet. They were every bit as good as the quartet which we heard from station WNAC, but their songs were of a different class in that they were all popular hit numbers. Just imagine hearing eight harmonizing voices singing popular music! The next time that you see "octette" listed on the programs don't forget to tune down to 326 meters.

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And it's easy to get such goods—anything you want in radio equipment. Big, complete stock—everything guaranteed; quick service; right prices. And you're sure it's reliable when it comes from Andrae. Get our complete catalog—free.

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ANDRAE In Business Since 1860

The Latest in Circuit Designs

HENLEY'S
222
RADIO
CIRCUIT
DESIGNS

A Complete and Up-to-Date Collection of Modern Receiving and Transmitting Hook Ups

Written and Edited by a Staff of Radio Engineers of Wide Practical Experience and Thorough Theoretical Trainings.

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East Side Y. M. C. A., New York City—
Author of "A B C of Vacuum Tubes"

Price \$1.00

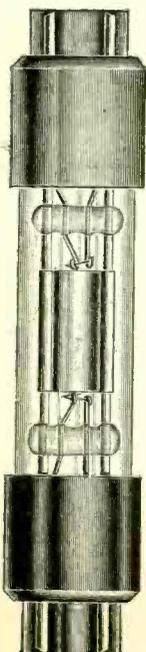
256 Pages.
284 Diagrams and Illustrations Specially made for this book.

AN ENTIRELY new and thoroughly practical book on radio circuit designs which will meet the needs of every radio enthusiast, whether novice or expert, amateur or professional. It is replete with correct and trustworthy radio information from which any one can successfully build and operate any of the circuits given. Contains the largest collection of radio circuits and Hook Ups ever published and includes all the standard types and latest developments.

This new book treats the subject in an entirely different and novel way, as it is the only book that illustrates the complete electrical design of the circuits, showing the electrical values of inductances, capacities and resistances, with the name of each element on the diagram of the circuit.

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The long-life tube!

Since their inception, radio vacuum tubes have been fragile. To knock or drop one incurred the expense of a new tube. But now there are

MYERS TUBES

Practically Unbreakable

—so protected by their unique design that they have been dropped on the floor without injury.

But their sturdiness is only one feature. They are the most perfect detectors and amplifiers obtainable. Smaller capacity and no bunched leads mean less interference—more clarity and greater amplification. Actual tests, all over the world, have proved their supremacy.

Two types—Dry Battery and Universal (for storage battery). At your dealer's—or send price and be supplied postpaid. Write for free circuit diagrams.

\$5 EACH Complete with clips ready to mount on your set; no sockets or extra equipment required.

F. B. Myers Co. Ltd.
Radio Vacuum Tubes
240 CRAIG ST. W.
MONTREAL CANADA

Calliaphone at WOC

ON February 4, the Calliaphone was broadcast from station WOC, Davenport, Iowa, between 8 and 9 o'clock p. m., comprising a program of the instrument playing by itself, played with an orchestra, and with a soloist. This instrument is said to be the first new loud volume toned instrument that plays automatically which has been produced in the musical field in the past 40 years.

Acme—Triflex 4 Tube Set Mounted \$40.00

5 Tube Acme—Triplex Works Either Way Crystal or Tube \$45.00

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Each Book also contains Accurate List of U. S. Broadcasting Stations to Nov. 15, 1923, alone worth the price of book.

Size of Book 8x11 inches. Record Pages good paper, suitable either Pen or pencil. Cover, heavy, flexible cover stock.

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to hear concerts from out of town. If you want to get new stations

ON YOUR CRYSTAL SET

write me today. I get new records every day from people using my plans who hear programs on Crystal from stations 400 TO 1000 MILES AWAY

No tubes, batteries or amplifying apparatus necessary. I hear KDKA (Pittsburgh Pa.) on Galena. You may already have everything you need and just have it connected up wrong. Send self-addressed envelope for picture of my set, and reasons why you need my plans.

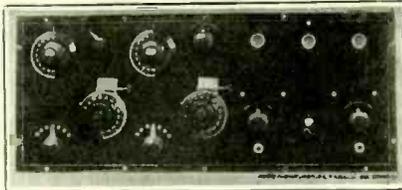
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1924's BEST RECEIVER

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Build It Yourself at Low Cost

Complete Engineering Plans anyone can understand, showing construction in detail of set, wiring, cabinet, bill of material, specifications, assembly, operation and instructions.

Blueprint 16x20, Photo-diagram, 8x10 Standard parts of all manufacturers can be used. Volume, Distance, Clearness and Non-Interference are the features of this set. Reliability and value guaranteed or money back.

COMPLETE PLANS AS STATED FOR

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Check plans wanted—cut out and mail with cash or money order.

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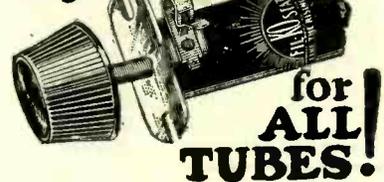
You Don't Like to Solder
VERY FEW FANS REALLY DO

Anyone can assemble a radio set with a screw driver and pliers by using the new perforated flat copper connector and be sure of its efficiency.

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Infinite Adjustment



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DESIGNED to permit infinite adjustment of currents used in vacuum tube. Gives absolute control of electronic flow and finest tuning possible. Fil-Ko-Stat will bring in DX you never heard before and shut out noise.

30 ohms full resistance.
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Made and Guaranteed by
DX Instrument Co. Harrisburg, Pa.
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Save 1/3 on Guaranteed Radio Equipment

Write us a post card—Address Dept. 42-R

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.

You will be amazed at the low prices Ward's quote. A complete tube set having a range of 500 miles and more, including tube, head set, batteries, and antenna equipment, as low as \$23.50.

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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WD-12	3.00	DV-6A	3.00
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UV-201	3.00	C-299	3.00
C-300	2.75	UV-201A	3.00
C-301	3.00	C-301A	3.00
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DV-1	3.00	Moorhead	3.00
6 v. Plain Detector	2.75		
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 Dealers and agents write for special discounts.
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DETECTOR-AMPLIFIER

T. No. 1. Detector-Amplifier. 1½ Volt Filament. ¼ Ampere. Plate Voltage, 22½-90.
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 T. No. 7. Detector. 6 Volt Filament. ¼ Ampere. Plate Voltage, 16-22½.
 Filament licensed under Patent No. 1422019 July 4th, 1922.

THORIO TUBES GUARANTEED
 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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 Dealers' orders given prompt attention

First Radio Course in Agriculture

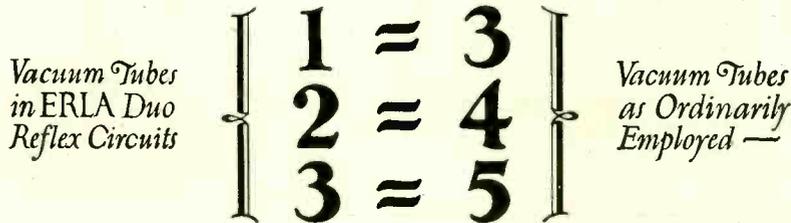
A RADIO course in agriculture to be broadcast from the Kansas State Agricultural College, Manhattan, Kans., on 286 meters will start February 11. Radio fans from all over the United States are asked to enroll in the first college of the air. The curriculum will consist of five courses. Fans may enroll in one or all subjects. A written examination at the completion of the radio semester will make it possible for students to receive a certificate of graduation from the first school of its kind ever conducted.

The program to be broadcast from the powerful station KFKB will consist of timely subjects primarily of interest to farmers. Faculty members will present interesting practical information. Lectures will be interspersed with musical numbers by the college music professors.

The extension radio curriculum as announced for the first radio semester, starting February 11, will consist of five courses: Monday, poultry husbandry; Tuesday, dairy and livestock husbandry; Wednesday, crops, truck and soils; Thursday, agricultural economics and farm engineering; Friday, home economics.

Enrollment blanks for radio students who desire a certificate of graduation from the first agricultural radio course will be supplied by the radio manager of the extension division, Kansas State Agricultural College.

Reduce Tubes by Half
With Erla Synchronizing Transformers



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.

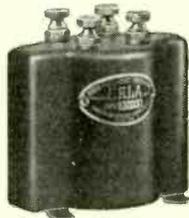
Even one tube provides excellent loud speaker reception over a wide range; two tubes blanket the zone ordinarily covered by four; while three tubes bring in stations on the loud speaker from coast to coast.

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.

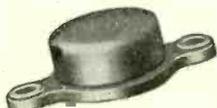
Detailed diagrams and descriptions of Erla Duo-Reflex circuits are presented in Erla Bulletin No. 16. Ask your dealer, or write, giving your dealer's name.



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.

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Save
1/2 Price
 of
New Tubes

Burned out or broken tubes repaired and guaranteed equal to new.

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HUNT'S UNIVERSAL HAIR-LINE RADIO TUNING DEVICE

ONE VERNIER FOR ALL DIALS

Gives micrometric adjustment outside the field of inductivity.

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

Post Office Finds "Roxy" Easily

S. L. ROTHAFEL is treasuring a postcard which was delivered at the Capitol Theatre, New York City, the other day, postmarked Washington, D. C., and bearing on the address side the single word "Roxy." It is as "Roxy" that Mr. Rothafel is known to thousands of radio fans who listen in on the concerts broadcast from the Capitol every Sunday night. The message on the other side of the card read:

"I have a small wager that a postcard addressed as is this one would reach you. If it does, it proves (1) the efficiency of the post office and (2) the extent of your popularity. Do I win the bet?"

The card was signed S. M. Bernhardt, 1443 T Street, N.W., Washington, D. C. Mr. Rothafel telegraphed back, "You win!"

DOUBLE THE LIFE AT HALF THE COST



Arrow Radio Batteries
are guaranteed two years in writing.

Will ship C. O. D. or allow 5% discount for cash with order. Order shipped same day received. Write today.

We specialize in Storage Batteries only.

Arrow Battery Co.
8 St. Clare Place
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6 V., 80 amps.	10.00
6 V., 100 amps.	12.50

\$25 for \$10

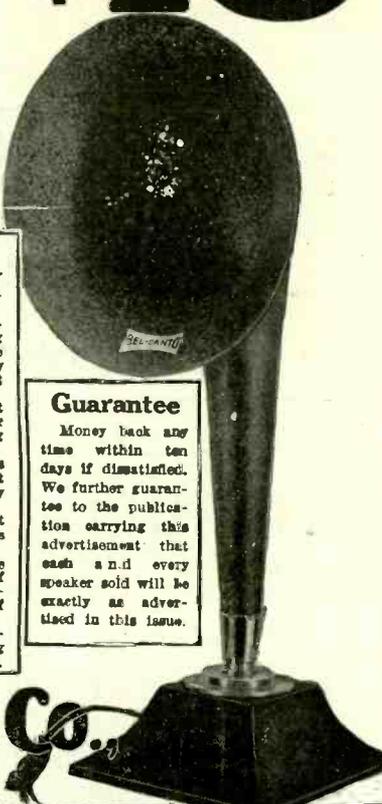
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THE ACOUSTICAL AMPLIFIER

BEL-CANTO

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This is truly a wonderful opportunity to buy this nationally known speaker at a tremendous saving.

Call at the factory, send us your check, money order or pay the postmaster \$10.00. C.O.D. DELIVERED FREE TO YOUR DOOR.

PRICE \$10

Bel-Canto Mfg. Co.

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General Office & Factory, 417-419-421 E. 84th St., N. Y. C.
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7 POINTS OF BEL-CANTO SUPERIORITY

1. Fiber horn. Crystalline finish.
2. Our own adjustable loud speaking unit, giving a wide range of tone quality and volume without distortion.
3. The base of cast iron, weighing four pounds, eliminating top heaviness.
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5. Complete instrument stands 24 inches high, 10-inch bell.
6. Guaranteed for one year from date of purchase against mechanical defects of any kind.
7. No auxiliary batteries required. Just plug in on second stage.

Guarantee

Money back any time within ten days if dissatisfied. We further guarantee to the publication carrying this advertisement that each and every speaker sold will be exactly as advertised in this issue.

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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 outfits at.

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

The outfits 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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4. Reflex. Two tube. 500 to 1000 mile loud speaker range	23.00
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
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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
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If you wish to make any set which is not listed here, write us. We make outfits of all kinds of sets, and use only the best of apparatus.

BILTMORE RADIO COMPANY
238 Lamartine St. Boston 30, Mass.

An Absolute Guarantee with every instrument made them famous!

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FOR SELECTIVE TUNING

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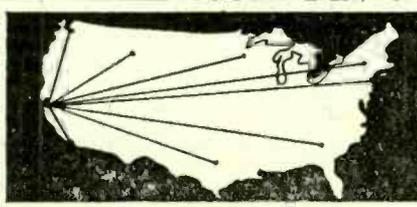
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DOUBLE DUTY PIG-TAIL Variometer

SHAMROCK MFG. CO.

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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 cell tubes may be used. All instructions, blueprint panel layout, assembly photo, etc. Postpaid 25c. Stamps accepted.

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RADIO CRYSTAL

Entire Surface Sensitive

The Recognized Standard Crystal Rectifier

Used all Over The World

Hundreds of Thousands of Satisfied Users. Rusonite Has Revolutionized Crystal Radio Reception.

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Guaranteed

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Supersensitive; will not oxidize

Price 25c

Order from your dealer or direct from

Rusonite Products Corporation

15 Park Row, New York, N. Y.

Come on, Fellows! Let's all build that Super-dyne that appeared in RADIO WORLD for Dec. 15, 22 and 29. It's the best thing that the past year brought out. Start it now!

LOUD SPEAKING CRYSTAL SET

Music heard all over room, and distant stations brought in on any type of crystal set with Steinmetz Amplifier. Get our complete Radio catalog. STEINMETZ WIRELESS MFG. CO., 3752 Penn Ave., Pittsburgh, Pa.

Coast to Coast on One Tube and No Body Capacity

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.

Radio Outfitting & Supply Co.
Box 1107 LANCASTER, PA.

SUPERTRAN

Trade Mark Reg. U. S. Patent Office

THE IDEAL AUDIO FOR NEUTRODYNES



Every Neutrodyne set requires audio transformers which are specially designed for this circuit. Build right by selecting Supertrans first! Greatest Volume. Least Distortion.

Price \$6.00

At your dealers or by mail postpaid on receipt of purchase price. Write for our free literature.

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14 Christopher St., New York

WHAT YOU HAVE BEEN LOOKING FOR The MICRO-COUPLER

Patent Pending

Made for use as Coupler, Wave Trap, R. F. Transformer and special Amateur Low Wave Coupler, all with coarse and vernier controls.

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Unmounted \$3.00 } Prepaid
Unit Panel \$7.75 } Insured

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SUNBEAM ELECTRIC CO.

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Satisfaction or money back

KNOCK DOWN NEUTRODYNES

Most popular receivers today.

\$80.00 Model KD 50, Fred Elsmann Receiver. ALL parts included. Special at..... \$69.80

65.60 Model 187A, Fada Receiver. ALL parts to build 5 Tube Neutrodyne. Special at..... 56.75

17.50 Workrite Parts Set. 16.95

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1.00 Curtis Rubber Bar Caps65

CONDENSERS

2.00 23 Plate R. C. Co. 1.25

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4.00 23 Plate, Vernier, R. C. 2.10

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Everything guaranteed as firsts. Don't delay getting price list No. 9

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OURS AND MANUFACTURER'S GUARANTEE

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Cutler-Hammer \$0.85
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Federal, 25 ohm 1.25
Filkostats 1.85

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Federal \$4.75
Brandes Superior 4.75
Baldwin Type C, Double 7.95
Western Electric 9.95
Ambassador 8.00
Diamond 8.00
Dr. Selbt, 6,000 ohm (German) 1.75

AUDIO TRANSFORMERS
Federal No. 65 \$8.50
Jefferson, 3-1 and 6-1 Ratio 2.85
Acme 3.95
All-American, All Ratio 3.85
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Amertran 5.75
Liberty, All Ratio 3.95
Neutrodyne Parts (genuine, guaranteed parts) for 5 tube set, complete \$8.50
Write us as to what you need and let us surprise you with our low prices. Send Money Order, or pay the Postman. Money Back if not Satisfied. Postage paid on all orders over \$5.00.

WHOLESALE RADIO SERVICE
39 Cortlandt St. Tel. Rector 1280 N. Y. City

Union Favors Radio In Mines

FULL powers to investigate the possibilities of radio as a means of saving lives in mine disasters was vested in the international officers of the United Mine Workers of America by a resolution adopted at the international convention at Indianapolis, Ind., last week.

It was explained that in experiments at Scranton, Pa. it was found possible to operate a radio receiving set successfully 1,000 feet underground and the international officers were called upon to investigate the feasibility of maintaining transmitters in the mines to notify the world of accidents or disasters.

IT'S A FRAME-UP CAST ALUMINUM FRAMES

FOR YOUR RADIO SET

MAKE IT RIGID and STRONG

NO WARPING NO SHORT CIRCUITS
SPRINGING BROKEN WIRES

NO MORE CABINETS

JUST APPLY FLAT MAHOGANY OR PLATE GLASS COVERS TO THE FRAMES

A SIZE FOR YOUR SET. PRICE 85c. Each

QUINBY RADIO CONSTRUCTION CO.
Subway Bldg., 181st Street and St. Nicholas Avenue
New York City

VACUUM TUBES REPAIRED

WD-11, WD-12, UV-201A, UV-199
and others for **\$3.00**

Quick service. All tubes repaired by us guaranteed to work as good as new. Send your dead tubes. We prepay parcel post to you. All you pay is \$3.00 to postman.

THOMAS BROWN CO.

511-519 ORANGE ST. NEWARK, N. J.

WD-11 and WD-12

TUBES REPAIRED

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

All tubes guaranteed to work like new.

Mail Orders Given Prompt Attention
"24 Hour Service"



70 HALSEY STREET, NEWARK, N. J.
TUBES SENT PARCEL POST, C. O. D.

YOU SAVE 50% OF THE USUAL COST



WORLD RADIO

Batteries Are Guaranteed
2 years in Writing
Will ship C. O. D. subject to inspection, or allow 5% discount for cash with order. Orders shipped same day received. WRITE TODAY.

World Battery Co.
Dept. 17
1218 So. Wabash Ave.
Chicago, Ill.
2 VOLT STORAGE BATTERY for
WD11 - WD12 \$5.00
6 V., 60 Amps. \$8.50
6 V., 80 Amps. 10.00
6 Volt, 100 Amps. \$13.50
6 Volt, 120 Amps. 14.50
6 Volt, 140 Amps. 16.00

If you see it in RADIO WORLD you know it's so. If you hear about it somewhere else, you can find it in last month's issues of RADIO WORLD. Start keeping that file now

FILL OUT AND MAIL NOW SUBSCRIPTION BLANK

RADIO WORLD

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1493 Broadway, New York City

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Please find enclosed \$.....

SUBSCRIPTION RATES:

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ADD \$1.50 a Year to Foreign Postage; 50c for Canadian Postage.

Sarnoff Predicts Radio Pictures

DAVID SARNOFF, vice-president and general manager of the Radio Corporation of America, recently delivered an address on "Radio and Its Meaning to the Farmer," at the University of Missouri, during the course of which he said: "I believe that an experiment to be made by my company during the present year will demonstrate the possibility of sending pictures by radio across the ocean."

Spanish Radio Regulations

SINCE the decree of the Spanish Government in March, 1923, declaring radio communication to be a monopoly of the state, there have been no definite regulations regarding the installation of broadcasting and radio telephone service, says a report from Consul F. A. Henry, at Barcelona. A recent conference held at Madrid between representatives of the various ministries and the leading radio companies is thought to have taken up the question of these regulations, although they have not yet been published.

Radio of Excellence PARAGON

Type RB 2A, \$125.00

- BALLANTINE Tuned Radio Frequency Transformer \$6.00
- LANGBEIN & KAUFMAN Variometers and Varlocouplers..... 7.00
- AMPERITES 1.10
- MYERS HI-MU Vacuum Tubes..... 4.35

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\$3000 to \$10,000 a Year

Learn at home, by actual practice, to design, construct, install, operate, repair and sell Radio Equipment. Pleasant, fascinating, profitable. My methods are simple, clear and successful. Turn your spare time into cash.

FREE WONDERFUL 1000 MILE TUBE RECEIVING SET. Write today for Booklet "Radio Facts" FREE. A. G. Mohaupt, Radio Eng., American Radio Association 4513 Ravenswood Ave., Dept. RW, Chicago

\$3.00

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Two Rheostats in One
PREMIER "DUOSTAT"
Trade Mark

You will see the advantages of this remarkable new apparatus at once. A real innovation. Think of it! One high-class Rheostat that completely replaces two of the ordinary types; does the work even more efficiently, and, in addition, greatly simplifies installation and wiring. One hole to drill. THAT'S ALL. That's what you get in the "Duostat."

Two independent resistor windings, each operating one tube. Bakelite Moulded Base, silver etched dial, "NICHROME" wire windings. Made for all types of tubes. No. 12, two windings, each 7 ohms. No. 13, two windings, each 25 ohms. No. 14, two windings, each 40 ohms. Price, all types, \$3.00.

You can't afford to leave out the "DUOSTAT" in your next "hook-up." Send for our free Bulletin No. 92. Ask your dealer.

Premier Electric Company
1805 Grace Street CHICAGO



ONE CONTROL ONLY

Makes It Most Simple to Operate

BRISTOL SINGLE CONTROL RADIO RECEIVER

(Non Regenerative)

Using Grimes Inverse Duplex System

SIMPLICITY OF OPERATION is the outstanding feature of this Receiving Set. One Control Dial includes every adjustment. To tune in, turn this Dial. A station once located can always be brought in again at the same setting.

NOT CONFINED TO LOCAL BROADCASTING—this four-tube set has power equal to six. Because the Grimes Inverse Duplex System utilizes the first two tubes for both Radio and Audio Amplification.

FULLY EQUIPPED FOR LOUD SPEAKER—no additional amplification is necessary—the patented Bristol One Stage Power Amplifier is incorporated as the last stage of amplification.

ANTENNA OR LOOP—either may be used to suit conditions.

SOLID MAHOGANY CASE with walnut finish encloses the complete Receiving Set. It is a beautiful piece of furniture fully in keeping with the most luxurious room.

The price—Bristol Single Control Radio Receiver, \$190.00.

Ask for copy of Bulletin 3013-BT describing this set.

THE BRISTOL COMPANY
Waterbury, Connecticut

For Transmission or Reception

"Freshman Selective" Mercury Variable Condenser

\$5

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

The "Freshman Selective" is attractively compact, quiet in operation and will withstand 5,000 volts without leakage or danger of short circuiting.

.0003 MF (Equiv. to 17 pl.) **\$5**
.0005 MF (Equiv. to 23 pl.)
.001 MF (Equiv. to 43 pl.) each

At your dealer's. Otherwise send purchase price and you will be supplied post-paid.

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

Chas. Freshman Co. Inc.
Radio Condenser Products
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**ALL LINES OF
RADIO MERCHANDISE
ARE IN OUR STOCK**
New York Prices Direct to You
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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.
Dealers and Jobbers Write for Discounts.
ACKERMAN BROS. CO., Inc.
301 W. 4th St. (Dept. "RW"), New York, N. Y.

**RADIO CONSTRUCTOR plans
make set building EASY!**

Ask for Newman's RADIO CONSTRUCTOR Plans and Books at your dealers. Blue Prints showing full size templates, wiring connections and instructions, for building the most popular circuits.
S. NEWMAN, Publisher
74 Dey Street New York City

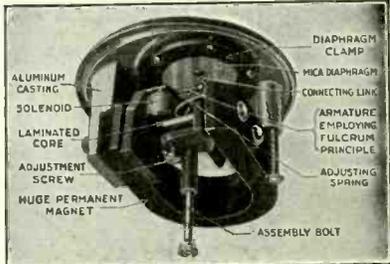
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SEND FOR OUR COMPLETE
MONEY SAVING CATALOG
TIMES SQ. AUTO SUPPLY CO. INC.
MAIL ORDER DEPT.
1745 BROADWAY AT 56th STREET
NEW YORK, N. Y.

Another Eastern Fan Hears KGO's Opening
EDITOR, RADIO WORLD: In your issue of Jan. 26th Dr. Morris has been mentioned as the only eastern fan to hear KGO on their opening night. On the night in question, I was just dial twisting as usual and had been listening to 6KW, Cuba. He signed off at 11.01½ E. S. time, and a few minutes after KGO came in. The first gentleman that spoke described some California county and at 11.23 mentioned Santa Clara and Santa Barbara. At 11:30 the second person started speaking and just made mention of the fact that it was his pleasure to congratulate the Gen. Electric Co. all over again. Owing to interference, the station was not held long, but it came in clear while being heard. The following morning I wrote to the Radio Editor of the Boston Post, advising him of this report. I also have written to the station itself for confirmation. I might also add that on the week of Jan. 2 I heard KHV at Los Angeles four times, holding them one evening for almost three hours, and another time for about two hours. And for a fact that might be of interest to you, this was all done on UV200 detector through a UV201 audio stage on a hookup as published in a recent issue of RADIO WORLD. Have also heard and received confirmation from 2LO and Calgary in the last two months. Hoping Dr. Morris will not be offended to know that he was not alone in his good reception, I am, yours truly, **ELMER J. CUDDY.**
180 Washington St., Dedham, Mass.

THE TRINITY LOUD SPEAKER

TYPE "A1"
21" FIBER HORN
\$25.00

TYPE "B"
(For Phonographs)
\$12.50



INTERIOR CONSTRUCTION

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

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

SEND FOR LITERATURE.

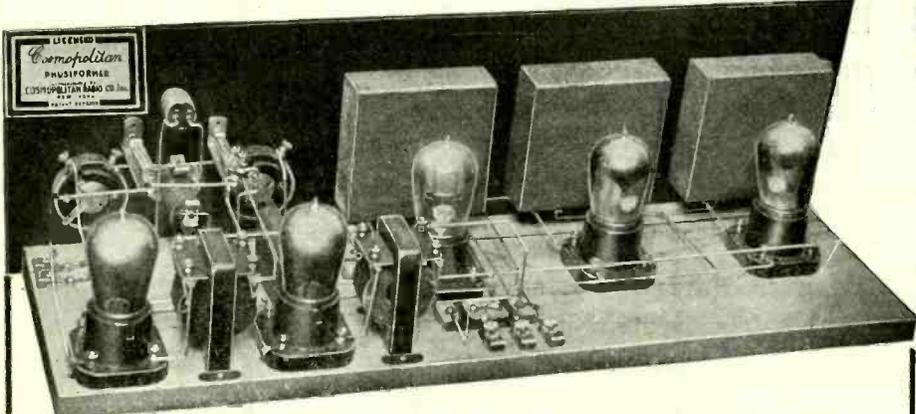
TRINITY RADIO CORPORATION
446 TREMONT STREET, BOSTON, MASS.

CURE RE-RADIATION!
CLEAR THE AIR FOR RADIO
Why Raise Cain with Your Neighbor?
THE NEW
DK Radio Frequency Transformer
will do it—BESIDES

Increasing your Receiving Range tremendously—
Absolutely eliminating all Squeals and Howls—
Adding Selectivity, Clarity and Volume—
Enabling the use of a Loop.

The DK RADIO FREQUENCY TRANSFORMER is small, compact and can be placed in any desired position in your set. Anybody can add this indispensable unit in a few moments.
PRICE \$4.50

If your dealer cannot supply you, send direct to
R. ROBINSON COMPANY
83 Barclay St. (Tel. Barclay 7543), New York City
Dealers Write for Terms



COSMOPOLITAN PHUSIFORMER

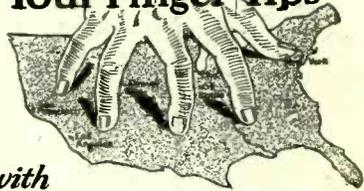
Converts any set to the equivalent of a Neutrodyne and then some.
More satisfactory than any instrument heretofore given to the public.
It meets the following requirements:

- 1—Non-oscillation
- 2—Non-radiation and non-interference
- 3—Sensitive to distant stations
- 4—Freedom from hand capacity
- 5—Synchronized and calibrated tuning
- 6—Simple operation and construction
- 7—Inexpensive
- 8—Wave Trap

LIST PRICE \$8.50

For further particulars apply to any radio dealer or write to address below.
COSMOPOLITAN PHUSIFORMER COMPANY, INC.
GROVER C. DAHLBENDER, Secretary and Treasurer
Factory: 151 East 126th Street, New York City Office: 2255 Broadway, New York City

The Whole U.S.A. at Your Finger Tips



with
A KENNEDY TUNER
PATENT PENDING
NONE GENUINE WITHOUT THIS SIGNATURE



BE CONVINCED WITH YOUR OWN EARS

I give demonstrations each evening at my home, 470 West 159th Street, N. Y. C., of my Tuner, bringing in Stations from New York to Los Angeles.

The Kennedy Tuner has no taps and no switches to turn and only one control to pick Stations with. Volume can be increased or decreased by turning dial on Kennedy Tuner, making receiver so simple anyone in a family can operate.

Kennedy Tuner and Diagram\$5.00
Diagram without Tuner.....\$1.00

Send your check, money order, or pay postman C. O. D. as preferred. Call at 137 West 48th Street by day or 470 West 159th Street evenings.

Satisfaction Guaranteed or Money Refunded

T. J. KENNEDY
137 West 48th Street New York City

British Unions Object to American Bands Broadcasting

PAUL SPECHT, American orchestra impresario, has received a cable from London, advising him of the objection of the British labor unions to Specht's broadcasting over WJZ to London with the purpose of selling American orchestras to English hotel and cafe managers.

Some months ago, Paul Specht went to England under the management of Lyons and Co., Ltd., and played at prominent English cafes and leading music halls. The British unions objected and the Hon. C. Jesson introduced legislation in Parliament to prevent the American musician from entering the country, but his efforts were without avail.

Recently, during the transatlantic tests by the Radio Corporation of America, Paul Specht broadcast several of his orchestras which were heard in England and France and received offers for his bands from both countries. Specht has received this cable from a London news agency:

"British musicians union taking joint action labour union warning home office object English stations receiving dance band music broadcast from America contend serves purpose demonstration with view selling orchestras in England action means Specht Columbia record orchestras via WJZ etc., have started another row here amongst British syncopators, claim would lose broadcasting engagement fees if American invasion this field permitted wire your attitude."

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.

Radio Supplies at Cut Prices

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Handy New Type	\$12.93
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New York Coil 23	1.49
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Dayton Fan Coupler	5.65
Dayton Fan Variometer	5.35
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Western Electric	8.50
Baldwin	8.45
Blue Streak	3.39
Little Tatler	2.79
Frost 2000	2.65
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DiatoGrand New	19.75
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Western Electric 10 D	39.50
Western Electric 10 A	135.50
Western Electric Victrola Unit	9.25
BATTERIES	
Burgess No. 2156, 22 1/2 volt, Large Size ..	1.85
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Bremer-Tully Neutroformer	1.35
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Jenkins, Vernier, 8.5 or 30 ohm	1.29
Pacent, 20 ohm73
Dayton Fan, 30 ohm61
Marco Vernier	1.49
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MISCELLANEOUS	
Bus Wire, Sq., Tinned, 2 ft. Lengths ..	.02
Spaghetti, 3 ft. Lengths06
UV199, 201A, WD12, WD11, UV200	4.29
Western Electric 218A	9.11
SETS	
Bremer-Tully 5 tube Neutrodyne	77.00
Crosley XI	48.75
Crosley V (Precision Ace)	14.95
PARTS	
For a 5 tube Neutrodyne	34.90
ALL STANDARD MERCHANDISE AT LOW PRICES. Write for Agent's Price List. Always include Parcel Post and Insurance.	
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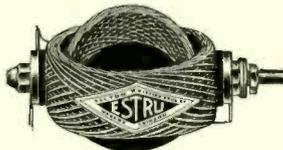
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Cockaday Coil Set \$2.50

Including full size blue prints of panel layout, complete picture hookup, and fully illustrated instructions for construction and operation.

Coils are fully assembled, made exactly as specified by Mr. Cockaday, D coil bank wound. Far more efficient than any home-made coils.

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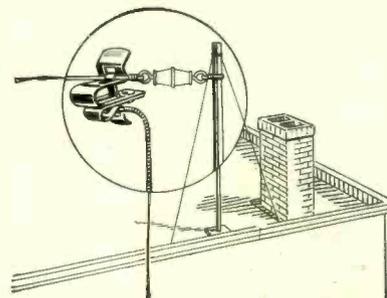
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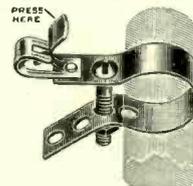
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A Small Tube That's a Big Performer

The new UV-199 is proving a mighty popular member of the Radiotron family, particularly for portable sets.

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FORMICA
 A Laminated Phenolic Condensation Product
SHEETS TUBES RODS
 The Best Made—BACK MOUNTING INDUCTION SWITCH—See Them
UNITED RADIO MFG. CO.

No Broadcasting Stations in Spain

ALTHOUGH no broadcasting stations have as yet been established in Spain, there is considerable interest of late in radio receiving sets of sufficient range to receive broadcasts from Paris, The Hague, Berlin, and London, Consul H. M. Woolcott reports. The principal drawback to a more extended sale of radio receiving apparatus there is the apparent lack of technical knowledge on the part of those who have undertaken the sale of radio materials. An investigation of the market shows five dealers who carry radio receiving sets in stock, mainly of British and French manufacture, but only one of the dealers interviewed seemed to have much knowledge of the subject.

One set of American origin was found in the stock of a local dealer which he states he has been unable to set up. It is believed that if a well qualified American salesman would visit Spain with samples of medium and high-grade instruments and make practical demonstrations, considerable business might result and good connections for future trade could be established.

Local operators experience more difficulty in receiving from Paris than from London, because there is little intervening land between Bilbao and London. However, it would seem that there should be no difficulty in receiving with a medium power apparatus from all the principal broadcasting stations of Europe.

USED BOOKS bought, sold and exchanged. List free. Roy McConnell, Ravenna, Nebr.

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 WHEN YOU WANT IT—WITHOUT FISHING

LAST ALL STATIONS YOU HEAR

TIME AND SETTINGS AT A GLANCE

BOND PAPER 32 PAGES 5x8 1/2 BULLED BROWN SIDES

CONTAINS LIST OF ALL BROADCASTING STATIONS

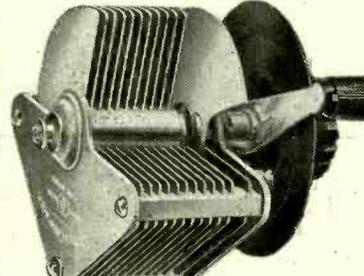
Stop wasting time on silent stations. Send a quarter (no stamps) for the Handy Radio Reference. Changeable daily record and permanent log in one.

CAN BE USED ON ANY SET
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 "A" and "B" BATTERIES specially built for your Radio Set in all types. Highest quality GUARANTEED for DISTANCE, CLEARNESS, and LONG LIFE.
Standard Electric Novelty Co.
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 Best proposition for Jobbers and Dealers. Some territory still available for New Distributors. Write for details at once.



A SUPER CONDENSER for ANY CIRCUIT
DUPLEX
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 NONE OTHER
COMPACT PRECISION CONDENSER
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Knob and Lower Verner Control. Max. Min. Ratio 25 Plate Verner 80-1. Price \$3.80 with knob and lower but not a dial.

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The receiver every fan has been looking for. The Four-Tube Receiver that is more powerful than a six-tube Naval Receiver. The Receiver which does not require a laboratory expert to build or operate. The Receiver that accomplishes anything any other will—and then more.

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WANTED—Westinghouse RC regenerative three-tube, or similar receiver. State details fully. Leslie Frazer, Oakwood School, Poughkeepsie, N. Y.

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PATENTS—Write for free Guide Books and Record of Invention Blank before disclosing inventions. Send model or sketch of your invention for our prompt Examination and Instructions. No charge for the above information. Radio, Electrical, Chemical, Mechanical and Trademark experts. Victor J. Evans & Co., 924 Ninth, Washington, D. C.

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WANTED—Mail us your discarded jewelry, Gold Crowns and Bridges, Watches, Diamonds, Silver, Platinum, and Old magneto points. Money promptly mailed. Goods returned if offer refused. United States Smelting Works (The Old Reliable), Dept. 55, Chicago.

LOWER PRICES on new tubes
 Box 342, New Haven, Indiana.

BODY CAPACITY BOTHER YOU? The Stabilo circuit uses no shield. Gets distance, volume, tone. Result two years experimenting. Simple to make. Booklet, 50 cents cash. Charles R. Ladd, Bellows Falls, Vermont.

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FOR SALE—Slightly used Grebe CR-6 Receiver with tubes, in perfect condition. First money order for \$90.00 takes it. Also have considerable other equipment very cheap. Act quick. Eugene Milburn, 917 Francisco Street, Los Angeles, Cal.

FOR SALE—Westinghouse R. A. Regenerative tuner, \$20.00. Two step amplifier, \$12.50. Willard two volt storage battery, \$2.00 each. Factory made Radio-Frequency Transformers, \$1.75 each. Two step Radio Frequency Amplifier and Detector, \$12.00. Raymond Schlegel, 1118 N. Negley Avenue, Pittsburg, Penn.

EMPLOYMENT IN SOUTH AMERICA
 300 addresses of employers, \$1. South America Information Bureau, Portland, Oregon.

STOCK in Oklahoma operating mine exchange for good Radio. Post Office Box 852, Tulsa, Okla.

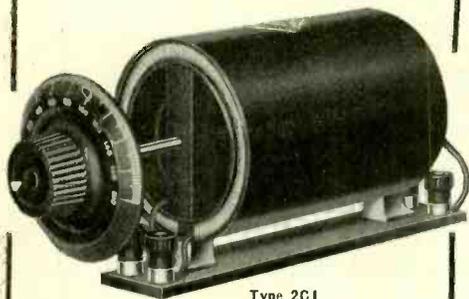
DETECTIVES NEEDED EVERYWHERE. Excellent positions, cities, towns. Particulars free. Captain Wagner, 188 East 79th St., New York.

PATENTS—SEND DRAWING OR MODEL FOR EXAMINATION AND OPINION. Booklet free. Watson E. Coleman, Patent Lawyer, 644 G St., Washington, D. C.

More Radio Fans in Mexico

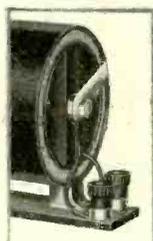
ACCORDING to the Director General of Telegraphs, an increasing number of requests have been received lately for permits for the establishment of radio broadcasting and receiving stations, says a report from H. Bentley McKenzie, Assistant Trade Commissioner, Mexico City. Broadcasting stations are now subject to a tax of 100 pesos a year, and receiving stations to a tax of five pesos per year. At the present time there are at least three broadcasting stations operating in the city.

The Star Is Here



Type 2C1

A SINGLE SLIDE COUPLE FOR BETTER, CLEARER TUNING



Back View

NO BODY CAPACITY EXTRA KNOBS

NO SOLDERING DUSTY PARTS

A couple coil designed to vary inductance instead of capacity, so as to give volume and selective tuning without distortion or noise. A couple coil designed to eliminate extra knobs, extra work and soldering entirely. Fully tested and guaranteed.

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STAR Products are guaranteed to give satisfaction, to be of the best material and workmanship obtainable. Guaranteed to be complete and ready for easy, quick attachment.

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Write or wire to-day for territory, illustrated literature, etc.

STAR RADIO PRODUCTS CO.

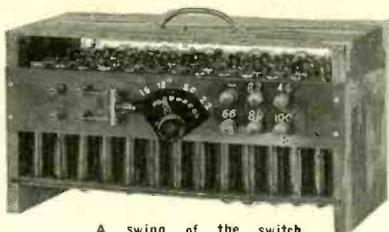
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Powerful—Durable—Rechargeable



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!" "Not only a wonderful battery, but handsome, also." "The best investment I ever made!" "Now, I get real radio enjoyment!"

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Telephone Bushwick 6753

Open Till 9 P. M. Daily

Batteries can be obtained from the following dealers: Brooklyn Radio Service, 573 Myrtle Avenue; Smith and Livingston Streets, Brooklyn; 17 John Street, New York City. Romcho Storage Battery, 146 West 68th Street, New York City. Conroy Storage Battery Co., 147 East 76th Street. Stephan Radio, 6 Nassau Street, Roosevelt, L. I. Autoelectric Storage Battery & Supply Co., 201 Paterson Street, Paterson, N. J. DEALERS WRITE FOR TERMS.

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LASTS A LIFETIME
MADE OF EDISON ELEMENTS
SATISFACTION GUARANTEED

No Change of Wiring Necessary

Only Three (3) Main Terminals to Connect

Type A—100 volt, with variable detector, from 16-22 volts, \$20.50.

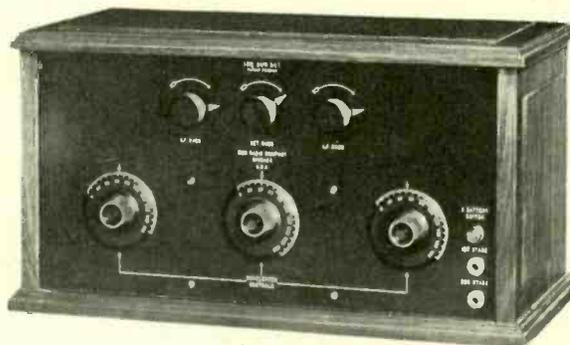
Type B—100 volt, with variable detector, from 16-22 volts and variable voltage from 44 to 100 volts for amplifier, \$23.50.

Type C—140 volt, with variable detector, from 16-22 volts, \$26.50.

Type D—140 volt, with variable detector, from 16-22 and variable voltage, from 44-140 volts for amplifier, \$30.00.

Marvelous New "Sun" Receiver Guaranteed Non-Regenerative

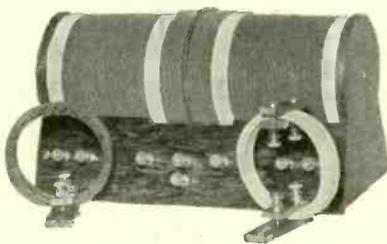
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"THE AIR IS FULL OF THINGS YOU SHOULDN'T MISS"



Eveready "C" Battery

4½ volts, three distinct uses. Length, 4 in.; width, 1½ in.; height, 3 in.; weight, 14 oz. At all reliable radio dealers.

This "C" Battery is a Wonder Worker

YOU can make the loud speaker respond with a new fullness and naturalness of tone. You can save money by adding months to the life of your "B" Batteries. These things you can do by using the new Eveready "Three" as a "C" Battery.

You already have an "A" Battery for the filament and a "B" Battery for the plate. A "C" Battery is connected to the third element of your vacuum tube, the grid, affording a control that is marvelous in action on audio frequency amplifiers.

As a "C" Battery the Eveready "Three" prevents distortion and excessive flow of current from the "B" Battery, lengthening its life. It is a wonder worker that saves its small cost many times over. Connect it in your audio frequency amplifier and note the difference. Full directions on the label and

in "How to Get the Most Out of Your 'B' Battery," a booklet on "B" and "C" Batteries, sent free on request.

This triple-use battery can also be used as an "A" Battery in portable sets. Light and full of pep. Its third use is as a "B" Battery booster.

Use the Eveready "Three"—a tested product of the world's leading electro-chemical battery laboratory. It serves more radio uses and effects more economies than any radio battery heretofore developed.

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