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PHOTO OF COOLIDGE AS IT LOOKED AFTER BEING TRANSMITTED MAY 31

1924

RADIO WORLD

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VOL. 5. No. 10. 139-114 ILLUSTRATED EVERY WEEK



(Wide World)

FOUR RADIO SERENADERS on the boardwalk at Coney Island.

8 TUBE SUPER-HETERODYNE

THE "SUPER-HET" THAT GOT SCOTLAND



BUILD YOUR OWN "ROLLS-ROYCE"

Construct for yourself, using genuine Resas parts, an exact duplicate of the set on which Frank P. Foley received 5SC, Glasgow, Scotland, on March 17, 1924, at 5.19 P. M. (See article, page 11, May 24 issue of Radio World.) For the first time all the improvements incorporated in the super-heterodyne by Frank P. Foley are given to the radio public.

8 Tube Super-Heterodyne Kit ^{Complete} Unassembled \$140.00

KIT COMPRISES:

- | | | |
|---|---|--|
| <ul style="list-style-type: none"> 1 Bakelite Panel, 8x40x$\frac{1}{4}$", drilled, buffed and engraved. 1 Mahogany Cabinet, 8x40x8, Removable Base. 1 Specially Constructed Grounded Rotor Condenser, capacity .001 M.F.D. 1 Specially Constructed Grounded Rotor Condenser, capacity .0005 M.F.D. 3 Resas Super-Heterodyne Transformers, the finest obtainable for intermediate frequency amplification. | <ul style="list-style-type: none"> 1 Resas 10,000 Meter Coupler, whose unique design affords unequalled selectivity. 1 Resas Oscillator Coupler, permitting smooth, even control of oscillations. 8 Na-Ald De Luxe Sockets (bayonet contacts). 2 Kellogg 3-1 Audio Frequency Transformers. 4 Dubilier .00025 mfd. Fixed Condensers. 4 Special Resistences. 1 Dubilier .001 mfd. Fixed Condenser. | <ul style="list-style-type: none"> 1 Weston Model 301 Voltmeter, 0-10 Volts. 1 Weston Model 301 Ammeter, 0-5 Amps. 4 Pacent Rheostats. 1 Pacent 375 ohm Potentiometer. 7 Binding Posts, nicked. 1 Cutler-Hammer Battery Switch. 2 1-Microfarad Fixed Condensers. 3 Jacks (Phosphor Bronze Contacts). 1 Mydar Wave Change Switch. 1 Grid Bias Battery. 2 Univernier Dials, Geared. |
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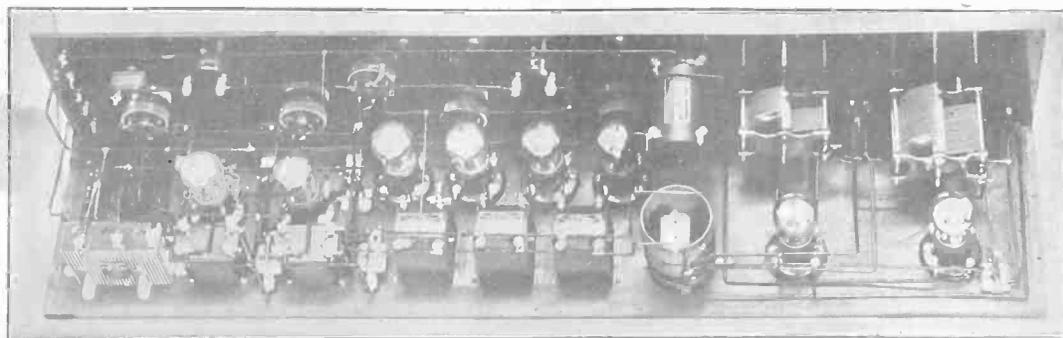
Kit comprising 3 Resas Transformers,

1 Resas 10,000 meter Coupler, 1 Resas Oscillator Coupler.....\$39.50

Complete detailed constructional data with each kit giving full constructional information and photographs which makes wiring so simple that a boy can build this set.

To those desiring complete set, ready to use, we will assemble your parts, charging \$40.00 for our labor.

Guarantee of absolute satisfaction, or money returned, if notified of any dissatisfaction within ten days of receipt of goods.



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RADIO WORLD

[Entered as second-class matter, March 28, 1922, at the Post Office at New York, N. Y., under the Act of March 3, 1879]

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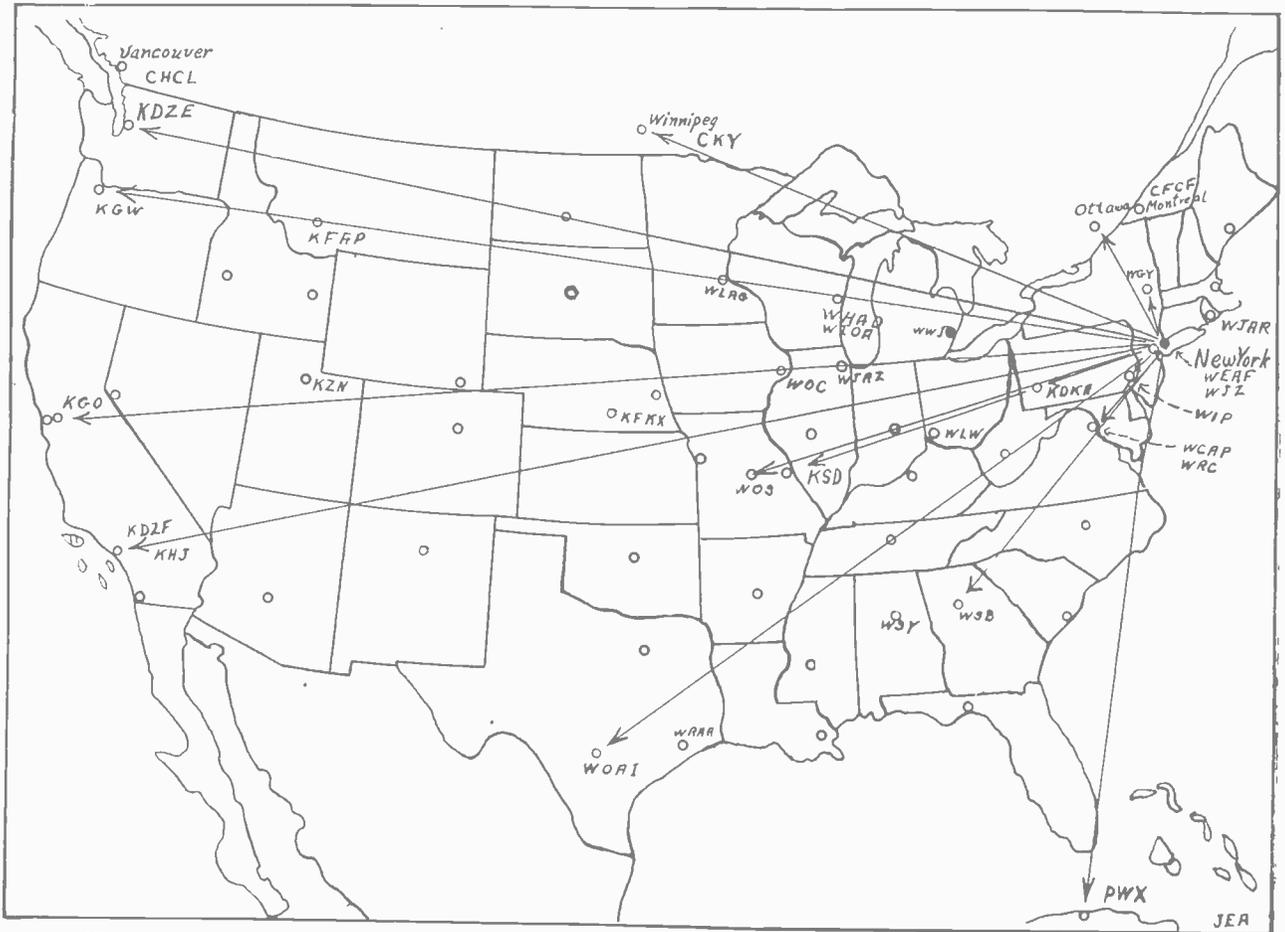
Vol. V. No. 10. Whole No. 114

May 31, 1924

15c. per copy, \$6.00 a year

An Improved Super-Heterodyne Costing About \$150, Complete

WITH FULL INSTRUCTIONS FOR MAKING THE RADIO-FREQUENCY TRANSFORMERS YOURSELF



STATIONS heard on the loud speaker in New York City on Super-Heterodyne made by J. E. Anderson and described in his article.

[In his noteworthy article that begins in this issue of RADIO WORLD concerning the best circuit yet devised, J. E. Anderson, recognized authority, makes important improvements on the Super-Heterodyne. One of these is the prevention of radiation by the use of a muffler tube, which also increases selectivity and sensitivity. A novelty is the exposition of how to make your own radio-frequency transformers of the type specially required for the Super-Heterodyne.]

By J. E. Anderson
Radio Engineer

Part I.

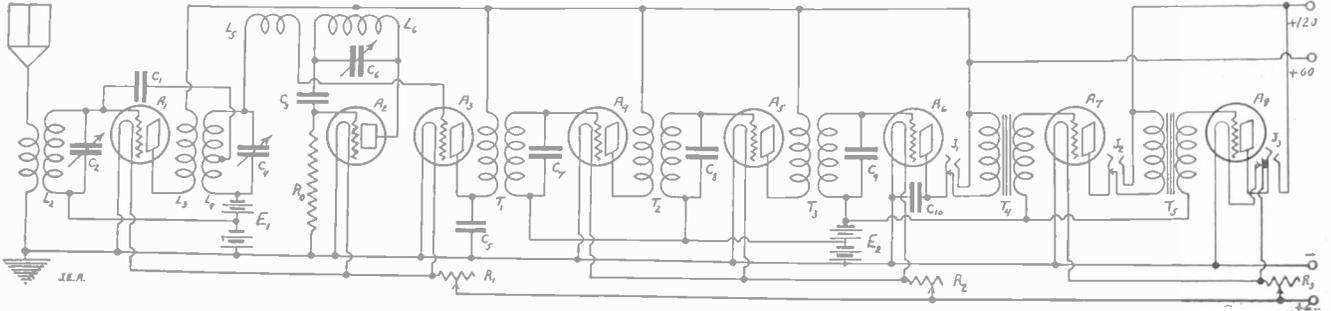
THE Super-Heterodyne receiver is daily gaining in popularity. People now realize that in principle this type of receiver is not only the best available but that it is likely to remain so for a con-

siderable time. Contrary to popular ideas, the radio art is not changing very rapidly at the receiving end, and any changes that may take place at the transmitting end will probably not affect the receiver fundamentally. Those who now purchase Super-Heterodynes feel that they are not only getting the best to be had, but that they will not be forced to admit a few years hence that they are in possession of a relic of radio antiquity.

Those not now in a position to get one of the receivers nevertheless have their hopes focused on Super-Heterodynes. Some day they will get one, but meanwhile they will be content with a less elaborate and less costly set. Yet a Super-Heterodyne need not cost any more to build than some of the other receivers of satisfactory performance. Even if a novice will build

(Continued on next page)

Easy to Build This Great DX Getter



WIRING DIAGRAM of Anderson's Transcontinental Super-Heterodyne, which is easy to construct.

(Continued from preceding page)

the set himself, and if he will do a little shopping and exercise a little judicious care in selecting his parts, the total cost of a really first class Super should not exceed \$150. This includes everything—antenna equipment, set, tubes, batteries, headset, and loud speaker. It is even possible to lower this figure somewhat in certain cases without sacrificing essential quality.

Many regard the Super-Heterodyne as too difficult to construct successfully at home. Some who have attempted to build and operate a circuit of this type have met with trouble. This may not be the fault of the novice at all. Some circuits called Super-Heterodynes are so only by claim or courtesy. They don't "deliver." A Super-Heterodyne is no more difficult to build than the other "dynes" and most of the "flexes."

The Super-Heterodyne requires only a little ingenuity and a full willingness to observe a few precautions.

The circuit described in this article deviates considerably from the usual run of Super-Heterodynes, yet it follows closely the design of receivers which have given superior performance in regards to both selectivity and sensitivity. The quality of the signal, of course, largely depends on the design of, and the kind of apparatus used in, the audio frequency amplifier. This feature has not been neglected.

Before proceeding with the description of the circuit it may be well to make a brief statement of the principle on which it is based.

The term Super-Heterodyne is a contraction of the expression "super-audible frequency heterodyne," that is, a heterodyne which is so high that it can not be heard. The term heterodyne means a "beat" between two high frequency electrical currents or potentials which have different rates of oscillation. The "beat" is the periodic rise and fall in the amplitude of the combined current when the two are impressed on the same circuit. The frequency of the rise and fall is the beat frequency, or the heterodyne frequency. If this is above audibility, the beat is a Super-Heterodyne frequency.

If two currents of different frequencies are impressed at the same time on a rectifier, or some other device which introduces distortion, there will be generated a current having a frequency equal to the beat frequency. This is done in the Super-Heterodyne, and it is this super-audible beat current which is amplified before detection.

One of the two high frequencies that enter into the production of the super-audible beat current is the radio frequency signal which is to be received. The other is provided by a high frequency oscillator, which is an essential part of every Super-Heterodyne receiver. These two are impressed on a modulator device, sometimes called a frequency changer. The super-audible beat frequency current is then selected by means of

circuits tuned to that frequency, and amplified to any degree desired. It is then detected in the usual manner, and amplified at audio frequency if desired.

The super-audible beat frequency, which is usually referred to as the intermediate frequency, may have any value from 20,000 to 100,000 cycles per second. A common value employed is 50,000 cycles per second. This value is selected once for all when the transformers in the intermediate frequency amplifier are designed and constructed. To select this frequency subsequently, all that is necessary is to turn the control on the high frequency oscillator until its frequency differs from the frequency to be received by the desired amount.

The receiver described in this article is an eight-tube circuit, comprising a muffer tube A_1 , an oscillator A_2 , a modulator A_3 , two intermediate frequency amplifiers A_4 and A_5 , a detector A_6 , and two audio frequency amplifiers A_7 and A_8 .

The muffer is necessary to prevent radiation from the antenna, which might interfere with neighboring receivers. Although the Super-Heterodyne sometimes is classed as a non-radiating circuit, it may cause quite serious radiation. But the muffer is not wholly used for altruistic reasons. It pays for itself well in other ways. It increases the signals many times by virtue of the amplification in that stage and also by virtue of the increased efficiency of the modulator at larger amplitudes. It also increases selectivity of the receiver. This is desirable because under certain conditions there is a type of interference which the Super-Heterodyne amplifier does not exclude, but which may be excluded by a selective high frequency tuner.

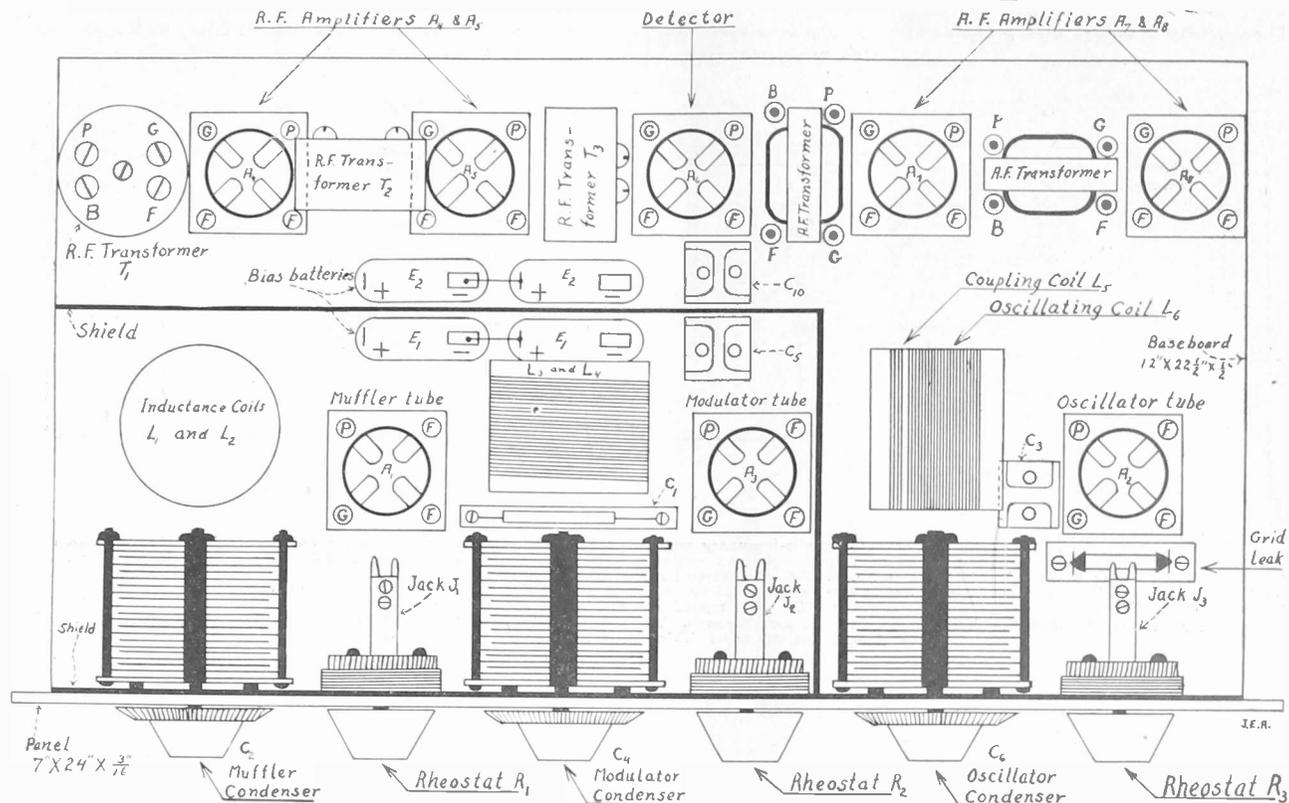
The muffer tube may cause oscillations of its own, and this would seriously interfere with clear reception. For this reason a neutralizing condenser C_1 is used. This further prevents radiation from the oscillator.

The input to the muffer tube, and the receiver, is of the double circuit type, with a small antenna coil L_1 and a secondary tuning coil L_2 . This type of circuit is used because of its greater flexibility over the single circuit type.

Either an open circuit antenna or a loop may be used as desired without any alteration in the circuit or without any extra binding posts. For best results the antenna should be of the ordinary outdoor type, not exceeding 150 feet in length. Good results, however, will be obtained over fairly long distances with an indoor antenna. This may be of the open circuit type and consist of a single wire from ten to fifteen feet long. A loop will also give good results. This may be either tuned or untuned. If tuned, an external condenser in series with the loop and the coil L_1 should be used.

The secondary tuning condenser C_2 is a variable air
(Concluded on next page)

Where Parts are Placed in "Super-Het"



TOP VIEW of Super-Heterodyne, showing inside of cabinet and giving the location of the parts. The shielding runs across the back of the panel and also encloses the left-hand side of the set, as shown by heavy black line.

(Concluded from preceding page)

condenser having a maximum capacity of .0005 microfarad.

The modulator used in this receiver employs the grid bias method of modulation. This is not used frequently, but it gives better results on strong signals, as it is more stable in operation. The modulator is not so quickly overloaded by the oscillations from the oscillator.

The signal input to the modulator is obtained by means of the tuned coupling transformer L_3L_4 . The secondary of this transformer is shunted by means of the variable air condenser C_4 . This is an important tuning element in the receiver, and it should be of the best quality both mechanically and electrically. It should preferably be provided with a vernier for fine adjustment. Its capacity should be .0005 microfarad at maximum setting.

Parts Needed for Super-Heterodyne

FOR constructing the Super-Heterodyne, described by J. E. Anderson, the following parts should be used:

- Three lengths of insulating tubing, 3" diameter and each 2½" long.
- One-half pound of No. 24 D.C.C. wire.
- Three variable condensers, .0005 mfd., vernier preferred, geared.
- Three dials, 3".
- One neutralizing condenser, C_1 (or four).

- One by-pass condenser, C_5 , .0005 mfd.
- One by-pass condenser, C_3 , .001 mfd.
- One .002 mfd. by-pass condenser, C_{10} .
- One 1 mfd. by-condenser across 60-volt battery.
- Three intermediate frequency transformers, as described, with condensers.
- Two audio frequency transformers, best quality.
- Three 10-ohm rheostats.
- Two double circuit jacks.
- One single circuit, automatic filament control jack.
- Four 4½-volt grid batteries.
- Eight standard vacuum tube sockets.
- Eight UV201A vacuum tubes, except as suggested.
- One 12,000-ohm grid leak.
- One grid leak mounting.
- Six binding posts, preferably appropriately engraved.
- One panel not less than 7" x 36", except as suggested.
- One baseboard to match.
- One cabinet to match.
- One sub-panel about 1.5" x 10" x 3/16".
- Copper or brass shield about 6" x 48" x 1/16".
- A few feet of rosin core solder.
- Twenty-five feet of copper bus bar, tinned.
- A few feet of "spaghetti" or rubber tubing.
- A few nickel-plated wood screws, oval heads, and about one inch long.
- About six dozen soldering lugs.
- A quantity of 6/32 machine screws and nuts, and a number of small round-head brass wood screws for mounting transformers, etc.
- Brass strips for mounting the inductance coils, shields, and intermediate frequency transformers.
- Two telephone plugs.
- One headset.
- One loud speaker.
- One 100-ampere-hour storage battery.
- One 120-volt dry cell plate battery.
- A good antenna—outdoor, indoor, or loop.
- A good ground connection.

[The second instalment of Mr. Anderson's authoritative article on building the Super-Heterodyne will be published in next week's RADIO WORLD, issue of June 7.]

Circuits That Have Stood the Test

These trusty standbys give a choice of five good receivers. Which do you prefer? Write to Technical Editor, Radio World, 1493 Broadway, New York City, telling why.

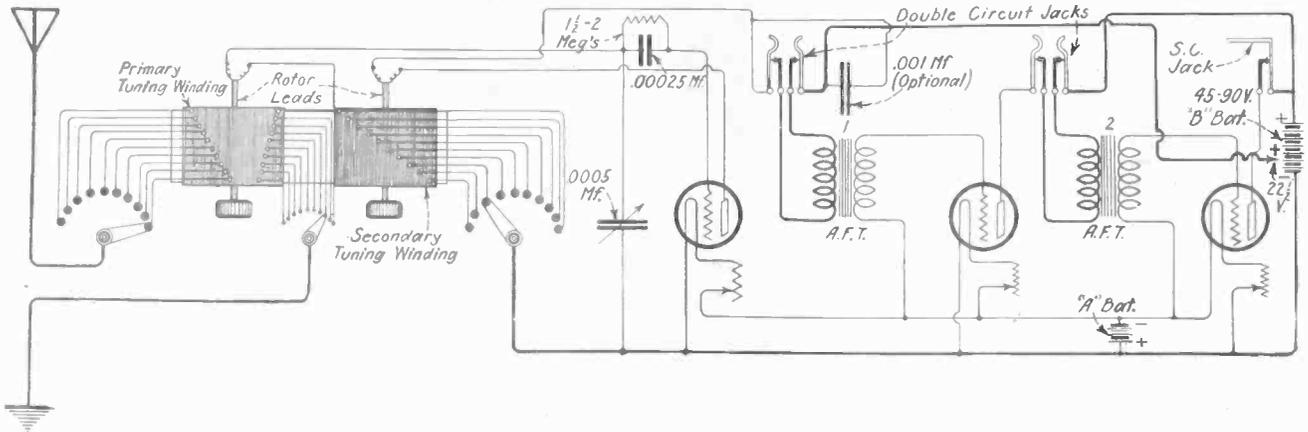


FIG. 1 is a Duplex receiving tuner with two stages of audio-frequency amplification. Both primary and secondary are tuned, thus allowing extreme selectivity. The tuner consists of two windings on a single tube and two rotors placed within. The cardboard or bakelite tube is 4" in diameter and 7 1/2" long. The primary winding has 90 turns of No. 22 SCC wire, tapped every nine turns and then at every turn until the end of the winding. These two sets of taps are brought out to two switches and connected to the aerial and ground. Starting about 3/4 of an inch from the end of the primary wind the secondary with 70 turns of No. 22 SCC wire, tapped every 10 turns. Both primary and secondary windings are spaced a bit in their respective centers to allow the shafts of the rotors to pass through. The primary rotor has 80 turns of No. 24 SCC. The secondary rotor has 60 turns of the same size wire. This circuit is a bit difficult to tune.

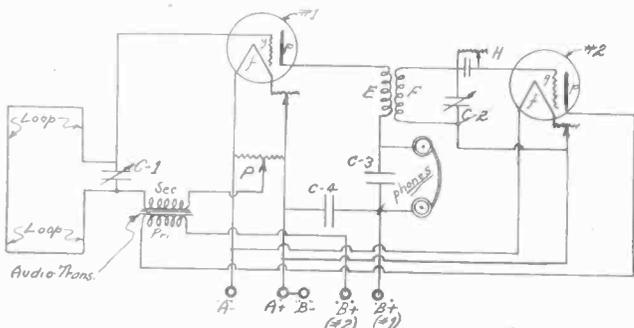


FIG. 2 is a two-tube reflex, with three controls. It gives good volume on a small sized loop and is good for distance. The first tube is for both radio and audio-frequency amplification, while the second tube is the detector. The loop is also a tuning inductance, as it is in the grid circuit and has a variable condenser bridged across it. A C battery is not required as the potentiometer across the first tube takes care of the negative grid bias. This type of set can be made portable.

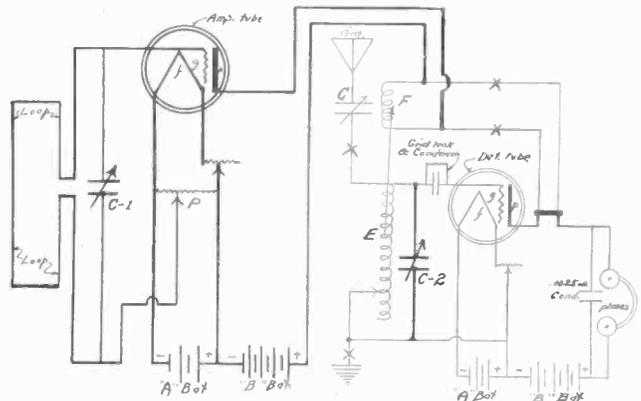


FIG. 3 shows how to change a tickler coil regenerative set into a good loop set. The heavy black lines denote the necessary changes. The two crosses denote where the present circuits should be broken. The radio-frequency amplifier or first tube can be placed in a small separate cabinet. The loop for this receiver should have about eight turns of wire and measure 3 feet on the diagonal. C-1 is a 23-plate condenser. C-2 is a 7-plate condenser. These should have vernier. A potentiometer is used to stabilize the RF tube.

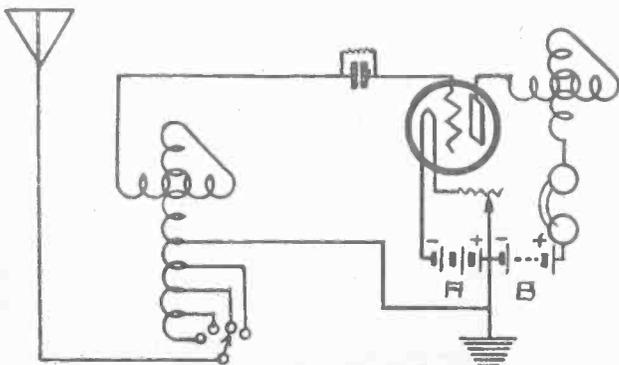


FIG. 4 shows the old method of obtaining regeneration by means of a plate variometer. This circuit is a bit harder to tune than the single circuit regenerative receiver due to the extra control required for tuning the plate. No variable condensers are needed, because both grid and plate are brought to resonance inductively by the variometers. Fans who have experimented with circuits using inductive tuning exclusively say they get true resonance with better success than when they use capacitive tuning through condensers.

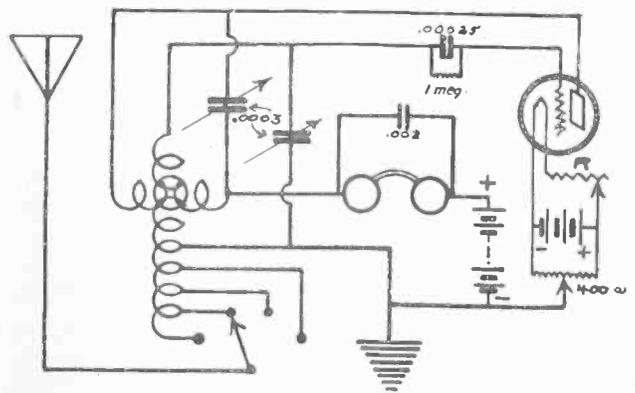


FIG. 5 is another variation of the circuit shown in Fig. 4. Here no separate inductance is used to tune the plate, as the rotor of the coupler, bridged by a variable condenser, serves the purpose. The stator is also tuned by a variable condenser. The volume and regeneration are controlled by the rotor. This circuit is very selective.

A Sensitive Two-Tube Reflex

[This is the third of a series of four articles on the construction of a Super-Power set. Each article calls for the construction of a workable set, but the development is successively advanced. The second article appeared in RADIO WORLD, issue of May 17, and the final one will be published soon.]

By Byrt C. Caldwell

THIS week we shall need another socket, a tube, and one more radio-frequency transformer of the same manufacture as the first.

This time we shall change the receiver into a two-tube reflex which will operate a loud speaker with good volume for distances up to 500 miles or more. The receiver is now becoming a real sensitive instrument. It will now be capable of equaling average good four-tube sets.

The wiring is considerably different now, and most of it will have to be removed. Leave the wire which connects the ground and the antenna to the coupler and the condenser, and the wire to the grid of the first tube. Remove all of the other wiring.

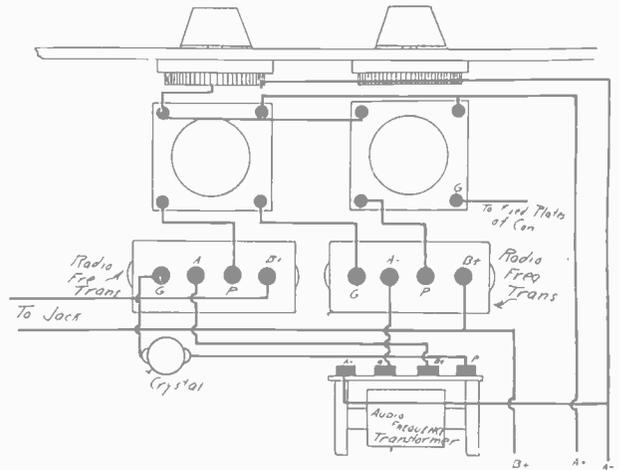
The builder should now have considerable skill in wiring, and should be able to make a neat piece of work.

Place the new socket directly in back of the rheostat, and in line with the first socket. Place the new radio-frequency transformer directly behind this socket, and in line with the first transformer.

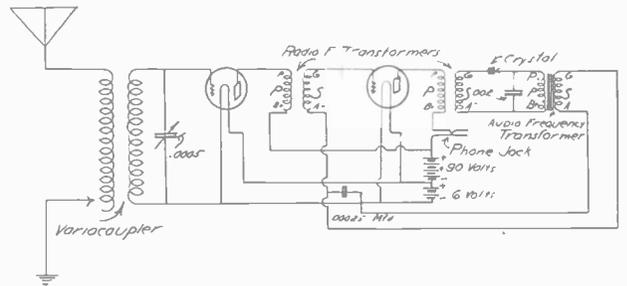
The instruments are now all arranged and we are ready to rewire the receiver. In wiring it is a good plan to use the largest soldering lugs, or copper terminals used for wiring receivers. When very small ones are used the binding posts can not be fastened down tightly and a good efficient job is not the result. The best and quickest method of soldering is as follows.

Spread about a dozen or two of the lugs on the table where you do your work and place a tiny piece of resin in each. Then, using wire solder, melt a drop in each lug, and hold the iron against the lug for several seconds, until the solder flows out and fills up the lug. Use plain wire solder. That is, wire which does not have a core of flux. Now, take a strip of bus-wire, and bend it exactly to the shape which is desired, measuring it for the correct length by holding it in the set, after each bend is made. When the wire is thus made to fit, dip each end lightly in powdered resin, and, melting the solder in one of the lugs, place the end of the wire in it, and hold it until the solder has flowed up smoothly around it, and has combined with it. When this is done to both ends of the wire it is a simple matter to fasten the wire under the binding posts. Many constructors make a great deal of unnecessary work for themselves by first placing the lugs under the binding posts and then bending the wire and soldering it into place.

Wire the receiver in the following order. First connect the filament circuit and then placing the tubes in their sockets. Connecting the battery, test your wiring. Remove the tubes and the battery and then connect the remaining tube socket binding posts to their proper binding posts on the radio-frequency transformers. Then connect the B of the second RF transformer to the phone jack, and the other side of the jack to B plus binding post, running this wire between the RF and AF transformers as shown. Connect the A of the second RF transformer to the B of the AF transformer, and then connect the crystal between the G of the second RF transformer, and the P of the audio transformer. To finish the wiring, connect the A of the AF transformer to the A minus binding post, the A of the first RF transformer to the G of the AF transformer, and the B of the same RF transformer to the long wire from the jack to the B plus binding post. The small fixed condensers are



HOW the parts are assembled.



TWO-TUBE circuit, with one stage of straight RF, the second tube being reflexed for RF and AF. A crystal detector is used.

connected in as in the wiring diagram, at the most convenient position.

You should now receive stations hundreds of miles away with sufficient volume to operate a good loud speaker.

If the receiver is inclined to howl, which it might do to a slight extent if the work has not been done with the greatest care, turn the filament down slightly. However, in the final article, we shall use the potentiometer, which will prevent oscillation.

If the tuning is not quite as sharp as you might like with an outdoor antenna, use a short piece of wire indoors, or a loop. After the four tubes are completely wired, we shall consider several methods of greatly increasing the selectivity of the receiver.

Next we shall change our receiver into a three tube reflex, a set capable of receiving stations 1,000 miles or more away on the loud speaker, using only an indoor antenna.

The new apparatus required will be one socket, one tube, (amplifier tube) and one more radio-frequency transformer and another AF transformer. A mica fixed condenser of .00025 mfd. capacity will also be required.

Lamps Held in Hand Light to Full Brilliancy

THE development of short wave radio transmission, which has resulted in the rebroadcasting of signals from WGY by eight English stations, has produced some interesting phenomena. As high as ten kilowatts have been impressed on the antenna at Schenectady in starting the 107-meter pulsations on their long journey.

Because of the intense field about the transmitter it is possible to light an ordinary sixty-watt lamp to full brilliancy by holding the lamp in the hand. Two men, standing on insulated stools, and each holding a metal rod in his hand, can draw a six-inch arc between the rods. No shock is felt because current of this nature travels through the skin rather

than through the body. However, if bare hands were used instead of the metal rods, a severe burn would be the result. The building is heated by a small coal stove and the engineers have learned that care must be taken in transferring coal from the coal bucket to the stove. If the body comes in contact with any metallic object arcs will jump from stove to shovel.

Metal pencils, watches or similar articles containing metal cannot be carried on the person on account of the small sparks which will jump to them. Shoes with nails cannot be worn because of the stinging experienced when the wearer steps on nails in the floor.

UNRESTRICTED BROADCASTING FOR DEMOCRATIC CONVENTION

THE executive committee of the Democratic Convention Committee decided in New York City that all stations will be given an opportunity to share in broadcasting the convention to give the widest possible distribution to the speeches. The speeches will be relayed by wire from the platform to several of the principal broadcasting stations in the United States.

RADIO WORLD'S

Complete List of Broadcasting Stations

This list gives call letters, names of operating companies, wave length in meters and kilocycles. Mailed on receipt of 15c, or start your subscription with that number.

RADIO WORLD, 1493 Broadway, N. Y. C.

This Crystal Set Got 450 Miles

By Brewster Lee

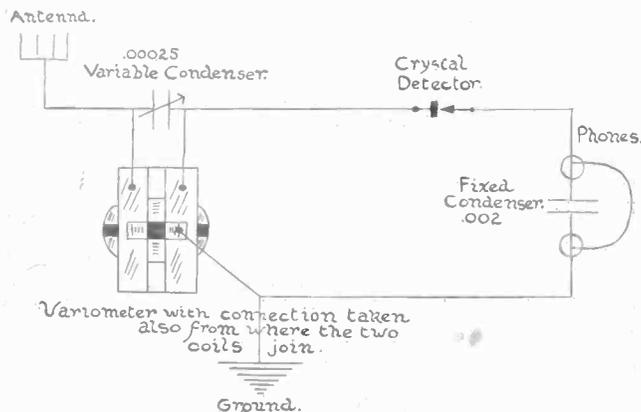
AS the years roll by in radio the humble crystal set seems to be left behind in the mad rush of supers, flexes, ultras and neutros trying to maintain the lead in the radio race. Before vacuum tubes came into common use eight or nine years ago, the amateur with an elaborate crystal outfit used to hold it up proudly and say, "My crystal wireless receiving set can pick up WCC press and NAA time signals so loud that I can hear them without having the phones on."

Strange as this may seem, it is a fact. The writer, in Boston, has heard consistently NAA, Arlington, Va., a distance of about 450 miles, in the daytime, all the naval wireless stations along the Atlantic seaboard from NBD, Otter Cliffs, Me., to NAR, Key West, Fla., with only a loose-coupler (now called a vario-coupler) galena crystal detector and phones. It must be taken into consideration, of course, that all these stations used fairly high power.

There is no reason why good long distance results cannot be obtained with a simple crystal set today.

One thing, though, which is quite necessary is that a good antenna be used, at least 100 feet long, and raised as high as possible over surrounding objects. A good ground is also very important. In an apartment house, the use of water and steam pipes takes away some of the efficiency of the ground because the pipes run all over the building to every apartment. Wherever possible an outside ground, connected to a sheet of metal or a number of pipes buried as deep as possible in the earth should be used.

The variometer is connected as follows: One binding post is connected to the aerial and one side of the variable condenser, and the other binding post to the other side of the same condenser and to one side of the crystal detector. A connection is then made to the point where the stator and rotor coils are connected, usually on the metal cross-piece at the back of the unit as shown in the accompanying diagram. This connection



WIRING DIAGRAM of crystal set using variometer and variable condenser for tuning.

goes to the ground and also to one of the binding posts provided for phones. From the other phone binding post a connection is made to the other side of the crystal detector. The small fixed condenser is then connected across the phone binding posts.

The crystal which may be silicon, galena, bornite, zincite, or any of the synthetic crystals now on the market, is first adjusted by means of the cat-whisker until a sound is heard in the phones. This sound, unless you happen to be tuned to a station, will be very slight. The variable condenser is now tuned until a signal or broadcasting station is heard, and the vario-coupler adjusted until the loudest sound is obtained. A slight readjustment of the cat-whisker may now be necessary.

Extraordinary clarity of voice and music is obtained when using a crystal as a rectifier in the above circuit.

The theory of crystal reception is thus explained: The incoming signals travel down the antenna and lead into the condenser and variometer where the signal desired is tuned in. The current then goes as far as the crystal detector, when one-half of it is rejected, and the other half passes through. This is called rectification. The phones are not sensitive to the high frequency alternating current as obtained from the antenna, therefore the current must be changed to a lower frequency so that it may be heard.

As there are no batteries and very little wiring, the chances of loose or bad connections is materially lessened, thereby making the set noiseless.

The set is simplicity itself, and no skill is required to tune it. As shown in the diagram, the parts are:

- One variometer
- One 23-plate variable condenser.
- Crystal detector
- One .002 fixed condenser
- Earphones.

New Broadcasters

List of Class A Stations Newly Licensed

Call	Station	Frequency Kcys	Wave Length Meters	Power Watts
WDBE	Gilham-Schoen Electric Co., Atlanta, Ga.	1190	252	10
WDBH	C. T. Scherer Co., Worcester, Mass.	1120	268	100
WDBJ	Richardson-Wayland Elect. Corp., Roanoke, Va.	1310	229	20
WDBL	Wisconsin Dept. of Markets, Stevens Point, Wis.	1080	278	500
WDBN	Electric Light & Power Co., Bangor, Me.	1190	252	5
WRBC	Immanuel Lutheran Church, Valparaiso, Ind.	1080	278	500
Transferred Class C to Class A				
CFGH	Leland Stanford Jr. Univ., Stanford University, Cal.	1100	273	500
WTG	Kansas State Agri. College, Manhattan, Kansas	1100	273	50
KFPY	Symons Investment Co., Spokane, Wash.	1060	283	100
WDBA	Fred Ray, Columbus, Georgia	1270	236	20
WDBB	A. H. White & Co., Inc., Taunton, Mass.	1310	229	10



(Kadel & Herbert)

THE FRONTENAC BREWERY BAND that broadcasts every Saturday night from the brewery, Montreal, Can., through CKAC.

How to Get Highest Efficiency

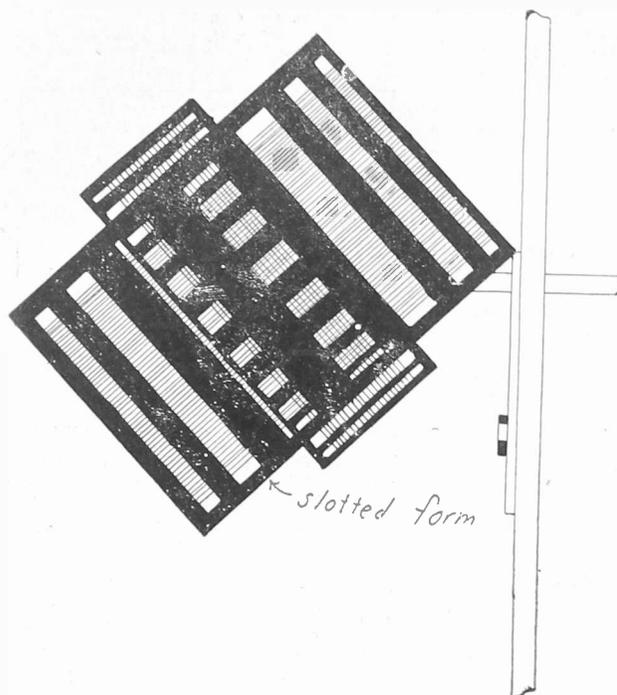


FIG. 1—Showing highest efficiency inductance.

By Charles Hapgood

It is false economy to purchase cheap apparatus for the construction of a receiver in order to get the largest set for the least money. A set employing four tubes, using high-grade apparatus, will usually give better results as to distance, tone quality, and selectivity than a set using six tubes and poor, low-priced apparatus. As a rule, the most efficient apparatus is reasonable in price; but, of course, it does cost more than the cheap parts which we see everywhere.

This article is written that the fan who makes his own receiver might have an idea of what really efficient apparatus is when he goes "shopping."

We will start with the panel. Most of the nationally advertised panels are very good. Hard rubber, which is efficient, may be obtained under several trade names. Bakelite, radion, or some other products of a similar composition are excellent. Dials, switches, sockets and other insulating material in the receiver should be made of the same material. There are many different kinds of rheostats, sockets, etc., which have a cheap composition for insulation. Such instruments waste a great amount of energy, and should never be used.

Inductances, if improperly made, are a great source of loss of energy. In selecting an inductance, no matter what kind, make sure that the insulating material is hard rubber, bakelite, etc., and not black shellaced cardboard. The winding should not have any binder to hold it to the form; or, if it has, this binder should be celluloid, and not shellac. The insulating support should also be of such a form that air is used as much as possible as the insulation. There are some variometers and variocouplers on the market which are "ribbed." In this way air is made to surround the wire. The ideal inductance would be one which has no insulating material whatsoever; but, of course, the construction of such an inductance would be mechanically impossible. Fig. 1 shows a 180° variocoupler—very efficient. The wire is wound over a "grid" of hard rubber or some other insulator. No such coupler, to the writer's knowledge, can be had at present.

We next come to the condensers. The variable condenser is one of the sources of greatest loss in the receiver. It is extremely important that a good variable condenser be used, especially in a radio-frequency receiver. When looking over the condensers select one which has practically all metal construction. The only insulation should be two or three small strips of hard rubber, used to support the fixed plates. This insulation should be at as great a distance as possible from the plates.

The difference in the results obtained when low-loss condensers are used, and when the old type is used, is astounding. If one of them is substituted for the old type in a receiver it actually seems to add a stage of radio-frequency amplification. In addition the

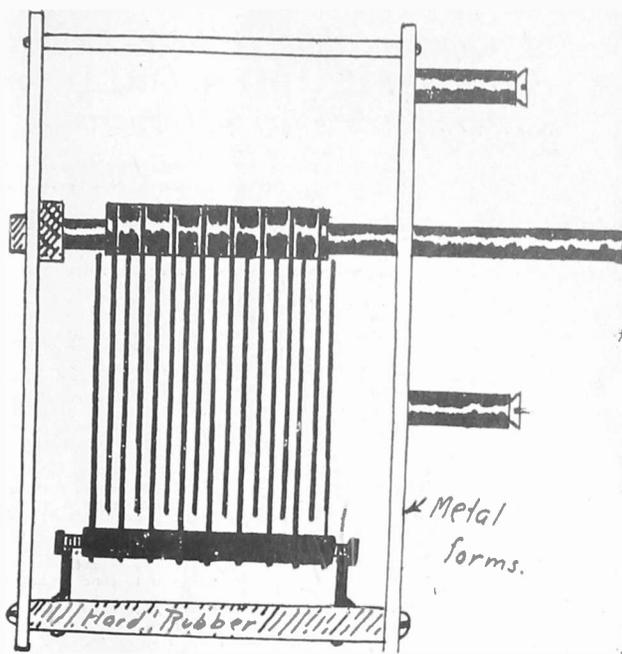


FIG. 2—A low-loss variable condenser, with air dielectric.

selectivity of the receiver is greatly improved. If the receiver with another condenser brings in a station over a range of five to ten degrees of the dial it may be tuned out with a turn of but one or two degrees with these condensers. With receivers which are badly affected with body capacity these condensers seem to be a complete "cure." The writer has tried one in such a receiver, and it was improved to such an extent that body capacity had absolutely no effect. The second illustration gives a good idea of how a good, low-loss condenser of this type should look.

As to the audio-frequency transformers, the best are those most widely advertised.

In purchasing batteries get those which are widely advertised. Get them at a store which does a brisk business, and have them tested to make sure that they come up to their proper voltage rating. In this way you should get fresh batteries that are full of pep. If you use dry cells, buy new ones as often as you feel that you can afford them. The consistently good results which you will obtain will be worth the slight extra expense. Give your batteries, both filament and plate, proper attention.

We come next to the antenna and ground. With our latest super-sensitive receivers the outdoor antenna is becoming of less and less importance. However, the outdoor antenna gives much better results for distance than the indoor antenna or loop. When constructing the antenna place it as far as possible from all obstructions. Use metal supporting posts. If more than one wire is used the spreader should be of metal, and but one insulator should be used at each end unless two are used in series. The best ground is made by soldering the ground wire to a large piece of sheet copper and burying this about five or six feet under the ground. Charcoal should be covered over it, and a strong brine should be poured over it before the hole is filled in.

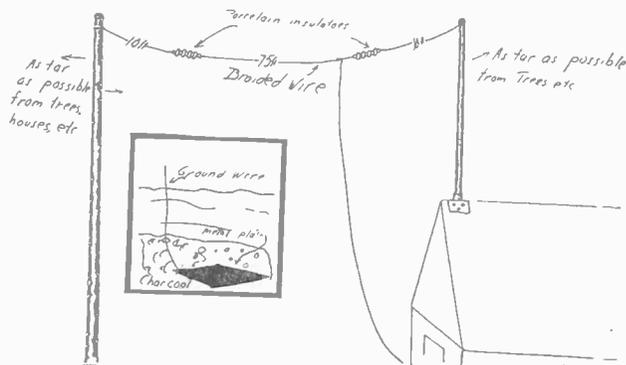


FIG. 3—Precautions to be taken in aerial installation to get best results.

The Radio University

A Question and Answer Department conducted by RADIO WORLD for its Subscribers by its Staff of Experts.

Address Letters to Radio University Department
RADIO WORLD, 1493 Broadway, New York City

IN RADIO WORLD for Oct. 13, 1923, on page 19, you gave a schematic diagram of a five-tube radio-frequency outfit. I would like to know the following: 1—I wish to make it a portable set. Will it be all right to use UV199 tube and 4-volt A batteries? 2—I notice you have only one stage of audio-frequency. May I add another? 3—On the one audio-frequency stage you show one 45-volt B battery. With an extra tube will this be sufficient? 4—Will this set run a loud speaker? 5—Where do I hook up another jack so that I may listen in on the head phones before the loud speaker? 6—What capacity condenser is used on the loop? 7—To what is the rotor plate of the condenser connected? 8—Is the plus or minus side of the A battery connected to the rheostat of the first radio-frequency transformer? 9—Will it be all right to use Federal audio-frequency transformers for AF amplification? 10—Could a 6-inch square loop be used or would it require an 18-inch square loop? 11—Would there be an advantage in having a C battery?—M. P. Adams, Mooseheart School, Mooseheart, Ill.

1—Four-volt dry-cell batteries may be used with the UV199 tubes, but in this case, where there are five tubes, it is advisable to have at least three sets of four-volt batteries wired in parallel. 2—A second stage of audio-frequency amplification can be added easily. A wiring diagram showing how this is done was published in the University Department of RADIO WORLD, issue of May 24. 3—Where greater volume is required you should use one more 45-volt B battery wired in series with the other. 4—As it is now, the set will operate a loud speaker, but with not much volume on distant stations. However, with the addition of a second stage of AF, distant stations will be heard with good volume on the speaker. 5—A double-circuit jack may be placed after the detector tube in the manner shown in the diagram referred to in answer to your question No. 2. The top post over the word "input" goes to the detector tube plate, and the bottom connection goes to the positive on the 22½-volt B battery, as shown in the five-tube diagram you refer to in your questions. 6—The condenser used across the loop has a capacity of .005 mfd. 7—The rotor plates of the condenser are connected to one side of the loop and also to the grid of the first radio-frequency tube. 8—The plus side of the A battery is connected to the rheostat of the first tube. 9—The transformers you mention are excellent for the purpose. 10—A six-inch loop is rather small, therefore not much energy can be picked up with it. The larger one would be much better for both direction and signal strength. 11—Use a C battery in the audio-frequency stages of amplification. About 4½ volts would be the proper potential.

1—For a loop aerial (box type) what wire is best to use and how many turns on a 20 x 20 inch loop? 2—Will ordinary stranded, insulated electric light wire do? 3—Does it make any difference if the leads are brought in from the side of the loop instead of from the bottom?—J. C. Callaway, 239 Boston Post Road East, Mamaroneck, N. Y.

1—Some kind of stranded copper wire, preferably with as much surface as convenient to use, works best with loop antennae. 2—The wire you mention will serve the purpose excellently. 3—It will be more convenient for you to have the leads brought out at the bottom of the loop, because otherwise you may not be able to turn the loop to the best direction for receiving your stations. If the leads are at the bottom, they can be turned easily to any direction.

I have built one of the popular types of reflex sets, and although it works the operation is very poor. I cannot get loud signals or even average distance on it. Is this talk about reflex sets being wonderful more or less misleading?—N. A. Reinhard, 548 Amett Blvd., Rochester, N. Y.

You probably have followed out the wiring directions correctly and are using good parts. But there is one thing about reflex sets that causes trouble to some radio experimenters. In this circuit, where the tubes are double used, the received impulse must travel back and forth over the same wires and through the same tubes at different frequencies. It is therefore plain that the path of the current must be as little obstructed by long leads and poor connections as possible. Comparative newcomers have failed in reflex construction because they did not use the utmost precaution in designing the actual wiring. The shortest possible leads MUST be used, and

connections firmly made with a solder and flux that will not corrode and cause a high resistance joint. Large-sized wire should be used for all grid connections and extreme care used to avoid running grid and plate wires near or parallel. If this advice is followed results will immediately increase.

I have a good Superdyne set, plenty of volume and fine quality on local stations, but I cannot get a whisper from any station with a higher wave length than WEAF. Previously I had a three-tube set with which I could get the leading stations throughout the country transmitting on high broadcast wave lengths.—C. Byron, 2445 University Ave., New York City.

Your trouble is that the coils in your Superdyne have not enough inductance to enable you to tune over 492 meters. This can be remedied by winding 6 or 8 turns of wire more on the plate coil, and the same number of extra turns of wire on the secondary coil. This will enable you to tune to about 550 meters.

Regarding the article on how neighbors can both use the same AF, published in RADIO WORLD, issue of May 24, will you please publish a picture showing the connections in the apartment upstairs?—Jack Rielley, 405 Hawthorne Ave., Newark, N. J.

The connections are shown in the accompanying picture (Fig. 14) and were explained in the article.

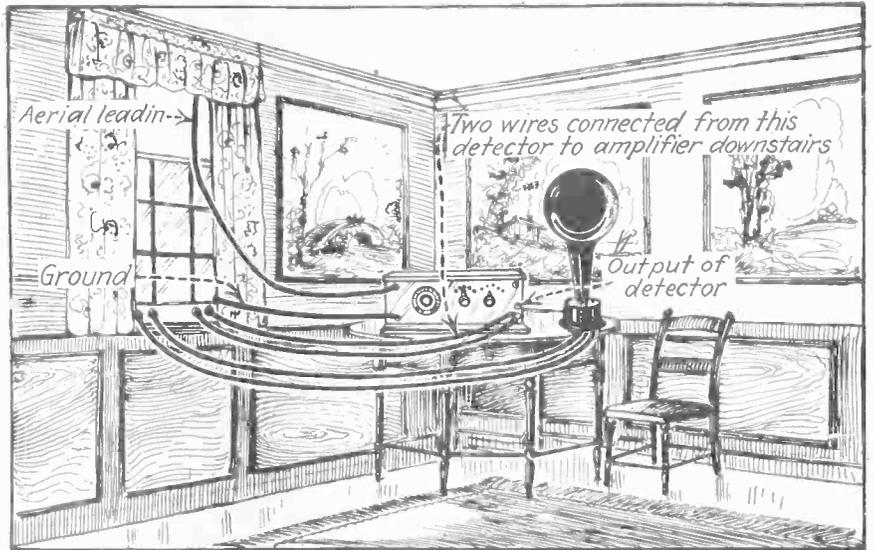


FIG. 14—Connections from the detector in an upstairs apartment (shown above) to the AF amplifier of a set downstairs, the amplified signal being returned to the loud speaker upstairs.

Two wires run from the detector upstairs (shown above) and lettered "Output of detector." They go through the window to the amplifier in the set in the apartment below. Two wires from below return the amplified signals to the loud speaker upstairs. Of course, the service can be instituted in the opposite direction, if the amplifier is upstairs and the detector below.

I have built a small crystal receiving set as

described in the University Department of RADIO WORLD recently, but I sometimes have trouble in adjusting the crystal detector to maximum sensitivity. Is there any method by which I could adjust the crystal regardless of whether voice or music was coming over the air?—A. Fischer, General Delivery, Cos Cob, N. Y.

The diagram, Fig. 15, shows how to connect a dry-cell battery key or push-button buzzer and

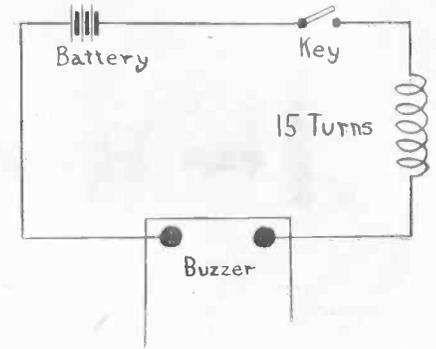


FIG. 15 shows how to connect a dry-cell battery, buzzer, key and coil of wire to test crystal detector. The coil is placed near the tuning coil of the set so that the electric impulses may be induced from one coil into the other.

small coil of wire with which you may adjust the crystal detector. The coil of wire is placed near the tuning coil and the push-button or key closed so that the buzzer's spark travels through the coil and by induction transfers energy to the tuning device on the set. The crystal detector is now adjusted until the loudest sound is heard. This little outfit may also be used to practice the wireless code, as the sound reproduced is similar to that of wireless telegraph signals.

In March 15 issue of RADIO WORLD I read

Join RADIO WORLD'S University Club

And Get Full Question and Answer Service for the Coming 52 Weeks.

RADIO WORLD, 1493 Broadway, New York City:

Enclosed find \$6.00 for RADIO WORLD for one year (52 Nos.) and also consider this as an application to join RADIO WORLD'S University Club, which gives me free information in your Radio University Department for the coming year.

Name

Street

City and State

Photos to Be Broadcast to Europe!



(International Newsreel)

PHOTO of President Coolidge and Mrs. Coolidge as it looked after being received in New York City by telephone from Cleveland in the recent test. The vacuum tube, the Aladdin's lamp of science, was radio's contribution to the success of the invention. The radio itself will be used to transmit photographs. Preparations are being made for such service between Europe and the United States. The invention works just as well by radio as by land wires. Extra precautions against interference must be taken.

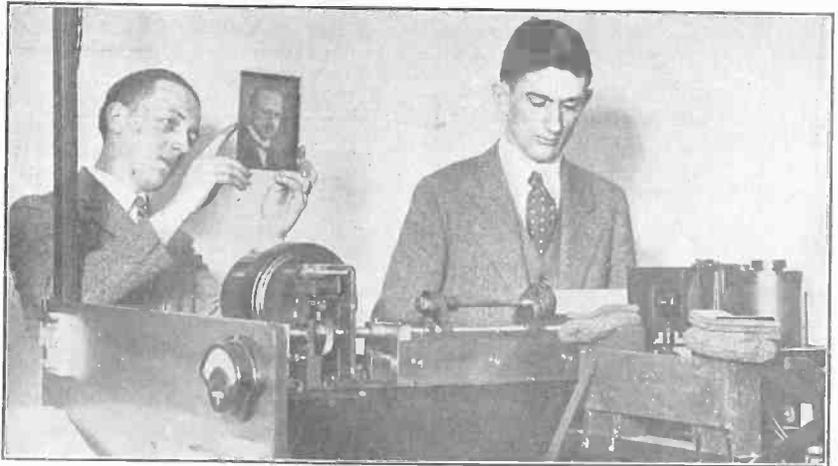
THE early sending of photographs by radio from the United States to Europe and vice-versa was forecast by an engineer following the recent transmission of photographs over telephone wires between Cleveland and New York. The radio will be used in the United States, too, besides the land wires. The successful demonstration was hailed as holding some promise for television, the exhibition of movies by radio, with accompanying speech and music. The present stage of development, however, promises only still pictures.

The sending of the photographs was done in the presence of newspaper editors, under the auspices of the American Telephone & Telegraph Company, the patent owners. Fifteen pictures, each 5x7 inches, were sent in two hours. They included pictures of President Coolidge, scenes in Cleveland and groups of editors. Radio contributed the vacuum tube that made the success of the invention possible. The company has been telephoning daily to England by radio for more than a year in experiments to determine the feasibility of installing an America-to-Europe radio telephone service. The transmission of pictures by radio across the Atlantic, is expected as a routine development.

The principle of transmitting and receiving photos is as follows:

By means of the photo-electric cell every variation of a beam of light is translated into a variation of electric current, and again translated into a variation of light.

The source of light used in the sending machine at Cleveland was an automobile lamp. A small spot of light from the lamp passed



(International Newsreel)

THIS is the receiving apparatus used in the new method of transmitting pictures. The reception is effected by a needle of light projected through a lens onto a film revolving on a spool. This needle rotates in lines, as on a phonograph record, and in this way records on the receiving film the shades of black and white, bringing out the details of the characters or of the scenes in the picture. The photo of President Coolidge and Mrs. Coolidge, published herewith, was received on the above machine in New York City. The Coolidge picture is the first of the photos transmitted in the test to be printed in a radio publication, and the laboratory scene is also the first to get such publication.

through a lens and was directed upon photographic film to be transmitted.

As this cylinder revolved, the point of light passed through the transparent film and fell upon a potassium pencil which ran through the centre of the cylinder. This piece of potassium formed a highly sensitive photo-electric cell. When light fell on it the electrons flew from the surface of the potassium, forming an electrical current. Observers of the test quickly noted that

the amount of light that passed through the revolving film was, of course, constantly lessening and increasing, according to the black and white that make the picture. Where the film was wholly transparent, the light passed through without loss and caused a comparatively strong current from the photo-electric cell. Where the film was dark, the light was correspondingly reduced and likewise the current. The constant

(Concluded on page 30)

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MAY 31, 1924

Better Receivers and More Radio Activities This Summer

THERE should be no truth this year in the paraphrase: "And now is the summer of our discontent." Radio has progressed so much during the past year that static and other troubles have been more or less relegated to the rear. In addition to this is the obvious fact that this summer there will be millions more of potential users of radio sets than there have ever been since radio caught the world by the ear and made it listen. This new army of radioists was created out of practically raw material when during the Christmas and New Year holidays hundreds of thousands of purchases of sets and parts were made in various sections of the country. As radio holds its devotees it naturally follows that the demand for better sets, or newer parts, should be increased to a percentage based on the larger numbers of the new total of radio fans.

In other words, it now becomes a question not only of more users of sets and parts but also of better sets and parts. Radio urges constant experimentation. One who tries out a crystal or a one-tube set this week will want to be graduated

Plenty of Room on the Roof



(Kadel & Herbert)

WHEN there's company at home, and he might be crowded for room and venture intrusion of solitude necessary for experimenting, Edmund Kean takes to the roof. He lives in a 14-story apartment house in New York City. "Best DX results on the roof," is his saying.

into the four-tube or six-tube set class before many months pass. This applies equally to parts and to sets. Every time a new condenser or a variometer or what not makes its appearance, there is a natural inclination on the part of the radioists to find out if it is something better than they have. It is this adventuring that helps to combine pioneering and romance with the science of radio.

Better sets and parts, and always better, is the cry of your progressive owners of receivers, and it is this fact that makes for greater activities in radio, not only during the winter months but also the summer season hitherto approached with fear and trembling by the radio trade, the members of which are now meeting new conditions face to face with the knowledge that the summer of 1924 will be the banner radio season since the entertainment and science first came into public view.

The String to Hammond's Invention

IT is somewhat puzzling to learn that Italy has ordered installations of the Hammond system for

privacy in radio communication, while no announcement is made of any action by the United States government. The impressive claims for the invention merit a full test by the leading country in radio achievement. John Hays Hammond, Jr., American inventor of the system, says that by using the same wave length throughout, with only the modulation varied, privacy is achieved, and it is possible to limit the reception to those desired to be reached. This would make possible, he says, the exaction of a tax on the owners of receiving sets. Programs would be heard only by those who pay.

Mr. Hammond probably has contributed something of value to the art, but if his invention is to be used in forcing his own solution of the problem of paying broadcasting artists, it will have an unhappy effect. Can not the infant industry be spared the constant ogre of a tax?

SKIPPING ONE

IN discussing the bill to prevent radio monopolies, Senator Howell of Nebraska said: "We don't know much about the ether. We haven't been able to investigate it." Happy ether!—Seattle Times.

Mounting Parts for the Superdyne

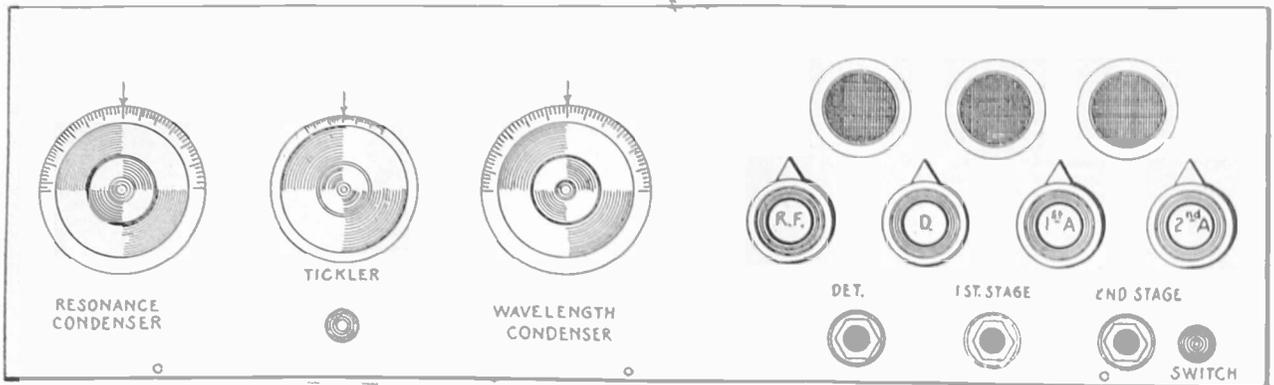


FIG. 5—Front panel view of complete assembled and wired Superdyne, showing location of coupler, condensers and rheostats. No binding posts appear on the panel.

[This is the third and final instalment of an article on how to construct the Superdyne. Part I appeared in RADIO WORLD, issue of May 17, and Part II in the May 24 issue.]

By **N. N. Bernstein**

Technical Editor

PART III

IN part two of this article, complete information on how to wind the various coils was given, together with panel and layout diagrams.

After all the coils are wound, we are ready to mount the parts on the baseboard and panel. Fasten the baseboard to the panel by means of three 2" narrow shank wood screws. Then place the condensers, coupler, rheostats, jacks and control switches in place.

The sockets are mounted on a separate piece of bakelite or hard rubber by means of two brass angles as shown. A four-gang socket for UV199 tubes may be made by the builder by mounting them himself, or may be purchased ready made. The sockets are placed high up on supports to allow the space directly underneath them to mount the transformers, which should be placed directly under the third and fourth tubes, at right angles. This allows short leads from the jacks and the tubes to be brought down to the transformers. Next, mount the binding posts for the battery connections on a strip of bakelite 4" x 2½". Two small brass angles are used to raise them from the base, allowing the connections to be made through the back of the cabinet, and the wiring to be done from under the smaller panel.

Solder the filament connection to the tubes and rheostats. Bring one lead from the plus side of the battery connector block over to the tubes and make your connections. The rheostats are all wired in the negative side of the tube filaments. Take care that the wiring to the tube and rheostats is firm and secure, as changes in temperature cause the screws and nuts to loosen up. It is best to place a small copper lug on each screw to be soldered, and then tighten it as much as possible. Next, solder the antenna and ground wires.

In wiring the secondary and plate circuits make all the leads as short and direct as possible, never allowing any plate and grid wires to run close together or parallel. This is especially important as far as the first two tubes are concerned, carelessness in this respect often resulting in the failure of the set to work to its highest efficiency. Also keep all plate and grid wiring as far back from

the panel as possible so that there will be no hand capacity while tuning.

There has been some misunderstanding about "reversing the tickler leads." It will be found that the leads to the tickler can be connected with either one of the terminals going to the positive end of the B battery and plate coil. The "reversal" can be obtained simply by turning the rotor over 90 degrees. No disconnecting of wires is necessary.

Referring to Fig. 3, published in RADIO WORLD, issue of May 24, the following are the connections to the binding posts:

Post 1, antenna; post 2, ground; post 3, A battery minus; post 4, A battery plus; post 5, minus of the first 45-volt B battery; post 6, tap at 22½ volts from the first 45-volt B battery; post 7, positive of the first 45-volt B battery and minus of the second 45-volt B battery; post 8, positive of second 45-volt B battery.

The above will also be your guide in making the necessary connections from the assembled parts to the binding posts. Fig. 5 shows what the front of the set will look like when completed.

The tuning of the Superdyne is more difficult than that of most sets, but once your station is properly tuned, tremendous volume is obtained even on stations 1,500 miles distant. The operation of the completed set is as follows:

First, light the bulbs to normal brilliancy, with the phone plug in the last stage jack. The tickler does not have to be in any particular position to start. The general idea of tuning any circuit that has grid and plate controls is to tune both at the same time, that is, vary both grid and plate condensers with both hands

simultaneously. This should be done slowly. When a signal is heard, the grid condenser is placed so that the loudest signal is obtained and the plate condenser brought up to a similar point. It is then necessary to vary the rotor. Turn the rotor to the point where the signals are loudest, without becoming mushy or squealing. After tuning the rotor it may be necessary slightly to retune the condensers.

It may be necessary sometimes to turn down the first or radio-frequency tube very low, so that tuning may be accomplished without making the circuit squeal. It may be turned up again after the desired station has been brought in. It is not advisable to use headphones on the second stage, as the signals will be too loud for comfort and too strong for the safety of the phones.

With the Superdyne it is necessary that perfect B batteries be used always, as the slightest deficiency in them will cause noises and possibly render the set inoperative. A storage B battery is good insurance, against this source of trouble and when possible should be used. It may be found advisable, if dry cell B batteries are used, to solder all connections, even on the battery terminals. This will provide secure contact. Care should be taken also not to have long leads from the B batteries. A .001 condenser can be shunted across the ground and positive of the B battery to reduce noises.

Patience with this set will work wonders. After a little experience with it, the operator will be able to log stations from one end of the country to the other without difficulty.

Ads via Ether Intrude on Home, Says Director

By **J. C. M'Quiston**

Director of KDKA, KFKX, KYW and WBZ.

RADIO has no place as an advertising medium. Newspapers, magazines and other accepted media of advertising are the natural methods of getting a product before the public. Radio has no place in this scheme, and will ever be only supplemental to the service of great publications.

Will radio serve the advertiser? My answer is "No." The home is a sacred place and whatever enters the home should be invited. The newspaper, the magazine, or any other vehicle that has been used for advertising has entered the

home with the consent of the owner. However, radio now has given us a new problem to solve. This problem is that of intrusion. The radio advertising message would enter uninvited; therefore, it would be unwelcome. There might be a few who would incidentally derive benefit from such advertising, but all of the million that might be listening in would have no particular message.

BOUCHERON ADDRESSES SCOUTS

SPEAKING in New York City before one of the largest Boy Scout audiences, Pierre Boucheron, one of the first radio amateurs in the United States, and now with the Radio Corporation of America, predicted that radio broadcasting would lead the way to the formation of an international Boy Scout organization.

BROADCAST PROGRAMS

KEY

Abbreviations: G. M. T., Greenwich Meridian Time; E. S. T., Eastern Standard Time; C. S. T., Central Standard Time; M. T., Mountain Time; P. T., Pacific Time; m, meters; k, kilocycles.
 D. S. T.—Daylight Saving Time.

How to tune in a desired distant station at just the right time—Choose your station from the big list published herewith. See what time division the station is under (E. S. T., C. S. T., etc.); then consult the table below. Add to or subtract, as directed, from the time as given on the PROGRAM. The result will be the same BY YOUR CLOCK that you should tune in. The table:

If you are in	And want a station in	Subtract	Add
E. S. T.	C. S. T.		1 hr.
E. S. T.	M. T.		2 hrs.
E. S. T.	P. T.		3 hrs.
C. S. T.	E. S. T.	1 hr.	
C. S. T.	M. T.		1 hr.
C. S. T.	P. T.		2 hrs.
M. T.	E. S. T.	2 hrs.	
M. T.	C. S. T.	1 hr.	
M. T.	P. T.		1 hr.
P. T.	E. S. T.	3 hrs.	
P. T.	C. S. T.	2 hrs.	
P. T.	M. T.	1 hr.	

If you are under Daylight Saving Time, and the station you want is under that time, too, or if both are under Standard Time, the above table will hold.

If you are under Daylight Saving Time, and the station operates under Standard Time, add one hour to the table result.

If the station uses Daylight Saving Time, and you are under Standard Time, subtract one hour from the table result.

Wednesday, May 28

WGI, Medford, Mass., 360m (830k), E. S. D. S. T.—6:45 P. M., code practice. 7 P. M., message to Camp Fire Girls. 7:30 P. M., evening program.

WEAF, New York, 492m (610k), E. S. D. S. T.—4 P. M., Theodore Mattmann, cellist, accompanied by Sophie Mattmann; Pirates Den Trio; Ida Davenport, coloratura soprano. 6 P. M., dinner music from Rose Room, Waldorf-Astoria; synagogue services, auspices United Synagogue of America; daily sport talk, Thornton Fisher; Raymond Parker, tenor; talk by American Agriculturist; lecture on psychology by Gardner Murphy; Oh, Look Who's Here; The Chiclet orchestra; Oskenonton, Mohawk Indian baritone.

WSB, Atlanta, Ga., 429m (700k), C. S. T.—Noon, entertainment. 3:30 P. M., play-by-play baseball broadcast. 5:30 P. M., Miss Bonnie Barnhardt's songs and Burgess bedtime story. 10:45 P. M., Ritz Harmony Boys dance orchestra.

WOO, Philadelphia, 509m (590k), E. S. D. S. T.—7:30 P. M., sports results and police reports; dance program, Havana Casino orchestra. 8:15 P. M., address, "The Citizen's Military Training Camp," Col. P. W. Huntington. 8:30 P. M., grand organ recital, Mary E. Vogt. 9 P. M., WOO orchestra; Douglas MacDonald, baritone; Harriette C. Ridley, accompanist.

WDAF, Kansas City, 411m (730k), C. S. T.—3:30 P. M., Gearsy's Missourians. 6 P. M., piano tuning-in number on the Duo-Art; marketgram; weather forecast; time signal, and road report; The Tell-Me-a-Story Lady; music—Fritz Haulein's Trianon Ensemble. 8 P. M., program by Otto Grosse and Mrs. Frederick C. Shaw. 11:45 P. M., (Nighthawk Frolic), the "Merry Old Chief" and the Plantation Players.

WRC, Washington, 469m (640k), E. S. T.—3:45 P. M., piano recital, Eleanor Glynn. 5:30 P. M., current topics, editor, The Outlook. 4 P. M., song recital announced. 5:15 P. M., instruction in international code. 6 P. M., stories for children. 6:15 P. M., talk, auspices Smithsonian Institute.

WGY, Schenectady, 380m (790k), E. S. T.—11:30 A. M., stock market report. 11:40 A. M., produce market report. 11:45 A. M., weather report. 11:55 A. M., time signals. 5 P. M., produce and stock market quotations; news bulletins; baseball results. 5:30 P. M., adventure story.

WOS, Jefferson City, Mo., 441m (680k), C. S. T.—8 P. M., address: "Handling Legumes as a Cash Crop," by Mr. C. E. Carter. 8:20 P. M., program, Missouri State Reformatory band and orchestra of Boonville.

CKAC, Montreal, 425m (700k), E. S. D. S. T.—3:45 P. M., Mount Royal Hotel concert orchestra. 4 P. M., weather, stocks, news. 4:30 P. M., Mount Royal Hotel dance orchestra.

WDAR, Philadelphia, 395m (760k), E. S. D. S. T.—2 P. M., Arcadia concert orchestra. 4:30 P. M., artist recital. 5:15 P. M., program of dance music, Cosmopolitan Trio. 5:45 P. M., baseball and other sports results. 7:30 P. M., Dream Daddy with the boys and girls. 8:30 P. M., American Legion Memorial Day program, special. 10 P. M., recital from studio.

WWJ, Detroit, 517m (580k), E. S. T.—10:25 A. M., weather forecast. 11:55 A. M., Arlington time. 12 noon, dance music by Jean Goldkette's orchestra. 3 P. M., Detroit News orchestra. 3:30 P. M., weather forecast. 3:35 P. M., market

reports and baseball scores. 5 P. M., baseball scores. 7 P. M., Detroit News orchestra; Byron Thomas, baritone; Miss Margaret Bruce, pianist; Arthur Reed, tenor.

WIP, Philadelphia, 509m (590k), E. S. D. S. T.—1 P. M., luncheon music, Tea Room orchestra. 1:30 P. M., weather forecast. 3 P. M., Ruth Jones, soprano; Gladys Lawton, contralto; Albert Zinger, violinist; Emilie Loeben, accompanist. 6 P. M., weather forecast and final baseball scores. 6:05 P. M., dinner music by St. James Hotel orchestra. 6:45 P. M., agriculture livestock and produce market reports. 7 P. M., Uncle Wip's bedtime stories.

WLAG, Minneapolis, Minn., 417m (720k), C. S. T.—2:40 P. M., daylight concert. 4 P. M., magazine reading. 5:30 P. M., children's stories. 6 P. M., sport hour. 7:30 P. M., farm lectures. 9:15 P. M., business message. 9:30 P. M., Woman's Choral Club; Mrs. Molly Mulhern, contralto. 10:30 P. M., Geo. Osborn's Gold Pheasant orch.

KGO, Oakland, Cal., 312m (960k), P. T.—3 P. M., musical program. 4 P. M., concert orchestra of Hotel St. Francis. 6:45 P. M., stock exchange; weather reports; news items.

KFI, Los Angeles, 469m (640k), P. T.—4:45 P. M., Evening Herald and Examiner news bulletins. 6:45 P. M., Nick Harris detective stories and concert. 8 P. M., Evening Herald and Examiner concert. 10 P. M., Hollywoodland Community orchestra. 11 P. M., Max Fisher's Coconut Grove orchestra.

KFNH, Shenandoah, Ia., 266m (1130k), C. S. T.—7:30 P. M., request program of old time music.

WCAE, Pittsburgh, 462m (650k), E. S. T.—6:30 P. M., dinner concert from William Penn hotel. 7:30 P. M., the Sunshine Girl. 7:45 P. M., baseball scores; Joe Jacobson, character singer. 8:30 P. M., Mrs. Claribel Wheatley, soprano soloists.

KDKA, Pittsburgh, 326m (920k), E. S. T.—6:45 P. M., news bulletins. 7 P. M., literary program; baseball scores. 7:15 P. M., lecture from the University of Pittsburgh studio. 7:40 P. M., market reports. 8 P. M., Esther Rose James, soprano; Clarence S. Moore, tenor; mixed quartette, Ernest Letcher, accompanist and Miss Helen Stargo, violinist. 9:55 P. M., time signals. **KYW, Chicago, 536m (560k), C. S. T.**—7 to 7:58 P. M., musical program. 8:05 P. M., "Good Roads" talk. 9 P. M. to 1:30 A. M., Midnight Revue.

WBZ, Springfield, Mass., 337m (890k), E. S. T.—8:30 P. M., Helen True, soprano; Virginia Burdick, pianist; William Ellis Weston, accompanist. 9:30 P. M., "The Troubadours." 10:55 P. M., time signals; weather reports. 11 P. M., summary day's events, General Conference M. E. Church. 11:30 P. M., dance music by Leo Reisman and his orchestra. 11:45 P. M., Jack Griffin, novelty entertainer. 12:15 A. M., dance music by Leo Reisman and his orchestra.

KGW, Portland, Ore., 492m (610k), P. T.—7:30 P. M., baseball scores, weather forecast and market reports. 8 P. M., concert by Columbia Theatre all-artist orchestra. 9 P. M., business talk by James Albert. 10 P. M., dance music by George Olsen's Metropolitan orchestra.

WHN, New York, 689m (830k), E. S. D. S. T.—8:15 P. M., Victor Wilbur, baritone. 8:30 P. M., Benjamin Koenigsberg, Union Orthodox Jewish Cong., talk; Cantor M. Hillman in songs. 8:50 P. M., Agnes Macpeake, soprano. 9 P. M., Dan Gregory's Dancing Carnival orchestra. 9:30 P. M., Witmark Bender and White program. 10 P. M., Fletcher Henderson's Alabama Club orchestra.

WOC, Davenport, Ia., 484m (620k), C. S. T.—6:30 P. M., Sandman's visit. 6:50 P. M., sport news and weather forecast. 7 P. M., educational talk. 8 P. M., Erwin Swindell, organist; Helga Westling Carlson, soprano.

WJZ, New York, 455m (660k), E. S. D. S. T.—7:30 P. M., Selzer's Cafe Boulevard orchestra. 7:45 P. M., "Baseball Scoring," by Frederick G. Lieb. 8:35 P. M., city official series talk. 8:50 P. M., Vanstam Lee, baritone, accompanied by Keith McLeod. 9:10 P. M., Geo. W. Oakes, "German and French Elections." 9:30 P. M., 258th Field Artillery Band; songs by Sergeant Nolan and Corp. William Mangin. 10:30 P. M., Coleman's Club Trocadero orchestra.

WLW, Cincinnati, O., 309m (970k), E. S. T.—5:15 P. M., baseball results. 7:30 P. M., memorial services for departed nobles of Syrian Temple. Masonic funeral anthem, ensemble. 8:30 P. M., talk, Bernard and Robinson, songs. 8:45 P. M., program orchestral and male quintet numbers.

WOR, Newark, N. J., 405m (740k), E. S. D. S. T.—8:50 P. M., Arthur B. Reeve, author of the Craig Kennedy stories, on "Psychology of Modern Dance." 9:15 P. M., program, direction Mme. Louise von Feilitzsch. 10 P. M., popular music by the Elite orchestra.

KHJ, Los Angeles, 395m (760k), P. T.—2:30 P. M., matinee musicale. 6 P. M., Hickman's concert orchestra. 6:45 P. M., children's program; bedtime story by Uncle John. 8 P. M., program, courtesy Bruce A. Findlay. 9 P. M., Dr. Mars Baumgardt, lecturer; Studebaker radio orchestra. 1 P. M., Hickman's dance orchestra.

KSD, St. Louis, 546m (550k), C. S. T.—6:30 P. M., Abergh's Concert ensemble from Hotel Statler. 9 P. M., James H. Johnstone, mandolin and tenor banjo soloist; Clarence Crow, whistler; Geraldine Mich's orchestra. 11 P. M., dance music by Rode-mich's orchestra.

WFAA, Dallas, Tex., 476m (630k), C. S. T.—12:30 P. M., musical program presenting Red-Head Girl of Dallas Journal.

Thursday, May 29

KSD, St. Louis, 546m (550k), C. S. T.—8 P. M., program by Schubert Club direct from High School, East St. Louis.

WFAA, Dallas, Texas, 476m (630k), C. S. T.—12:30 P. M., address, R. A. Gilliam. 8:30 P. M., musical program, auspices City Federation of Women's Clubs. 11 P. M., Kidd Springs orchestra, popular music.

WGI, Medford, Mass., 360m (830k), E. S. D. S. T.—6:30 P. M., closing stock market reports; agriograms; Boston police reports. 7 P. M., meeting of Amrad Club. 7:30 P. M., talk by Geoffrey L. Whalen, "The Radio Movie Man." 7:45 P. M., popular song hits, "Bernie and His Bunch." 8:30 P. M., musicals; weather report, and time.

WEAF, New York, 492m (610k), E. S. D. S. T.—11 A. M., Minnie Weill, pianist; market and weather reports. 4 P. M., Pauline Flerstein, lyric soprano; Nicholas Continello, violinist; Frank Leithner, jazz pianist; children's hour program. 6 P. M., dinner music from Rose Room, Waldorf-Astoria; mid-week services, auspices Greater N. Y. Federation of Churches; daily sport talk by Thornton Fisher; Erna Korn, contralto; Anna Fried, violinist, and Hedy Spilner, pianist; Hunter College concert, direction Dr. Henry T. Fleck; Dora Damon Pardee, cornetist; William Hyatt, tenor; Vincent Lopez and orchestra.

WSB, Atlanta, Ga., 429m (700k), C. S. T.—3:30 P. M., play-by-play baseball broadcast. 5:30 P. M., Miss Bonnie Barnhardt's songs and Burgess bedtime story. 8:9 P. M., sacred and jazz quartets; John McCrindle, Scotch balladist. 10:45 P. M., Dr. Charles A. Sheldon, city organist; Rainbow orchestra.

WOO, Philadelphia, 509m (590k), E. S. D. S. T.—11:30 A. M., weather forecast. 12 noon, luncheon music, Tea Room orchestra. 12:55 P. M., time signals. 4:45 P. M., grand organ and trumpets. 7:30 P. M., sports results and police reports. 10:55 P. M., time signals.

WDAF, Kansas City, 411m (730k), C. S. T.—3:30 P. M., D. Ambert Haley's dance and concert orchestra. 6 P. M., marketgram, weather forecast, time signals and road report; the Tell-Me-a-Story Lady; music, Fritz Haulein's Trianon Ensemble. 11:45 P. M., (Nighthawk Frolic), the "Merry Old Chief" and the Plantation Players.

WRC, Washington, 469m (640k), E. S. T.—5:15 P. M., instruction in international code. 6 P. M., children's hour. 7:45 P. M., the Question Box. 8 P. M., piano recital by Charles T. Ferry. 8:15 P. M., Lillian Evans-Tibbs, soprano. 8:30 P. M., selections from "The Bohemian Girl." 9 P. M., dance program, Pete Macias' L'Aiglon orchestra. 9:55 P. M., time signals; weather forecasts.

WGY, Schenectady, 380m (790k), E. S. T.—1 P. M., music and address, "Significance of Memorial Day." 5 P. M., produce and stock market quotations; news bulletins; baseball results. 5:30 P. M., dinner music by Instrumental Trio, Hotel Ten Eyck. 7:30 P. M., concert, Mendelssohn Club of Albany.

WDAR, Philadelphia, 395m (760k), E. S. D. S. T.—11:45 A. M., daily almanac. 12 noon, organ recital from Stanley Theatre; features from studio; Arcadia concert orchestra. 2 P. M., Arcadia concert orchestra. 4:30 P. M., Isabel Sgarro, pianist. 5:30 P. M., educational talk. 5:45 P. M., baseball and other sports results. 7:30 P. M., Dream Daddy with the boys and girls.

WWJ, Detroit, 517m (580k), E. S. T.—10:25 A. M., weather forecast. 11:55 A. M., Arlington time. 3 P. M., Detroit News orchestra. 3:30 P. M., weather forecast. 3:35 P. M., market reports and baseball scores. 5 P. M., baseball scores. 7 P. M., Detroit News orchestra; Miss Eileen Whitley, soprano; Earl Upton, pianist. 10 P. M., dance music by Jean Goldkette's orchestra.

WOAW, Omaha, Neb., 526m (570k), C. S. T.—6 P. M., every child's story hour. 6:30 P. M., dinner program by Yost's orchestra. 9 P. M., program, courtesy Girls Order of Muses.

WIP, Philadelphia, 509m (590k), E. S. D. S. T.—6:05 P. M., dinner music by Harold Leonard's Red Jackets. 6:45 P. M., agriculture, livestock and produce market reports. 7 P. M., Uncle Wip's bedtime stories. 8 P. M., timely topics for motorists. 8:15 P. M., program in honor of Memorial Day. 9:30 P. M., broadcasting religious services, United Synagogue of America, Rabbi Samuel J. Cohen; Rev. Jacob Mason, Rabbi Karl Banowitz. 11:15 P. M., dance music by Ted Weems' orchestra.

WLAG, Minneapolis, Minn., 417m (720k), C. S. T.—2:40 P. M., daylight concert. 4 P. M., magazine reading. 5:30 P. M., children's hour. 6 P. M., "Hooshoe Pitching." 6:15 P. M., Olson's Original Syncopators. 7:30 P. M., farm lectures.

WBS, Springfield, Mass., 337m (890k), E. S. T.—7:40 P. M., musical program, St. James Theatre orchestra. 8:15 P. M., quartette arrangement, "In a Persian Garden." 9:30 P. M., concert by Quincy B. P. O. E.; musical program by string quartette, pianist and singers; Elks' Toast; address. 10:55 P. M., time signals; weather reports.

KGW, Portland, Ore., 492m (610k), P. T.—7:30 P. M., baseball scores; weather forecast; market reports. 8:15 P. M., dance music by George Olsen's Metropolitan orchestra. 10 P. M., dance music by George Olsen's Metropolitan orchestra.

KPO, San Francisco, 423m (710k), P. T.—5:39 P. M., children's hour stories. 7 P. M., Rudy Seiger's Fairmont Hotel orchestra. 8 P. M., organ recital by Theodore J. Irwin. 9 P. M., program, management of Maybel West. 10 P. M., Max Bradford's versatile band.

KGO, Oakland, Cal., 312m (960k), P. T.—1:30 P. M., N. Y. Stock Exchange and weather reports. 4 P. M., concert orchestra of the Hotel St. Francis. 6:45 P. M., stock exchange; weather reports; news items. 8 P. M., radio drama, "Peg o' My Heart," music by Neapolitan Trio.

KFI, Los Angeles, 469m (640k), P. T.—4:45 P. M., Evening Herald and Examiner news bulletins. 6:45 P. M., Y. M. C. A. concert and lecture. 8 P. M., Ambassador Hotel concert. 9 P. M.,

Examiner concert. 10 P. M., Harry Girard and pupils.

KFNF, Shenandoah, Ia., 266m (1130k), C. S. T.—7:30 P. M., concert by artists from Shambaugh, Ia.

WCAE, Pittsburgh, 462m (650k), E. S. T.—6:30 P. M., dinner concert from William Penn hotel. 7:30 P. M., Uncle Kaybee. 7:45 P. M., baseball scores; Ben Fields, WCAE's own entertainer; Miss Thelma Fields, accompanist. 8:30 P. M., musical program by St. Clair entertainers, and H. D. Higgins, pianist. 11 P. M., late concert.

KDKA, Pittsburgh, 326m (920k), E. S. T.—6:45 P. M., news bulletins. 7 P. M., "Your Garden This Summer," radio garden editor. 7:15 P. M., farm program, including market reports, arranged by the National Stockman and Farmer. 8 P. M., KDKA Little Symphony orchestra; Brackenridge Glee Club. 9:55 P. M., time signals; weather forecast; baseball scores. 10 P. M., Edgar Thompson male quartet.

KYW, Chicago, 536m (560k), C. S. T.—6 P. M., dinner concert from Congress Hotel. 6:35 P. M., talk on "Sports," by Leo Fisher. 6:55 P. M., talk on "Finance and Markets" by Thos. Hoyme.

WHN, New York, 360m (830k), E. S. D. S. T.—10:10 P. M., John Paluhi and Hawaiian orchestra. 10:30 P. M., program by All Nation's Ass'n. 10:45 P. M., Fletcher Henderson's Alabama Club orchestra. 11:15 P. M., Judith Roth, singing. 11:20 P. M., Al Wilson, singing. 11:25 P. M., Bertha Nelson, singing. 11:30 P. M., Al Reiser's dancing carnival orchestra; Ross Fowler, baritone.

WOC, Davenport, Ia., 484m (620k), C. S. T.—12 noon, chimes concert. 12:15 P. M., weather forecast. 1 P. M., closing stocks and markets. 3:30 P. M., educational program. 5:45 P. M., chimes concert. 6:30 P. M., Sandman's visit. 6:50 P. M., sport news and weather forecast. 9 P. M., orchestra program.

WJZ, New York, 455m (660k), E. S. D. S. T.—7 P. M., Jack Rabbit stories. 7:20 P. M., "Financial Developments of the Day." 7:30 P. M., Specht's Lido Venice string ensemble. 8:30 P. M., Wanamaker organ recital. 9:15 P. M., "The Human Element in Business." 9:35 P. M., Mayor Hyman's people's concert. 10:30 P. M., Hotel Majestic orchestra.

WJY, New York, 405m (740k), E. S. D. S. T.—7:30 P. M., Walter S. Vogel, baritone. 8 P. M., "Golf," by Innis Brown. 8:15 P. M., Jack Nelson, popular songs. 8:30 P. M., Ethel Aaron, soprano. 8:45 P. M., "Kipling." 9:15 P. M., Ace Brigade and virgins. 9:45 P. M., M. M., garden talk. 10 P. M., William O Bell, baritone.

WLW, Cincinnati, O., 309m (970k), E. S. T.—5:15 P. M., baseball results. 10 P. M., Times-Star Radio Club. 10:10 P. M., Glee Club of West Night High School. 10:30 P. M., Pleasant Ridge Mothers' Club "Kitchen Cabinet Orchestra"; Al Bernard and Russell Robinson, singing their own songs. 11:15 P. M., popular program by Doherty's Melody Boys.

WOR, Newark, N. J., 405m (740k), E. S. D. S. T.—3 P. M., special G. A. R. program; songs from '61 to '65; Decoration Day address. 3:45 P. M., xylophone solos by Frank Goss, Jr. 6:15 P. M., Albert E. Sonn, technical editor, in "Radio for the Layman." 6:30 P. M., "Bits of Songs Hits." Murray Wachsmann. 7:20 P. M., resume of the day's sports.

KHJ, Los Angeles, 395m (760k), P. T.—2:30 P. M., matinee musicale. 6 P. M., Art Hickman's concert orchestra. 6:45 P. M., children's program; bedtime story by Uncle John. 8 P. M., program, courtesy Fitzgerald Music Co. 9 P. M., Ruth Ryan Pederson, mezzo-soprano. 10 P. M., Hickman's dance orchestra.

Friday, May 30

WOR, Newark, N. J., 405m (740k), E. S. D. S. T.—6:15 P. M., Agnes Leonard in songs for children. 6:30 P. M., Man in the Moon stories. 7 P. M., 312th Infantry Asso. of Newark, Memorial Day program. 7:20 P. M., resume of the day's sports.

KHJ, Los Angeles, 395m (760k), P. T.—12:30 P. M., special program for Decoration Day. 2:30 P. M., matinee musicale. 6 P. M., Hickman's concert orchestra. 6:45 P. M., children's program; bedtime story by Uncle John. 8 P. M., special program for Decoration Day. 9 P. M., All-American program. 10 P. M., Hickman's dance orchestra.

WFAA, Dallas, Texas, 476m (630k), C. S. T.—12:30 P. M., address, Dr. Robert Stewart Hyer. 8:30 P. M., program by talent from Van Alstyne

WGI, Medford, Mass., 360m (830k), E. S. D. S. T.—7 P. M., meeting of the Amrad Club. 7:30 P. M., evening program. 7:40 P. M., late Ampico releases. 7:50 P. M., Red Cross health talk. 8 P. M., program in commemoration of Decoration Day; weather report, and time.

WEAF, New York, 492m (610k), E. S. D. S. T.—4 P. M., Billy Wynne and Greenwich Village Inn orchestra. 6-11 P. M., dinner music from Rose Room, Waldorf-Astoria; Douglaston Club male quartette; daily sport talk by Thornton Fisher; Manton Marble, tenor, accompanied by Fred P. Hart; Billy Jones and Ernest Hare, The Happiness Boys; Memorial program from the Capitol Theatre; B. Fischer's "Astor Coffee" orchestra; Carlo Restivo, accordion artist.

WSB, Atlanta, Ga., 429m (700k), C. S. T.—Noon, entertainment. 3:30 P. M., play-by-play baseball broadcast. 5:30 P. M., Miss Bonnie Barnhardt's songs and Burgess bedtime story. 8 P. M., Almas Temple Shrine band and glee club. 10:45 P. M., Rainbow orchestra, Biltmore Hotel.

WOO, Philadelphia, 509m (590k), E. S. D. S. T.—7:30 P. M., sports results and police reports; dinner musical Hotel Adelphia concert orchestra. 8:30 P. M., Elsa Schumann, soprano; Lillian Bass, pianist; George R. Miller, baritone; Frank J. Daniels, violinist; Harriette G. Ridley, accompanist. 9:15 P. M., "Protect the Little Soldiers of the Air—the Birds," Charles P. Shoffner. 9:30



MAT H. FRIEDMAN, RADIO WORLD'S representative in Chicago, who went on the air at WLS, broadcasting questions and answers. Answers he has not time to give over the radio are published in RADIO WORLD. Mr. Friedman will be a regular Wednesday feature at WLS, the Sears-Roebuck station. Speaking of speaking before the microphone, Mr. Friedman said: "It was like that feeling you have when some one catches you talking to yourself."

P. M., grand organ recital, Mary E. Vogt. 10 P. M., dance program, Royal Palm orchestra.

WDAF, Kansas City, 411m (730k), C. S. T.—3:30 P. M., Leo R. Davis "Radio" orchestra. 6 P. M., marketgram; weather forecast; time signal, and road report; The Tell-Me-a-Story Lady; music, Fritz Haulein's Trioan Ensemble. 8 P. M., program by the WDAF Minstrels with The Star's radio orchestra. 11:45 P. M., (Nighthawk Frolic), the "Ferry Old Chief" and the Plantation Players, Hotel Muehlebach.

WRC, Washington, 469m (640k), E. S. T.—5:15 P. M., instruction in international code. 6 P. M., children's hour. 7:45 P. M., Bible talk. 8 P. M., "Radio and the Bureau of Standards," by J. H. Dellinger. 8:15 P. M., concert by U. S. Army band and dance orchestra. 9:55 P. M., time signals and weather forecasts.

WGY, Schenectady, 380m (790k), E. S. T.—7:40 P. M., baseball results. 7:50 P. M., address, "The Awakening," A. Citizen's Civic Duty. 8 P. M., Frances Williams Tranter, soprano. 8:15 P. M., melodrama, "The Little Rebel."

WOS, Jefferson City, Mo., 441m (680k), C. S. T.—8 P. M., Decoration Day program by Jefferson City Boy Scouts of America.

CKAC, Montreal, 425m (700k), E. S. D. S. T.—1:45 P. M., Mount Royal hotel luncheon concert. 4 P. M., weather, stocks, news. 4:30 P. M., Mount Royal Hotel, the Dansant.

WDAR, Philadelphia, 395m (760k), E. S. D. S. T.—2 P. M., Arcadio concert orchestra; recital from studio. 4:30 P. M., program of dance music. 5:45 P. M., baseball and other sports results. 7:30 P. M., Dream Daddy with the boys and girls. 7:50 P. M., book review. 8 P. M., authors and poets corner; Arcadia concert orchestra. 10 P. M., Howard Lanin's dance orchestra.

KFAE, Pullman, Wash., 330m (910k), P. T.—8:30 P. M., orchestra numbers; the science of geology, Arthur Kralowec, Auburn; soprano solos, Miss Ruth Wilkins; seed potatoes, George L. Zundel; instrumental solos.

WOAW, Omaha, Neb., 526m (570k), C. S. T.—6 P. M., speakers half-hour. 6:30 P. M., dinner

program by Ken Baker's Omahans. 9 P. M., program by Central High School orchestra.

WIP, Philadelphia, 509m (590k), E. S. D. S. T.—Out of respect for our noble dead, Station WIP will not broadcast on Memorial Day.

WLAG, Minneapolis, Minn., 417m (720k), C. S. T.—2:40 P. M., daylight concert; Decoration Day program; Ronning's brass quartet; Arcana male quartet; address, Rev. Don Frank Fenn. 4 P. M., magazine reading. 5:30 P. M., meeting children's radio health club. 6 P. M., sport hour, "Radio," Ray R. Sweet; "Life Saving," Nell Thorpe. 7:30 P. M., farm lectures; American Legion program. 9:15 P. M., business message. 9:30 P. M., program by bugle and drum corps.

KGO, Oakland, Cal., 312m (960k), P. T.—1:30 P. M., N. Y. Stock Exchange and weather reports. 3 P. M., musical program; poems, read by Wilda W. Church. 4 P. M., concert orchestra of the Hotel St. Francis. 6:45 P. M., stock exchange, and weather reports; news items.

KFI, Los Angeles, 469m (640k), P. T.—4:45 P. M., Evening Herald concert. 5:15 P. M., Examiner news bulletins. 6:45 P. M., vocal concert. 8 P. M., Evening Herald and Examiner concert. 10 P. M., Oscar Seiling and Louise Gunning. 11 P. M., Max Fisher's Cocoanut Grove orchestra.

KFNF, Shenandoah, Ia., 266m (1130k), C. S. T.—7:30 P. M., patriotic concert.

WCAE, Pittsburgh, 462m (650k), E. S. T.—6:30 P. M., dinner concert from William Penn hotel. 7:30 P. M., Uncle Kaybee. 8 P. M., baseball scores. 8:30 P. M., musical program by Gertrude Sykes King, soprano soloist; Mrs. Edstrom, contralto soloist; E. C. Hennig, cellist; Edward W. Koontz, pianist.

KDKA, Pittsburgh, 326m (920k), E. S. T.—6:45 P. M., news bulletins. 7 P. M., baseball scores; Radio Boy Scout meeting. 7:15 P. M., feature. 7:40 P. M., National Stockman and Farmer market reports. 8 P. M., concert by the KDKA Serenaders and assisting artists. 9:55 P. M., time signals; weather forecast; baseball scores.

KYW, Chicago, 536m (560k), C. S. T.—6:10 to 6:20 P. M., Paul Whiteaman's "Collegians." 6:20 to 6:30 P. M., Joska DeBabary's orchestra. 7:45 P. M., talks. 9 P. M. to 1:30 A. M., Midnight Revue.

WBZ, Springfield, Mass., 337m (890k), E. S. T.—7:30 P. M., bedtime story for the kiddies. 10 P. M., concert by the Palmer High school orchestra; Mrs. Margaret Henry, soprano. 10:55 P. M., time signals; weather reports.

KGW, Portland, Ore., 492m (610k), P. T.—12:30 P. M., Peck Holton's orchestra of the Wintergarden. 3:30 P. M., lecture by Jessie D. McComz, Home Economics. 7:30 P. M., baseball scores; weather forecast and market reports. 8 P. M., special Memorial Day program. 10:30 P. M., Hoot Owls.

KFO, San Francisco, 423m (710k), P. T.—1 P. M., Rudy Seiger's Fairmont Hotel orchestra. 2:30 P. M., organ recital by Theodore J. Irwin. 4:30 P. M., Rudy Seiger's Fairmont Hotel orchestra.

WHN, New York, 360m (830k), E. S. D. S. T.—9:30 P. M., Hotel Carlton Terrace orchestra. 10 P. M., "Memorial Day," by Jos. T. Cashman. 10:10 P. M., Jos. C. Wolfe, baritone. 11 P. M., K. I. K. entertainers. 11:20 P. M., Coley Colson, tenor. 11:30 P. M., S. S. City of Seattle, Atlantic City Line orchestra.

WOC, Davenport, Ia., 484m (620k), C. S. T.—6:30 P. M., Sandman's visit. 6:50 P. M., sport news and weather forecast. 7 P. M., educational lecture; 8 P. M., musical program; Zoe Fullerton, reader; Arvid Enstrom, tenor; Katherine Rankin, pianist; Roy Work and Wesley Gosline, guitars. 9 P. M., road bulletin.

WJZ, New York, 455m (660k), E. S. D. S. T.—7 P. M., Jack Rabbit stories. 7:10 P. M., "Motor Camping Sites," by A. H. Van Doran. 7:20 P. M., "Financial Developments of the Day." 7:30 P. M., weekly French lesson. 8:15 P. M., Katherine Jaggi Wier, pianist. 8:40 P. M., Dora Damon Pardee, trumpeter. 9:10 P. M., revolver shooting. 9:40 P. M., American Olympic riding team. 10:30 P. M., Specht's Alamac Hotel orchestra.

WJY, New York, 405m (740k), E. S. D. S. T.—7:30 P. M., Frances Kirsch, soprano. 8 P. M., (Continued on page 18)

Who Is America's Most Popular Radio Entertainer?

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

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

Use the accompanying blank and mail to Broadcasting Manager, RADIO WORLD.

Cut off. Fill out. Mail today.

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

Dear Sir:

My favorite entertainer is Station Name Street Address City and State

A new list showing total vote cast will be published in the June 7 issue. RADIO WORLD, dated May 3, contained the complete totals of entertainers up to the day of going to press with that issue.

The Radio Woman



(Kadel & Herbert)
 WITH SUMMER approaching, Miss Betty Pearce, Forest Hills, N. Y., is considering how she can fix up her accordion-pleated speaker as a fan, too.



(Kadel & Herbert)
 THE RADIO WOMAN listens in club in hand, while golf lessons are broadcast.



(Foto Topics)
 WOMEN serve refreshments at the dance of the Radio Association of Greater New York.

Radio World Cartoonist Loo



IMPRESSIONS DONE WITH A MATCH - WHAT HE SAW IN A FEW MINUTES AT RADIO STA



ANOTHER Radio World cartoonist, L. Hinckley, sees some fun in radio. The cook's moments are made happier while she listens in—though the expense may be terrific for the head of the house. But what is there to worry about, even if the fish-balls sizzle a little too long, so long as Mary Jane is a contented radio fan?

in at WHN, New York City



MRS. SNYDER, THE GENIAL SATURDAY AFTERNOON ANNOUNCER, WAS DELIGHTFULLY COURTEOUS

AVY LA SKERE - THE DOUBLE VOICED SINGER - SINGS LIKE THIS

AND SOUNDS LIKE THIS

TRA LA LA LA

ICK BY BUDDY SCHEEL.
WHN, ATOP LOEW'S STATE THEATRE BLDG

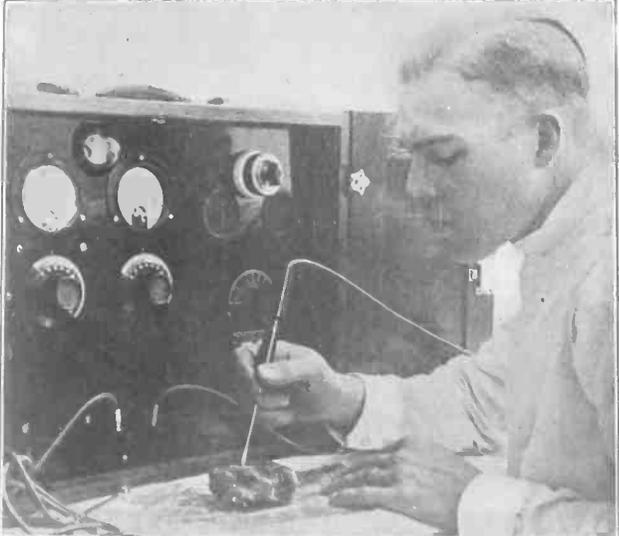


N. Y. Eve. World Radio Magazine)
THE Super DX Fan has an efficiency system.

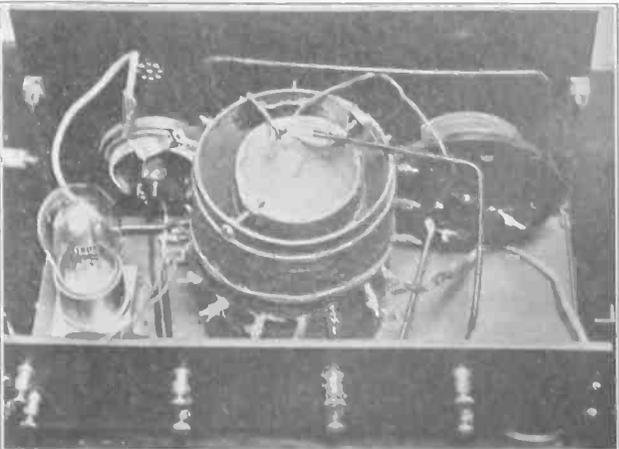
Wounded Vets Get Sets



(Photograms)
WOUNDED VETERANS of the World War have a pleasanter time of it now that radio sets have been installed in government hospitals. This photo was taken in Mt. Alto Hospital. At the Government hospitals the veterans not only listen in, but, with headphones attached, go on merrily making sets. It proves fascinating and makes life brighter.



(International Newsreel)
HOPE of a cancer cure by the "radio knife" is held out by Dr. R. J. Carseth, shown demonstrating his experiment. The device is grounded, then applied to the patient to burn away tissue.



(Kael & Herbert)
A PORTABLE one-tube CW transmitter, which may be used with B batteries. Any hard receiving tube, such as the UV-201, UV-201A or WE-216A, may be used. A set of this kind is just the thing for amateurs to take on their vacations, so they can carry on short distance communication.

Programs

Friday, May 30 (continued from page 15)

looseleaf current topics. 8:30 P. M., "Income Taxes," by Frank Shevit. 10 P. M., Benjamin Listengart, violinist; A. Lapaglia, violinist; Shirley Listengart, accompanist.

WLW, Cincinnati, O., 309m (970k), E. S. T.—10:30 A. M., weather forecast and business reports. 1:30 P. M., market reports. 3 P. M., stock quotations. 4 P. M., special program, Memorial Day.

Saturday, May 31

WGI, Medford, Mass., 360m (830k), E. S. D. S. T.—6:30 P. M., code practice; weather forecast; New England crop notes. 7 P. M., meeting of Amrad Club. 7:30 P. M., talk on current events, David M. Cheuey. 8 P. M., talk on New England business industry; musicale; weather report; time.

WEAF, New York, 492m (610k), E. S. D. S. T.—4 P. M., Mount Royal orchestra; Augusta Zerbin, dramatic soprano. 6 P. M., dinner music from Rose Room, Waldorf-Astoria; Josiah B. Free, baritone, accompanied by Miss Murphy; bedtime story; Genevieve McKenna, dramatic soprano; Anna Daly, violinist, and Anita Fontaine, pianist; William Friedman, pianist; Vincent Lopez and his orchestra.

WSB, Atlanta, Ga., 429m (700k), C. S. T.—Noon, entertainment. 3:30 P. M., pay-by-play baseball broadcast. 5:30 P. M., Miss Bonnie Barnhardt's songs and Burgess bedtime story. 8-9 P. M., All-Star Week-end revue. 10:45 P. M., Journal Hired Help skylark; Rainbow orchestra.

WOO, Philadelphia, 509m (590k), E. S. D. S. T.—11 A. M., grand organ. 11:30 A. M., weather forecast. Noon, luncheon music, Tea Room orchestra. 12:55 P. M., time signals. 4:45 P. M., grand organ and trumpets. 7:30 P. M., sports results and police reports. 10:55 P. M., time signal and weather forecast.

WDAF, Kansas City, 411m (730k), C. S. T.—3:30 P. M., the Riley-Ehrhart orchestra. 6 P. M., marketgram; weather forecast; time signal; road report; the Tell-Me-a-Story Lady; music, Fritz Hanlein's Trianon Ensemble. 11:45 P. M., (Nighthawk Frolic) The "Merry Old Chief" and the Plantation Players.

WRC, Washington, 469m (640k), E. S. T.—5:15 P. M., instruction in international code. 6 P. M., children's hour. 7:45 P. M., Bible talk. 8 P. M., Carolyn Manning, contralto. 8:15 P. M., talk on U. S. Coast Guard by Oliver M. Maxam. 8:30 P. M., Ruth Peter, soprano. 8:45 P. M., talk by Honorio Pueyredon, ambassador of Argentine. 9 P. M., concert by U. S. Marine band. 9:55 P. M., time signals and weather forecasts. 10 P. M., United States Marine band.

WGY, Schenectady, 380m (790k), E. S. T.—11:30 A. M., stock market report. 11:40 A. M., produce market report. 11:55 A. M., time signals. 8:30 P. M., dance music, orchestra of Hotel Ten Eyck.

CKAC, Montreal, 425m (700k), E. S. D. S. T.—7 P. M., kiddies' stories in French and English. 7:30 P. M., Rex Battle's dinner concert orchestra. 8:30 P. M., specialties. 10:30 P. M., J. C. Smith and his roof garden orchestra.

WDAR, Philadelphia, 395m (760k), E. S. D. S. T.—11:45 A. M., daily almanac. 12 noon, organ recital from Stanley Theatre; features from studio; Arcadia concert orchestra. 2 P. M., Arcadia concert orchestra; Metropolitan quartet. 4:30 P. M., Bobbie Lee and his Cotton Pickers. 5:45 P. M., baseball and other sports results. 7:30 P. M., Dream Daddy with the boys and girls.

WWJ, Detroit, 517m (580k), E. S. T.—10:25 A. M., weather forecast. 11:55 A. M., Arlington time. 3 P. M., Detroit News orchestra. 3:30 P. M., weather forecast. 3:35 P. M., market reports and baseball scores. 5 P. M., baseball scores. 7 P. M., Detroit News orchestra.

WOAW, Omaha, Neb., 526m (570k), C. S. T.—6 P. M., speaker's half-hour. 6:30 P. M., dinner program by Saxton Family orchestra. 9 P. M., program arranged by Eugenie W. Dinkins.

WIP, Philadelphia, 509m (590k), E. S. D. S. T.—6:05 P. M., dinner dance music by Harold Leonard's Red Jackets. 6:45 P. M., agriculture, live-stock and produce market reports. 7 P. M., Uncle Wip's bedtime stories. 8 P. M., "30,000 miles around the world with Thomas Jefferson Bause." 8:30 P. M., concert by Schumann Trio; Augusta B. Witherow, soprano; Anna Gordon, violinist; Hilda Wolf, pianist. 9 P. M., program by Glee Club of Penn. Railroad. 10 P. M., dance music by Ted Weems and orchestra.

WLAG, Minneapolis, Minn., 417m (720k), C. S. T.—8:30 A. M., announcements. 10:45 A. M., household hints. 11:35 A. M., weekly meeting of Postcard Club. 7:30 P. M., business message. 9:15 P. M., Finnish Lutheran Church choir; Mrs. Foras Malmberg, soprano. 10:45 P. M., Sam J. Heiman's Casino orchestra; Nelle Searles-Marsh, soprano; Eleanor Freeman, accompanist.

KGO, Oakland, Cal., 312m (960k), P. T.—12:30 P. M., N. Y. Stock Exchange and weather reports. 4 P. M., concert orchestra of the Hotel St. Francis. 8 P. M., musical program; feature numbers by A. Cappella choir. 10 P. M., to I A. M., Hotel St. Francis dance orchestra.

KFI, Los Angeles, 469m (640k), P. T.—4:45 P. M., Evening Herald and Examiner news bulletins. 6:45 P. M., vocal concert. 8 P. M., Althea Oliver in all-American concert. 9 P. M., Examiner concert. 10 P. M., popular song concert. 11 P. M., Max Fisher's Cocomat Grove orchestra.

KFNH, Shenandoah, Ia., 266m (1130k), C. S. T.—7:30 P. M., old time musicians.



Emilie Loeben, the popular accompanist at Station WIP, Philadelphia. Miss Loeben also presents her own programs.

WCAE, Pittsburgh, 462m (650k), E. S. T.—6:30 P. M., dinner concert from William Penn hotel. 7:30 P. M., Uncle Kaybee, 7:45 P. M., baseball scores; Lew Kennedy, baritone; Miss Irene Setser at the piano. 8 P. M., silent period. 8:30 P. M., Paul Kramer's Syncoptors.

KDKA, Pittsburgh, 326m (920k), E. S. T.—6:30 P. M., children's period. 6:45 P. M., helps to teachers. 7 P. M., baseball scores; "Sport Review" by James J. Long. 8 P. M., concert by Westinghouse band. 9:55 P. M., time signals; weather forecast; baseball scores.

KYW, Chicago, 536m (560k), C. S. T.—7 P. M., Birdie Gordon, soprano; Sallie Menkes, accompanist; George B. Simons, tenor; Ada Hitt, accompanist; Bartley Hurst, banjo; Banjo James, banjo; Ruth Buhl, reader. 8:15 P. M. to 12:30 A. M., late show.

WLZ, Springfield, Mass., 337m (890k), E. S. T.—7:05 P. M., dinner dance concert by Leo Reisman and his orchestra. 7:30 P. M., bedtime story for the kiddies. 7:40 P. M., concert by Hotel Kimball Trio. 8:30 P. M., program of vocal and instrumental music.

KGW, Portland, Ore., 492m (610k), P. T.—11:30 A. M., weather forecast. 3 P. M., children's program; story by Aunt Nell. 10 P. M., baseball scores; weather forecast; dance music by George Olsen's Metropolitan orchestra.

KPO, San Francisco, 423m (710k), P. T.—2:30 P. M., Tau-Mu orchestra. 3:30 P. M., tea dansant. 8 P. M., Art Weidner and his popular dance artists. 12:45 P. M., Commonwealth Club luncheon at the Palace Hotel.

WHN, New York, 360m (830k), E. S. D. S. T.—9:15 P. M., Emma Soltis, violinist, classical program. 9:30 P. M., musical program. 9:45 P. M., Fitzpatrick Brothers, old time songs. 10 P. M., George Roberts and Jimmy Doyle, popular songs. 10:15 P. M., musical program. 10:30 P. M., Jimmy Clarke and His Entertainers. 11 P. M., Maida Dantzer, soprano. 11:12 P. M., program announced.

WOC, Davenport, Ia., 484m (620k), C. S. T.—12 noon, chimes concert. 12:15 P. M., weather forecast. 3:30 P. M., educational program. 5:45 P. M., chimes concert. 6:30 P. M., Sandman's visit. 6:50 P. M., sport news and weather forecast. 9 P. M., orchestra program.

WJZ, New York, 455m (660k), E. S. D. S. T.—5 P. M., Landau's Harbor Inn serenaders. 5:30 P. M., state and federal agricultural reports. 7 P. M., Uncle Wiggley stories. 7:15 P. M., Mary Gleason, recitations. 7:30 P. M., Waldorf-Astoria Grill orchestra. 8:30 P. M., Elizabeth Gibbs, contralto, accompanied by Keith McLeod. 9 P. M., Creighton Allen, pianist. 10:35 P. M., Club Lido Venice orchestra.

WLW, Cincinnati, O., 309m (970k), E. S. T.—10:30 A. M., weather forecast and business reports. 1:30 P. M., market reports.

WOR, Newark, N. J., 405m (740k), E. S. D. S. T.—8 P. M., Gene Ingraham's Bell Record orchestra. 8:55 P. M., Augusta Kottler, soprano. 9:05 P. M., baritone solos, James MacDonald. 9:15 P. M., talk by Captain D. Malman, S. S. Resolute; concert by orchestra of S. S. Resolute. 9:55 P. M., fifteen minutes with Olympic cham-

pions. 10:20 P. M., Ben Friedman entertainers. **KHJ, Los Angeles, 395m (760k), P. T.—**6 P. M., Hickman's concert orchestra. 6:45 P. M., children's program; bedtime story by Uncle John. 8 P. M., program, courtesy J. Howard Johnson. 10 P. M., Hickman's dance orchestra.

KSD, St. Louis, 546m (550k), C. S. T.—8 P. M., Missouri Theatre orchestra concert specialties. **WFAA, Dallas, Tex., 476m (630k), C. S. T.—**12:30 P. M., address, William M. Reilly. 8:30 P. M., musical recital, W. A. Green Co. Choral Club. 11 P. M., Adolphus Hotel orchestra. 12 P. M., Lopez orchestra, at Palace Theatre.

Sunday, June 1

WFAA, Dallas, Texas, 476m (630k), C. S. T.—6 P. M., Radio Bible Class. 7:30 P. M., Austin College commencement exercises. 9:30 P. M., Jack A. Davis and his orchestra.

WGI, Medford, Mass., 360m (830k), E. S. D. S. T.—4 P. M., twilight program; Adventure Hour; musicale. 8:30 P. M., evening program; talk, auspices Greater Boston Federation of Churches; musicale.

WSB, Atlanta, Ga., 429m (700k), C. S. T.—11 A. M., First Presbyterian Church service. 5-6 P. M., Buford, Ga., Methodist Church choir. 7:30 P. M., Wesley Memorial Church service.

WOO, Philadelphia, 509m (590k), E. S. D. S. T.—2:25 P. M., musicale exercises; regular Sunday afternoon session of Bethany Sunday School; Bethany Sunday School orchestra. 3:15 P. M., sacred recital on Wanamaker grand organ, by Clarence K. Bawden. 7:30 P. M., evening services from Bethany Presbyterian Church.

WDAF, Kansas City, 411m (730k), C. S. T.—Baseball scores at 3:30, 4, 4:30 and 5 o'clock. 4 P. M., program by members of Southeast Music Study Club.

CKAC, Montreal, 425m (700k), E. S. D. S. T.—4:30 P. M., sacred concert.

WWJ, Detroit, 517m (580k), E. S. T.—7:30 P. M., services at St. Paul's Episcopal Cathedral. 5 P. M., Detroit News orchestra.

KGO, Oakland, Cal., 312m (920k), P. T.—3:30 P. M., concert by KGO Little Symphony orchestra and soloists.

KFI, Los Angeles, 469m (640k), P. T.—10 A. M., L. A. Church Federation service. 4 P. M., El Serrano community choir. 6:45 P. M., vocal recital. 8 P. M., Ambassador Hotel concert. 9 P. M., Examiner concert. 10 P. M., Cinderella ball-room orchestra.

KFNH, Shenandoah, Ia., 266m (1130k), C. S. T.—3 P. M., religious services. 6:30 P. M., sacred song service.

KYW, Chicago, 536m (560k), C. S. T.—10 A. M., Central Church service; musical program, direction Daniel Protheroe. 1:30 P. M., studio chapel service, direction Chicago Church Federation. 6 P. M., preliminary service, Chicago Sunday Evening Club. 7 P. M., regular meeting, Chicago Sunday Evening Club.

KGW, Portland, Ore., 492m (610k), P. T.—6 P. M., church services. 7 P. M., George Olsen's concert orchestra in dinner program; baseball scores.

KPO, San Francisco, 423m (710k), P. T.—11 A. M., undenominational and non-sectarian church services. 8:30 P. M., concert by Rudy Seiger's Fairmont Hotel orchestra.

Monday, June 2

WHAZ, Troy, N. Y., 380m (790k), E. S. T.—9 P. M., three one-act plays by students' dramatic club of Troy High School. 10:30 P. M., popular dance music, Capitol Sereaders orchestra.

WDAF, Kansas City, 411m (730k), C. S. T.—3:30 P. M., Kismet Temple Shrine band. 6 P. M., marketgram; weather forecast; time signal; road report; music, Fritz Hanlein's Trianon Ensemble. 8 P. M., program by Islam Temple Shrine band. 11:45 P. M., (Nighthawk Frolic); Syrian Temple Shrine band.

CKAC, Montreal, 425m (700k), E. S. D. S. T.—1:45 P. M., Mount Royal Hotel orchestra. 4 P. M., weather, stock, news. 4:30 P. M., Mount Royal Hotel dance orchestra.

WFAA, Dallas, Tex., 476m (620k), C. S. T.—12:30 P. M., address, Dr. A. D. Laugenour, Dallas Astronomical Society. 8:30 P. M., musical recital, Schubert Junior Choral Club.

KGO, Oakland, Cal., 312m (960k), P. T.—1:30 P. M., N. Y. Stock Exchange and weather reports. 3 P. M., musical program. 4 P. M., Hotel St. Francis dance orchestra. 6:45 P. M., stock exchange and weather reports; news items. 8 P. M., educational program, with musical numbers; courses in agriculture, Spanish, music, economics, and literature.

KFI, Los Angeles, 469m (640k), P. T.—4:45 P. M., Evening Herald and Examiner news bulletins. 8 P. M., Evening Herald concert. 9 P. M., Examiner concert. 10 P. M., Max Fischer's Cocomat Grove orchestra.

KGW, Portland, Ore., 492m (610k), P. T.—11:30 A. M., weather forecast. 3:30 P. M., literary program. 7:30 P. M., baseball scores; weather forecast; market reports. 8 P. M., Roy Bryson, tenor; Imogene Letcher, pianist.

KPO, San Francisco, 423m (710k), P. T.—4:30 P. M., Rudy Seiger's Fairmont Hotel orchestra. 5:30 P. M., children's hour stories. 7 P. M., Rudy Seiger's Fairmont Hotel orchestra. 8 P. M., organ recital by Theodore J. Irwin. 9 P. M., program, management Lena Frazee. 10 P. M., E. Max Bradfield's versatile band.

Tuesday, June 3

WDAF, Kansas City, 411m (730k), C. S. T.—3:30 P. M., Moslem Temple Shrine band. 6 P. M., marketgram; weather forecast; time signal; road report; the Tell-Me-a-Story Lady; music, Median Temple Shrine band. 11:45 P. M., (Nighthawk Frolic); Hella Temple Shrine band.

(Continued on page 19)

5,000,000 Hear Hoover's Speech

A SPEECH by Secretary Hoover, Radio Chief of the United States, to the National Electric Light Association, at Atlantic City, was broadcast by WEAF, New York City; WCAP, Washington, D. C.; WJAZ, Providence, R. I.; WGY, Schenectady, N. Y., and KYW, Chicago.

Secretary Hoover spoke from his office in Washington, his voice being carried by telephone wire through an amplifier in a repeater station in Philadelphia and from there to the Million Dollar Pier, where the convention was dining. The secretary's voice was carried back to Philadelphia from Atlantic City and then back to Washington for broadcasting from WCAP. All told, 26 repeaters and special amplifiers were used. It is estimated 5,000,000 heard his speech, in which he opposed government ownership of the electrical industry.

"Any attempt to make the public pay for the privileges of receiving radio programs would be a mistake," David Sarnoff, vice-president of the Radio Corporation of America, told the convention.

"The widespread popularity of radio has, in my opinion, come about largely through the fact that radio listeners may draw upon the programs sent from all broadcasting stations without restriction, and this freedom, I think, should be preserved."

"The public is now paying for broadcasting in a very large measure. The cost of operating my company's broadcasting stations is added to the cost of doing business. There would be no market for radio receivers if there were no broadcasting."

Appeal for Popularity Votes From WJZ

WJZ, New York City, is taking advantage of the Most Popular Entertainer contest conducted by RADIO WORLD. At the conclusion of a program by Irving Selzer's Cafe Boulevard Orchestra on May 20 it was announced via the ether that Irving Selzer and his band were going strong in the race. Listeners were asked to send in a vote for their favorite to WJZ, Aeolian Hall, New York City, or to RADIO WORLD.

In addition to putting the artists further ahead in the race, the broadcast appeal was termed a good way to show appreciation of an entertainer's efforts.

PROGRAMS (Concluded)

CKAC, Montreal, 425m (700k), E. S. D. S. T.—4 P. M., weather; news, stocks; music. 7 P. M., kiddies' stories in French and English. 7:30 P. M., Rex Battle and orchestra; Benj. Scherzer, violinist. 8:30 P. M., English musical program, orchestra of S. S. Doric; talk. 10:30 P. M., J. C. Smith and dance orchestra.

WFAA, Dallas, Tex., 476m (620k), C. S. T.—12:30 P. M., address, DeWitt McMurray. 8:30 P. M., alumni banquet of Austin College, Sherman, Tex. 11 P. M., musical recital by Aida Choral Club.

KGO, Oakland, Cal., 312m (960k), P. T.—1:30 P. M., N. Y. Stock Exchange and weather reports. 4 P. M., concert orchestra of the Hotel St. Francis. 6:45 P. M., stock exchange and weather reports; news items. 8 P. M., program by Temple Israel, San Francisco; address, "Hunting Wild Game in Africa," by H. A. Snow. 10 P. M. to 1 A. M., Hotel St. Francis dance orchestra.

KFL, Los Angeles, 469m (640k), P. T.—4:45 P. M., Evening Herald and Examiner news bulletins. 6:45 P. M., vocal concert. 8 P. M., Ambassador-Max Fisher's Cocomat Grov orchestra. 9 P. M., Examiner concert. 10 P. M., Miabelle Everett Studio in recital.

KFNF, Shemandoah, Ia., 266m (1130k), C. S. T.—7:30 P. M., program by Fisher Farm Bureau.

KGW, Portland, Ore., 492m (610k), P. T.—11:30 A. M., weather forecast. 3:30 P. M., talk by Jeanette P. Cramer, home economics. 7:30 P. M., baseball scores; weather forecast; market reports.

KPO, San Francisco, 423m (710k), P. T.—5:30 P. M., children's hour stories. 6:30 P. M., "Cleveland Six" orchestra. 7 P. M., Rudy Seiger's Fairmont Hotel orchestra. 8 P. M., program, management U. S. Army, 30th Inf. band. 10 P. M., Bradfield's versatile band.

Barnyard Impatience



ROOSTER: I wish they'd hurry up with that bed-time story. It's almost sundown.

Wendall Hall to Wed via Ether on June 4

RADIO fans all over America have been "invited" to a radio wedding June 4, when Wendall Hall, radio troubadour, and Miss Marian Martin, of Chicago, will be married before the microphone of Station WEAF, New York City, and will be broadcast from WJAZ and WCAP. The radio couple will have a radio honeymoon speaking over all the larger stations in the United States and Canada, to be followed by a speaking tour of Hawaii and Cuba. Miss Martin is a newspaper woman and has chosen Miss Dorothy Fullerton, daughter of a Chicago newspaperman, as her bridesmaid.

Mr. Hall sent out the "invitations" via the ether from WLS, Chicago.

BROADCASTERS DISTINGUISH THE COPYRIGHT BILLS

THE hearings on the Newton and Johnson bills before the House Committee on Patents were concluded. The National Association of Broadcasters, 1265 Broadway, New York City, says:

"These bills must not be confused with the Dill bill in the Senate. The House bills contemplate wide-open public performance, whereas the Dill Senate bill seeks to relieve radio alone."

"It would be tiresome to go into all of the acrimonious debate. Suffice it to say that the so-called American Society of Composers, Authors and Publishers were strictly on the defensive and used methods typical of a last trench stand."

"No one attending either the Senate or House hearings has yet been able to reconcile the statements of the so-called American Society with their actions. They exhausted themselves and their witnesses in trying to prove that radio ruins their songs and kills their business. At the same time they are soliciting stations to become licensees and their members are using every known ruse to have their music broadcast."

SHORT WAVE BRIDGES CONTINENT

A SPEECH on preparedness by Brig.-Gen. John Ross Delafield, with music by the Sixteenth Infantry Band and an introductory address by General James G. Harbord, was broadcast from the studio of the Radio Corporation of America (WJZ, New York City), and sent to San Francisco. The method used was the new short-wave radio relay, recently developed. WJZ transmitted on a wave length of 455 meters for its regular patrons, while a direct-wire connection to Schenectady carried the waves there. At WGY two transmitters were used, one at 380 meters for the regular listeners-in and another at 100 for relay to KDKA of the Westinghouse Company at Pittsburgh. Here again two transmitters were used, one working at 325 meters for local listeners and the other at 98 meters to relay to KFKX of the Westinghouse Company at Hastings, Neb. The latter retransmitted on a new length at 104 meters, which was caught by Station KGO of the General Electric Company, at Oakland, Cal. The latter station retransmitted at its usual length of 312 meters for coast listeners.

GET THOSE SUPERDYNE COPIES

THE Superdyne Circuit, brought up to date in diagrams and text, in RADIO WORLD for May 17, 24, 31. Per copy, 15c; the three copies, 45c, or start your subscription with the first number. RADIO WORLD, 1493 Broadway, New York City.

The Radio Clubs

What They Are Doing to Help Solve Pressing Problems

Address Club Editor, RADIO WORLD, 1493 Broadway, New York City.

Amateurs Hold Meeting Via the Ether

By BERNARD S. SHIELDS, DALLAS, TEX.

AN experiment to determine whether it is possible to hold a club meeting by radio, with all members seated comfortably in their homes, has been tried out successfully by amateurs in this vicinity. All business was transacted with as much ease as if the members were gathered in one room.

The idea was conceived by members of the West Gulf Amateur Fone Club, started recently by local representatives of the American Radio Relay League, the national association of radio telegraph amateurs. Practically all members have installed radiophone transmitters in their homes. Due to bad weather the suggestion was made that the members hold their meeting "in the air." Notices were sent to all club members suggesting a wave length of 190 meters.

At the appointed time all members were at their sets when the president started up his radiophone and called the meeting to order. The roll was called by the secretary, and, as their names were spoken, the members picked up their microphones and answered "present."

As each set had been carefully tuned in advance all members of the club could hear everything that took place. Amateurs in towns nearby had been invited to "attend," and it was interesting to hear the voices of these out-of-town members, since they seldom had the time and facilities to attend the regular meetings.

The session lasted more than two hours and met with such general approval that it was voted to hold subsequent "ether meetings" every Sunday afternoon thereafter. The broadcast listeners in Dallas have been invited to listen in on these occasions.

Rattlesnake Radiates

STATE COLLEGE, PA.

A LIVE rattlesnake broadcast his eerie rattle by radio from the Pennsylvania State College station.

"Kelly," a pet rattlesnake owned by Professor George R. Green of the nature study staff, barely had started his scheduled performance when members of the unseen audience within a radius of thirty miles began reporting by telephone that they were hearing the broadcast perfectly.

The snake rattled almost continuously for fifteen minutes. It was stopped occasionally by Professor Green, who placed a stick over the twelve-button rattle through the mesh of its wire cage, to enable hearers to pick up the sound.

This was said to be the first time a rattlesnake has been utilized for radio entertainment.

Nightingales Broadcast

RECENT news reports from England state that British listeners were treated to a concert by nightingales and other native song birds. The manager of the broadcast station, who conducted the test, had the microphone cleverly concealed in the native haunts of the birds so that their singing might be enhanced by the natural setting.

MASONIC LODGE HAS "RADIO NIGHT"

PERFECT ASHLAR Lodge, F. & A. M., meeting at Mecca Temple, 130 West 56th Street, New York City, held a "radio night." The first and second degrees were conferred, the lodge "closed," and, at 9:30 P. M. radio entertainment was begun. It was not a "listen-in," but entertainers from WEAF appeared in person. A film, "With the Studio of WEAF Via Radio," was shown.

WBRR USES 273 METERS

THE wave length used by Station WBRR, Staten Island, New York City, formerly 244 meters, is now 273 meters. The station is operated by the People's Pulpit Association, of 124 Columbia Heights, Brooklyn, N. Y.

Out Next Week

Issue of June 7

THE BIG VACATION NUMBER OF RADIO WORLD

Teeming with Features of the Radio Activities of All Outdoors

Italy Buys Hammond Sets that Make Messages Private

ROME.

JOHAN HAYS HAMMOND, Jr., the noted American inventor, has perfected a means of sending and receiving multiple radio messages at the same time on the same wave-length. This compares to the multiple use of the same wires in wired telephony. He has contracted with the Italian government for installing several such receiving and sending sets, which are of value in war no less than in regular commercial use, because privacy is achieved.

So agents of Mr. Hammond have announced.

The system consists in modulating the carrier waves with a plurality of super-audible waves, each one of which can, in its turn, be modulated in such a way as to carry a message. A station using a certain wave length can, it is said, by simply changing the frequency of the super-audible waves, send several messages simultaneously without their interfering with each other.

As an infinite number of combinations of wave lengths can be obtained, it is impossible, the inventor says, for any one to listen in on the message unless he should know beforehand on what combination of wave lengths the sending station is working. This feature, it was emphasized, confers privacy to the new system, which is therefore extremely valuable for military purposes as well as for commercial uses.

Another vital property claimed for the Hammond system is that it will allow a greater number of transmitting stations to be operated. In the past, the number of transmitting stations have been limited and could not be exceeded without one station interfering with another. The Hammond system, it is declared, with its almost unlimited combinations of wave lengths, will allow the number of stations to be increased without any danger of interference.

Although his invention has been examined chiefly as to its military utility, Mr. Hammond believes that it will have great commercial value as well. He thinks that if it is applied to broadcasting, it will be possible to make programs heard only by those who pay for them.

The Hammond system would use from 70 to 80 per cent of standard apparatus, supplemented by his special devices. The standard transmitting station, he said, could easily be adapted to his system.

John Hays Hammond, Jr., sailed from New York City April 5 for Italy with the announced purpose of testing for the Italian government his device for radio transmission, which, he said at that time, would insure secrecy in receiving messages and would solve the problem of putting the cost of broadcast programs on the listener.

Announcement was made on March 20, 1923, that the Radio Corporation of America and the American Telephone and Telegraph Company had bought the rights to 200 patents held by Mr. Hammond. These included the Hammond selector unit, utilized in radio control of torpedo vessels, by which two sets of radio impulses can be transmitted simultaneously from one broadcasting station, and the Hammond system of making radio transmission secret.

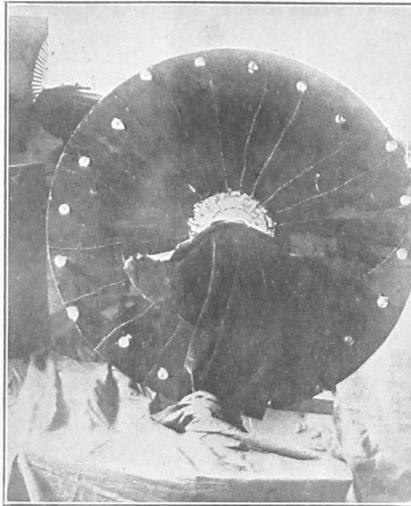
CKAC Will Operate at 7,000 Watts Next Month

CKAC, owned and operated by La Presse, of Montreal, will operate a 7,000-watt three-phase rectification Marconi set early next month, when the new installation and the entirely renovated studio will be completed. CKAC is operating on 2,000 watts and resorts to an all remote control system of entertainment following the destruction of its studio, April 26, which burned down as the consequence of a faulty flashlight apparatus used in photographing a new microphone. The transmitting room and apparatus were spared. The 7,000-watt set is advertised as "the most powerful station in the world."

RADIO COMPASSES ON SHIPS

RADIO compasses, or direction finders, have been installed on the Leviathan and the President McKinley, of the Shipping Board; eight ships of the Admiral Line, nine of the Matson Navigation Company and four of the Standard Oil Company, it was recently announced by the Department of Commerce.

TELEVISION is one step nearer realization, due to his device (shown below), says J. L. Baird, Scottish engineer. One of two discs is shown. An image placed behind the rear disc can be reproduced on the front one, it is said, and a one-tube set will do it. Vision can be broadcast as far as sound, says Mr. Baird.—(Wide World.)



Radio to Guide ZR-3 in Flight to America

PLANS for radio communication with the German-built ZR-3, the new giant airship of the Navy, when she crosses the North Atlantic in early July, are going forward through the co-operation of the U. S. Weather Bureau and the Naval Communication Service.

At least one Naval vessel will take station in mid-Atlantic to serve as a radio communicating central between the European and American stations, relaying messages to and from the airship all the way over. As was done in the first trans-Atlantic flight, several station ships may be used, in an effort to take all safety precautions possible.

The ZR-3 is equipped with a German radio set, which will operate on 1,400 meters. It is planned that the Naval radio station at Bar Harbor, Me., will receive incoming messages from this aircraft on her first cruise. The present radio equipment on the ZR-3 is not a very long range set, but as soon as she reaches this country the Navy will install a modern high-powered set, and probably a special short-wave outfit such as has just been completed for the American-built ZR-1.

Inter-American Conference Opens

MEXICO CITY.

THE United States delegates to the first Inter-American Electrical Communications Conference were active in the conference, that opened Tuesday. Ambassador C. B. Warren is chairman of the United States delegation. Representative Wallace, of Maine, and Allen H. Babcock, chief electrical engineer of the Southern Pacific, are the two other delegates.

The attaches who will assist the three delegates are understood to include P. E. D. Nagle, communication expert of the Department of Commerce; Commander D. C. Bingham and Lieut. A. P. H. Tawressey, of the Naval Communication Service; Major L. B. Bender, of the Army

Coolidge's Father Capitulates; Gold Jacks on His Set

JOHAN COOLIDGE, father of President Coolidge, has at last installed a radio set in his home at Plymouth, Vt. His enthusiasm was worked up at a friend's house when he heard Calvin's speech, via the ether, from the Associated Press banquet in New York City. But he was afraid operating a set was "too much trouble." He found it was easy, and now has a Freed-Eismann, gift of the corporation. The screws and jacks are solid gold.

New Directors Elected by Radio Relay League

HARTFORD, CONN.

THE names of the new directors of the American Radio Relay League were announced by the executive committee following official count of the ballots from all divisions throughout North America.

Between 15,000 and 16,000 ballots were distributed and in several divisions rather strenuous campaigns were waged. The new directors:

Atlantic Division, George L. Bidwell, Washington, D. C.

Central Division, Clyde E. Darr, Detroit.

Dakota Division, Cyril M. Jansky, Jr., Minneapolis.

Delta Division, Benjamin F. Painter, Chattanooga, Tenn.

East Gulf Division, Harry F. Dobbs, Atlanta, Ga.

Midwest Division, L. Boyd, Laizure, Kansas City, Mo.

New England Division, George H. Pinney, South Manchester, Conn.

Northwestern Division, Karl W. Weingarten, Tacoma, Wash.

Pacific Division, Allen H. Babcock, San Francisco.

Rocky Mountain Division, Paul M. Segal, Denver.

Roanoke Division, W. Treadway Graveley, Danville, Va.

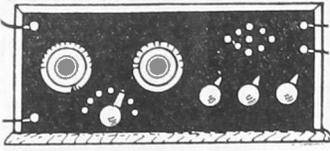
West Gulf Division, Frank M. Corlett.

A. H. Keith Russell becomes a director through his election as Canadian General Manager of the A. R. R. L. Although Canada is divided into several operating divisions, it is represented on the board by this office created in the League's new constitution. The election of the foregoing candidates becomes effective July 1, 1924.

The annual meeting will be convened by the president, Hiram Percy Maxim, the latter part of July.

Signal Corps; W. R. Vallance, of the State Department, and probably L. L. Lee, head of the radio division of the Shipping Board Operating Department. Mr. Lee has left Washington for an inspection trip to New Orleans and Galveston, and will probably sail for Mexico from a Gulf port.

The conference intends to see what general principles can be laid down and also to develop some agreement which might aid in settling questions between the several republics of this hemisphere on communications in general. If such a convention is adopted by the delegates from 21 countries, it would have to be approved by the legislative branches of the several countries.



The RADIO PRIMER

Information and Instruction for the Beginner

THE DIFFERENCE BETWEEN A VARIOCOUPLER AND A VARIOMETER.

THE question of variocouplers and variometers has arisen quite frequently among novices in radio. Quite a few do not understand the difference. Both look much the same, having an outer winding which remains stationary and an inner winding on a movable ball. This ball rotates usually one complete turn within the diameter of the stator.

The variocoupler is a direct descendant of the loose-coupler, which, in the days before broadcasting was about the only piece of apparatus used for tuning wireless circuits. The loose-coupler usually consisted of two coils of wire wound on insulating tubes. The smaller tube on which the secondary winding was placed had a mechanical arrangement whereby it could be slid in and out of the primary so as to vary the inductance between them. These loose-couplers could tune from about 200 all the way up to 2,500 meters, thus taking in the amateur, commercial and press wave-lengths. Nowadays, however, variocouplers are made to take in from about 200 to 600 meters, which includes all the broadcast wave-lengths.

The variocoupler is wound throughout with the same size wire, usually about size 22 double cotton or silk covered. The outer or primary windings have taps taken from the wire at equal distances from one another. For example, if the primary has seventy turns of wire on it, ten taps may be made, one at every seventh turn. Sometimes six taps are taken, one from every seventh turn, and six more taken, one from each turn. These taps are brought out to switch points on the front of the panel—the six taps of seven turns each to one set of points, and the six taps of one turn each to the other. This arrangement gives the choice of from one turn to all seventy turns by merely placing the switch arms on the proper switch points.

It is not always necessary to have these taps and switch points as there is another arrangement, with the use of a 43-plate variable air condenser, whereby all the primary tuning may be done by the use of only one dial. If this is desired, the condenser is connected in series with the aerial and one end of the primary winding on the variocoupler. The other end goes to the ground. In this way, all the turns of wire on the primary are always in the circuit and the tuning accomplished by adding or diminishing the capacity of the condenser. This condenser has the effect of shortening the natural wave length of the antenna, but at the same time not detracting any from its efficiency.

The variometer is almost identical in construction as the variocoupler, with the exception that there are no taps taken off, and that one end of the primary winding is connected to one end of the secondary winding. The commonest use of variometers is in tuning the grid circuit and plate circuit. The tuning is accomplished by rotating the inner winding or secondary. The closer the turns of wire of the secondary and primary are, the higher their natural wave length becomes. These phenomena are due to induction, the same as in the variocoupler. A very fine adjustment of circuits is possible by the use of variometers, due to the absence of dead-end losses and the greater efficiency inductances have over capacities.

A variometer can be used very efficiently in place of a variocoupler, should the necessity arise, by simply disconnecting the end of the primary winding connected to the secondary, thus making two separate windings. The primary may then be used with the aid of a 43-plate condenser as described above. In purchasing or building variocouplers or variometers, extreme care must be taken to make sure that the connections from the rotor shaft to the bearing plates have a good electrical contact.

Beginners' Dictionary

TAPS—Connections taken from a coil of wire. They are made by soldering a length of wire to a bared spot on the winding of the coil. These connecting wires are brought out to metal points fastened on the front of the panel so that they may be utilized conveniently. The taps on the panel are arranged semi-circularly so that a metal arm or lever centered properly will touch each point as it is rotated. Thus any given number of turns on the coil may be brought into use simply by turning the switch arm controlled by a knob. The more taps made, the greater the selection of any given number turns desired is possible.

VARIOMETER CONNECTIONS—The connections from the rotor of the variometer to binding posts and stator windings are taken off by two methods. There are two metal shafts in the rotor, one on each end, forming an axis. These two rods are not connected with each other, but are each connected to an end of the rotor winding. The shafts turn in holes made in the end-plates, which also some times serve to keep both halves of the primary winding in place. This friction of the rotor shaft on the end-plate is not sufficient electric contact, therefore some sort of spring contact is made on the shaft. The second method is the use of a flexible wire soldered to the shaft, the other end of the wire being soldered to the end-plate.

SERIES—Placing radio apparatus in series can be likened to a train of cars, each car fastened to the next, in a row. Electrically, one unit is connected in series merely by connecting a binding post of one to the binding post of another, so that in reality, as well as electrically, they are in a row. If you put the end of your aerial lead-in at one post of a condenser, and connected the other end of the condenser to the aerial binding post of your set, the condenser would be in series.

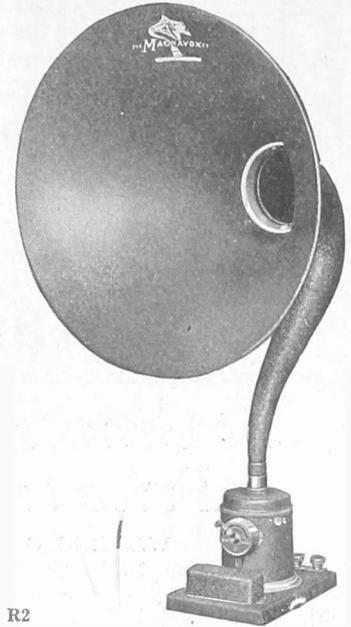
Has Set on His Flivver

WITH a three-tube set installed in a Ford sedan and using an aerial strung from the radiator to the rear tire Harold Finke of Evansville, Ind, recently drove out into the country, stopped his car and succeeded in getting WGY from Schenectady, N. Y., very clearly and with good volume.

THE RULING PASSION

HOSTESS—"Must you be going, Mr. Dugan?"
Absent-minded Radio Announcer—"Er, yes, good-night. WZOK signing off at 11:15 P. M."—Brown Jug.

MAGNAVOX Radio Products



R2 New Model \$50.00

MINIMUM current consumption has been combined with perfect volume control in the new model R2 Magnavox Radio Reproducer illustrated above.

The new Volume Control enables the user to reproduce broadcast programs from very soft to very loud, by moving a simple electrical switch, with a corresponding saving in current consumption.

These two new features—Volume Control and reduced current consumption—make the R2 Magnavox the ideal Reproducer.

Magnavox Reproducers

- R2 with 18-inch curvex horn...\$50.00
- R3 with 14-inch curvex horn...\$35.00
- M1 with 14-in. curvex horn. Requires no battery for the field....\$30.00
- M4, latest Magnavox Reproducer. Requires no battery..\$25.00

Magnavox Combination Sets

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

Magnavox Power Amplifiers

- A1—1-stage Power Amplifier...\$27.50
- AC-2-C—2-stage Power Amplifier \$50.00
- AC-3-C—3-stage Power Amplifier \$60.00

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

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MR. D. X. HOUND

Radio World's Own Artist Crates An
Enjoyable Character

By HAL SINCLAIR



The Radio Trade

Patent Grants No Right to Fix
Price or Use, Says White

WASHINGTON.

THE House Merchant Marine Committee has made an effort to speed the enactment of new radio legislation by tacking the remnants of the White bill to the Howell bill (S 2930), already passed by the Senate. A special ruling for early consideration on the floor of the House is now awaited.

Representative White, who fostered HR 7357, has embodied most of the important features of the original White bill in his report, but has included some remedial features calculated to prevent monopolies of the ether, and prevent price fixing and restraint of use of tubes and radio apparatus. The committee action was unanimous.

In his report, which was presented by Chairman Green to the House along with the amended Senate bill "reaffirming the use of the ether for radio communication, or otherwise, to be the inalienable possession of the people of the United States and their Government," Mr. White points out that the existing patent law does not empower a patent owner to fix and maintain the retail sale price or use of instruments after they have passed into the hands of the public. In this connection he claims in his report, that the patentee may not serve notice to the purchaser by attaching restrictive notices, that an instrument, presumably a vacuum tube, may be used only in specified apparatus or for certain purposes. He said:

"The exclusive right granted by a patent is limited to the invention described in the application therefor. It is also true that the monopoly of use granted by the patent law cannot be made the means of controlling the price of the patented article after it has in reality, even though not in form, been sold and paid for. The law does not empower the patent owner by means of license contracts with dealers and license notices attached to patented articles to fix and maintain the prices at which the instruments may be disposed of after they have passed into the hands of the public and after the patent owner has received the full price which it asks or expects for the instrument. Nor does the law empower a patent owner by notices attached to the thing patented to extend the scope of the patent monopoly by restricting its use to materials necessary for its operation but forming no part of the patented invention, nor to send the patented article forth into the channels of trade, subject to conditions to be imposed thereafter in the vendor's discretion."

Public interest will center in Section Four of the new bill, which deals with the complaints against certain companies manufacturing vacuum tubes and sets, together with the methods of their sale. It has been charged that they have been guilty of maintaining prices at unreasonable levels; of improperly restricting the use of instruments and their parts by competitors as well as the public, and of other practices held prejudicial to the free development of the radio art and public interest.

Westinghouse Earns 18%;
Business Big

THE net income available for dividends of the Westinghouse Electric & Mfg. Co. for the year ending March 31, 1924, was \$16,125,303, as shown by the company's annual report. This represents earnings of \$8.98 per share, or practically

18 per cent. on amount of stock outstanding during the year. Gross earnings amounted to \$154,412,918, which exceed those of any previous year in the history of the company, except the year ending March 31, 1919. Value of unfilled orders at the close of the fiscal year was \$63,738,702. Last year the figure was \$61,914,237. Total current assets, including inventories of \$80,000,000, were \$153,209,401, equal to more than six times the total current liabilities which were \$25,730,413. New stock to the value of \$17,955,000 was offered for subscription by the stockholders payable on April 16, and a stock dividend of 10 per cent., or \$10,773,000, was declared payable to stockholders of record May 2, 1924. General Guy E. Tripp, chairman of the board, says that 31,819 employees were insured under the company's insurance and savings plan and that the total amount of savings held in the fund on March 31, 1924, was \$2,845,853.

Crystal Has a Vernier for
Best Results

REAL vernier service on a crystal detector is obtained by the use of the Ambrose Vernier Detector, 220 Vernon Avenue, Brooklyn, N. Y. The crystal is excellent both for plain crystal set rectification and for reflex circuits. The synthetic mineral is sensitive over most of its surface and good volume is obtained. Add to that the great purity of tone for which the crystal rectifier is known and you have fine results. The most sensitive spot on the crystal is easily found and kept. There is a three-fold provision for achieving this. First, the crystal itself may be moved by one lever, which will describe half a circumference. Then the cat-whisker is adjustable as to its relative position on the crystal, and again with the vernier control. Once adjusted, the cat-whisker held its position for 78 hours without requiring any readjustment, and then only a very slight variation was made by a turn of the vernier.

Newark Exposition Plans
Broadcast Station

RADIO is to be an important feature of the Permanent Industrial Exposition, of Newark, N. J., which has started excavation on a site 200 by 309 feet in area for the second largest building in that city. This institution will afford sales offices to various industries.

It is planned to install in the building a powerful transmitting station, to be used for the dissemination of price quotations and exposition news among the buyers of the country. Newarkers are proud of the reputation of their city as a broadcasting center, and it is understood that strong pressure is being brought to bear to have the new station used for general broadcasting, as well as for commercial purposes. Whether this plan can be worked out is still a matter of speculation.

Finds Circuit Is Well
Suited for Summer

THE Bestone Circuit is well adapted to Summer reception, the manufacturer of the set finds, adding:

"The tonal qualities of this receiver are free from distortion and are in every way perfect, being unaccompanied by any squeals, howls or other foreign noises. Even static is reduced to a minimum and unimpairs reception from stations

nearby. Certain nights, of course, when static is very prevalent, far distance stations cannot be received. During the warm months the more powerful stations up to 1,000 miles can be received with loud speaker volume. In this way perfect entertainment is assured in the camp or on the launch.

"The Bestone Circuit is a 4-tube set. There is no regeneration, and the set does not radiate. It ordinarily will receive stations up to 1,500 miles distance on the loud speaker, while Pacific Coast stations have been numerous logged on the receiver tested in New York City.

"Simple to tune, having only two control dials, it is not only sensitive, but very selective. The volume on local stations is so great that it is oftentimes necessary to plug into the first stage of audio frequency.

"The circuit was developed by engineers of Henry Hyman & Co., Inc., New York City, and is put out in a massive mahogany cabinet with compartments for B batteries."

How to Connect Amperite
in Filament Circuit

THE device known as Amperite is a self-adjusting rheostat for all amplifying tubes. It consists of a special filament, hermetically sealed in a glass tube filled with an inert gas. The filament has the unique property of changing its resistance as the A battery voltage changes, in such a way that the filament of the vacuum tube is constantly operated at maximum efficiency. Thus, it can be substituted for hand rheostats in all amplifying circuits. Amperite is always connected in series with the "A" battery and the tube filament. By using the proper Amperite cartridge any desired combination of tubes may be used in a set. It may be mounted anywhere inside the set. There is no nob, it works perfectly in audio and radio-frequency and for every type of circuit. The attached sketch shows the method of hooking up Amperite in circuit.



W. R. FRANCIS IN NEW POST

WILLIAM R. FRANCIS, for eight years with The New York World, has become general manager and account executive of the Lewis Advertising Corporation, 38 Park Row. Mr. Francis has an advertising experience covering more than thirty years. He was the organizer of the Portland Advertising News League of Maine and formerly president of the Maine Advertising Corporation.

Business Opportunities
Radio and Electrical

Rates: 40c a line; Minimum 3 lines.

EFFICIENT RADIO SET WANTED

We want to form connections with a radio engineer who has developed something really worth while in a receiving set. We have excellent facilities for manufacturing and marketing, and have already worked out some very attractive features in cabinet construction. Party must know the art thoroughly and have something both original and efficient. We would prefer a man who could make moderate investment and take active interest in the enterprise; all replies confidential. Please don't answer unless qualifications are as outlined. Box XIII, Radio World.

RADO "B" BATTERIES—OPPORTUNITY TO enter into the manufacturing of this type of batteries; large and constant consumption; big profits; small capital needed. Box XI, Radio World.

RADIO OPPORTUNITY—HIGHLY EFFICIENT new receiving set, ready to market; plant fully equipped and in production; need active partner with \$12,000. Box XII, Radio World.

INFORMATION WANTED

Address of the Teco Radio Co., Boston, Mass. Please address J. L., care Radio World.

The Weekly Rebus

CAN you decipher this rebus? Send your answer to Rebus Editor, RADIO WORLD, 1493 Broadway, New York City. Mention Rebus No. 3. The names and addresses of those sending in the correct answer will be published.



The correct solution of Rebus No. 1, published May 17, was "Honeycomb Coil."

Among those who answered this correctly were: Chester Bogert, 138 E. 31st St., Brooklyn, N. Y.; J. E. Trout, 32 Putnam Ave., Brooklyn, N. Y.; Wm. F. Miller, Riverhead, N. Y.; Joe Linchan, 219 No. Avon St., St. Paul, Minn.; J. E. Watlington, (dealer), Box 513, S. Boston, Va.

Miss Mattie E. Cummins, 1536 Randolph St., Detroit.

Lincoln Osborn, 149 S. Knox St., Albany, N. Y.; Hyman Schwartzberg, 54 Jefferson St., N. Y. C.; J. H. Patterson, Ashland, Va.

Phillips Smith, 612 18th St., N. W., Washington, D. C.

Jos. Landry, 37 Spencer Ave., Chelsea, Mass.; B. J. Killen, 34 Indiana St., Wheeling, W. Va.

Thos. F. Adams, 637 I St., N. W., Washington, D. C.

C. Homewood, 7025 Glenoch St., Philadelphia, Pa.; Wm. H. Couch, Jr., 108 Shelton Ave., New Haven, Conn.

Dee Kay Vose (dealer), London Mills, Ill.; Edw. P. Kingsland, Haskell House, Port Washington, N. Y.

Wm. D. Lahn, 861 Dumont Ave., Brooklyn, N. Y.

Wm. Filler, 1741 Washington Ave., N. Y. C.; David Krantz, 1650 Amsterdam Ave., N. Y. C.

Edw. C. Niend (dealer), 144 E. State St., Trenton, N. J.

LeRoy Matle, 245 Franklin Ave., Grantwood, N. J.

Jos. Kirtoik, 72 Grand Ave., Staten Island, N. Y.; August O. Yakie, Box 17, Port Arthur, Tex.

Miss Beatrice Teachman, 371 Scranton Ave., Lynbrook, L. I.

Clyde E. Reed, R. F. D. 1, Norfolk, Neb.; Wm. Van Alstyne, 14 Phillip St., Greenfield, Mass.

Walter R. Armstrong, Sr., 606 S. Genois St., New Orleans.

Jos. Curry, Box 64, Franklin, Tex.; Herbert W. Abdill, 249 Mt. Vernon Ave., Orange, N. J.

Martin M. Kiger, Washington, Kan.; Chas. Linebeck, Johnson City, Tenn.

Harvey Glazier, 91 W. Main St., Cobleskill, N. Y.

John E. Hagstrom, 3011 Euclid Ave., Berwyn, Ill.

Robert S. Skull, 136 E. Queen St., Chambersburg, Pa.

Howard Ault, Arcanum, O.; Graham Starr Jones, 222 So. Penn. Webb City, Mo.

Harry Strassberg, 108 E. 110th St., N. Y. C.; Percy Christopher, 215 N. Morris St., Stoughton, Wis.

Ernest Rollins, 211 S. Huntington St., Medina, Ohio.

Harry W. Murphy, 610 Sharon Ave., Zanesville, Ohio.

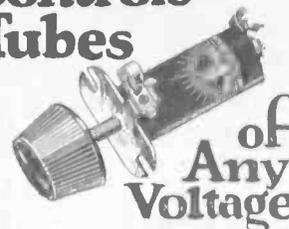
Oscar H. Colwell, 48 Wendell St., Providence, R. I.

Geo. P. Fee, 32 Pleasant St., Nantucket, Mass.

Dealers Fear Abuse

DEALERS, interviewed concerning the invention of John Hays Hammond, Jr., that makes privacy possible in broadcasting, expressed fear that the device would be used by the A. T. & T., patent owners, to collect a fee from set owners, as it would be possible to restrict reception only to those who pay.

Controls Tubes



of Any Voltage

YOU can't expect to hear stations 2,000 miles off with a boiler factory working in your own tubes. FIL-KO-STATS tune your tubes, enable you to control regeneration and stop re-radiation. They also heat your filaments to proper temperature SUDDENLY which keeps them from crystallizing and saves tubes. Write for Booklet—"Improved Radio Reception Through Scientific Tube Tuning."

FIL-KO-STAT

The Scientifically Correct Radio Rheostat

Price \$2.00 at All Dealers

Made and Guaranteed by
DX Instrument Co., Dept. RW 531, Harrisburg, Pa.



ULTRADYNE

the Improved Super-Heterodyne.
Send 50c for book giving complete details of drilling, assembling, wiring and tuning 6 and 8 tube ULTRADYNE Receivers.

50c

Phenix Radio Corp., 5-9 Beekman St., N. Y. C.

SUPERDYNE KIT

Complete Parts (highest quality), including Bakelite Panel, with Plans and Blue Print, \$28.90

COILS LIST PRICE (\$6.50) OUR PRICE \$5.25

SEND FOR OUR SPECIAL PRICES ON OTHER SUPERDYNE PARTS. Remittance Must Include Postage. No O. O. D.

Marvel Radio Specialty Co.
132 NASSAU STREET NEW YORK CITY



SUNBEAM'S VACATION SPECIALS

DIRECT FROM WHOLESALER TO YOU

A Full Line of Fresh Supplies for your Summer Needs—Crystals, Tubes, Batteries, Parts, Spring Aerials, Phones, etc. All tested and guaranteed.

14 Years in the Same Spot IDEAL VACATION PORTABLE SETS
THE AIR-KING, 3 Circuit Tuner... \$16.50 THE FAMOUS JOURNAL 1 Knob Set... \$12.50
THE WONDERFUL AMBASSADOR, 1 Tube \$16.50

All three assembled and wired in handsome Cabinets. Each of these sets has brought in WOC from New York City.

"ANYTHING IN RADIO" Satisfaction and Quality Absolutely Guaranteed EVERYTHING ELECTRICAL
SUNBEAM ELECTRIC CO., 71 Third Avenue, New York City
"Write to Third Avenue and Save a Third"

S-U-P-E-R-D-Y-N-E

The Circuit Featured by RADIO WORLD

The most satisfactory radio circuit yet developed. Any locality, all conditions. Equal in all respects to five tube Neutrodyne, but more simple to tune and no critical adjustments.

Local and Long Distance With or Without Ground
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Perfect Reproduction

Our engineers have developed the coils for this circuit to its highest perfection. Coils for Superdyne (complete with diagram)..... \$6.50

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Sleeper

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Licensed under the Grimes Inverse Duplex Inventions. No aerial—no ground. Just dial to turn.

Perfect selectivity—no interference.

The Monotrol will bring in more stations with better reception than any other set you have ever heard.

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NO Tuning, Coils, Adjustments, Batteries, Tubes. You just listen where you are.

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Only three times size of set. Great for Actors, Traveling Men, Agents, etc., etc.
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Instantaneous in Operation—Positive Contact



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Just push removable part, attached to wire, on the base stud and it snaps into place making a positive electrical connection.

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A positive electrical connection in ten seconds, without solder or tools, that cannot pull out or shake loose and is as easy to remove as it is to assemble to the cable.

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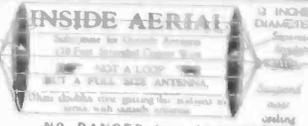
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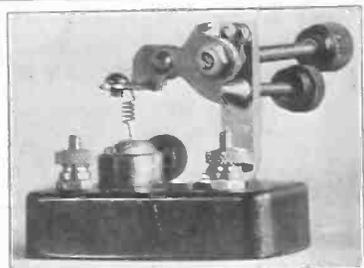
New Patents

Radio Receiving Apparatus

No. 1,479,475: Patented January 1, 1924. Patentee: O. Minton, Greenwich, Conn.

This invention relates to radio receiving apparatus, and aims to provide a simple and compact apparatus by eliminating the aerial or loop which is customarily a part of such apparatus.

In accordance with the invention the loop or aerial of an ordinary radio receiving apparatus is replaced by a grounded circuit containing a variable inductance, and most desirably also a variable condenser. The inductance may be provided by two inductance coils positioned for mutual inductance and connected in series. The two ends of the coils which are connected together are grounded.



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It will be worth while for every reflex set or crystal set to give the Ambrose Vernier Crystal Detector a trial. This detector has stood all tests from the most prominent radio men in the country. We guarantee each instrument to be 100% perfect in its results. If your dealers do not handle the Ambrose Vernier Crystal Detector, send \$2.00 money order to us, and we will forward one to you, at our expense. Metropolitan Distributor, American Wireless Corp., No. 54 West 23rd St., New York City. All other territories open. Write for particulars.

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New Corporations

Radio Telephone and Telegraph Corp., N. Y. C., radio apparatus, 100 shares common stock, no par value; A. Werner, H. E. and A. Diamond. (Attorney, W. Klein, 152 West 42d St.)

Audak Co., N. Y. C., sound reproducing apparatus, \$10,000; J. C. and B. Parvey, A. Lader. (Attorneys, Anderson, Phillips & Moss, 565 5th Ave.)

Electrical Engineering & Equipment Corp., White Plains, N. Y., \$10,000; G. P. Harris, I. Hampson, A. G. Gethner. (Attorneys, Morgan & Bagg, Mt. Vernon.)

World Wireless Corp., N. Y. C., radio equipment, 150 shares common stock, no par value; H. A. Strong, F. Demovitch, F. Raab. (Attorneys, Joseph & Demov, 1431 Broadway.)

Darwal Corp., N. Y. C., motors, radios; W. J. Curtis, Jr., B. Agnon, L. Newman. (Attorney, Haar, 299 Broadway.)

Giant Radio Battery Co., N. Y. C., \$10,000; J. Comerchu, J. J. Toledo. (Attorney, S. Harnick, 305 Broadway.)

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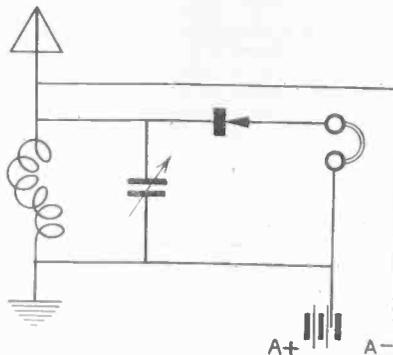
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WHAT'S WRONG HERE?

THE wiring in the accompanying diagram is wrong. If you find what you think is the error, write to Wrong Dia-



Wrong Diagram No. 4

gram Editor, RADIO WORLD, 1493 Broadway, New York City. The names and addresses of those sending in the right answer will be published. The following sent in the correct answer to Wrong Diagram No. 1, published May 17:

Wm. Palek, 3527 East 138th Street, Cleveland, O.
I. D. Burrough (dealer), 144 East State Street, Trenton, N. J.

Uriel Clapp, R 2, Hinsdale, Ill.
H. S. Miller, 1335 15th St., Washington, D. C.
John Kuzma, 275 Schoonmaker Avenue, Monessen, Pa.

H. A. Cassini, 2392B St. Hubert Street, Montreal, Can.

Jennings Carter, Mentone, Ind.
Dan Bunner, Mentone, Ind.
C. C. Breusmaid, Box 572, Green River, Wyo.
Vincent Schaffer, 9 East Front Street, Williamsport, Pa.

Rollin Jenney, 414 Jackson Avenue, Endicott, N. Y.

W. N. Hubbard, 354 Wall Street, Meriden, Conn.
W. H. Couch, Jr., 108 Shelton Avenue, New Haven, Conn.

F. A. Sirovatka, 2218 South Austin Boulevard, Cicero, Ill.

Arthur Rand, Oakland, Me.
Pat Ewing, Box 184, Hardin, Mont.

Fred Gretch, 1311 East Condit Street, Decatur, Ill.

J. E. Flitcraft, 225 East Second Street, Peru, Ind.
Oscar Jonas, 142 Gallup Street, Mt. Clemens, Mich.

M. L. Lujan, Hotel Belmont, San Diego, Cal.
F. L. Sanders, M.D., Rialto Building, Kansas City, Mo.

Reflex Fletcher, Rouses Point, N. Y.
Rev. W. P. Haskin, pastor, M. E. Church, Amesville, O.

H. Clark, Box 262, Litchfield, Conn.
R. S. Shull, 136 East Queen Street, Chambersburg, Pa.

Alphy Blais, 25 D'Aiguillon Street, Quebec, Can.
R. L. Weil, 472 West End Avenue, N. Y. C.

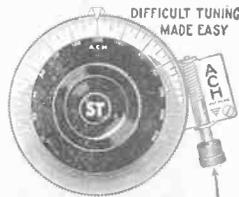
Richard Aubin, 25 Jefferson Street, Schenectady, N. Y.

Kenneth Bailey, 2039 Penna. Avenue, Warren, Pa.

E. W. Simmons, 141 Central Avenue, San Francisco.

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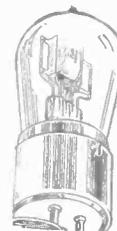
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University (Concluded from page 10) dyne. The Magnavox loud speaker will work fine with this outfit. * * * **RADIO WORLD'S BROADCAST UNIVERSITY** Questions and Answers Broadcast Every Wednesday Evening from WLS, the Sears-Roebuck Station, Chicago.

I have a five-tube Neutrodyne that refuses to operate correctly. The set works clearly on four tubes on local stations, but I get distance faintly. The four tubes I use are the first radio-frequency, detector and two amplifying tubes. When I turn on the first tube there is a tremendous howling. Can you tell what my trouble is, and how to remedy it?—H. G. Wappler, 7423 Kenwood Ave., Chicago. Your set is not properly adjusted. The first radio-frequency tube must be neutralized so that the howling will be eliminated. To do this, remove the first radio-frequency tube and place a small piece of paper under one of the filament prongs. Replace the tube, and turn all the filaments on. The first tube will not light. Now tune in on any station which happens to be on the air. The signal may be very faint. Vary the small neutralizing condenser of the first tube until the signals are weakest, or die out entirely. Fix the condenser in this position so that it will not change, by dropping some sealing wax on it. Now, to make sure that the second tube is all right take the paper from under the filament prong of the first tube, place it in a similar position under one filament prong of the second tube, and neutralize that in the same manner as the first. If the work is done correctly the howl will have disappeared. * * *

I bought a 5-tube Neutrodyne, fully equipped. We first used an antennae, attached to our lighting system, and got fairly good distance. Lately signals began falling off and although local stations come in with good volume, distant stations cannot be brought in. What is our trouble?—Arthur Holdsworth, 831 South Harvey Ave., Oak Park, Ill.

There are several things which must be taken into consideration. If you have bought a cheap set at a bargain, not using the best of parts, the outfit loses efficiency as the elements work their changes in the insulation of the various parts used in the set. The sockets, condensers, coils, etc., are subjected to changes in humidity and temperature, and naturally if the insulation used in the various parts is not of the best, they will lose their insulating powers. What could be done is to disconnect the set and place it in a fairly hot, dry place, as near a stove, so that all moisture will be driven out. Of course, do not put it into an oven, but rather place it nearby, so that there will be no fear of melting any of the rubber. After this treatment, the set will probably work as before, if not better. * * *

HOW ONE FAN SOLVED THE PROBLEM At first I could not get by station WLS, Chicago, on account of its power, clarity and nearness to my receiving set. But now I can listen to it at will, then if I do not care to listen I can tune it out, despite its proximity to my home. I put up a new aerial, running east and west, while my first aerial runs north and south. Then I wired a small crystal set to my large crystal set, which gives me the selectivity that I need. Now WLS can go ahead and do all the broadcasting it wants and as far as I am concerned it will make no difference. As the station no doubt receives interference kicks from fans who are near it, I am not among them, now that a remedy has been found.—F. T. Travers, 3116 Lexington St., Chicago.

SUPERDYNE THE WONDER CIRCUIT Tremendous Volume! D. X. Without an Aerial Original Globe Coils With Complete Wiring Instructions and Diagram. \$6.25 Postpaid \$6.25 **Globe Radio Equipment Co.** 217 WEST 125th STREET NEW YORK

P O W E R From Your Lamp Socket Send for particulars. **SIBBENEL RADIO CO.** 29 Mount Eden Ave., New York, N. Y.

For \$2.50 and your old burnt out tube we will send you a new quarter ampere detector or amplifier tube. Send \$2.50 and your old tube to **MARTIN HARDWARE COMPANY** 105 No. Main St. Hamilton, Missouri POSTAGE EXTRA

RADIO CRYSTALS MOUNTED, UNMOUNTED, BULK Packed under your own label if desired. Dealers and Jobbers—Write us for lowest prices on Quality Crystals. **MELODIAN CO. OF AMERICA** INDEPENDENCE, MISSOURI

PERPETUAL RADIO FUSE! \$100.00 Reward If you can blow your bulbs, with **Stanley's Perpetual Radio Fuse** in your receiving set. A NEW INVENTION. Practical and perfect. No second cost, it lasts a lifetime. No changing of set, installed in two minutes. Orders coming in by the thousand. Your order received and delivered in rotation. Factory working night and day. THE PRICE IS \$2.50 and it lasts forever. **THE STANLEY RADIO COMPANY** 2717 Lorain Avenue Cleveland, Ohio

COSMOPOLITAN PHUSIFORMER The Missing Link in Radio 15-17 WEST 18th ST. NEW YORK

HOWARD No. 1004 Multi Terminal Receiver Plug in a instantaneous connection for as many as six pairs of standard receiver plugs... \$2.00 Patd. Aug. 28, 1923

HOWARD No. 1001 6 1/2 Ohm Rheostat... \$1.10 25 Ohm Rheostat... \$1.10 40 Ohm Rheostat... \$1.10 Patd. 870,042

HOWARD No. 1002 6 1/2 Ohm Ml-ometer Rheostat... \$1.50 25 Ohm Ml-ometer Rheostat... \$1.50 40 Ohm Ml-ometer Rheostat... \$1.50 Patd. July 10, 1928 **JOBBERS WRITE FOR DISCOUNTS** Send 2c. Stamp for wiring diagram and folder to Dept. J.

HOWARD Radio Co. Inc. 4248 NORTH WESTERN AVENUE

HOOK-UPS FOR EVERYBODY—Henley's 222 Radio Circuit Designs, \$1.00, postpaid. The Columbia Print, 1490 Broadway, N. Y. C.

SUPER RADIOS

"The Slagle Beats Them All"

You'll hear all of our customers talking like that, without exception, because we guarantee you a finer radio for less money than you can buy anywhere. Our sets have topped them all in popularity for dependability and long range—receiving over thrilling distances—clearness of tone to the elimination of foreign noises. Write today for our FREE catalogue and prices.

HIGH CLASS DEALERS WANTED

SLAGLE RADIO COMPANY
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AMPERITE

The "SELF-ADJUSTING" Rheostat

PERFECT for every CIRCUIT

Simplifies wiring
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Write for
Free Hook-ups

The "Goode" Two-o-One

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Le Ton d'argent

Guaranteed



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MAIL
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Postpaid

QUARTER AMPERE AMPLIFIER-DETECTOR RADIO TUBE

GUARANTEED SATISFACTORY

All "GOODE" Tubes Sold Direct to the Consumer—No Dealer Profits

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Detector-Amplifier..... \$2.39
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Detector-Amplifiers..... \$6.42
(All postage prepaid)

The "Goode" Two-o-One A Tube amplifies or detects. It is a quarter ampere, six volts, standard base silvered tube.

Send express or postal money order or New York draft to—

The Goode Tube Corporation
Incorporated

EVANSVILLE INDIANA

NEWS NUGGETS

HEARING his wife's voice over the radio by the amplification of waves picked up through his own body, was the experience of the Rev. Claude E. Morris, pastor of the Prospect Park Baptist Church, Brooklyn, N. Y. Mrs. Irva Marshall Morris, his wife, was one of those singing for the Federation of Churches from WEAFL. Mr. Morris was at the home of Eric H. Palmer, 305 Avenue C, Brooklyn. "Just body induction," commented Mr. Palmer.

* * *

FIDDLERS of years ago will be heard every Saturday evening from WLS, Sears-Roebuck Agricultural Broadcasting Station, Chicago, for three months, to determine which one is the best.

New Synthetic Crystal Put on Market

THE Syn-Tec, a crystal of excellent design, with standard base and large magnetic surface sensitive at every spot, is a product manufactured and distributed solely by the Appliance Radio Co., 1441 Broadway, New York City. It is sold with a money-back guarantee and in addition to its other qualities the manufacturers claim that it will stand very high voltage and give wonderful results for reflex as well as straight crystal detection.

Coming Events

MAY 26-31—National Outdoor Sports Exposition, Grand Central Palace, New York City. One feature will be a radio division.

JUNE 10—Opening of Republican National convention, Cleveland. Speeches nominating candidates for President and Vice-President will be broadcast.

JUNE 24—Opening of Democratic National convention, Madison Square Garden, N. Y. C. Speakers nominating candidates for President and Vice-President will be broadcast.

AUG. 16-21—Radio Exposition, San Francisco, conducted by Pacific Radio Trade Assn.

SEPT. 22-28—First Annual International Radio Show, Madison Square Garden, New York City.

OCT. 2-11—Exposition, Grand Central Palace, New York City, under auspices of American Radio Exposition Co.

LITERATURE WANTED

THE names and addresses published below are those of readers of RADIO WORLD who desire manufacturers of and dealers in radio sets, parts and supplies, to send literature on their products.]

F. B. Cordova, Apartado 1140, Tampico, Mexico, is a dealer desiring catalogues and price lists from jobbers and manufacturers of radio parts, "with best prices for dealers in foreign countries."



DUTCH RADIO VALVE

D-201-A

Honest!
25 Amp. 5-6 Volts

Detector-Amplifier
Guaranteed

Rigidity tested by expert
engineers.

Sole Distributors for U. S.
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723 Rose Bldg., Cleveland, Ohio
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IMPROVE YOUR 5 TUBE "NEUT"

If it isn't just right and you used GOOD parts, you can use same panel, same layout and, in a few hours' easy work, turn it into a Kladag Coast-to-Coast On Loud Speaker Receiver that takes its hat off to nothing. Scores have done this.

We'll send you complete, simple instructions, hook-up, extra part and snaf real gold sheathed bus wire, prepaid, for \$5.00. Descriptive sheet only—10c. Radio list for stamp. We accept U. S. stamps same as cash.

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Standard of the Radio World, 130 separate units fully guaranteed. Write for Catalog.

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Make Your Own Radio Receiving Set

ENJOY the concerts, baseball scores, market reports latest news, etc., as sent out by large broadcasting stations. This NEW copyright book, "EFFICIENT RADIO SETS," shows how to make the most perfect, complete, inexpensive, easily and simply constructed sets ever attempted, with complete drawings and plans for receiving Wireless Broadcastings. Postpaid 25c.

R. W. COLLINS CO., 197 Fulton St., Brooklyn, N. Y.

AT LAST THE MOST PERFECT ONE-TUBE REFLEX

CLARITY — VOLUME — DISTANCE

Inductance or Capacity Tuning or Both

NO Howling, Hissing, Squealing, Distortion, Rheostat, Potentiometer, Storage Battery (optional), Taps, Switches or dead-end losses.

Complete hook-up and all information

PRICE ONE DOLLAR

Checks and stamps not accepted.
Curiosity seekers please remit one dollar for complete information.

MYERS RADIO SHOP

P. O. Box 694 Oakland, California

ARROW BATTERY SLASHES Prices

Prices Smashed!
Quality Not Sacrificed
TO CONSUMERS

Here is real battery quality, guaranteed to you, at prices that will astound the entire battery-buying public. Order direct from factory. Put the Dealer's Profit in your own pocket. You actually save much more than half, and so that you can be convinced of true quality and performance, we give a

Written Two-Year Guarantee

Here is your protection! Noneed to take a chance. Our battery is right—and the price is the lowest ever made. Convince yourself. Read the prices!

Special 2-Volt Radio Storage Battery, \$3.75
Special 4-Volt Radio Storage Battery, 6.00
6-Volt, 60 Amp. Radio Storage Battery, 7.00
6-Volt, 80 Amp. Radio Storage Battery, 8.00
6-Volt, 100 Amp. Radio Storage Battery, 9.50
6-Volt, 120 Amp. Radio Storage Battery, 11.50
6-Volt, 140 Amp. Radio Storage Battery, 13.00

We ask for no deposit. Simply send name and address and style wanted. Battery will be shipped the day we receive your order Express C. O. D., subject to your examination on arrival. Our guarantee accompanies each battery. We allow 5% discount for cash in full with order. You cannot lose! Act quick. Send your order today—NOW.

Arrow Battery Co.

1421 South Wabash Ave.

Dept. 8 Chicago, Ill.



Dates Announced for Listening in for Eiffel Tower

HARTFORD, CONN.

RADIO amateurs of the United States and Canada are listening for test signals from the Eiffel Tower in Paris through special request to the American Radio Relay League from General Ferrie, director of telegraphs for the French government.

A special short wave radio transmitter has been installed at the tower for this purpose and reports of reception by amateurs of North America under varying weather conditions are to be sent to the A. R. R. L. and forwarded to the French government.

A definite schedule of transmission has just been received by amateur radio from FL, the Eiffel Tower station. F. H. Schnell, traffic manager of the A. R. R. L., has advised all amateurs to listen for the special test signals the rest of this month.

The object of these tests is somewhat similar to that of the Bureau of Standards when it undertook to collect data on fading with the assistance of amateur stations. The Department of Telegraphs of the French government, however, is particularly desirous of securing information on the strength and range of short wave radio transmitting equipment.

The Eiffel Tower will transmit on waves of from 25 to 115 meters as follows:

Wave Length	Dates (all May)	Time (E. S. T.)
25 meters30	10:20 to 10:35 p. m.
25 meters28, 31	10:00 to 10:10 a. m.
		4:00 to 4:15 p. m.
		4:20 to 4:35 p. m.

Electron Vacuum Tubes will be used in ocean cable transmission, said Major-General George O. Squier, retired, telling in Washington of a new invention. The radio principle will be used on the sub-audible band of frequencies, he said. He was chief signal officer of the Army.

CAUGHT

with worn-out dry cell "B" batteries? Purchase the economy way. Build a rechargeable "Hawley" knockdown "B" storage battery consisting of large-size Edison elements, special molded extra heavy flat bottom glass vials, (not ordinary thin test tubes, special nickel wire, 200 hole hard rubber perforated separators, rubber stoppers, chemical electrolyte; in fact, everything for the actual making of battery, including, free, an 8-page illustrated folder, showing the simple putting together, making of a charger, and charging. 4 volt, \$6.25; 90 volt, \$9.90; 100 volt, \$10.50; 150 volt, \$14.25; 200 volt, \$17.00. Unconditional guar-

antee or money refunded. 30-day trial. Pioneer dealer. B. W. Smith, 31 Washington Ave., Danbury, Conn.

PRE-AMPLIFIER

A Radio Frequency Amplifier of **TREMENDOUS POWER** Gets distance, volume, less static. Attachable to any receiving set. Price complete with tube, \$25.00.

Send for Circular

S. A. TWITCHELL

1930 Western Avenue Minneapolis, Minn.



Actual Size

MONTREAL—CALIFORNIA

(More than 2500 miles)

ON ONE MYERS TUBE

Remarkable radio reception is an everyday result with MYERS TUBES. Mr. W. E. Gerrard, 73 Pine Avenue, St. Lambert, Montreal, Canada, with a set designed and constructed by himself, and using only one MYERS TUBE, hears KDZB, Bakersfield, California.

Get distance with clarity. Myers are the only tubes correctly designed for radio without bunched leads. Two types—for dry or storage battery. Insist on MYERS at your dealer's—otherwise send purchase price and be supplied post paid. 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



WORLD BATTERY Saves You 50%

Famous Guaranteed Quality and Service—Backed by Years of Successful Manufacture and Thousands of Satisfied Users.

Prices That Save and Satisfy

Auto Batteries		Radio Batteries	
6-Volt 11 Plate, \$12.25	6-Volt 60 Amps, \$ 8.50	6-Volt 80 Amps, 10.00	
8-Volt 13 Plate, 14.25	6-Volt 100 Amps, 12.50	6-Volt 120 Amps, 14.50	
12-Volt 7 Plate, 17.00	6-Volt 140 Amps, 16.00		

Special 2-Volt Storage Battery for W.D.11 and 12 tubes. Will run 200 hours on one charge. Rechargeable. \$5.00. Special 4-Volt Storage Battery for U.V.199 tubes. Same features as 2 Volt. \$6.00. Shipment express C.O.D. subject to examination. 5% Discount for cash in full with order.

2-Yr. Guarantee Bond in Writing With Each World Storage Battery proves satisfactory World performance. Mail this ad with your name and address and we will ship battery day order in receipt; and give you a 45-Volt "B" Battery and Hydrometer Free with each battery purchase. Write today.

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45 V. B. BATTERY and HYDROMETER

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Genuine R. C. A. Tubes (all types).....	\$3.98

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Magnavox, M-1	\$21.95
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60 Amp.	\$9.95
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Bradloystat	1.49
Pacont79
Klosner59
Federal No. 1879

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Bell69
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Pacont, 19940
Federal79
General Radio89
Workrite, 19960

PLUGS	
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Weston89
Red R.89
Pilot50

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Amsco, 2"	\$.30
Amsco, 3"50
Amsco, 4"79
De Forest, 3"35
De Forest, 4"40
Pathe, 2"30
Pathe, 3"40
Pathe, 4"55
Federal, 3"50
Federal, 4"	1.15

TRANSFORMERS AUDIO	
Star, 3 to 1	\$2.60
Star, 6 to 1	2.95
U. V. 712	5.20
Modern, 4 to 1	3.95
Modern, 10 to 1	4.40
Aemo	3.25
All American	3.35
Federal No. 65	4.30
Thordarson, 3/2 to 1 ..	2.80
Thordarson, 6 to 1 ..	3.20
Jefferson No. 41	3.20
Amertran	4.55
Erla, 3 to 1	3.75
Erla, 6 to 1	3.95
Federal No. 226	3.25

TRANSFORMERS RADIO	
Coto Coll	\$.69
Aemo R-2, 3, 4	3.25
Aemo 30K Super-Heterodyne	4.20
Atwater Kent	3.80
Tri Coil A	1.90
Erla Reflex	3.25
Rasia RT6	3.00
Rasia CR	3.25
Owl65
UV 1714	3.60
RR 1716	6.75

TRANSFORMERS PUSH PULL	
Camo Duplex	\$9.90
All American	9.50
Modern	10.00

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Jewel, 0-50 Volts	\$2.25
Jewel, 0-12-120 Volts ..	9.85
Sterling, 0-50 Volts ..	1.75
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Sterling, 0-10 Amp.	\$3.50
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Sterling, 0-8 Volts	3.50
Sterling, 0-100 Volts ..	4.00
German Meters, 0-50 Volts	1.25

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AK 5 Tube	\$78.50
Grebe CR 12	112.00
Grebe CR 9	65.00
Grebe CR 14	77.00
Colin B. Kennedy	68.00
Fada, 160	78.00
Fada B Tube	65.00
CROSLY XJ	40.00

Allow us to quote on any parts or standard sets.

How Photos Are Transmitted

(Concluded from page 11)

fluctuations of current emanating from the photo-electric cell are then imposed on the direct current, which flows through the telephone wires. This current is several billion times as powerful as that caused directly by the light, but the strong current is made to reproduce every variation in intensity.

This new current, with all its fluctuations, was carried over the long-distance telephone wires from Cleveland to Pittsburgh, where it was automatically "stepped up" by vacuum tubes

until the loss of current in transmission was made good. This process was repeated at Philadelphia and again at New York. This fluctuating current was introduced here into the receiving apparatus. It was made to flow through a very thin metal wall, which formed one side of the slot through which the point of light passed, as it copied the Cleveland picture on the film in the receiving apparatus.

This metal wall is placed in a strong magnetic field. The field was so orientated as to cause the metal wall to move outward as the current passed through it. The stronger the current the further it moved outward and the wider it opened the slot of light.

The constant vibration of this bit of metal caused constant variation in the amount of light that could pass through the slot. The lines on the revolving film were broadened and narrowed accordingly and the result was the pictures that were received recently. The changes in the light that passed through the film in Cleveland fluttered the light in the receiving instrument in New York, registering themselves finally in the width of the lines on the photograph produced here.

In order to have the light and shade fall at exactly the right points on each line, it was necessary that the film cylinder in Cleveland and film cylinder here should move at exactly the same rate of speed. This was accomplished by a device similar to the synchronizer used in the printer-telegraph. Current flowing between Cleveland and New York and acting in conjunction with tuning forks keep moving at equal speed the picture itself and the film on which it is being copied.

Adapting this method to radio is the next step. Static and interfering wave-lengths are problems to be solved. The process can be grafted on radio as easily as upon the long-distance telephone.

Experiments which the telephone company has been making for more than a year with England has shown that static and other conditions would make radio telephoning possible nearly every hour of the day in Winter and for several hours of the day in Summer. The main obstacles in the way of radio telephoning across the Atlantic at present are the lack of international agreements to connect American with foreign services and the lack of other international agreements which would give a monopoly of a certain band of wave-lengths for transatlantic radio telephoning.

The new telephone pictures are made on an entirely different principle from the Belin process by which pictures have been sent across the trans-oceanic cables. Light has no part in the Belin process, in which the photograph is used as a relief map.

\$15 Set Gets 2,000 Miles

The Essex Radio Special, the receiving set with a conscience, gets you more distant stations clearer and sweeter than sets costing ten times its price.

\$15 SET COMPLETE WITH CABINET, WITHOUT TUBE OR BATTERIES

\$20 SET COMPLETE WITH CABINET, TUBE AND BATTERIES

Essex Radio Service

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Detailed information on request.

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Send for our new CATALOGUE No. "B" (just off the press).

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"That Special Size" for Your Phonograph, Portable or "Super"

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RADIO TUBES

Bring or mail in your Blown-out Tubes (any kind) and get a genuine Refilled WD-12, UV-199, UV-200 or UV-201A.

ON TEN DAYS' TRIAL \$2.25

If tube blows out within Ten Days we replace it Free. Money refunded if you are not convinced. It is equal or better than any tube on the Market—Without old Tube \$2.40.

Mail Orders C. O. D.
Associated Radio Tube Manufacturers
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Solid Mahogany



RADIO CABINETS

7x19x7. \$4.00 POST-PAID on receipt of
7x24x7. \$5.00 price. All standard sizes in
7x26x7. \$5.50 stock. Write for prices.

EBCO RADIO CABINET CO.
(Manufacturers) New York City
410 West 27th St.

Record Your Radio Stations On RADEX Log Cards to Match Your Set



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by S. T. Aston & Son

Telephone
FRANKLIN 2155

100 Cards, Mahogany Finish or Oak Cabinet, and Index Dividers, Complete, \$3.00. A Useful Accessory to Any Set. Give Name of Your Set or Sketch of Dial Arrangement. Sent Postpaid on Receipt of Cash or Money Order.

S. T. ASTON & SON
114 WORTH STREET NEW YORK CITY

DON'T BLAME IT ALL ON STATIC



A run down "B" Battery plays more havoc with efficient reception than the grandest static you ever heard.

22½ V. Variable	Large \$1.80	Medium \$1.60	Small \$1.00
45 V. Variable	3.60	2.75

S & H "B" BATTERIES

are not two days old when they're sent to you. And they are built right. Made of finest materials to give extra service. After you've used them if you don't feel they're the best buy, send them back and your money will be refunded.

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

S & H Battery Supply Co.
41 Nevins Street Brooklyn, N. Y.

HOOK-UPS FOR EVERYBODY—Henley's 222 Radio Circuit Design. Mailed for \$1.00, postpaid. The Columbia Print, 1493 Broadway, N. Y. C.

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS

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BEST 2-TUBE HOOKUP ever developed. Equals 5 tubes! Latest invention! Not yet on market! Hookup and instructions, \$1.00 cash. B. Radio Products, 123 B Street, S. E., Washington, D. C.

FULL LIST OF BROADCASTING STATIONS in Radio World dated May 17th, 1924, mailed on receipt of 15c or start your subscription with that number. RADIO WORLD, 1493 BROADWAY, NEW YORK CITY.

FOR SALE—Improved 4-circuit tuner. Five tubes, 2,500-mile Loud Speaker range, \$125. Three-tube Loud Speaker set, \$60. Three-tube Westinghouse R C set, \$90. One-tube Auto-Plex, \$25. UV-201A, UV-201, UV-200 (repaired) tubes, \$3.00. C. N. FISHER, Williamstown, Mass.

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TUBES REPAIRED in Middle West, reasonably. W. F. ELECTRIC CO., Box 1490, Indianapolis, Ind.

MONEY IN RADIO! Super-sensitive crystals made for almost nothing. Sell for 50c to \$1.00. Directions, \$1.00 cash. Guaranteed. B RADIO PRODUCTS, 123 B Street, S. E., Washington, D. C.

MAGNAVOX R3—Latest nationally advertised reproducer; electrical modulator. List, \$35.00. Introductory, \$25.00. The factory sealed carton is your guarantee. Radio Central, Dept. W, Abilene, Kansas.

FOR SALE—3-tube radio set, solid mahogany cabinet; tunes easily, excellent workmanship; reception loud and clear. 800 miles on horn. Wonderful opportunity to obtain a good set at very low price. Phone 1363 New Rochelle for par-

ticulars, or address E. Pratt, 21 Grant St., New Rochelle, N. Y.

PATENTS PROCURED—Send sketch or model today for examination, prompt report and advice. No charge for preliminary advice. Write for free Booklet and blank form on which to disclose your idea. Highest references. Promptness assured. Clarence A. O'Brien, Registered Patent Lawyer, 201-C Security Bank Building, Directly across the street from Patent Office, Washington, D. C.

PATENTS—SEND DRAWING OR MODEL FOR EXAMINATION AND OPINION. Booklet free. WATSON E. COLEMAN, Patent Lawyer, 644 G Street, Washington, D. C.

GRAM'S RADIO MAP IN TWO COLORS—Best map on the market, 35c. The Columbia Print, 1493 Broadway, N. Y. C.



TOWER'S
Scientific
WEIGHS ONLY 8 OZ
Perfect Tone Mates

\$2.95
Plus
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OUR \$200,000.00 COMPANY STANDS SQUARELY BACK OF EVERY HEADSET

WORLD'S GREATEST HEADSET VALUE

Formerly \$6.00, now \$2.95, with Notable Improvements
Longer Cord (full 5 feet), Stronger Magnets, Higher Resistance, Increase of Sensitivity, Perfect Tone Mates
EVERY SET TESTED BY LICENSED RADIO OPERATORS

Send no money - Order on a Post-Card

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The Bestone V-60 Super-Toned Receiver



*Incorporates
All the Essential Qualities
for Ideal Radio Reception*

Tone	Distance	Volume
Economy	Sensitivity	Selectivity
Ruggedness	Two Controls	Simple Tuning
No Regeneration	No Distortion	No Reradiation
No Howls or Squeals	No Body Capacity	Only Four Tubes

Parts May Be Had by the Experimenter

Write for Particulars

HENRY HYMAN & COMPANY, Inc.

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Manufacturers

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CHICAGO

"The 'Bestone' Receiver under tests conducted by the Radio Editor has proven superior in tonal quality to any set, commercial or home-made, tested under similar conditions. It was noteworthy that volume was not sacrificed for clarity as is commonly the case."

New York Telegram-Mail.

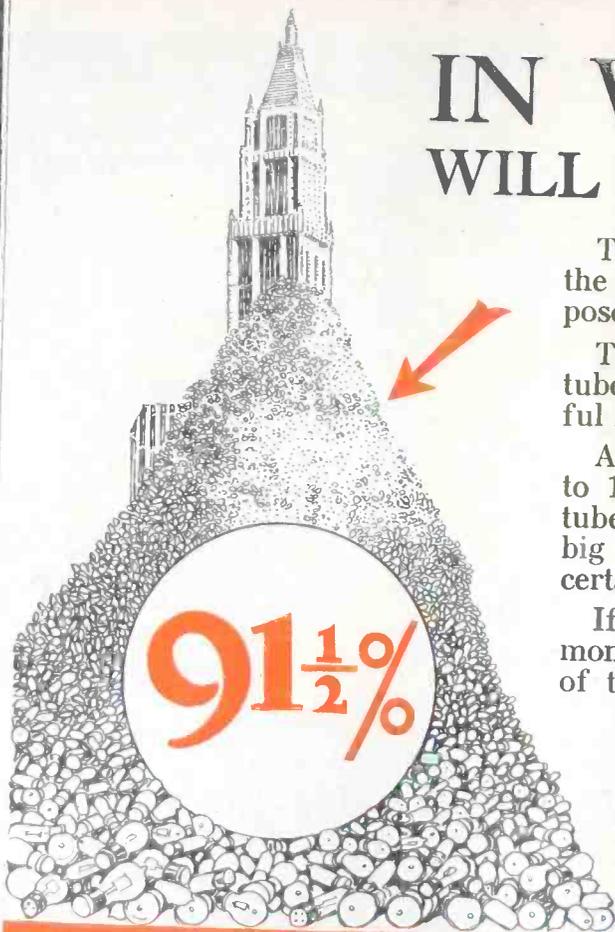
"It is easy to tune and it certainly does work—has the selectivity which is essential where the ether is congested as it is here."

New York Herald-Tribune.

"The 'BESTONE' Circuit combines the essentials of the ideal radio Receiver in an economical, practical combination. The outstanding features are its quietness of operation without distortion, its extreme sensitivity, simplicity of operation, faithful reproduction and distance-getting qualities."

New York World.

IN WHICH PILE WILL YOUR TUBES GO?

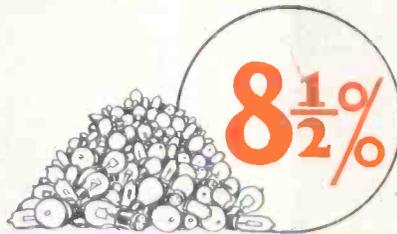


This big one (91½%) almost covers the Woolworth Building and is composed of tubes needlessly blown out.

The little pile (8½%) is made up of tubes which have served their full useful life.

As you read this the chances are 10 to 1 against you that some of your tubes have already been buried in the big pile. Don't continue this almost certain loss.

If you can afford to throw your money away, DON'T READ the rest of this advertisement.



For a Trifling Sum You Can Absolutely Protect Your
Tubes Against Blow Outs

RADECO SAFETY FUSES

Are Every Day Saving Thousands of Dollars
in Tubes.

Tests recently held at the Massachusetts Institute of Technology prove that the Radeco Safety Fuse blows out in

Less than 1/10th of 1/1000th of a Second.

This means that the fuse always blows in time to save the tube.

Beware of fuses which are fitted in the "B" Battery leads. These can only protect against "B" Battery current, and by reducing the voltage may seriously affect the efficiency of your set.

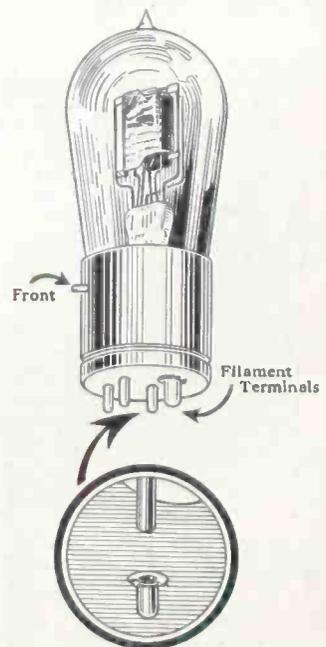
Radeco Safety Fuses are slipped on the filament prong of the tube—protect the tube against all causes of blow outs, and are guaranteed not to interfere in any way with the operation of your set.

Equip your tubes now with Radeco Safety Fuses and save yourself worry, trouble and expense.

Price, 50 cts. each, by mail post paid

or from your dealer. One fuse to a tube is sufficient. In ordering, state type of tube used.

"A fuse which doesn't go on the filament terminal doesn't protect the set."



RADIO EQUIPMENT CO.

New England's Oldest Exclusive Radio House

20 STUART STREET

BOSTON, MASS.