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(C. Kadel and Herbert)

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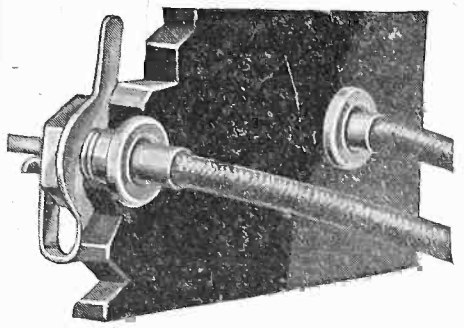

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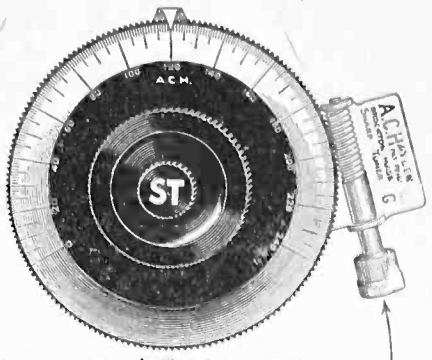

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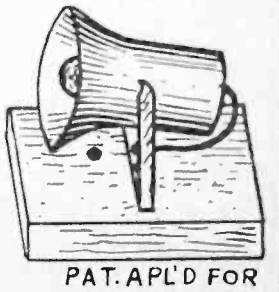

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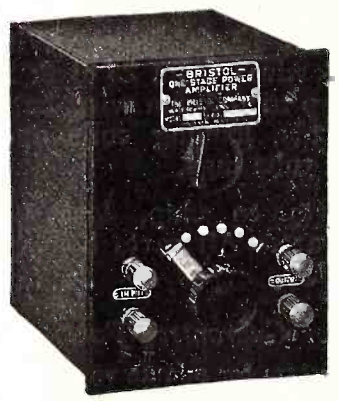

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VOLUME FOUR OF

RADIO WORLD

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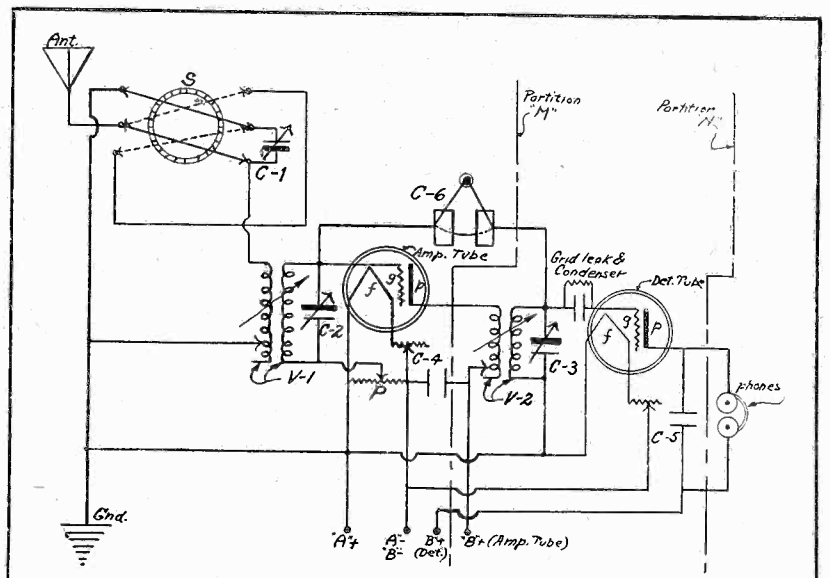
Radio-Frequency Using Variocouplers

By C. White, Consulting Engineer

THE other day in the radio column of a local newspaper I saw an article stating that the future of radio depended to a large extent upon the perfection of amplification, both radio- and audio-frequency. While this is true, still I think that there are other factors that have just as much control as that of successful amplification, and the factors I have in mind are quiet operation and selectivity. All the amplification in the world is of little practical use if you can not tune in and out what you want and that which you do not want; and again, all the selectivity with amplification is of little use if the tone reproduction is false and distortion is introduced by the periodic introduction of extraneous noises. Not so long ago I tried out a set that was simple and quite selective for the type of circuit that was employed, but the howls and groans that would break in now and then plainly showed that that style of circuit and receiver would soon be doomed. The factors that control quiet operation are not always the circuit design, but often the quality that is behind each and every piece of apparatus that is put in the set. Poor and hasty construction has on the other hand spoiled the proper functioning of really good apparatus. Purchasing good apparatus is only half the job; putting it together is the other half; both halves are equal and together they make the whole.



An extremely selective two-tube circuit embodying several novel features, such as using variocouplers for tuned radio-frequency and a neutralizing capacity between the first and second tubes adding materially to the selectivity and quietness of operation.

One of the factors that lends to quiet operation is the use of a short antenna, say only about 20 feet of wire. This is contrary to a previous common belief that a long antenna means greater distance. It may mean greater volume, but it certainly does not mean greater distance. Sets with ordinary circuits, well build, have been able to copy distant stations without either antenna or ground, and do it with a quality that is very pleasing. Although a long aerial picks up more energy, still you must stop to consider that it also gathers in a lot of extraneous radio-frequency energy that is floating around in the ether unwanted. A long aerial in addition makes tuning broad and often difficult, especially when the aerial is swaying in a high wind.

But to use a short aerial something must be done to make up for the loss of energy. Radio-frequency amplification is the solution to that problem. If we amplify the little portion of radio-frequency that is picked up by the short aerial and then detect, it is an actual fact that a lot of extraneonus noise, such as static, is reduced in proportion to the signal desired. On the other hand too much radio-frequency amplification will introduce more noises than a long aerial using only the detector with audio-frequency amplification. In most cases two stages of radio-frequency amplification have been looked upon as a reasonable, efficient limit for this type of amplification. Yet there are a few circumstances in which three stages have been used with very extraordinary results. It is a general rule, however, that two stages is the limit in city districts where trolley cars, electric motors and high-tension lines are relatively nearby. Out in the wilderness where no electrical disturbances are present due to electric motors and cars starting and stopping, four stages of radio-frequency are feasible.

For those who live in or near the large cities, or the moderately small towns with modern electrical equipment, one stage of radio-frequency amplification will often suffice owing to the proximity to broadcasting stations and other transmitting sets. If you are now operating a noisy receiver build this radio-frequency receiver, shorten your aerial, and note the difference, not only in purity of tone but selectivity. You can add any amount of plate voltage that your tubes will take; in fact, the higher the plate voltage within tube limits the better the radio-frequency amplification. If you are going to use audio-frequency amplification as well this fact does not always hold true because with some

(*Concluded on next page*)

Nine Districts Heard by North Pole Radio

PRINCE RUPERT, B. C., Canada.—Amateur radio stations in all nine districts of the United States have been heard by Donald H. Mix, radio operator with the McMillan polar exploration expedition, according to messages received here by Jack Barnsley, member of the American Radio Relay League. This despite the fact that Mix has been unable to communicate both ways with American amateurs recently except on very rare occasions.

As soon as contact had been established with the "Bowdoin's" radio station, Wireless North Pole, Mix advised that he was transmitting from North Latitude 78.30 and Longitude 78.30 "in winter quarters about ten miles north of Etah." Mix continued: "We have a foot of snow here and ice is beginning to form in harbor."

Amateurs were asked to listen every night for press reports in his second message, reading: "To A. R. R. L.: Hearing all districts. Please have gang listen every night for press and list calls heard." He then went ahead with the following, according to Barnsley, which was copied without missing a single letter: "To Joseph Cook, 164 Jackson Blvd., Chicago, Ill.: Tablet found and put up in my cabin today. Express appreciation Central Graduate Association."

This message was signed by the explorer, Donald B. MacMillan. Another was a personal message to Mrs. L. N. Fogg, Freeport, Me.

The first news of the Japanese earthquake disaster was sent to the expedition by Barnsley and acknowledged. Mix stated: "Arrived here August 17. You are the first station I have heard since we came north of Disco Island. Exchanged signals with 1ANA and 7DC. That's all. You can't imagine how glad I am to raise you."

Regeneration

FANS and broadcast listeners have become so used to "finding the station" by the squeak method that they do not think they will hear the stations unless they first hear the squeal of the carrier by making their sets oscillate. Bear in mind that you can hear the station just as plainly by listening in just below the "squeal point" as you can above it and you will not have to turn your rheostat down for each station that you get. After you hear the first faint murmur of a voice, bring your vernier condenser and coupler controls into use, get it as loud as possible—then turn up your detector rheostat a "teeny" bit and listen to him pound in. And this method stops those noisy squeaks and howls in the phones and loud speakers of your nearby neighbors. Tell them about it, get together and all learn how to tune by the "squealless method" and then note the difference.

(*Concluded from preceding page*)

audio-frequency transformers very low plate voltage must be used to keep down distortion and excessive tube noise. Although the diagram herewith illustrates the receiver as consisting of two tubes, one a radio amplifier and the other the detector, yet the ordinary audio-frequency amplifier can be easily attached and successfully operated. It is advised, however, that a separate "B" battery be used on the audio-frequency amplifier, and if UV199 tubes are employed a separate "A" battery is not only better from the pure scientific standpoint but far more economical since small flashlight cells can be used to make up each separate "A" battery.

In assembling take the greatest care to well solder all joints, mount the tube sockets on sponge rubber and connect up to the socket terminals with flexible stranded wire in order to allow the full extent of the mechanical jar absorption by the sponge rubber base support. The entire back surface of the panel and the partition walls of the cabinet must be shielded with copper foil which is electrically connected to the ground terminal of the receiver. The partition walls are the walls that separate the detector from the radio-amplifier and the detector from the audio-frequency amplifier, if one is used. Of course, if only two tubes are employed, the partition wall "N" easily can be omitted from the construction.

A series-parallel switch S allows you to choose either a series or a parallel connection between the seven-plate condenser C-1 and the primary (stator) of the variocoupler V-1. Across the secondary (rotor) another seven-plate condenser C-2 is shunted. It will be noted that the primary of V-1 can be operated untuned if so desired by placing S in the parallel position and setting the condenser C-1 for zero capacity (that is, when the plates are not in mesh). In cases of rather severe interference C-1 can be tuned in to help select the proper station by adjusting the taps on the primary of V-1 and the condenser. Under certain circumstances better selectivity is obtained by tuning the Ant.-Gnd. circuit with C-1 in series with the primary coil of V-1. The condenser C-3 is the same type as C-1 and C-2; likewise, V-1 is similar to V-2.

To operate the set successfully V-2 and its condenser C-3 must be tuned to the same wave length as V-1 and its condensers, C-1 and C-2. The condenser C-4 is a 1 mfd. paper insulated telephone size condenser, while C-5 is .0025 mica bypass condenser for the phones. The condenser C-6 is something new, or a new application of an old theory. It is a co-called three electrode condenser. It has two sets of stationary plates insulated from each other and an isolated sector-shaped movable plate. It forms a method of controlling extremely minute values of capacity. If you find it difficult to procure such a condenser two small three-plate condensers can be placed in series with each other and substituted for the three-electrode condenser as illustrated. But, if you do use the two small condensers, be sure and connect the rotors together electrically and the respective stators, or stationary plates, to the grids. Then again, you can substitute a "neutrodon" if either of the previous two methods are not satisfactory.

The potentiometer P has a resistance of 300 ohms or more and together with C-6 the stability of the circuit can be easily maintained at all times by either one or the other, or both. There is nothing really hard about the circuit and anyone who is capable of reading the standard radio symbols will experience little or no difficulty in assembling the set if he follows all the tips given.

In connecting up the condensers C-1, C-2 and C-3 be sure to see that they are connected as shown on the schematic diagram. The heavier line on the schematic symbol for the condenser indicates the fixed plates of the condenser. Do not forget to purchase rheostats that are of the correct resistance to go with the vacuum tubes you employ. This is a very important fact because ample control of the filament current is quite necessary in a receiver of this type. Do not attempt to use the same "B" battery voltage on both detector and amplifier tubes. You will be either robbing one or forcing the other.

The Radio-Controlled Watch

Automatically Corrects Itself Twice Daily by Radio

THE radio controlled watch, without attention on the part of the wearer, automatically corrects itself twice daily on the radio time signal waves broadcast from the United States Naval Observatory, Washington, D. C.

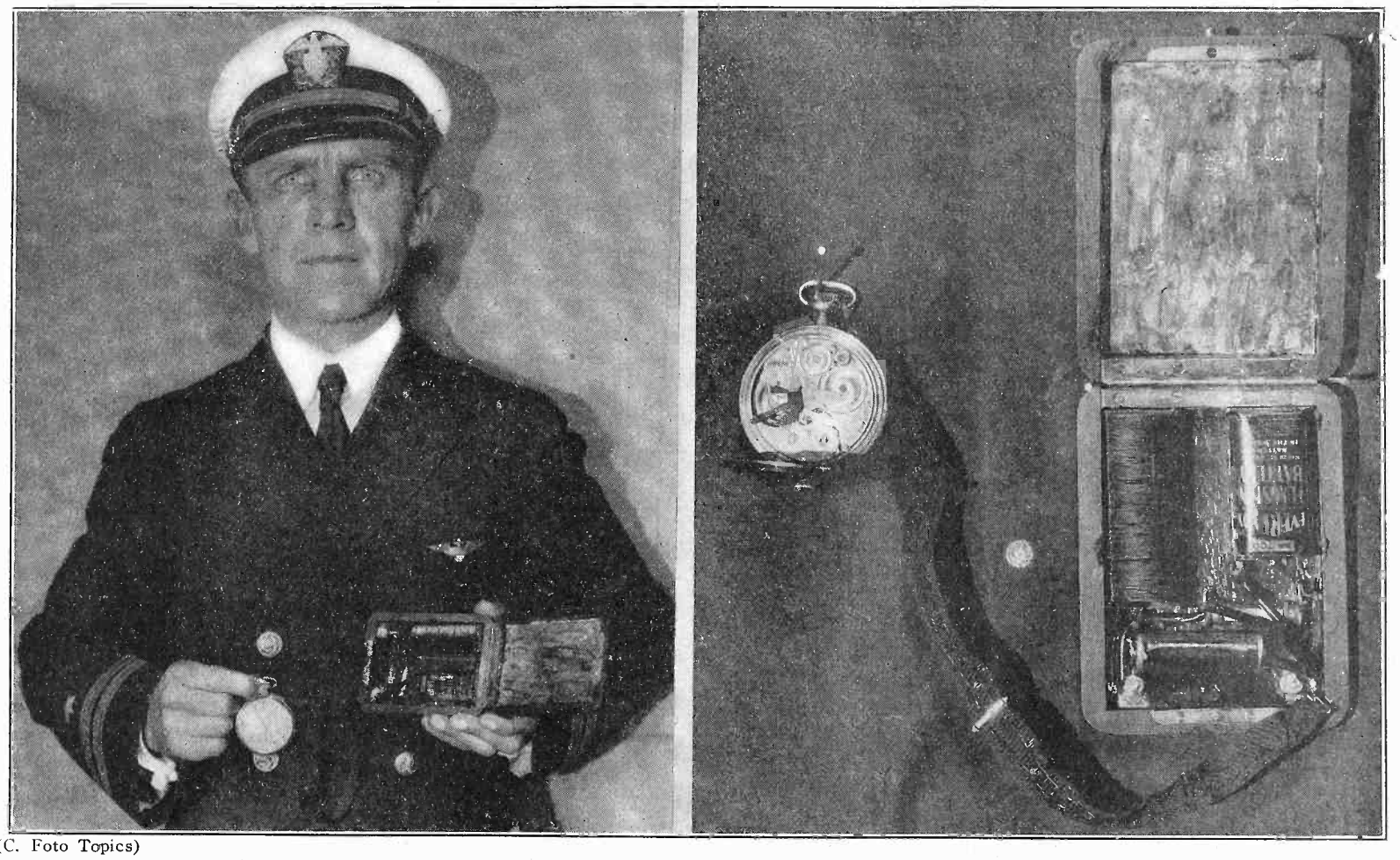
The watch itself is a current model of American manufacture and with the exception of an additional projection for "plugging-in" the set is similar in appearance to any ordinary timepiece. A pair of fine wires concealed in the watch chain carry the radio impulses from the receiving set to the watch.

In the usual type of coherer it is necessary to "break down" the contact made by the filings within the tube in order to open a circuit after it has been closed by radio impulse. This is usually accomplished by some mechanical device such as a buzzer. However, by the amalgamation of certain silver salts and mercury the inventor has developed a type of coherer that is "self-restoring"; in other words, the coherer automatically opens the circuit in which it is connected at the expiration of each wave impulse.

The time signals with which most of us are familiar are sent beginning at 11.55 a. m., Standard Time, in an intermittent series of beats or dashes with breaks to indicate the 29th and 59th seconds of each minute and a long break of ten seconds before the final dash indicating 12.00 noon.

The sum of the dashes or impulses broadcast during this period is 270. The watch contains a finely made escapement operated by an armature connected with the relay. The escapement wheel contains 270 teeth, one tooth of which is released by the escapement on each impulse or beat received. On the 270th, or noon signal, the escapement wheel will have completed one revolution, at the completion of which the mechanism for setting the hands is released and regardless of whether the watch be fast or slow the hands promptly click to the correct time as received on the time signal waves.

Immediately after the hands of the watch have been corrected the circuit between the watch and the pocket set is automatically opened in order to prevent other impulses on the same wave length from disturbing the action within the watch until it is time to receive the night signals sent at 9.55 p. m. to 10.00 p. m., Standard Time, when the circuit is again automatically closed ready to receive signals.



(C. Foto Topics)

Lieut. John W. Iseman and his radio-controlled watch and the miniature receiving set which automatically corrects it twice daily.

The radio controlled watch is a horological achievement rather than a radio innovation inasmuch as the radio apparatus used is with certain refinements similar to any set used for model control.

The set consists primarily of a fixed coil sharply tuned to a predetermined wave length, a fixed detector of an improved type and a condenser. A small flashlight battery incorporated in the set is used to supply the current for the sensitive relay contained in the watch. Interposed in the circuit between the battery and the relay, a new type of coherer is used to open and close this circuit on the radio impulses.

The escapement and relay is made of non-magnetic material carefully insulated from the watch movement, thus eliminating the possibility of residual magnetism and its effect upon the time-keeping qualities of the watch.

Lieutenant John W. Iseman, of the Naval Air Service, perfected this novel watch with the main idea of correcting chronometers on board ship. Its use makes possible the obtaining of accurate time in any weather at any time of year.

An Interesting Multi-Range Circuit

By J. E. Anderson, M. A.

MANY of the radio addicts who have learned to read the di-da-da-di's that frequently punctuate an evening's entertainment have had their curiosity whetted. They want to know what lies beyond the limits of the dial. They are ready to explore the unknown regions of the radio spectrum, but usually they have not the means. They want to push into the ultra-dial region and listen to the chatter of amateurs, but they find their tuning coil is too large and has too much distributed capacity. They want to push into the infra-dial region and eavesdrop on the business of ships and commercial stations, but they find that their coils and condensers are too small to tune in on any of the longer waves. They feel the need of a universal set, or at least one with which they can tune to waves from 100 to 1,000 or 2,000 meters. Those who roll their own coils can easily fill their need. One of the ways of doing it is described below.

The circuit which is the subject of this article is not entirely new, but it has so many advantages that it is quite worthy of a conspicuous place before the radio public. It is multiplex in three respects: in selectivity, in volume, and in wave length range. Several degrees of selectivity may be obtained with it, although the coupling between the primary and the secondary is usually fixed. In consequence of this, the volume may be changed independently of the two stages of audio-frequency amplification. And by virtue of the tapped inductance coils and the arrangement of the switch, the tuning range of the set may be extended in both directions from the ordinary broadcasting portion of the radio spectrum.

Now look at the diagram. When the dial switch is on stop No. 1 the circuit is an ordinary single-circuit tuner, characterized by loud output and low selectivity. The frequency range is now mainly determined by the antenna inductance L_1. The effective capacity in the circuit is rather definitely fixed by the self-capacity of the antenna. The tuning condenser C_1 reduces this capacity considerably, and hence it is necessary to use a rather large coil. Ninety turns on a 3.5″ tube is recommended.

When the dial switch is on stop No. 2 the circuit is of the parallel-tuned antenna type; that is, the secondary tuning condenser C_2 is connected in parallel with the antenna inductance coil L_1. This connection gives good selectivity and fair volume of output, and it also makes possible tuning in on the longest wave lengths. The secondary tuning condenser is effectively connected in parallel with the self-capacity of the antenna as well as with the primary inductance coil. The two capacities therefore add together to form a large condenser. This, taken in connection with the large primary coil, makes it possible to reach the long wave lengths. When this connection is used the primary condenser C_1 should either be left at its maximum capacity setting or else be short-circuited; otherwise it will considerably cut down the upper limit of wave lengths that may be attained.

When the dial switch is on steps No. 3, No. 4 and No. 5, the circuit is an ordinary double-circuit tuner, characterized by fair volume and high selectivity. The secondary inductance coil L_2 is made sufficiently large to bring in wave lengths up to about 1,000 meters and taps are brought out so that the lower wave lengths may also be reached. This coil may consist of 60 turns of wire on a tube 3.5″ in diameter, tapped at the 30th, 45th, and 60th turns.

Regeneration is effected in this circuit by means of the feed-back condenser C_5, which is connected between the plate and the primary circuit. The full line shows the connection which is to be preferred in most cases, but the dotted line shows an optional way. Condenser C_4 is the usual by-pass across the telephones, or the primary of the audio-frequency transformer, and the "B" battery. It may be omitted if desired as the feed-back condenser serves the purpose, and if used it should not be greater than .0005 mfd., for a larger value might prevent sufficient regeneration.

The capacity of the antenna condenser C_1 should be .001 mfd., which is given by a 43-plate variable air condenser; C_2 should be the same size and type of condenser, but should be capable of vernier adjustment; C_3 is an ordinary grid blocking condenser and may have any value from .0001 to .00025 mfd.; C_5 should be a variable air condenser not smaller than .0005 mfd., that is, a 23-plate condenser.

The coils L_1 and L_2 may be a variocoupler, provided that the secondary is properly tapped and that both windings have a sufficient number of turns. However, it is neither usual nor desirable to tap the rotor coil of a variocoupler, because it necessitates the use of several flexible leads. Quite satisfactory results may be obtained if the two coils are wound on the same tube and the coupling between them fixed. In making this coupler proceed as follows: First obtain a cardboard or composition tube 3.5″ in diameter and about 6.5″ long. Then start winding about ¼″ from one end, put on 30 turns and bring out a tap, then put on 15 more turns and bring out another tap, and so on until 90 turns have been put on the tube. Now skip a distance of about ¾″ and, winding in the same direction, put on another section of 30 turns and tap, then two sections of 15 turns between taps. This gives a coil of 150 turns, separated into two main sections of 60 and 90 turns. Between these two sections, that is, between the two central 30 turn sections, bring out a tap and connect this to the ground terminal in wiring up the circuit.

There will be two inductance switches needed to properly connect this set—one single arm switch and five points for the primary coil, and one double arm switch and 10 points for the secondary.

In the diagram is shown a potentiometer across the "A" battery terminal. This is not absolutely necessary but is desirable if a UV200 tube is used as a detector. If not used, connect the grid return lead to the positive side of the "A" battery instead of to the sliding contact of the potentiometer. The grid leak resistance may have any value from 1 to 5 megohms.

Requests are certain to be made for diagrams showing how one or two stages of audio-frequency amplification may be added to the detector. This anticipates their queries and shows how. Double circuit jacks, J_1 and J_2, are provided to enable the operator to listen in on either the detector or the first stage of audio amplification; a single circuit jack J_3 is used for the final listening post. The first audio-frequency transformer may have a transformation ratio of one to five, the second A. F. T., one to three.

In this diagram separate terminal posts are shown for the detector and amplifier. This is in case it is desired to use tubes of different filament characteristics necessitating separate batteries. If all the tubes require the same filament voltage, minus A_2 may be connected to minus A_1 and plus A_2 to plus A_1, thus elim-

inating two binding posts and one "A" battery. Similarly if all the tubes require the same plate potential, minus B_2 may be connected to minus B_1 (already done if plus A_1 and plus A_2 are connected) and plus B_2 and plus B_1. If the amplifier tubes require a higher potential than the detector, the extra battery should be connected between terminal posts plus B_2 and plus B_1 (not minus B_2), with the negative of the new battery to plus B_1.

For UV199 tubes the filament voltage should be 4.5 with a 30 ohm rheostat; for WD11 and 12 the filament voltage should be 1.5 and the rheostat six ohms; for UV201 and 201A the voltage should be six and the rheostat six ohms.

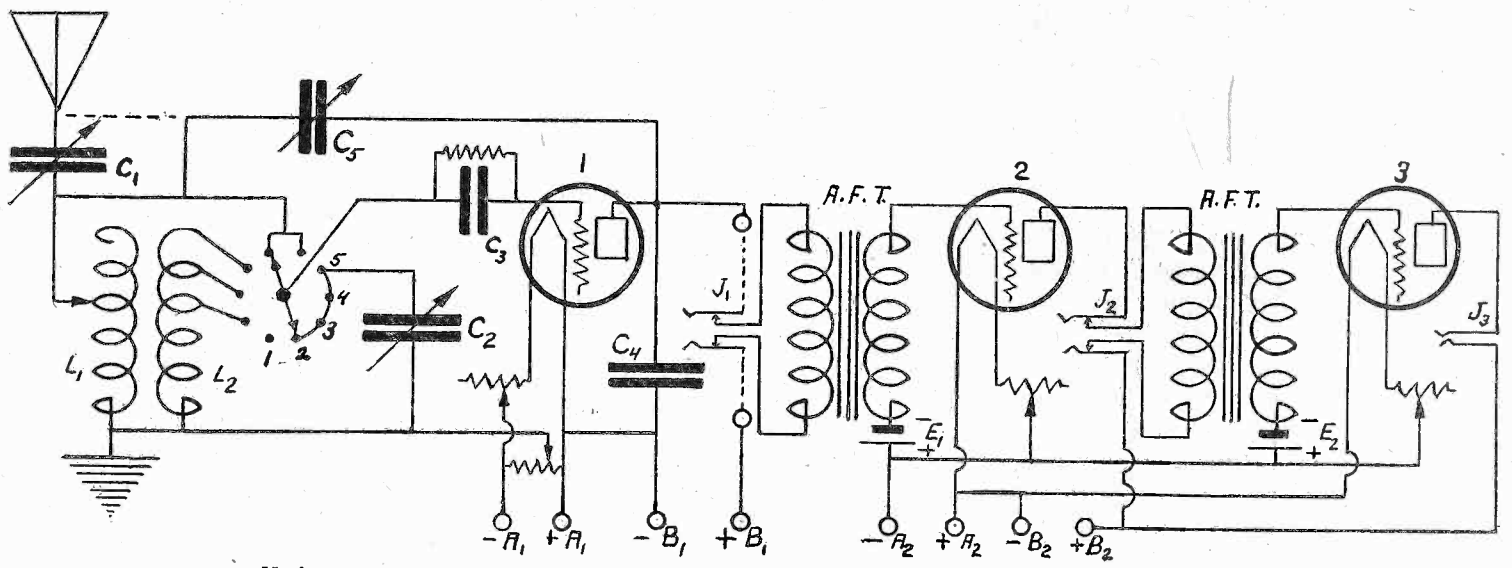
The plate potential on the detector should be 22.5 volts if a UV200 is used and about 40 for the other tubes. The plate potential on the amplifier tubes may be any voltage from 40 to 60. The grid biasing batteries E_1 and E_2 depend on the tube and the plate potential. For 60 volts on the plate for UV201A and many other tubes it should be about 3 volts; for 40 volts, 1.5 or less.

A good combination for this circuit is to use a WD11 for a detector and two UV201A for amplifiers, with separate "A" batteries, 40 volts on the plate of the detector, and 60 on the amplifiers. In line with this suggestion is the following summary of parts:

C_1, 43-plate variable; C_2, 43-plate variable, vernier; C_3, fixed value of .00025; C_4, fixed value .0005 (optional); C_5, variable 23-plate; grid leak, 2 megohms; a tube 3.5″ diameter and 6.5″ long; wire, sufficient to wind 150 turns on tube, No. 22 double silk or cotton covered; two switch arms, one double and one single, with 15 points; one WD11 tube with socket; two UV201A with sockets; 3 six ohm rheostats; two audio transformers; two double circuit jacks and one single; four small grid dry cells; 9 large filament heating dry cells; one potentiometer (optional), 400 ohms; one plate battery of 60 volts with a tap at about 40; 9 binding posts (minus B_2 being omitted). The two "A" plusses are connected together to furnish a return for the plate current in the amplifier tubes. Besides the above parts a panel and a cabinet of the desired dimensions will be required.

In wiring up this circuit all leads should be made as short as possible, especially in the two-tuned circuits, and shields should be placed between the operator and the two condensers C_2 and C_5. The rotary plates of C_2 should be connected to the ground terminal. In operating the set the greatest number of turns that will give satisfaction should be used on both tuning coils in order to reduce as much as possible the effect of dead end turns.

Another important feature of this circuit will be pointed out before closing. When the dial switch is on step No. 1 and the circuit is a single-circuit tuner, the secondary tuned circuit may be converted into a wave trap by the simple means of connecting a "jumper" from the upper side of condenser C_2 to one of the taps on coil L_2. A suitable "jumper" may be made by soldering two small connection lugs to the ends of a flexible, insulated wire about 3″ in length. The holes in these lugs will slip over the projections of the switch points back of the panel and the lugs may be fastened in the usual manner. Thus a very selective wave trap is available when it is needed the most. A "jumper" similar to the above may also be made to short-circuit the condenser C_1 when this is needed for tuning in on the longer waves. This makes it a very flexible and selective tuner and receiver.



Hook-up for an interesting multi-range circuit, which is flexible and is really two sets in one.

Radio Will Always Keep American Communication Open

By William H. Easton

THE complete break that occurred in the communication with Tokio and Yokohama after the earthquake would hardly be possible in the United States. Here we have developed an unparalleled system of radio stations, broadcasting and amateur, and even were nine-tenths of New York City to be destroyed, it is almost certain that at least a few of these stations would survive. But supposing that more of them did or that they lacked power for operation, there would still be left innumerable receivers suitable for use as transmitters with ranges up to fifty miles or more. With telephone transmitters connected properly into the circuits of these receivers and with sufficient power for several days' operation in the receivers' batteries, news from every section of the city would be flowing out with the air, caught up by listeners just outside the devastated area, and then transmitted in every direction.

Something of the usefulness of radio has been shown in certain local catastrophes that have already occurred in this country; in the event of a widespread disaster, its inestimable value would be quickly demonstrated.

Standardizing Radio Nomenclature

By Carl H. Butman

RADIO terminology has expanded and become so complicated along with the rapid development of radio apparatus and practice, that very soon the nomenclature of this worldwide service will have to be standardized. Such steps have already been taken in another growing art and industry—aeronautics.

As early as 1920 the Institute of Radio Engineers began clarifying and systematizing the terms used in radio communication and for designating the instruments and apparatus. Two years later the first published report was issued by the Institute. Since then no revision has been announced, although the body has a standing nomenclature committee, on which the government is represented.

The first step by any individual governmental department toward the elimination of obsolete terms and the adoption of a standard nomenclature for radio apparatus has just been taken by the Bureau of Engineering of the Navy Department. Orders issued to the entire naval personnel define the terminology to be used in making requisitions and in correspondence pertaining to radio instruments. The matter of terminology is of interest not only to the navy and the radio industry, but to all users of radio apparatus as well, in order that amateurs and others may always be assured of securing the exact instrument desired.

Among the terms which are declared obsolete by the navy are the commonly accepted names for batteries "A," "B" and "C." In lieu of the term "A battery," the Navy Department will hereafter require the more definite expression, "filament battery." Similarly, the term "plate battery" is to be substituted for "B battery," and "grid battery" for "C battery."

The term "vacuum tube" is proper, and all such names as "audion," "pliotron," "radiotron," etc., are incorrect, the navy claims. Also, the term "receiver" has no place in radio terminology with reference to head phones, the expression "telephone headset" being declared standard for navy use. A receiver, it is explained, is a complete receiving circuit.

There is no such thing as a "spark tube transmitter," according to navy officials, the proper term for a vacuum tube transmitter in which high voltage A. C. is used being "A. C. tube transmitter." The designation "flag top aerial" is superseded by "antenna," the term "aerial" being declared obsolete for all purposes. "Antenna ammeter" is the authorized term for what has been commonly known as a "radiation ammeter," and "antenna resistance" is given as the correct definition of what has been popularly called "radiation resistance."

All telegraph keys manually operated are "hand keys," but the small key used for signaling circuits or for controlling relays is hereafter to be known in the navy as the "Morse key." The old direction finder is now known officially as the "radio compass," and no longer as "radio goniometer."

The navy orders also clarify the terminology heretofore used in connection with radio and audio amplification. The proper term for radio amplifying apparatus being "radio frequency amplifier."

It is expected that the orders of the Navy Department, which are the first efforts made by the government to arrive at a standard terminology of radio apparatus, will be reflected in the radio industry, where the more popular but less definite terms have been largely used. It is probable that the matter of standard nomenclature will be brought before the interdepartmental Radio Communication Board by the Navy Department. The standardization of radio terms by the government will make it obligatory upon the industry to follow such nomenclature in bidding for government contracts, resulting in the gradual adoption of such terminology generally. Recently efforts were made toward the standardization of apparatus; and the next move will be to simplify the terminology of the standard sets, apparatus and parts, it is believed.

Buy Carefully!

WHEN you want a timepiece you can rely upon you do not go to a second-hand dealer in watches and get a re-built watch. Then why go to a radio dealer who cannot give you what you want, especially tubes, in new and original cartons, with all the seals intact? If you patronize such dealers you may expect just one thing—to get stuck with bootleg tubes, rebuilt tubes, or partially used tubes, and apparatus that is inferior in quality or absolutely no good, or returned apparatus that has been bought up from manufacturers' sales and which is shopworn and probably damaged, but shined up to look like new. Insist on the standard trade-marks and unbroken seals. You do not have to buy in any particular shop, so do not be persuaded into taking material that looks faulty or from cartons that have been opened.

WNP Again Reports

A MESSAGE from Donald H. Mix, of Bristol, Conn., with the MacMillan expedition on the "Bowdoin" to the Arctic as wireless operator, has been received by his parents, Mr. and Mrs. Lewis H. Mix. It reported conditions at winter quarters were "fine." The message was dated 12:35 a. m., September 17, and was sent from 78.30 North latitude and 72.30 West longitude, above Etah, Greenland. The "Bowdoin" has received many messages, but seems to have difficulty in getting through the auroral band.

New Broadcasters

FOUR new Class A broadcasting stations were licensed by the Department of Commerce during the past week, and one transferred from Class C to A.

Call	Station	Meters	Kilocycles	Watts
KFJW	LeGrand Radio Co., Towanda, Kan.	226	1330	10
KFFB	Brinkley-Jones Hospital Assn., Milford, Kan.	286	1050	500
KFJV	Warren, T. H., Dexter, Iowa.....	224	1340	10
WTAQ	S. H. Van Gorden & Son, Osseo, Wisc....	226	1330	100
	Transferred C to A			
WNAR	Rhodes, C. C., Butler, Mo.....	231	1300	20

How Radio Aided the Associated Press in Getting News of the Japanese Disaster

THROUGH the courtesy of the executives of The Associated Press, RADIO WORLD publishes below an authentic account of the tremendous part played by radio in enabling that alert news-gathering organization to give to the world the first news of history's greatest disaster—the recent earthquake in Japan. The following is abstracted from advance proof sheets of an article prepared for "The Associated Press Service Bulletin":

At 6:20 a. m. Saturday, September 1, the San Francisco station of the Radio Corporation of America telephoned the San Francisco office of The Associated Press, that it had just received a message from the Japanese wireless station at Iwaki saying there had been an earthquake causing great destruction at Tokio and Yokohama. The quake occurred at noon Saturday, Tokio time, or eleven hours and twenty minutes before the first report of it was received.

In two minutes after receipt of the message, the editor on duty filed a bulletin on all wires. This was the first news American newspapers received of the disaster.

Iwaki is 144 miles northeast of Tokio. It was the only point of contact with the Japanese capital city. The Iwaki station had nothing but a meager report and communication with that station was only intermittent.

Cablegrams were sent immediately to Honolulu, Manila, Shanghai, Peking and Tokio. A radiogram was sent to Correspondent Denny at Tokio as well as a cablegram, although there was little hope of either reaching him. All correspondents in the Orient were instructed to use all available means of getting reports on the earthquake.

Saturday night a somewhat detailed report was received by the AP from Superintendent Yonemura of the Iwaki station via Radio Corporation. He received his information from a newspaper at Sendai, nearby. It said an earthquake had shaken down most of the buildings in both Tokio and Yokohama, killing thousands of persons and that Tokio was burning. Later that night communication was cut off and Tokio again was isolated from the remainder of the world.

What had happened? How could we get it? Those were the problems.

At 7:55 p. m., the Postal Telegraph Company advised us their cable service with Tokio via Guam had been interrupted, but that connections continued by way of Manila and Shanghai. A cablegram was sent to Correspondent Laval at Shanghai asking him to rush all details obtainable.

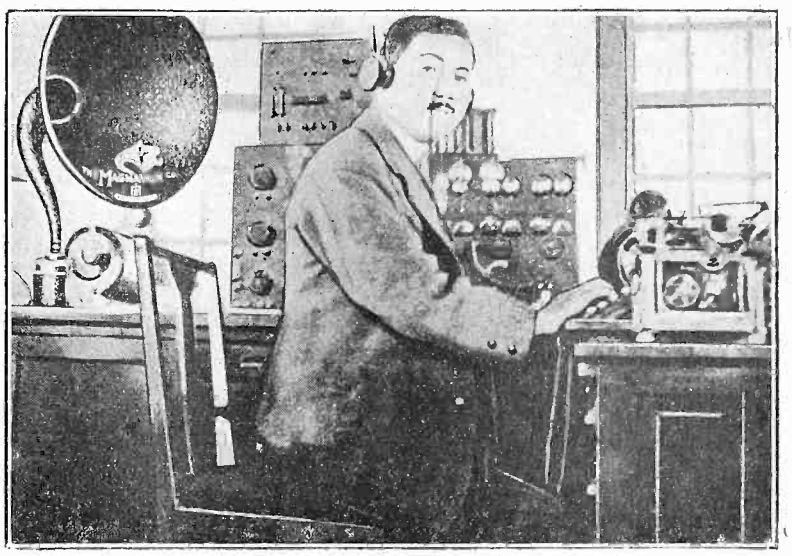
At 11:33 p. m. The Associated Press sent a cablegram to the "Chronicle" at Kobe, asking for all possible information.

At 11:35 p. m. we messaged Laval again, asking him if he could arrange for a substitute and leave for Tokio. This was arranged.

But it would require days for Laval to reach the scene. The burning question was how to get the actual news from Tokio direct. It seemed to be an impossibility. Then Superintendent Cowles got in touch with Superintendent Baxter of the Radio Corporation and asked him to send a note to the superintendent of the Iwaki station, requesting that a courier be sent to Tokio for The Associated Press. A Japanese newspaper man of Sendai was induced to act as courier and attempt to reach the stricken capital of Tokio. He was instructed to try to find Denny, using every means at his command and, failing, to return and report the conditions as he found them. If he found Denny, he was to get his copy and rush it back to the Iwaki station.

The courier went directly to Tokio over roads that were next to impassable. How he made the trip has not been learned, but it is known he got there, for on Wednesday a message was received from Denny together with a story, the first to be received by the outside world direct from Tokio. The message said the courier arrived at great risk to his life. The message and story were proof the courier made the round trip in less than three days.

The use of the Iwaki radio was destined to be brief. The distance from Tokio was great. The way was hard to travel and the government put all official business ahead, making it impossible to get press matter through.



Taki Yonemura, chief engineer of Japan's most powerful radio station, whose knowledge of English enabled him to flash the brief and poignant message acquainting this country with Japan's recent overwhelming disaster. This photograph is reproduced through the courtesy of the New York Times.

An editor in the San Francisco office has an acquaintance named Ito, connected with the Osaka Asahi. A message was sent to Mr. Ito, telling him we had been cut off from Tokio, and asking him to file to the AP every reliable report on the earthquake he could get. Arrangements were made here for him to file by cable via Shanghai. The news on the earthquake for the first three or four days after the disaster came principally from Mr. Ito and his reports were very comprehensive considering the magnitude of the disaster.

By the middle of the week Mr. Denny was able to get some press matter through the Radio Corporation from the Funabashi station, ten miles east of Tokio. By Saturday the connection was regular enough to enable the AP to depend on a Tokio date line, although there was some delay in transmission.

The Navy radio was of considerable assistance as well. Copies of reports from Admiral Anderson, commander of the American Asiatic fleet, to the Navy Department, were given to The Associated Press when they were in the nature of news.

So difficult was it to get a comprehensive story of what had happened in Japan that it was not until Sunday night, more than a week after the earthquake, that a full and complete report of the terrible disaster was obtained from Correspondent Denny.

RADIO PRIMER—For the New Army of Radio Beginners

By Lynn Brooks

REGULATIONS REGARDING INSTALLATIONS—The following are the tentative regulations of the Board of Fire Underwriters regarding radio installations and should prove of value to amateurs planning the installation of radio receivers or transmitters:

THE ANTENNA INSTALLATION—An antenna outside of a building must not cross over or under electric light, telephone or power wires or any circuit of more than 600 volts, or railway trolley or feeder wires. It shall be so placed that either antenna nor the above mentioned electric light or power wires can result in contact due to failure of either.

The antenna shall be constructed and installed in a strong and durable fashion and shall be so located as to prevent accidental contact with light and power wires by sagging or swinging.

Splices and joints in the antenna span, unless made with approved clamps or splicing apparatus, *shall be soldered.*

LEAD-IN WIRES—Lead-in wires shall be of either copper, approved copper clad steel, or other approved material, which cannot corrode excessively.

Lead-in wires on the outside of a building shall not come nearer than 4 inches to electric light or power wires unless separated by a continuous and firmly fixed non-conductor that will maintain permanent separation. The non-conductor shall be in addition to any other insulation.

Lead-in wires shall enter buildings through a non-combustible, non-absorptive insulating bushing.

RULES REGULATING PROTECTIVE DEVICES (LIGHTNING ARRESTERS)—Each antenna shall be provided with an approved protective device properly connected and located as near as practicable to the point where the wire enters the building.

The protective device shall be an approved lightning arrester which will operate at a potential of 500 volts or less.

The use of an antenna grounding switch does not obviate the necessity for the approved protective device required in this section. The antenna grounding switch if installed shall in its closed position form a shunt around the protective device, and must be of approved type (100 amp., 500 volts).

THE GROUND WIRE—The ground wire may be bare or insulated and shall be of copper clad or copper wire, not smaller than No. 14 B. & S. gauge. The ground wire shall run in as straight a line as possible to permanent ground. Gas piping must not be used under any consideration for grounding protective devices, receivers or transmitters. Permissible grounds are the grounded steel frames of buildings, water pipes or other grounded metallic work in the building, or artificial grounds, such as driven pipes, buried plates, etc.

The ground wire shall be protected against mechanical injury, and an approved ground clamp shall be used where the ground is connected to the ground wire of the protective device receiver, or transmitter.

GROUND WIRES FOR RECEIVING SETS—The ground wire for the receivers may be bare or insulated and shall be of the approved gauge, not smaller than the combined area of the wires in the lead-in, and in either copper or copper clad steel.

The ground wire may be inside or outside of the location where the receiver is located. When the wire is run as in full compliance with the rules regulating for the protective ground wire, both the receiver ground and the protective ground may be used as one.

Where it is inside the building, the ground wire shall be securely fastened and not come within 2 inches of any light, telephone or power wire.

These are just a few of the necessary regulations concerning a station and they are in regard to receivers alone. Look over your installation and see whether you have complied with all the regulations.

All these regulations are subject to the local ordinances and rules of the district insurance companies. For that reason, find out what their rules are before getting your set approved, first of all complying with the above conditions and regulations.

RADIOGRAMS

Another series of time signals is being arranged for the benefit of the Australian Government astronomer, to be transmitted twice daily from Honolulu. These signals will last for a period of three months beginning November 1, 1923. It is expected that they will be of assistance in furthering the work of the Pacific Survey.

* * *

Official recognition of the rapid strides made in wireless broadcasting in France is seen in the decision to make Felix Franchette an officer of the Legion of Honor. Dr. Franchette's radio research has made him known as the "radio wizard," and he was one of the first in France to interest himself in this field. To-day one of the foremost advocates of broadcasting, he organized the Society for Wireless Study, now comprising 200,000 radio fans.

* * *

Associated Press correspondence from Vladivostok, Siberia, states that the Daltorg (the Department of Trade in the Far East) has decided to open up the mica mines of Kamchatka, having learned from its agents abroad that there is demand for mica in America and that prices are high. A meeting of mine owners was called and the Daltorg agreed to finance an expedition for the survey of the deposits. Large deposits exist in the peninsula, where the natives use mica for window panes, and while some mines have ben registered they have not been working owing to the low prices prevailing.

"Yaas," drawled young Farmer Hardacres. "I've sort of decided to buy a radio set for the lonely evenin's, 'stead 'o marryin' that Perkins gal on the money I got saved."

"Do tell!" ejaculated his neighbor. "What's the idea?"

"Well, I figgered ye can turn off a radio."—American Legion Weekly.

* * *

Radio is rapidly coming to the forefront in literature, art and the drama. Its universal appeal and flexibility of possibilities make it a handy tool for the skilled craftsman. The humorous paragraphers, especially those of the *American Legion Weekly*, have captured many a check for radio jokes. RADIO WORLD itself has published some radio humor that ranks with the best. Several weeks ago *The Saturday Evening Post* printed a really funny story by Sam Hellman called "Blah Broadcasting." A play now running in New York City with the mysterious title "Zeno" makes use of radio as the crux of the action. A recent issue of *The Literary Digest* was enclosed in a cover design in colors representing two campers in the woods with a portable radio set by the campfire. The caption of the drawing was "A Concert in the Wilderness." The radio novel is yet to appear. In all probability, some publisher is even now preparing its announcement. Station WGY, at Schenectady, N. Y., has been broadcasting radio plays by its own troupe of actors for over a year and its broadcasting director, Martin P. Rice, recently offered a prize of $500 for the best radio drama. Director Smith, of Station WLW, Cincinnati, has been broadcasting playlets, which he calls "radarios," for some time past. Art is yet to claim a real radio masterpiece—but its birth doubtless is imminent.

A Duplex Receiving Tuner

By LeRoy Western

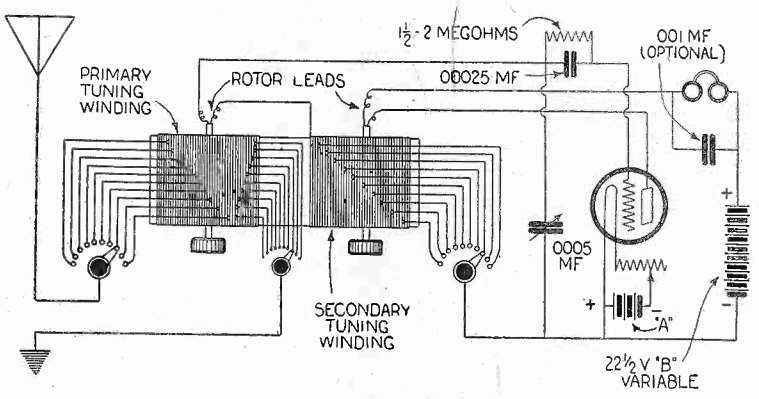
FOR the reception of broadcasting, the ordinary single circuit tuner will usually give the loudest signals, but its non-selectivity is objectionable, especially in congested areas. For this reason the author designed and built the receiving tuner illustrated herewith and with it obtained results far superior to the ordinary single circuit tuner. It gave signals fully as loud as any standard tuner of the type mentioned, but its selectivity was infinitely greater.

As will be seen, the tuner consists of two windings on a single tube and two rotors placed within. The tube itself should be of bakelite or cardboard 4" in diameter and 7½" long. The primary tuning winding should consist of 90 turns of No. 22 S. C. C. wire tapped every nine turns for nine taps and then every turn to the end of the winding. These two sets of taps should be brought out to two switches as illustrated and the two switch arms connected to the antenna and ground. Three-quarters of an inch from this winding, the secondary tuning coil should be started. It consists of 70 turns of No. 22 S. C. C. wire tapped every 10 turns. These two windings should each be split in the middle to allow the rotor shafts to pass through.

The rotors may be wound on the ball forms which may be purchased cheaply on the market, or may be wound on straight pieces of tubing which will rotate within the outside tube. The rotor within the primary winding should be wound with 80 turns of No. 24 S. C. C. wire wound in two sections, leaving space between the sections for the shaft. The other rotor within the secondary coil should be wound with 60 turns of the same size wire split in the same way. In building such instruments as this, the writer has found it very good practice to utilize brass or copper tubing for the rotor shaft. A hole can then be drilled in one side of the center of the tubing and the rotor leads, consisting of flexible wire, brought out through the tubing to the outside of the coil where other connections can be made thereto. This scheme should be used in this case as it will afford a very neat appearing instrument and will give greater satisfaction than any other simple method. Stops should be provided on the shaft so that the rotors cannot turn through more than 180 degrees, as otherwise the flexible leads or pigtails would become twisted and broken.

A single variable condenser is indicated for tuning the primary of this very selective tuner and occasionally another condenser of the same size is found advantageous when shunted across the tickler coil. In any case, in the writer's opinion, this duplex tuner is far superior to the single circuit tuner and fully equal to the standard three-circuit tuner as regards selectivity. Such a tuner can be very readily made by the amateur with very few tools and a pleasant surprise awaits the builder upon its completion, as he will find that it will tune extremely sharp.

In tuning, the following procedure should be approximately followed: The tickler coil should be placed at about zero coupling or very nearly perpendicular to the secondary coil. The secondary condenser should then be placed approximately half way in, and the primary switches varied until a signal is heard. The signal is then brought in louder by means of the secondary switch and condenser, and it may be found



Schematic diagram illustrating the duplex receiving tuner.

necessary to re-tune the primary slightly in order to obtain the very loudest signals. The two rotors should then be rotated until the signals become louder and regeneration takes place; in fact, all the circuits should be balanced until the maximum signal strength is obtained.

The Radio Woman

FRIEND HUSBAND and myself visited a friend of ours one day recently during the broadcast of the big fight, not mainly to hear the fight, but because of the fact that she had a birthday party that we were to attend, with the broadcast of the fight as an added feature. Friend Husband happened to be looking out the court window and saw quite a crowd listening in to the receiver that the superintendent of the building had placed in his rooms, with the loud speaker out the window. Along about the middle of the fight, five policemen entered the court and started in to clear the crowd away, thinking that it was a crap game. Upon being assured that it was not, and that the people were just interested in hearing the returns, the police were invited to take front row seats at the broadcast and so the crowd stood during the remainder of the "battle," with the bluecoats way up in front, affording police protection against any other raids by the well-meaning minions of the law I really enjoyed listening in on it a lot. It was much better than being over in the crowd, amid the jostle and bustle—and then there was the party afterwards. In other words, "a good time was had by all," even the police, downstairs.

* * *

A neighbor of ours who recently put in a nice new set has decided that excitement is not good for his wife. The decision came about this way: During the Dempsey-Firpo fight his wife was gradually getting excited in listening to the preliminaries, and he says that when the announcer proclaimed "Dempsey has just entered the ring wearing a white sweater around his neck," that his wife turned white and started in to clench her hands. But the real excitement did not come until Dempsey was knocked out of the ring. Then she jumped to her feet, pulling the phones out of the plug and actually yelled "Dempsey! Dempsey! Get up—Get up!" People on the street though that she was hurt and rushed in to help her, much to the mortification of her husband. Of course, she was just excited, but who wouldn't be with the American champion of the world out of the ring, and the referee tolling off the fatal seconds?

The Wireless Oracle

By Hirsch M. Kaplan

Station KSD of the St. Louis Post Dispatch, on a wave length of 546 meters came through surprisingly the other evening with the finest vocal and instrumental program that I've heard in a long time.

Would you like a return engagement of your famous radio star or stars? Then let me know. For let me cite as an example the case of the famous violinist Illumento Miserando. This week's performance through Station WJZ is the third time within a couple of months that he has performed over the radio. After each performance I have taken the pleasure to praise him and it seems as if he has taken my written thoughts as though they were those of all who listened in to his recitals. His appreciation of this is shown by his repeated performances.

It sure is a pleasure to hear the classical programs as offered by Station WJY. By the way, WJY, will you ever be on the air again daily?

Dr. Thomas's lecture on "Some Absolute Necessities" through Station WQAO, of the Calvary Baptist Church was a fitting sermon for a Sunday when there is no doubt that those who appreciate such services are listening in.

Radio fans, attention! I suppose that most of you have wondered why Station WIP was not on the air for a period ending October 2. Owing to the fact that this station was undergoing extensive alterations it was decided that it be closed for this short period.

Once we wrote "Roxy" and gently informed him that we never went to the Capitol, because in our opinion the best part of his program could be heard over the radio. A few weeks later, just to prove our assertion, we dropped in on him. Now the sonuvagun is taking us over every Saturday to the tune of a buck seventy.

The Cleveland News through Station WJAX offered a splendid concert program.

We may not receive our regular daily newspapers, but that does not mean anything to us radio fans, for whatever is put in the papers may be heard over the radio. WGY broadcasts condensed news items daily every evening at 7 P. M. Almost every other station is sure to be on the air with its up-to-the-minute sport news. The women folks are entertained every afternoon with either a fashion or a talk on housekeeping. The Times Annalist delivers every Sunday evening at 8 P. M. a talk to the business man on "The Annalist Talk for the Business Man."

There are slogans and slogans, but this we believe takes the apple-strudel—"The Voice from the Rockies Out Where the West Is" being none other than Station KFAF, of Denver, Colo. And speaking of the West! Glancing over a few of the programs of our wild and woolly neighbors, we find a large percentage billed as "of New York City," entertainers who have been broadcast by one or more of our local stations. Yet the Dx bug is forever yelling for a "silent night" so he can go after the thousand-milers.

Good Broadcast Programs

Station, WFAA, Dallas, Texas

October 6. Central Standard Time. 476 meters.

12:30-1:00—Address, Prof. J. Preston Comer, department of modern literature, Southern Methodist University.

8:30-9:30—Leland Johnston, pianist, manager retail sales department, the Baldwin Piano Company, in recital.

11:00-12:00—Paul Ashley's Texas Cowboys' Orchestra.

Sunday, October 7

2:30-3:30 P. M.—Radio Chapel Bible Class, Dr. William M. Anderson, Jr., pastor, First Presbyterian Church, Dallas, teacher. Bible study and song.

4:00-5:00—Grand concert of the Palace Theatre, Don Albert conducting the orchestra; Emil Velazco playing the organ; broadcast from the theatre.

9:30-10:00—Singers from the choir of Central Presbyterian Church, J. Wesley Hubbell, director.

10:00-11:00—Jimmy Allen's Orchestra, Southern Methodist University boys.

Station WOC, Davenport, Ia.

Central Standard Time. 484 meters.
Saturday, October 6

9:00 A. M.—Opening market quotations.
10:55 A. M.—Time signals.
11:00 A. M.—Weather and river forecast.
11:05 A. M.—Market quotations.
12:00 Noon—Chimes concert.
12:15 P. M.—Closing stocks and markets.
3:30 P. M.—Educational program—
Lecture by C. C. Hall.
(Musical numbers to be announced)
5:45 P. M.—Chimes concert.
6:30 P. M.—Sandman's visit.
6:50 P. M.—Baseball scores and weather forecast.
9:00 P. M.—Dance program (1 hour). P. S. C. Orchestra, with V. B. Rochte, baritone soloist.

Popular music released through the National Association of Broadcasters, of which WOC is a member.

Station WLW, Cincinnati

October 8. Central Standard Time. 309 meters.

10:30 A. M.—Weather forecast, business reports.
1:30 P. M.—Business reports.
3:00 P. M.—Grain and stock quotations.
4:00 P. M.—Special music by Jennie Kehrt. Babson reports.
8 P. M.——Piano solo by Adelaide Apfel.
2. Violin solo by Earl Derbis, Adelaide Apfel, accompanist.
3. Choruses of old songs by the Price Hill Four.
4. Piano solo by Adelaide Apfel.
5. Violin solo by Earl Derbes.

Vocal soloist: Norma Reiss, with William Epperhart at the piano.

The Roger Hill Dance Orchestra.

Dance Music from WOR

A FEATURE of the program at Station WOR, Newark, N. J., on Saturday evening, October 6, is to be a selection of dance numbers by Frank Reilly and his Country Club Orchestra, of Staten Island. This organization is rated as one of the "peppiest" now playing in the East and it is confidently expected that numerous special requests will follow the broadcasting of their popular music.

Station KDKA, East Pittsburgh, Pa.

October 6. Eastern Standard Time. 326 meters.

10:00 A. M.—Music. Union Live Stock Market reports.
12:30 P. M.—Music. Victrola and Victor records.
12:50 P. M.—U. S. Bureau of Market reports, furnished by the National Stockman and Farmer.
3:00 P. M.—Concert by the Grand Symphony Orchestra under the direction of David Broudy, from the Million Dollar Grand Theatre, Pittsburgh, Pa.
3:15 P. M.—Baseball scores of games being played today.
Football game, University of Pittsburgh vs. Lafayette College, broadcast direct from Forbes Field, Pittsburgh, Pa.
6:00 P. M.—Baseball scores.
6:15 P. M.—Dinner concert by the Westinghouse Band, under the direction of T. J. Vastine.
7:00 P. M.—Baseball scores.
7:05 P. M.—Dinner concert, continued.
7:30 P. M.—"Bringing the World to America," prepared by "Our World."
7:45 P. M.—"Let's Make Something," conducted by the Dreamtime Lady.
8:00 P. M.—Baseball scores.
8:05 P. M.—Humor from "Judge."
8:15 P. M.—Tribute to George Westinghouse—his 77th anniversary.
8:30 P. M.—Concert by the Westinghouse Band, under the direction of T. J. Vastine.
9:55 P. M.—Arlington time signals. Weather forecast.

Station WRC, Washington, D. C.

October 6. Eastern Standard Time. 469 Meters.

10 A. M.—Foreign Exchange Quotations furnished by the Washington Loan and Trust Co.
3 P. M.—Fashion Developments of the Minute prepared by Harper's Bazar.
3:10 P. M.—Readings by Anna Tillery Renshaw.
3:20 P. M.—Song Recital by Alfred Logan.
3:30 P. M.—Farm Home Reports.
3:40 P. M.—Current Events prepared by The Review of Reviews.
3:50 P. M.—Song Recital by Lucy Dickenson.
4 P. M.—The Magazine of Wall Street.
4:10 P. M.—Piano Recital by Anna Tiller.
6 P. M.—Children's Hour by Marietta Stockard Albion.

Station WDT, New York City

October 6. Daylight Saving Time, 405 meters.

12:00—Next installment of Tinkerman and the Winged Taxi by the author, Edith J. Craine.
12:10—Fletcher Henderson's Happy Harmonists.
12:20—Billy Newsome, with Jimmie Clark at the piano.
12:30—Miss Maud Mills, with Fletcher Henderson's Happy Harmonists.
12:40—Jackie Harroll, with Jimmie Clark at the piano.
12:45—Rosa Henderson, Vocalian record artist, with Fletcher Henderson's Happy Harmonists.
12:50—Fletcher Henderson's Happy Harmonists.

A New and Efficient Federal Receiver

THE Federal Telephone & Telegraph Co., Buffalo, N. Y., have recently completed and will shortly place on the market a new receiver, which, all things considered, is a most complete and uniform instrument. This receiver which is up to the usual high standard of all Federal products is unique in several ways, the least of which is its independence of many jacks and plugs to complete the switching of the loud speaker and the stages of either radio or audio-frequency amplification used or desired.

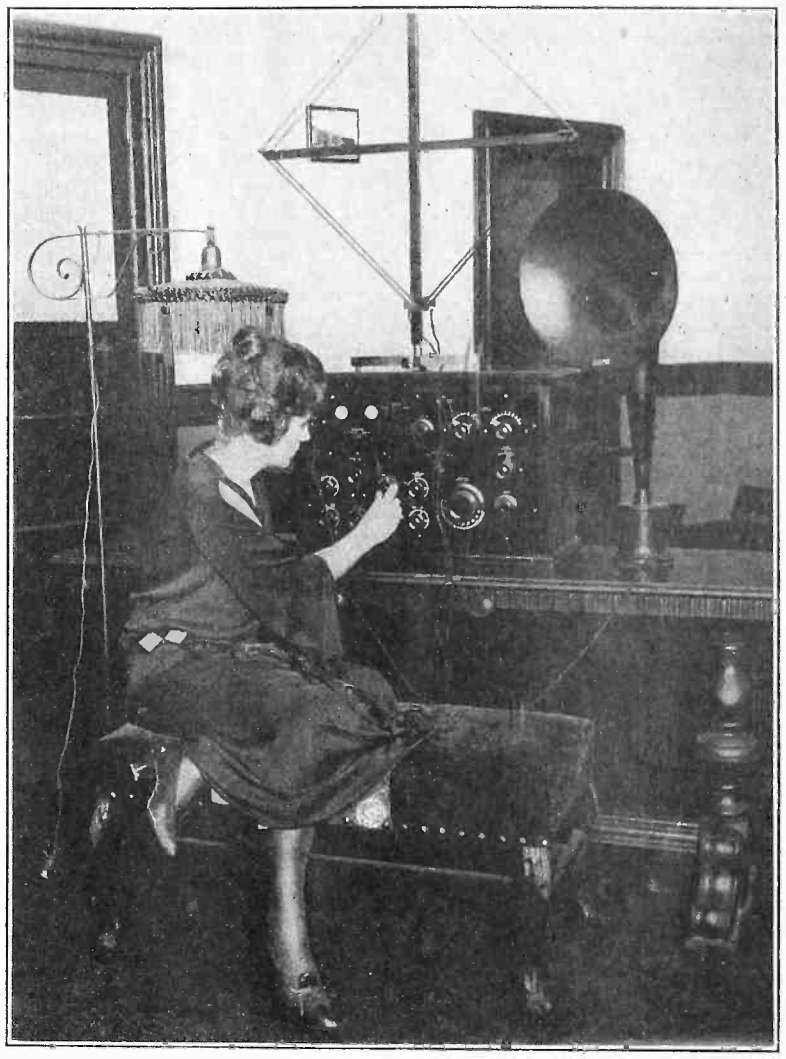
The receiver as shown in the illustration on this page is, besides being a very necessary utility for the reception of radio music and phone signals, an ornamental piece of furniture, when considered from the standpoint of appearance. At first glance this receiver appears rather complicated, but that is very much discounted when it is in operation, as it proves to be a very easily and flexibly operated machine, even in the hands of the novice who does not understand any more than the turning of the dials and the rheostats.

It consists of three stages of radio amplification, detector and two stages of power audio amplification, all of which is controlled by two switches. Any successive stages of either audio or radio amplification may be switched on or off by simply turning the correct knob, and without switching on or off by means of jacks and plugs. Of course, each tube has its rheostat, which principle has been found by the engineers of the Federal Tel. & Tel. Co. to be the best means of control, even though it makes the control of the receiver a bit more complicated. This is overcome, however, by the absolute faithfulness of reproduction in the finished product, or the signal as it is heard in the loud speaker. This has been considered as the main point around which the receiver was designed, and as far as possible in such things, it is very close to perfection.

Tuning is centered around two controls with taps and switches as the ultimate and rough tuning. The selectivity and wave length are easily operated by means of the dials and vernier. After the wave length has been picked by use of the three inductance switches, these two controls finish the absolute or fine tuning. Then without doing more than turning a simple handle, any desired combination of audio and radio-frequency amplification may be had. This is a point that especially commends it, but the entire receiver is without doubt a remarkably fine piece of construction both from the standpoint of neatness and absolute control.

A point of great interest is that by means of a centrally located switch, any tuning system may be arranged, either loop or outside or inside antenna, which is another great point in the many outstanding ones in this machine. It is noticed when in the reception of local signals, a great deal of interference might be experienced from static or some other cause, a turn of a small switch brings the loop into play, cutting all interference down to a minimum, and the use of the radio-frequency bringing the signal strength up to and even beyond that when using outdoor antenna.

For simplicity of control, range of receiver and maximum efficiency, this new receiver will no doubt quickly prove its popularity when the market is opened for its general sale and distribution.



(C. Foto Topics from K. V.)
A handsome and efficient Federal radio receiver.

The Store Owner as the Fan's Friend

MANY retail store owners in the small towns have established a sort of a Noon-time Radio Club for the radio fans of their particular district. Here the fans all gather during their spare time to discuss radio. If the dealer is alive, he studies up on the subject a bit, and becomes an adviser for the crowd.

The city dealer could use this idea and invite the local fans to consider his shop as a sort of debating society on problems of radio. Even better, he could start a club mainly with the idea of promoting radio, but in reality establishing himself as the dealer in radio of the locality and the Friend of the Fans.

Sometimes it Helps

THOSE fans new in the field do not realize that even though the tubes they have are supposed to work on exactly 22½-volt plate voltage as a detector, that better results can sometimes be obtained by using either more or less current. This is especially true with the new dry cell tubes when used as a detector. When used as an amplifier, any voltage between 45 and 100 may be used with no different results outside of the difference in the final volume and clarity. Try changing your detector voltage around from 16 volts to 45, in small steps to find out which is best, or make a battery box on which you can change the voltage at will. This last way is the best, as you can change the voltage on each station for the best reception.

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You may use the tubes you mention. The condenser should have either 23 or 43 plates as recommended.

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Dry cells cannot be re-charged. You can get a few hours' more service out of a dry cell, at a much lower rate, however, by punching a few holes in the bottom and standing it for three or four hours in a saturated solution of sal-ammoniac. However, this is so unreliable that it is not worth the trouble. Throw them out and buy new ones after they begin to drop in current.

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To load the circuit you mention, it will only be necessary to place the proper size honeycomb coil in series with your variometer. If you use a condenser in series with the variometer you will need a 1,000 DL, or a 200 DL in series with the antenna circuit shunted by a .005 mfd. condenser. This will allow you to get the wave lengths you want.

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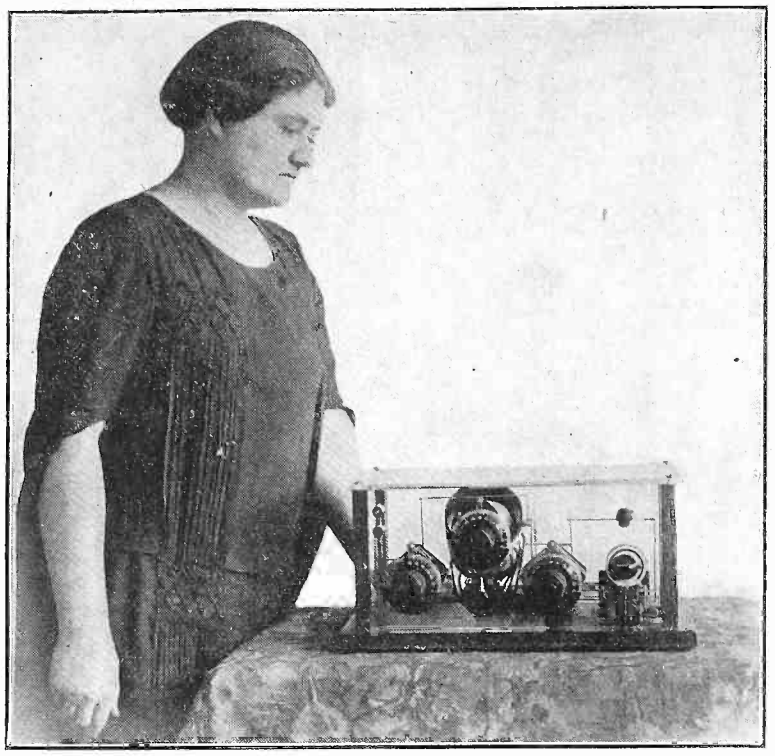

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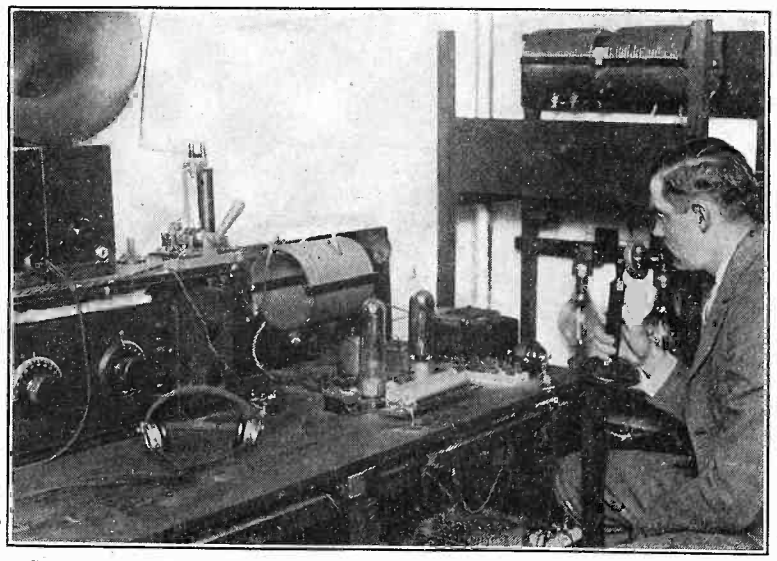

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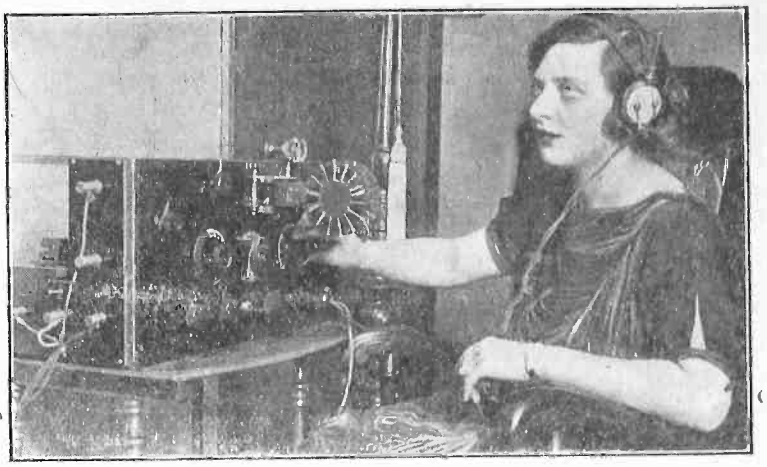

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Dr. Charles P. Steinmetz, the electrical wizard of Schenectady, likes to get away from the humdrum affairs of every-day laboratory work. So he buries himself in his mountain camp, wears old clothes, and spends his idle time fishing and radioing—even radioing while fishing, by using the portable Radiola II, and, of course, continually smoking his "long black seegars" without which he never is seen.

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Police Commissioner Richard E. Enright, of New York City, is shown broadcasting a talk from WEAF on "The National Police Bureau." The Commissioner has studied police and broadcasting conditions both here and abroad, and is conceded to be the best informed person on traffic and police problems in the world.

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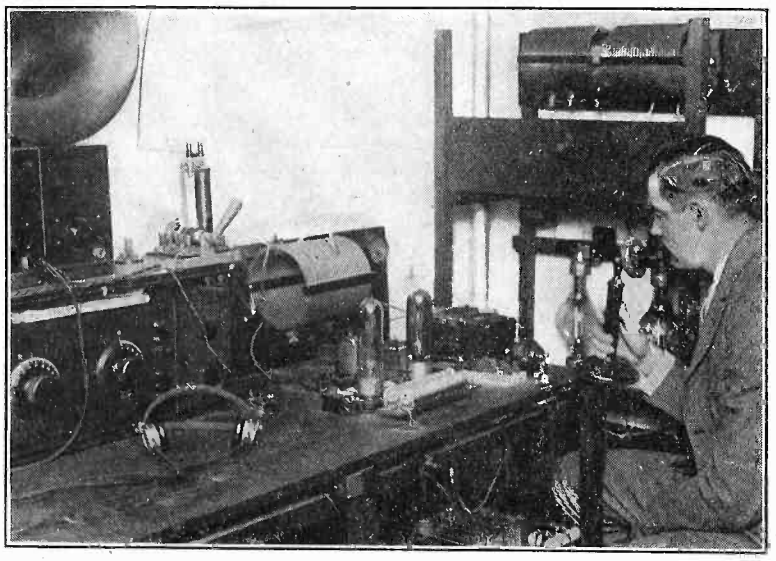

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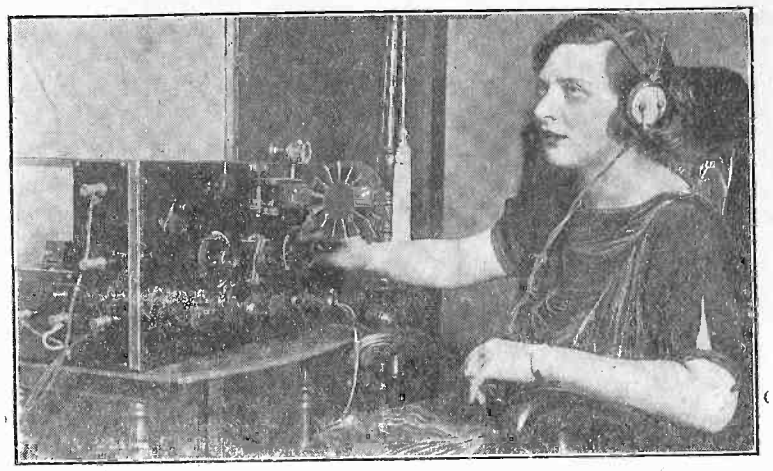
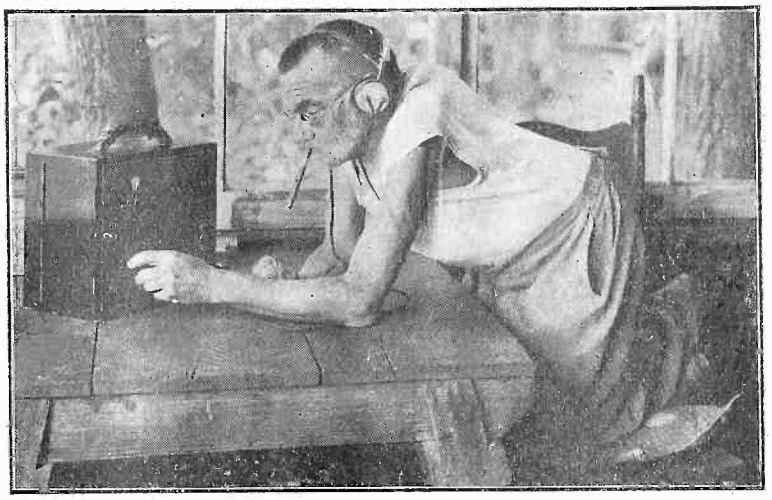


(C. Kadel and Herbert)

Mitzi, well known to Broadway as one of the brightest stars on the "White Way," is also an ardent radio fan and likes to discuss radio more than "Pung Chow," which these days is something. She is shown operating a specially constructed receiver in her private boudoir.



(C. Kadel and Herbert)

Dr. Charles P. Steinmetz, the electrical wizard of Schenectady, likes to get away from the humdrum affairs of every-day laboratory work. So he buries himself in his mountain camp, wears old clothes, and spends his idle time fishing and radioing—even radioing while fishing, by using the portable Radiola II, and, of course, continually smoking his "long black seegars" without which he never is seen.

(C. Kadel and Herbert)

Police Commissioner Richard E. Enright, of New York City, is shown broadcasting a talk from WEAF on "The National Police Bureau." The Commissioner has studied police and broadcasting conditions both here and abroad, and is conceded to be the best informed person on traffic and police problems in the world.

Armstrong, Flewelling, Reinartz, Ha

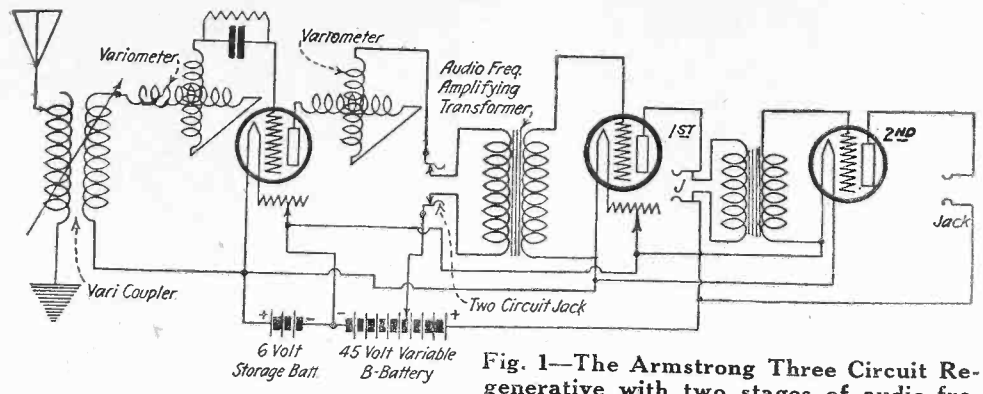


Fig. 1—The Armstrong Three Circuit Regenerative with two stages of audio-frequency amplification. See page 20 for constants.

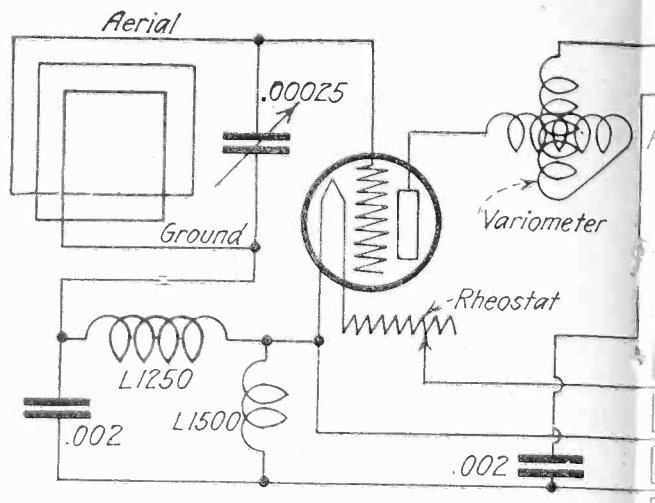


Fig. 5—The Armstrong super-regenerator for one tube using a loop for reception. See page 20 for constants.

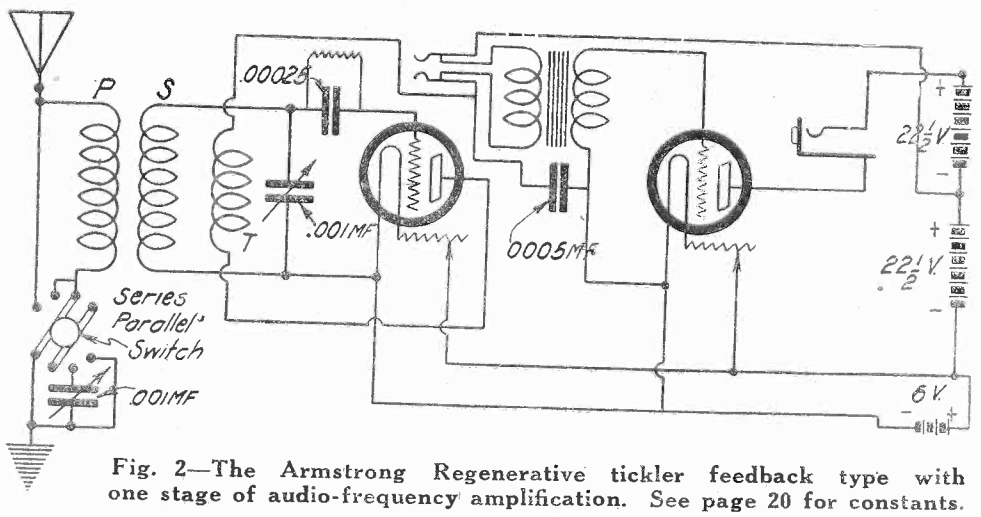
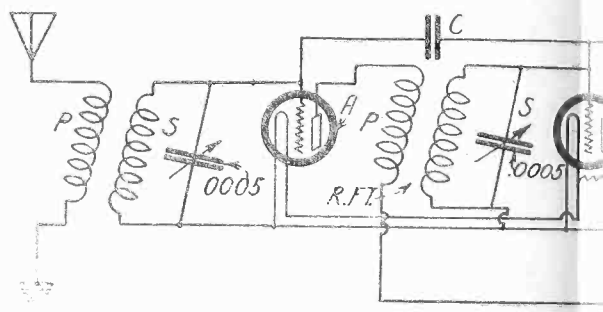


Fig. 2—The Armstrong Regenerative tickler feedback type with one stage of audio-frequency amplification. See page 20 for constants.



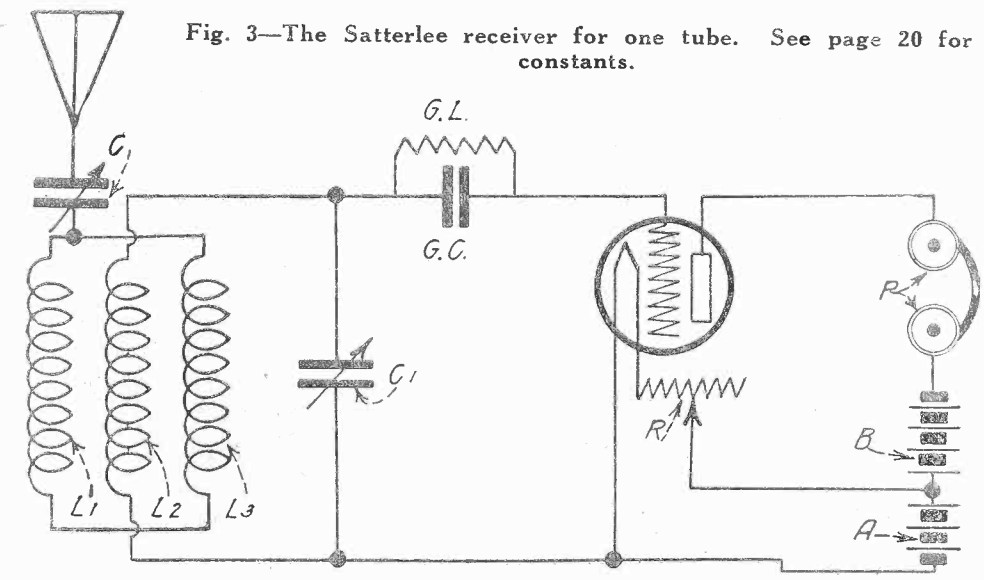


Fig. 3—The Satterlee receiver for one tube. See page 20 for constants.

THE circuits published herewith have been selected from the many that have appeared in RADIO WORLD during the past twelve months as those that the amateur will find most useful. They have come to be regarded as the standard circuits of to-day. Considering that there are virtually thousands of circuits the amateur builder and constructor may use, these few have been picked out as those which have been found tried and true and which the amateur may feel certain will function. Many arguments pro and con have been made on every one of them. The description and capabilities of each will be found on page 20 of this issue. Take your choice and know that whichever of them you construct you will have a "tried and true" receiver.

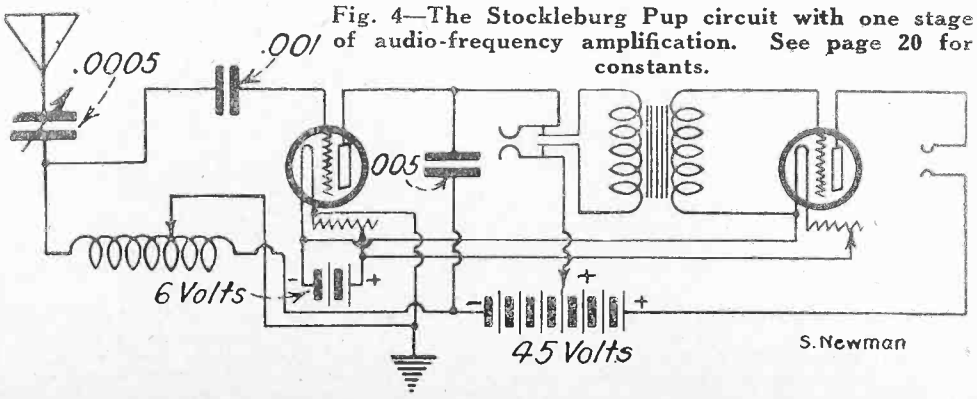


Fig. 4—The Stockleburg Pup circuit with one stage of audio-frequency amplification. See page 20 for constants.

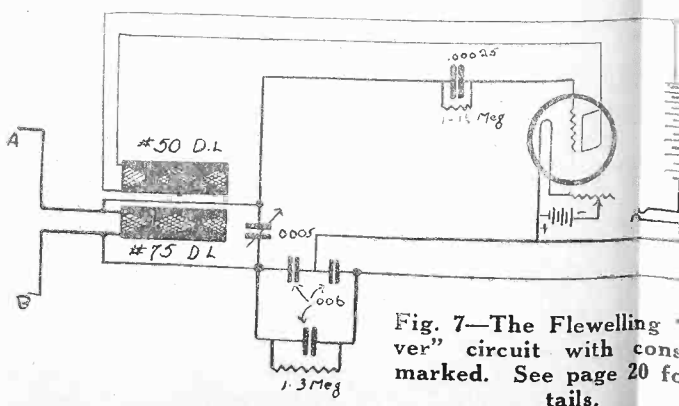


Fig. 7—The Flewelling "ver" circuit with cons marked. See page 20 fo tails.

zeltine and Other Popular Circuits

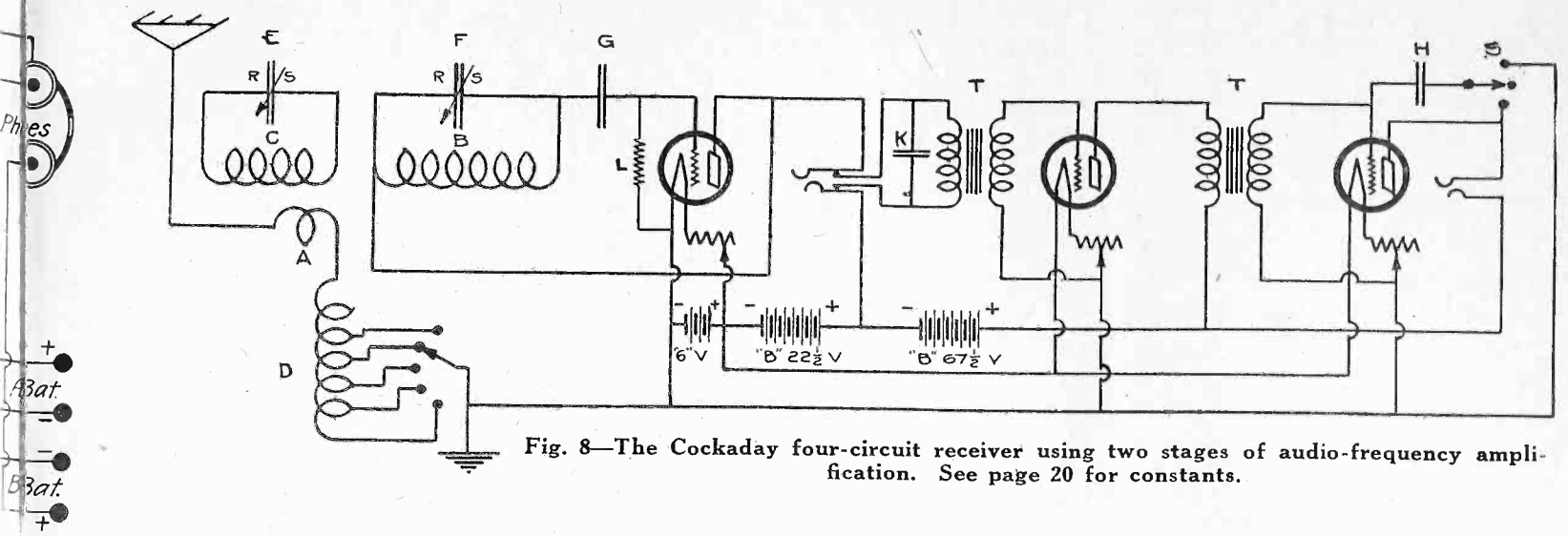


Fig. 8—The Cockaday four-circuit receiver using two stages of audio-frequency amplification. See page 20 for constants.

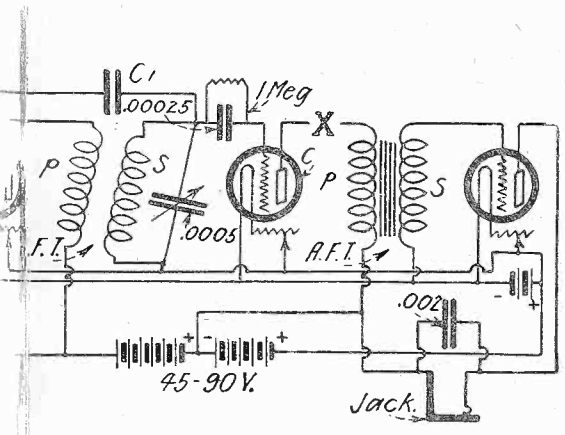


Fig. 6—The Hazeltine neutrodyne receiver for three tubes, with one stage of audio-frequency amplification, using special neutroformers in the radio-frequency circuits. For details see page 20.

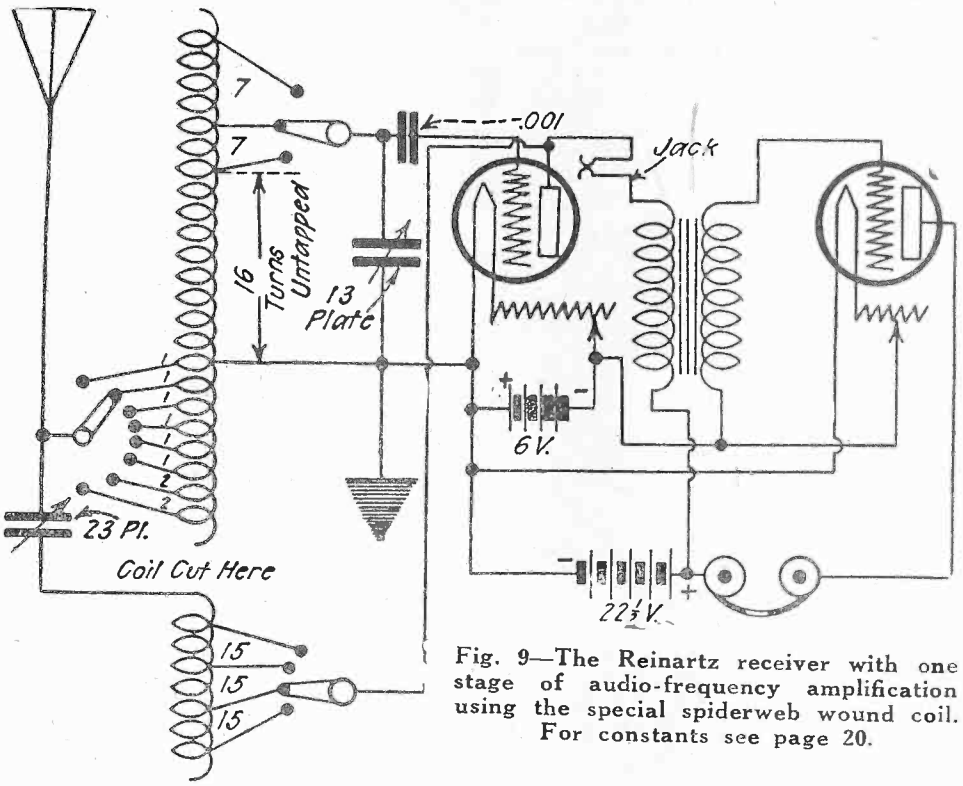
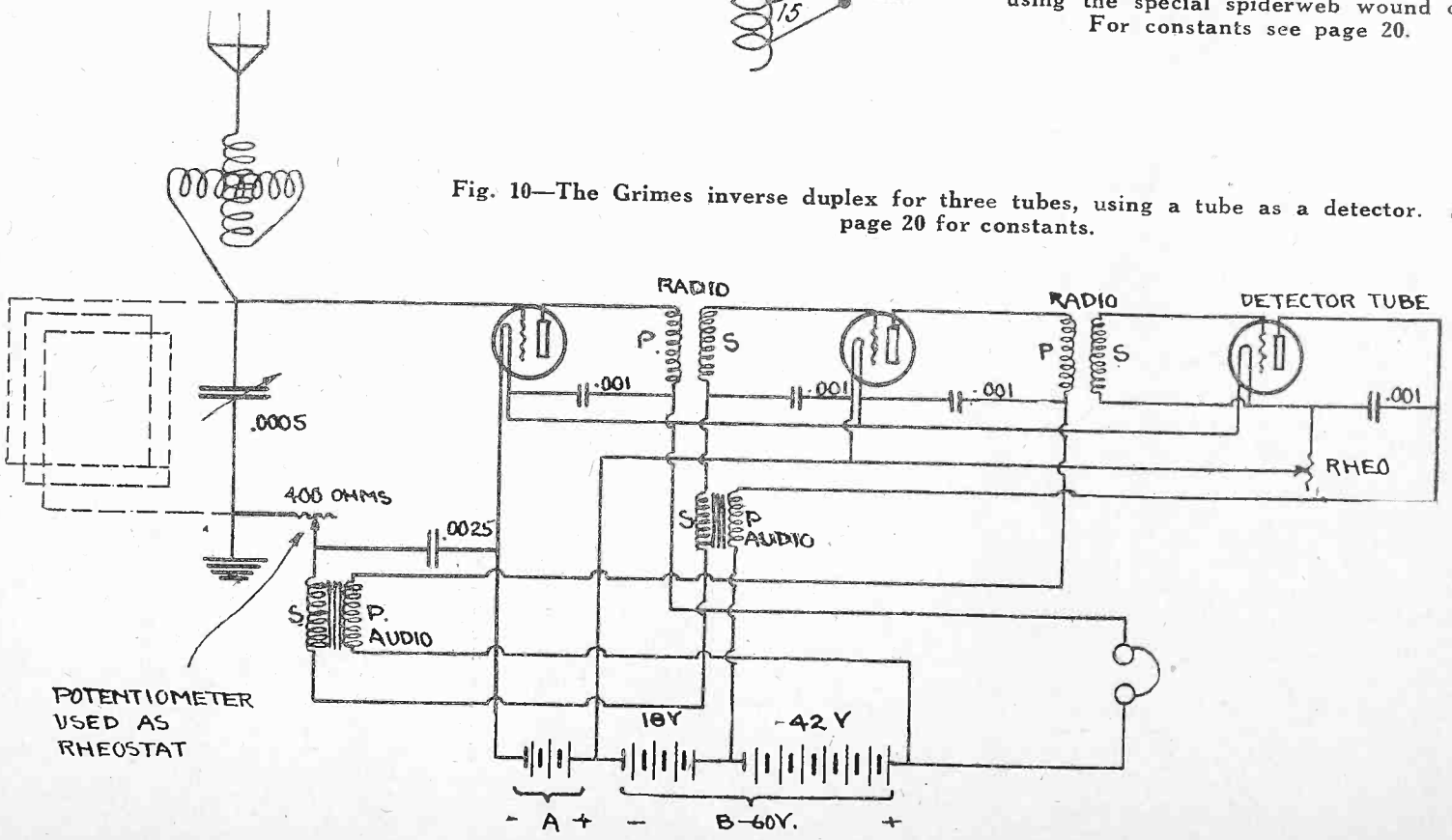


Fig. 9—The Reinartz receiver with one stage of audio-frequency amplification using the special spiderweb wound coil. For constants see page 20.

Fig. 10—The Grimes inverse duplex for three tubes, using a tube as a detector. See page 20 for constants.



Descriptions of Popular Circuits Shown on Pages 18 and 19

THE ARMSTRONG THREE CIRCUIT REGENERATIVE. This circuit shown in Fig. 1, Page 18, is popular with the average amateur who has been in the field for some time. Due to the fact that it takes a little time to get used to its proper manipulation it has not been bruited around as the popular circuit which it should be. Tuning is accomplished by means of the variocoupler in the antenna circuit and the two variometers, which also control the regeneration. They should be of good construction and able to cover all waves from 200 to 600. Any sturdily made variometers will serve for the grid and plate circuits. While the circuit is pictured for the 6 volt tubes, the 1½ volt tubes may be used by the substitution of dry cells for the 6 volt battery and by using the 6 volt tubes and the grid condensers and leaks made for such. The amplifying transformers should be of good make, preferably a high ratio in the first stage and one of lower ratio in the second, although the same ratio may be used in both stages. Selective in a high degree and somewhat critical in tuning, but not bothered by interference when rightly tuned.

THE ARMSTRONG REGENERATIVE THREE CIRCUIT USING TICKLER FEEDBACK. This circuit shown in Fig. 2, Page 18, is another Armstrong Regenerative circuit that has found almost universal appeal among the amateurs that desire flexibility and selectivity. The three coils P, S and T are the Primary, Secondary and Tickler, and consist of honeycomb coils of the proper sizes. These range from DL25 up to DL1500, with a wave length range of from 372 meters to 24,200 meters when shunted by a capacity of .001 mfd. There is a specific combination of coils for each band of wave lengths, which always work best on each particular band. The circuit's flexibility lies in that fact, as any desired wave range may be had. The regeneration is caused by the coil T feeding back a part of the energy in the plate circuit into the grid circuit, causing an amplification or regenerating of the signals. As before, any tubes may be used, simply by using the correct filament voltage on the tubes. It is not so critical of tuning as the three circuit variometer receiver, gives good results in selectivity and does not require expert manipulation.

THE SATTERLEE RECEIVER. This receiver is shown in Fig. 3, Page 18, and while it has not received the notice it should in the past has capabilities that should not be overlooked. The main one of these is its sharpness of tuning, and the fact that it can be operated on a ground alone, without antenna, or antenna alone without a ground. The three coils L1, L2 and L3 are specially wound spiderweb coils arranged in a special tuning arrangement. The two outer coils L1 and L3 should consist of two spiderweb coils of from 60 to 75 turns each, so arranged and mounted that they can open vertically book-wise. The second or L2 coil is a spider web coil of from 50 to 80 turns, so arranged that it can move in a vertical arc between the two outer coils, and can also rotate in a circular manner so that its plane can oppose or be in conjunction with either one of the two outside coils. The condenser in the antenna or A circuit consists of a 23 plate variable condenser. C1 should consist of a .001 variable vernier. GL and GC are the grid leak and condenser and should be the type best suited to the particular make of tube you intend using. B is the B battery of 22½ volts and A is the filament battery of either 1½ or 6 volts according to the type of tube used. Its capabilities are sharpness of tuning coupled with great selectivity and its independence of either antenna or ground.

THE STOCKLEBURG PUP. This circuit shown in Fig. 4, Page 18, is a derivation of the Hartley Oscillator, one of the single circuit receivers that have struck the popular fancy. It has just one adjustment, namely the condenser in the antenna circuit. The main inductance consists of the honeycomb coil, tapped at one-third of its turns from the end, the tap going to the ground circuit at which point the filament is also grounded. The amplifier may be any standard high ratio transformer of good make. The tube may be either 1½ or 6 volt style, changing the filament battery to suit the needs. It has good volume for distance, but lacks selectivity to some degree, but not enough to bother the experienced tuner or amateur.

THE ARMSTRONG ONE TUBE SUPER-REGENERATIVE. This circuit shown in Fig. 5, Page 18, is one of the famous super circuits that have appealed to the popular fancy during their regime. The loop may be any standard make of about 15 turns of wire on a 2 foot standard. The coils L1250 and L1500 are honeycomb coils arranged at right angles to one another with their ends meeting. The variometer in the plate circuit used to produce regeneration is a standard make with a wave length range of up to 600 meters and is used to produce the desired regenerative state in the receiver for each station or wave band. All the rest of the apparatus is marked, with the exception of the A and B batteries. The B battery can be any voltage from 45 volts up to 100. Sharp tuning and sensitiveness, coupled with a great amount of volume on one tube are the capabilities of this receiver. which if not handled properly is a great producer of oscillations which manifest themselves in squeals and squeaks. Good for distance as well as portability. The tube used should preferably be a 6 volt tube such as the power amplifier 216A or similar.

THE HAZELTINE NEUTRODYNE RECEIVER. This receiver shown in Fig. 6, Pages 18-19, has become very popular with fans who desire maximum distance, and minimum interference in a multi-tube radio-frequency amplifier receiver. The three sets of coils are specially wound transformers. P is a 16 turn winding on a 3 inch tube, the wire being preferably No. 24 or No. 26 DSC. S is the secondary winding which is placed on another slightly larger tube directly over the first and consists of 65 turns of the same size wire. The Condensers C and C1 are the Neutrodons or neutralizing capacities of very low capacity. (1 micro-microfarad or 1¼ micro-microfarad is about correct, depending upon the neutralization of the particular tubes being used). The three Neutroformers are identical in every detail, and are placed at an angle of 55° off vertical on the panel. If the regeneration in the detector circuit is required, a variometer should be placed at X in the circuit. Any standard audio-frequency amplification may be used.

Professor Hazeltine describes his circuit as follows: The neutrodyne circuit eliminates the capacity coupling between successive stages of an amplifier by introducing fixed neutralizing condensers. It has made possible *tuned radio-frequency amplification in several stages* without self-oscillation and other objectionable regenerative effects. Combined with efficient design of the radio-frequency transformers, this has the following results: a degree of selectivity not otherwise attainable in a broadcast receiver; the greatest possible amplification with a given number of vacuum tubes; the absence of beat notes and distortion due to regeneration; and great convenience in operation—since the controls are few and the same settings may always be used for receiving any particular station.

THE FLEWELLING "SUPER" CIRCUIT. This circuit shown in Fig. 7, Pages 18-19, has become popular because of its ability to receive over fairly long distances independent of either an antenna or ground. The constants of the special condenser bank are marked and are correct. The terminals A or B should be connected to either one side of a loop or antenna alone or ground alone, or both, should it be desired. The grid leak capacities are very critical. The set operates with a continual high whistle which is sometimes almost inaudible, and the pitch of which can be varied by the grid leaks. This resembles the variation frequency of the Armstrong Supers and if it is not present the set is not operating right. The two coils are honeycomb coils of the size shown. The tube should preferably be one that will stand high plate voltages as from 60 to 150 volts should be used on the plate. A good distance circuit, prone to cause disturbance in nearby receivers, but capable of receiving stations with remarkable volume, on local work operating a loud speaker with but 20 or 30 feet of wire attached to A and no ground.

THE COCKADAY FOUR CIRCUIT RECEIVER. An extremely selective and flexible circuit shown in Fig. 8, Page 19, which is remarkably free from re-radiation when properly constructed and operated. The constants of this receiver are: A—single turn of wire around coil C. B—65 turns of No. 18 S. S. C. wire on a 3¼ inch tube. C—34 turns of same size wire on same tube, but wound 1/16 inch away from coil B. D—43 turns bank wound, tapped at the 3, 7, 13, 21, 31, and last turns, and placed at right angles and close to coils B and C. E and F .0005 mfd Vernier variable condensers. G .00025 mfd fixed condenser. H .001 fixed condenser. K .0005 fixed condenser. L 1 megohm grid leak. T1—Amertran audio-frequency transformer (high ratio), T2—General Radio audio-frequency transformer. S3—point switch. Either 6 volt or 1½ volt tubes may be used with the circuit provided the proper filament current is used. This circuit is selective, not severely critical of tuning and free from squeals and howls, and cannot cause interference due to re-radiation.

THE REINARTZ TUNER CIRCUIT. This circuit shown in Fig. 9, Page 19, is a favorite with the amateurs, as being a remarkable CW receiver, but it is also a good broadcast receiver when properly constructed. The inductance is a special spiderweb tuner, both windings being placed on the same former, the smaller one of 45 turns being wound on first, tapped at every 15 turns and the larger one wound on the same former directly over the first, tapped for the first four turns at every second turn, then every turn for the next 6. Then 16 turns are wound without tapping. A tap is taken off and 14 more turns are wound tapping as shown. The 13 plate condenser should

(*Concluded on next page*)

New Devices of Interest to the Fall Buyer

Some New Magnavox Products

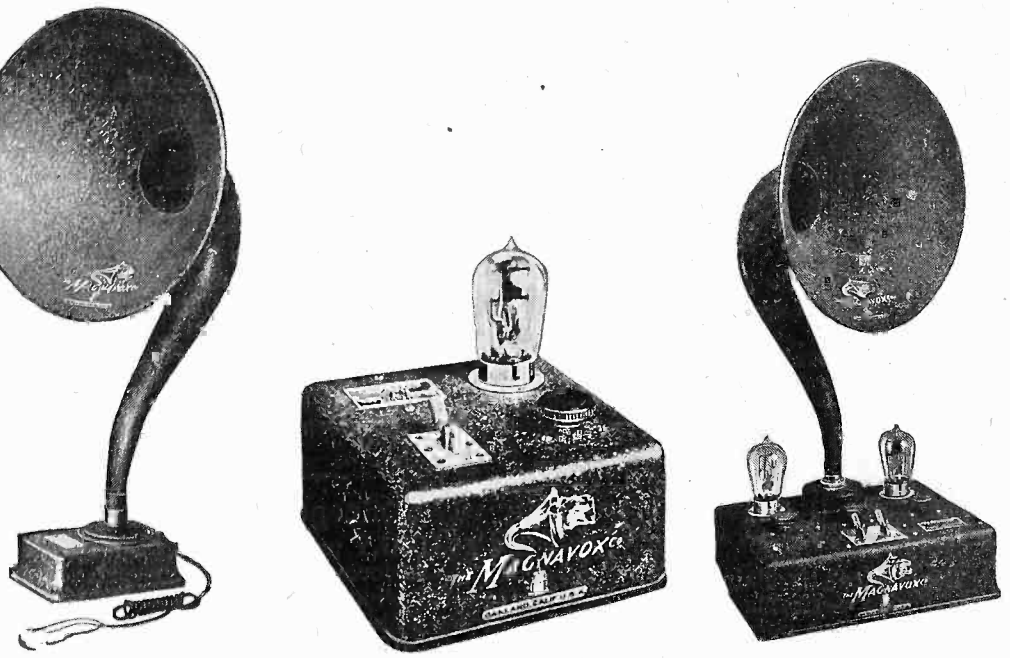
DURING the summer months when the demand for production was not as great as during the spring and winter months, the engineers of the Magnavox Company, California, were busy designing and bringing into the usual high stage of efficiency, several newly designed products in keeping with the improvements of the field. The improvements are not designed to consign the old type of apparatus to the scrap heap, but are highly improved models of the same type product turned out by this company for several years.

Among the foremost of these is a Magnavox radio reproducer, semi-dynamic type. This loud speaker calls for no outside battery, as it operates on the current in the plate circuit, not depending on a separately excited field coil. This was produced to conform with the demand for a loud speaker that would operate on the dry cell tubes, or sets using dry cells to amplify and detect the signals. It is neatly made of heavy pressed metal, with a 14-inch curvex horn and is furnished in either the standard metal crystallized black or the de luxe polychrome finish.

Along the same line this firm has produced a separate one or two stage audio-frequency power amplifier which may be used with any set, the horn or loud speaker being separated. It is designed for use with any tubes, but the power amplifier tubes or the standard six-volt tubes should preferably be used on account of the higher plate voltages that they will stand, and the consequent increased volume. This device is constructed of heavy pressed metal, with nickel controls and a heavy bakelite connection plate in the rear. The case is finished in either the standard metal crystallized black or the de luxe polychrome finish and forms a well appearing, excellent working adjunct to any receiver.

The Magnavox company also has produced a combination set of loud speaker and power amplifier, in both the one and two-stage sets. These are furnished with the standard 14 inch curvex horn, with the popular black or de luxe finish, neatly and strongly constructed of heavily pressed metal. As they are a combination of both loud speaker and power amplifiers in one, they save both space and time, as all that is necessary is the connecting of the batteries and plugging in the set and they are ready for use. Switches of the non-capacity type are furnished to allow the switching on or off of the tubes, in both the combination sets or the single or double power amplifiers. Again these amplifiers may be used with either the high power transmitting or the low power amplifying tubes.

All these instruments are furnished without tubes or batteries. They form a very necessary part of the average up-to-date radio man's equipment, as they allow extremely good volume, minimum distortion, minimum table space, and they are also handsome and may be considered as much a piece of decorative furniture as a useful piece of radio apparatus.



Three new loud-speaking devices made by the Magnavox company.

New Storage Battery Charging Attachment

THE great drawback to owning a radio set that operates in storage batteries is "lugging" the battery to a charging station unless you happen to own a charger that will do it at home. But the A storage battery problem has been solved by the use of this convenient appurtenance to the successful operation of the receiver, and the B storage battery has formed still another problem.

In order to successfully charge these batteries, the voltage of which is much higher than that of the A battery, and the amperage much lower, a problem has been offered for quite a time. Many a good battery has been ruined or rendered unfit for use by improper chargers of the liquid or semi-liquid type.

The France Mfg. Co., 104 Berea Road, Cleveland, Ohio, has placed on the market a charging attachment that converts their "F-F" battery charger into an instrument that will charge any B storage battery of from 24 to 96 volts. The charging rate is varied by the use of different sizes of ordinary incandescent lamps, in accordance with clearly written and easily understandable instructions that come with the instrument.

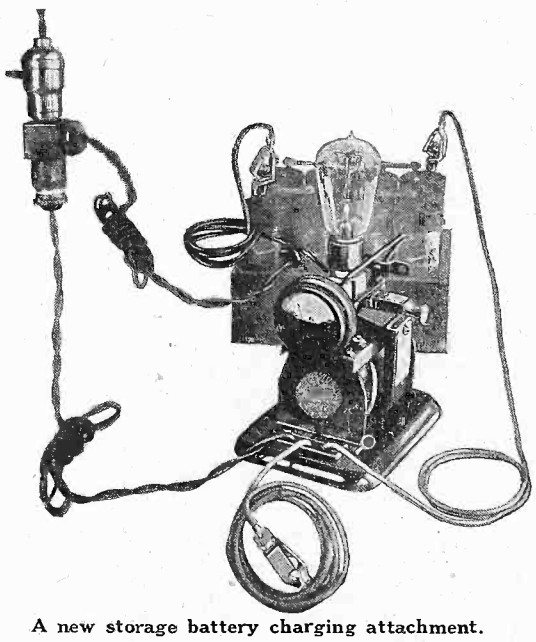
No A battery is needed to make the "F-F" Battery Charger and Attachment function. No changing of the connections are necessary or any other alterations.

There is no reason therefore for any one operating a set using storage A and B batteries for letting them deteriorate due to over-drawing the current from them and damaging the elements. Both A and B batteries may be charged from the same instrument, though at different times.

This new device has found a ready field with the fan who knows the advantages of using a storage B battery in the operation of his receiver, which is that the noises so common to other sets are done away with, and the B batteries are always in the proper condition. It is not necessary to guess as to whether they are the cause of numerous troubles.

Owners of both storage A and B batteries will be interested in the possibilities of this new instrument.

(*Other new devices described on following pages*)



A new storage battery charging attachment.

(*Concluded from preceding page*)

be used. Any tubes may be used by employing the correct filament current. This circuit is selective and a real good long distance receiver. The operation is fairly critical but can easily be mastered once the idea of the general tuning is gained. Simple of construction and fair volume recommend it to the man who does not have to fill a room with music on one stage.

THE GRIMES INVERSE DUPLEX. This circuit shown in Fig. 10, Page 17, is the most popular of all of the multi-tube reflex circuits, and while three tubes are being used the practical use of 5 is gained. The radio-frequency transformers should be of the best possible manufacture, as should be the audio-frequency transformers. One rheostat is used to control the filament circuits of all the tubes. Careful construction is the only necessary thing in building this receiver which is the best of the reflex circuits yet developed. Either antenna and ground or loop may be used. The constants pictured in the circuit diagram must be adhered to and either 6 or 1½ volt tubes may be used. This circuit is the most selective of all the reflex circuits and has good volume coupled with easy operation and if carefully constructed will have a good range for either loop or antenna and ground.

New Crosley Receiver

SEVERAL new types of receivers which have been developed by the Crosley Manufacturing Company, Cincinnati, lay claim to novel ideas in construction and appearance. Probably the foremost of these is the new model known as X-J.

The set, as depicted herewith, consists of a stage of tuned radio-frequency, detector and two stages of audio-frequency, incorporating a new book type condenser of the molded style, which is low in resistance and extremely efficient. The tuned radio-frequency circuit has a special coil which has been calculated for waves of 200 to 600 meters and is extremely efficient over such waves.

The receiver is neat in appearance, easy to handle and, due to the peculiar construction of the sockets, can be easily accommodated to any make of tube. There is very little metal showing on the front, which combined with the neatly machined satin finished panel makes a very neat appearing instrument, which is as much a piece of furniture as it is an efficient receiver.

The bus bar wiring is covered with heavy spaghetti and the entire receiver is very pleasingly laid out both outside and inside. The best of apparatus is used throughout, and due to the method of manufacture these receivers are sold at a very attractive price.

The model shown consists of one stage of tuned radio-frequency, detector and two stages of audio-frequency amplification. It is suitable for use with either storage battery or dry cell tubes. All the units are mounted on a Formica panel, with the battery leads and all connections on a sub-panel in the rear, keeping the battery wires and connections out of sight. This is a big point, as few people like to place a set in a conspicuous place and have wires running all over the face of the panel.

The new multi-stat rheostat is used throughout, making it possible to use two different types of tubes in the same circuit without even changing a connection. This is done by having two separate windings of resistance wire on the same former. One is a six ohm winding, and the other is a 24 ohm resistance winding, whereby any resistance up to 30 ohms may conveniently be had simply by the current manipulation of the rheostats as per the very complete instruction sheet that comes with every receiver.

The construction has been standardized to a very great extent and nothing outside of a change in the established principle of tuned radio-frequency receivers can change the model of the set in the least, offering to buyers a conviction that should they obtain one of these receivers they are sure of a long period of use before the receiver or its circuit is "out of date."

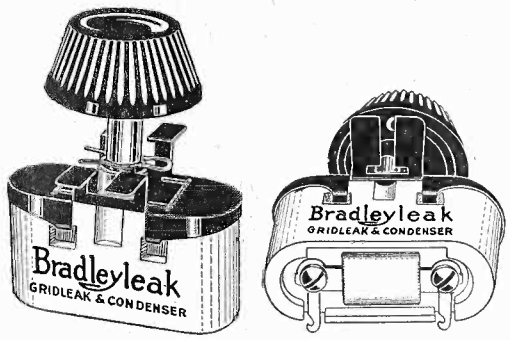
It is simple of manipulation, two large dials being used for the immediate tuning, the switch being used when a great wave length change is wanted. Sharp tuning is accomplished throughout the entire wave length range of the receiver without the necessity of wave traps or other unnecessary apparatus. This coupled with loud speaker volume on all stations heard on the detector alone makes it a very complete and efficient receiver.

A New Bradley Product

THE Allen-Bradley Co., Milwaukee, Wisconsin, manufacturers of the Universal Bradleystat and Bradleyometer, have added another item to their line of graphite disc radio products.

The new device is an adjustable grid leak known as the Bradleyleak which was developed to meet the insistent demand for a high-grade, dependable grid leak. It is similar in external appearance to the Universal Bradleystat and is equipped with an adjusting knob which conforms, in general design, with the approved tapered knob now used in most radio equipment and matches perfectly with the adjusting knobs of the Bradleystat and Bradleyometer.

The Bradleyleak can be adjusted between the limits of 250,000 ohms and 10,000,000 ohms or, as usually stated, between ¼ megohm and 10 megohms. The entire range of grid leak resistance between these limits is instantly obtainable without noises, steps or jumps by simply turning the adjusting knob. It is a significant fact that all intermediate values of resistance can be accurately obtained at any time which is a feature not often found in many types of adjustable grid leaks.



Bradley combined variable grid leak with condenser in the base.

The Bradleyleak is claimed to be very accurate and a desirable addition to any radio set. It makes possible the accurate adjustment of grid leak resistance for any tube used on a detector circuit.

The base of the Bradleyleak is recessed to receive a small fixed condenser which is furnished as an extra attachment, if desired. The grid condenser is accurately adjusted to a capacity of .00025 microfarads.

A Well Made Transformer

THE Liberty Radio Transformer Mfg. Co., Chicago, Ill., have placed on the market an exceptionally fine model of that very necessary but ofttimes mismade piece of apparatus on the radio set —the audio-frequency transformer.

It is very neatly encased in nickeled brass with a top of molded condensite whose insulating qualities are well known. All binding posts are nickeled and plainly marked as to terminals. The entire instrument forms a very pleasing article which is small in size, the form being upright rather than horizontal. The transformer takes up a space of 2½ x 1¾" of panel or base space and is strongly constructed. It has a ratio of 5—1, which is sufficient for all needs in the average set not calling for a special high ratio winding.

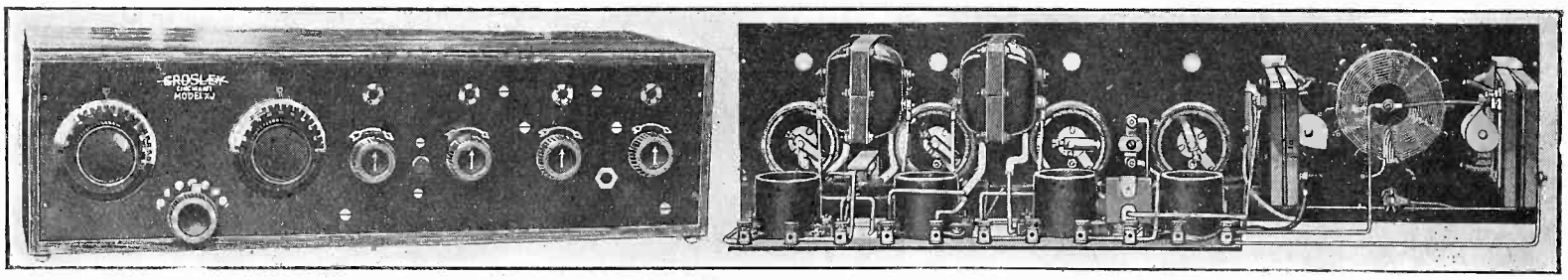
The transformer proper is well made of good Swedish steel with the windings well insulated, and there is not the least chance of a break or short circuit due to wires being exposed as the entire transformer is enclosed and no wires can be reached by any means.

Compared with the general run of transformers on the market, the people manufacturing this particular one have tried and succeeded in removing all causes of trouble as now experienced. By enclosing the transformer in a metallic case they have overcome any chance of intercoupling or magnetic coupling between stages causing howls and shrieks. This in conjunction with the fine insulation and construction and plain markings of terminals make the transformer as near perfect and fool-proof an article as has yet been seen, and should remove the bugaboo of transformers in the hands of the novice.

The Sleeper Fixed Coupler

WIDELY used in place of the familiar variocoupler, the Sleeper fixed coupler, which is registered at the United States Patent Office under this name, is popular because it does away with the coupling adjustment and the necessity for switches, switch points and soldered connections, at the same time increasing slightly the signal strength and sharpness of tuning.

A newer and very important use of this instrument is as a tuned non-oscillating radio-frequency transformer. It is connected in any R. F. amplifier, reflex, or inverse duplex circuit as is the ordinary transformer. For wave lengths from 200 to 600 meters it is shunted by a variable condenser of 0.00025 mfd. Since it is tuned, it operates at maximum efficiency at any point in the wave length range and, consequently, has no low efficiency points. Designed to be non-oscillating, it does not require the use of capacity neutralizing condensers.

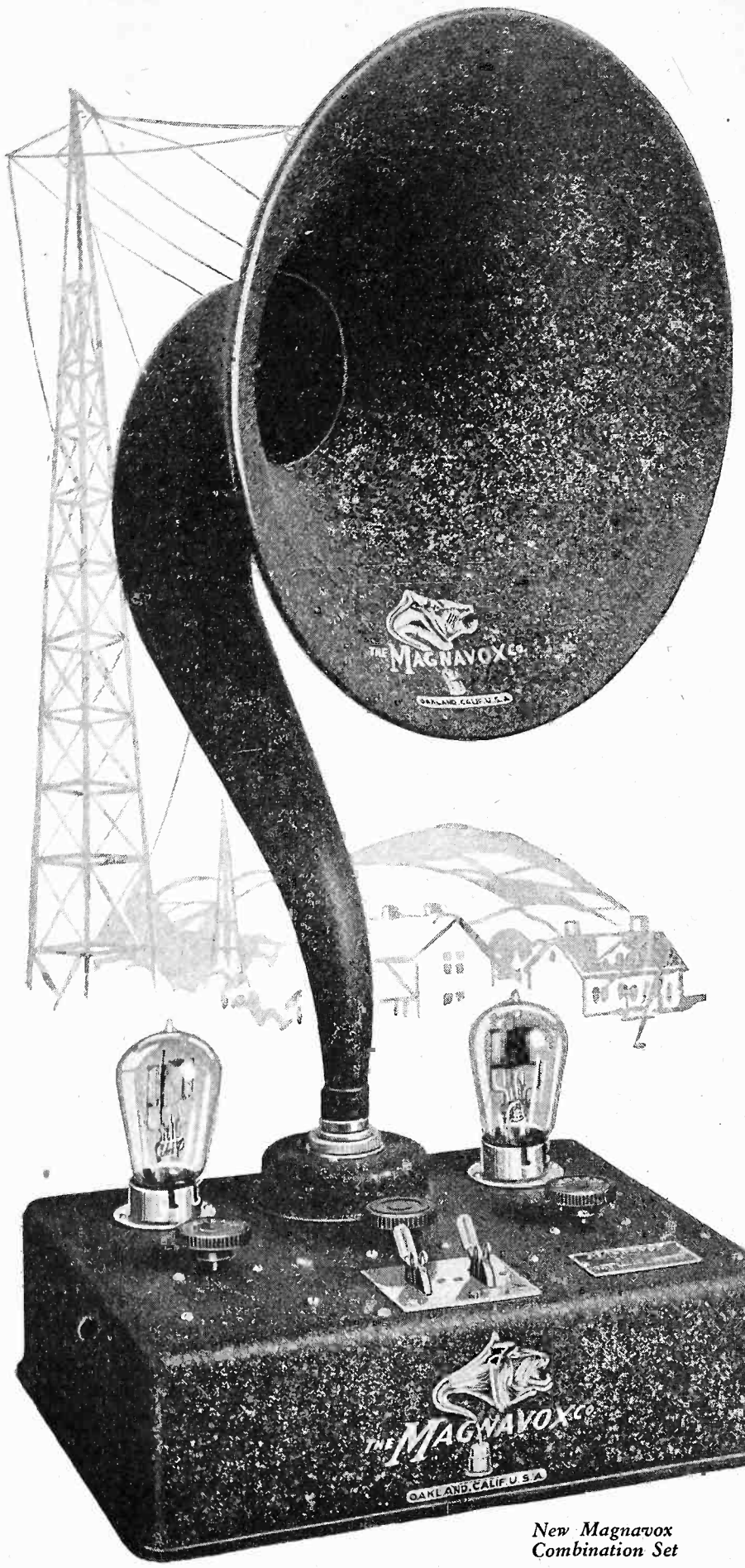


The outside and inside appearance of the new Crosley X-J receiver, a high grade product of the Crosley laboratories.

New Loud Speakers

THE Boudette Manufacturing Co., Revere, Mass., have placed on the market two types of loud speakers under the trade name of "The Sonochorde." One resembles the ordinary loud talker with a horn and heavy base. The other type resembles a cabinet, handsomely made up in mahogany and with a covered front and two closing doors to control the volume. They both work from the amplifying circuits of radio receivers without any additional batteries, and can be connected to 6 or 1½ volt circuits.

No wireless receiving set complete without



New Magnavox Combination Set

A2-R insures convenient and perfect Radio reproduction. Designed especially to meet the requirements of receiving sets used in the home.

10R

Magnavox Radio

The Reproducer Supreme

IT has been the dream of every Radio user to own in one unit a Power Amplifier and electro-dynamic Reproducer, thus insuring perfect Radio reproduction.

After exhaustive study and tests by our engineers, this has been successfully accomplished, and the new instruments of the unit type here illustrated in one and two stages of amplification may now be had through Magnavox dealers everywhere.

There is now a Magnavox for every receiving set. The full line embraces:

Magnavox Reproducers

R2 with 18-inch curvex horn . $60.00
R3 with 14-inch curvex horn . 35.00
M1 with 14-inch curvex horn. Equipped with binding posts and a five foot flexible cord; requires no battery for the field. 35.00

Magnavox Combination Sets

A1-R consisting of electro-dynamic Reproducer with 14-inch curvex horn and 1-stage of amplification 59.00
A2-R consisting of electro-dynamic Reproducer with 14-inch curvex horn and 2 stages of amplification 85.00
Special: with 18-inch curvex horn as illustrated . . . 95.00

Magnavox Power Amplifiers

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

Magnavox Products can be had of good dealers everywhere. Ask for a demonstration.

THE MAGNAVOX CO.

OAKLAND, CALIFORNIA
370 Seventh Ave., New York
World pioneers in the development and manufacture of sound amplifying apparatus

Magnavox Reproducers and Amplifiers

"Saving money by NOT advertising gives the sheriff and auctioneer most of their business."—F. S. C.

Radio Merchandising

Advertising Rates: Display, $5.00 an inch, $150.00 a page. Classified Quick-Action Advertising, 5 cents a word. *Telephone Lackawanna 6976*

Radio Trade Association Expects Biggest Fall Business Radio Has Known

EDITOR, RADIO WORLD: A recent check-up made among members of this association leads us to believe that we will have the biggest fall season the radio industry has ever known.

With minimum stocks in the hands of retailers and jobbers, we also find that the average manufacturer of radio equipment has on hand less than one-third of one per cent. of his estimated year's volume of business, or about half enough to supply one good day's business in the rush season.

Manufacturers will show a large accumulation of stock, but a question or two will usually bring out the truth—most of these goods are already sold, for immediate or early future delivery. We find that practically every manufacturer of radio apparatus who has brought out a new item in the past few months is today several weeks behind with orders. Over ten per cent. of our manufacturer members, according to conservative estimate, are today making deliveries in about twenty days after receipt of order.

All this brings us to the point where we repeat to the public, buy radio apparatus now!

Nationally known radio apparatus is already in such great demand that we will not be in the least surprised to see a sudden shortage in almost any product.

Yours truly,
THE RADIO TRADE ASSN.
L. A. Nixon, Secretary.
Henry M. Shaw, President.
New York City.

New Kennedy Receiver with Loud Speaker

A LATE advance in radio receiver design is the new Kennedy Type 410 receiving unit as incorporated in beautifully finished furniture models, products of the Colin B. Kennedy Company, St. Louis. These instruments are in mahogany with gold plated dials and fittings and are entirely self-contained.

Complete control of this new unit is accomplished by means of only two dials, one for tuning and the other for volume. The entire broadcasting range of wave lengths is covered.

These receivers may be used with any standard type of vacuum tube, dry cell batteries being contained in the cabinet and binding posts are provided on the rear for external six volt battery connection in case it is desired to use that type of tube.

The new Kennedy loud speaker is incorporated in each of these instruments.

In all three types the cabinet used has been especially designed for this particular purpose and the finished product is a thing of beauty. Unlike some other furniture model receivers, that are adaptations of phonograph cabinets, all of these instruments are designed to be controlled with the operator in the position that is most convenient for him.

Aids Greatly in Sharp Tuning

THE A. C. Hayden Radio & Research Co., Brockton, Mass., have recently put on the market at a very reasonable price a "knocked-down model" of their A. C. H. receiver. These people do not at the present time deal in completed sets, rather furnishing the prospective owner with the best of parts, including their A. C. H. sharp tuner dials to make up the circuit that they have found best. There are three types furnished, one with detector, one with detector and one stage and one with detector and two stages of audio-frequency amplification.

Of special interest to the fan who desires real sharp tuning in the operation of a receiver are the special dials made by this firm and featured as their main line. By means of a special gearing and locking arrangement extremely accurate and fine tuning is possible and after the tuning is accomplished a turn of a locking knob prevents the disturbance of the control, the instrument being positively locked and no movement being possible.

The fine tuning allows a turn of 1/1000 of an inch of the dial periphery which, when considering that the dial is either three or four inches in diameter is extremely small. Another point of interest is that the dial proper is divided into just twice as many divisions as the regular dials and much better chartings of the stations may be had. There is also a grounding arrangement on the dials, which are brass backed and insulated from the shafting, whereby each instrument may be shielded separately from body capacity, obviating the necessity of shielding the panels.

Increased Radio Business Expected This Fall

EDITOR, RADIO WORLD: We look for a materially increased volume of radio sales this fall. Whether this will be 100 per cent. over last fall's business is a question of the amount of optimism in each one's make-up.

Yours very truly,
GEORGE J. ELTZ,
Radio Sales Manager.
Manhattan Electrical
Supply Co., Inc.,
New York City.

Radio Trade Association Meetings

TWO very interesting meetings of the Radio Trade Association have been announced for October 9th and 10th, to be held at Grand Central Palace, beginning at 3 o'clock each day. Speakers covering every shade of the radio industry will be heard. Tickets and detailed information may be secured from the secretary of the association, 1133 Broadway, New York City.

Radio Patents Crowded Out

OWING to pressure on the reading columns of this issue, the summary of radio patents is omitted but will appear as usual in next week's RADIO WORLD.

Radio Literature Wanted

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

Pottstown Radio Supply Co., C. A. Cadwell, High St., Pottstown, Pa.
George Burton McLeester, 132 Fellsway West,
Virgil Henthorn, 142 Fourth Ave., Paden City, W. Va. (Retailer.)
Wm. Merk, 312 Third St., San Rafael, Calif.
R. R. Thomas, 227 Laurier Ave. West, Ottawa, Ontario, Canada.
Medford, Mass.
M. H. La Baw, Hamilton Square, Trenton, N. J.
George Lawrence, 2441 Seventh Ave., New York City.
F. J. Hoffmann, 462 Hanover St., Milwaukee, Wis.
Maitland & Spencer Roach, radio consultants, 2905 Columbia Ave., Philadelphia, Pa.
Mark J. Newell, 119 Amity Court, Scranton, Pa.
John W. Dixon, engineer, radio station, Apia, Samoa.
E. A. O'Connell, 34 Portage St., Westfield, N. Y.
Arthur G. W. Spurgeon, R. R. 1, Pekin, Ind. (Builds sets.)
David J. Morris, Rosehill Farm, Weir, Texas. (Distributor and retailer.)
Chas. E. Ryan, Box 15, Mannington, W. Va.
E. W. Strickland, 715 North 22nd St., Salem, Oregon.

An Excellent Text Book

THE text book, "Radio Frequency Amplification—Theory and Practice," published by the Radio Guild, Inc., 256 West 34th street, New York City, written by Kenneth Harkness with an introduction by Henry Smith Williams, comprising 176 pages neatly bound in a heavy mottled flexible cover is, to say the least, a surprising volume.

The author has taken nothing for granted. Assuming that the reader knows nothing of the theory of either electricity or radio, he has gone by easily understandable and intensely interesting steps from the first lesson on the elementary laws of electricity up to the principle evolved in the latest of radio frequency receivers, the neutrodyne principle of amplification. Each statement he makes is founded on absolute laboratory experiments and profusely illustrated with graphs and formulae, which are explained in a simple, straightforward, understandable manner. Nothing is taken for granted and the author is not cut and dried. He illustrates his statements by comparisons with every day occurrences.

It is a book that the average man can read, and if he does his reading intelligently will understand the theory of radio perfectly, even to the figuring out of some of the most complex radio formulae and problems. If after reading the volume and absorbing its ideas the reader cannot figure out to a fraction just why his set does not tune sharply, or why a certain interference is caused, the best physics or electrical teacher in any of the colleges would have a hard time instructing him.

The book has 175 fine illustrations, both diagrammatic and photographic, and is an excellent book for the amateur and novice. Even the experienced operator will find plenty of matter to interest him within its covers.

FIL-KO-STAT CONQUERS DISTANCE

SHUTS OUT NOISE

Full Resistance 30 Ohms

Takes the place of other rheostat or filament control without re-drilling holes in panel.

PUT A FIL-KO-STAT ON YOUR SET TODAY. You will hear stations you believed to be far beyond its range. You will get greater distance! Louder signals! Finer adjustment! NOISELESS OPERATION! *A. S. Allsup, of Kansas City, writes, "Since using my Fil-Ko-Stat I have picked up 5 stations I never heard before."*

The FIL-KO-STAT is the filament control of INFINITE adjustment, with a fine adjustment area 18 times greater than a wire rheostat, and several times greater than the next best filament control.

There are no screws to tamper with on the FIL-KO-STAT. No wires! No discs to chip or break! No adjustments to puzzle! Triple tested and adjusted at the factory to the ideal "off" for UV200, 201, 201A, WD11, WD12, UV199, DV6A, W. E. Peanut and *all* other tubes including 5 watt transmitting tubes. Hailed by amateur and professional radio men as the greatest step forward in the development of the tuning possibilities of the vacuum tube.

FIL-KO-STAT supremecy is proven by every test!!

Price $2 *In Canada* $2.75

Recommended and sold by dealers in high quality radio supplies.

MADE AND GUARANTEED BY DX INSTRUMENT CO. HARRISBURG, PA.

RADIO STORES CORPORATION
SOLE INTERNATIONAL DISTRIBUTORS
Dept. RW 106 218-222 West 34th Street New York

You Will Want This Book

Send 10c for "Radio Pocket Reference" by W. G. Merritt Garvey (of New York World Radio Staff), tables, 17 hook-ups, diagrams, etc. Reading this interesting book, we discovered that Mr. Garvey recommended the FIL-KO-STAT for fine filament control. We bought an edition of these books, and will send a copy anywhere at handling cost of 10c.

Band Contest by Radio

WHAT purposes to be the biggest nation-wide contest ever held will occur on Monday evening, October 15, when twenty-nine United States postal bands in the principal cities will hold a radio concert contest. This was decided at the convention of the National Letter Carriers' Association held last week at Providence when Emory Johnson, the motion picture producer and the Film Booking Offices of America offered a cash prize of $500 and a beautiful silver cup to the best mail man band in America.

With the decision to hold the contest radio was immediately accepted as the best means of reaching the public for their decision. In the United States there are twenty-nine large postal bands scattered from the Atlantic to the Pacific Coast. The plan calls for the concerts to be held on Monday evening, October 15th simultaneously all over the country.

Ballots will be printed in the radio sections of daily newspapers and in addition to this over a million and a half ballots will be distributed by letter carriers to people on their various routes who own receiving sets.

The names of each band and the station they are broadcasting from will be printed on the ballot so that it will be possible to tune in on three or four different concerts before the contest finishes. The ballots are to be returned to the listeners' mail carrier who will forward them to the Film Booking Offices where they will be counted.

Two weeks will be allowed to count the votes and the winners will be announced by radio on the evening of November 1st.

The $500 cash will consist of three prizes. The first will be $300 and to the first prize winner will also go the cup. The second prize will be $150 with $50 as the third. An unusual amount of interest is centering around the contest.

RADIO WORLD

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SUBSCRIPTION RATES

Fifteen cents a copy. $6.00 a year. $3.00 for six months. $1.50 for three months.
Add $1.00 a year extra for foreign postage. Canada 50 cents.
Receipt by new subscribers of the first copy of RADIO WORLD mailed to them after sending in their order, is automatic acknowledgment of their subscription order.

ADVERTISING RATES

One page: One time—$150.00.
Half, Quarter, Third and Two-thirds pages at proportionate rates.
One inch, one time—$5.00. Per agate line $0.40.
On four consecutive issues, 10% discount.
On thirteen consecutive issues, 15% discount.
Cover and preferred-position rates made known on application.
Terms: 30 days net. 2% 10 days.

CLASSIFIED ADVERTISEMENTS

Five cents per word. Minimum, 10 words. Discount of 10% on 4 consecutive issues—15% on thirteen consecutive issues. Cash with order.

Entered as second-class matter, March 28, 1922, at the Post Office at New York, New York, under the act of March 3, 1879.

IMPORTANT NOTICE

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

Electroplating Iron on Iron

A NEW process of electroplating, the culmination of experiments begun during the World War, has been perfected, so that it is now possible to build up worn or scarred or under-size machine parts in such a way that the new metal is firmly joined to the old, and of any hardness or toughness desired.

The electrolytic depositing of iron upon other metals dates back to 1860, at which time the Russian Government printed bank-notes from iron electrotypes, but the electroplating of iron upon iron was first seriously attempted during the war, when the wear and tear on countless machine parts, and the waste of many new parts that did not come up to the required size, made the repair and restoration of such parts of the utmost importance.

The most recent development of the process, which involves the use of a ferrous ammonium sulphate bath as the electrolyte, has solved what difficulties remained, and more than six thousand machine parts produced by it have successfully undergone severe tests.

Motor shafts, airplane propeller hubs and other machine parts designed for wearing service have been built up with new metal and have shown strength and endurance.

Music Publisher Will Boost by Radio

FRED FISHER, Inc., New York, music publishers, announce a new department, to be known as the Fred Fisher Radio Department. This part of the Fisher business will do nothing but push the Fisher songs at the various broadcasting stations throughout the country. Mr. Will Warner will be in charge of the new radio department.

New Broadcasting Station, Cleveland

THE first program of the Willard Storage Battery Company's new broadcasting station at Cleveland went on the air on September 26th. Permanent call letters have not yet been assigned to the new station.

On a wave length of 390 meters this company, one of the largest and best known manufacturers of automobile and radio batteries in the country, will broadcast its programs from one of the most powerful stations yet built. No expense has been spared in securing the most up-to-date equipment for transmitting.

On a six-acre lot adjoining the large Willard plant, the new station has erected a substantial building and two giant towers. Separate rooms in the building house the transmitting equipment, storage batteries, reception hall and studio, with commodious dressing rooms for the artists who will entertain the invisible audiences.

Two unique features of the Willard station are that its power for transmission is supplied exclusively by storage batteries and that no moving machinery is in or near the station. Even the machinery for the control of ventilation is remotely situated from the building. Huge racks of storage cells provide the 2,500 volts required by the 750 watt transmitter.

An unusual form of aerial is employed especially designed to eliminate static interference. The antenna consists of 12 wires in a double cage of six wires each. This aerial has a span of 250', with a weight of approximately 400 pounds. It is suspended at a height of about 138 feet between the two 140 foot towers, which are constructed of 4" angle iron to a height of 112', the remaining distance being covered by 38' masts of wood. Stranded steel guys, with numerous strain insulators, are set into concrete piers for back bracing, and the legs of the towers are deeply seated in more massive piers of concrete.

A counterpoise, 60' wide and 250' long, is supported by 6" I beams 12' tall immediately beneath the spread of the aerial. This counterpoise is composed of 12 250' lengths of antenna wire spaced 5' apart.

This station is ideally located for perfect transmission. Eight miles from the business center of Cleveland and one-half mile from Lake Erie, there is no disturbing element to mar its transmission. It is more than a quarter mile from the nearest electric car line, minimizing a factor which is often troublesome to broadcasting stations.

All equipment of the station, with the exception of the transmitting apparatus was made by the Willard Battery Company from plans and specifications made by S. E. Leonard, radio engineer of the company. Mr. Leonard will operate the station. L. G. Baldwin, radio sales manager, has charge of programs. A. R. Herske will be the announcer.

DON'T LOSE A SINGLE NUMBER

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

Music Publishers Are Only "An Aggressive Minority"

IN connection with the letter sent out on August 18th by the American Society of Composers, Authors and publishers, it is interesting to note an article appearing in the issue of "Billboard" of the same date, a theatrical magazine patronized freely by members of the American Society, describing their victory over Station WOR and concluding as follows:

"The decision has been hailed with considerable interest throughout the music industry, as well as the ranks of composers and authors, for it means that additional revenue amounting to half a million dollars a year will roll into the American Society of Composers, Authors and Publishers within a short time."

How is this sum arrived at? Can this be the formula: 500 radio stations times $1,000 (average) equals $500,000? And how much will the large stations be taxed in proportion to the small stations? What inducement can be made to get everyone in now? Can the answer be the quoting of low prices for licenses—honey to catch the fly? After all are in how soon and how much will they be raised? And hurry up before broadcasters discover the American Society should in reality pay them for the privilege of advertising music?

Some of these questions must be occurring to the able management of the American Society of Composers, Authors and Publishers, now that they have their favorable radio decision.

What is this American Society of Composers, Authors and Publishers? They may be termed "an aggressive minority" because:

They have 33 publisher members out of a known list of over 1500.

They have 253 author and composer members out of a known list of over 5000.

Very few radio stations have been impressed by the claims of the American society. If there were no association of broadcasters to stand between the American society and broadcasting stations, there would be an expensive bill to be paid by someone, and not more than one guess is needed as to who this "someone" would be.

Mr. Redmond's Unique Cage Aerial

EDITOR, RADIO WORLD: I note with considerable interest that you have published a photograph on the front page of your weekly of the new cage which has been erected on the Bush Building, London. This photograph appears on the front page of the July 28 edition of RADIO WORLD. I also have been informed that an article, which would interest me, has been published in the August 25 edition.

It was indeed a surprise to find a picture of my cage on the front page of your magazine, as I had no idea at the time I erected this cage that so much interest would be displayed. The cage itself is a new departure from the usual manner of building and does not agree in any way to theories put forth by mathematicians who are interested in the building of cages. The construction is composed of 2-inch iron pipe and the wire with which the cage is wound is protected by rubber hose from the iron work. The wire used is rubber-covered, waterproof gauge 7-42. You will note that the supports consist of 4-inch x 4-inch oak beams mounted on ball-bearing rollers. Directional effect can be obtained by rolling the entire cage to any position desired. The weight of the cage and mountings and the width, resists high winds and it is only necessary to block the rollers to keep the cage from moving. A cage of this kind is particularly useful in obtaining direction effects for flat top buildings and does away with unsightly aerials and masts. The frame-work of the cage is grounded and the effect of the iron work upon incoming signals is negligible.

The signals from Annapolis received with this cage are very strong and the operators have no difficulty in using a typewriter when copying.

Yours very truly,
R. H. REDMOND.

Bush House, Aldwych,
London, E. C. 2, England.

DO YOU WANT TO BUY, SELL OR EXCHANGE RADIO OR OTHER GOODS? TRY THIS DEPARTMENT AT 5c A WORD

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

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

MAGNAVOX TYPE R3. Latest nationally advertised reproducers. List $35. Introductory offer, $25. The factory sealed carton is your guarantee. Radio Central, Dept. W, Abilene, Kansas.

15c. LETTERED BINDING POSTS, complete set eight, 60c; two sets, $1.00. Prepaid, same day. Stamps accepted. Everything in radio. Ask for quotations. List for stamp. Kladag Radio Laboratories, Kent, Ohio.

GENUINE EDISON ELEMENTS (new) for making "B" Batteries. Obtained from U. S. Government. A positive and negative element—6c.; glass tube—3c; all other parts at reasonable prices. Postage, etc., 50c. extra per order. Free instructions. TODD ELECTRIC COMPANY, 103 West 23rd Street, New York.

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

LONESOME! MAKE NEW AND TRUE FRIENDS. Confidential. Write DOLLY GRAY AGENCY, Box 186B, Denver, Colo.

MAGNAVOX R3 or M1. Latest nationally advertised reproducers. List $35. Introductory $25. The factory sealed carton is your Guarantee. Radio Central, Dept. W, Abilene, Kansas.

BROADCASTERS APPRECIATE THANKS for free entertainment furnished. Our "Radio Applause Cards" make this convenient. Just mark them ballot style, address and mail. 20 for 25c.; 50 for 60c.; 100 for $1.00, postpaid. Stamps not accepted. ERNEST F. DOW, West Newton, Mass.

TRIPLE CIRCUIT, ATWATER-KENT REGENERATOR—including bulb and phones ($40.00). Also slightly used $48.00 loud speaker ($25.00). Tubes, Transformers, Rheostats, Sockets and Variable Condensers. Cheap. Write for prices. ROBERT REED, Corning, N. Y.

CHEMICAL WONDERS—Secrets and Mysteries fully explained. New Book, 10c. 150 Funny Parodies on latest songs, 25c. R. W. COLLINS CO., 197 Fulton Street, Brooklyn, N. Y.

VACUUM TUBE RESULTS FROM A CRYSTAL SET! A "PT" Ultra-Sensitive Contact will increase the range and audibility of your crystal receiver. The most sensitive catwhisker in the world. It will not jar out. Thousands in use. Record, 1,000 miles on phone; 3,3000 miles on spark. Price twenty-five cents in coin. "PT" CRYSTAL CONTACT COMPANY, BOX 1641, BOSTON.

STOP EXPERIMENTING—GET RESULTS with circuit used in leading WD11 tube set on market. Paragon of simplicity in design and construction. Circuit and specifications, 50c. OKAYED SUPPLIES CO., ELWOOD, IND.

THE SHEBOYGAN COIL tunes sharper than any other. Only the turns needed are in the circuit—no dead ends. It can be made in tube, spider-web or any other form. Fine for loading. Drawings sent for $1.00 M. O. E. GUEHNA, 118½ North 8th Street, Sheboygan, Wis.

EVERY RADIO FAN should have these two books, "101 Receiving Circuits" and "Six Successful Receiving Sets." By M. B. Sleeper. They are the most up-to-date radio books for the fan who likes to make his own, and will help you out and save you many times their cost. Both books are full of illustrations. Price, 50c. each, with 10c. extra for postage, or both for $1.00 sent postpaid. COLUMBIA PRINT, 1493 Broadway, New York City.

STANDARD ELECTRICAL DICTIONARY—By Prof. T. O'Conor Sloane. Just issued an entirely new edition brought up to date and greatly enlarged. Price, $5.00. The Columbia Print, 1493 Broadway, New York.

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EXCHANGE JOLLY, INTERESTING LETTERS THROUGH OUR CLUB. Betty Lee, Inc., 4254 Broadway, New York City. Stamp appreciated.

MOTORCYCLES AND SIDECARS—Their Construction, Management and Repair.—By Victor W. Pagé. Describes fully all leading types of machines, their design, construction, maintenance, operation and repair. Shows all new improvements in motorcycle construction and gives the most complete instructions ever published for starting, driving and repairing all types of motorcycles. There is a complete exposition of modern starting methods and a full explanation of the operating principles and repair of the new automatic electric lighting systems. The care of the generator, storage battery, automatic cut-out and other parts is clearly expounded. All types of change speed gears and clutches are fully outlined, also full instructions for their use. A complete new chapter has been added on the thorough overhauling and repairing of motorcycle engines, all processes are fully described and illustrated. The reader is told what parts wear, how to detect depreciation and how to make all repairs and adjustments necessary to make the engine as good as new. 693 pages, 371 illustrations. New Revised and Enlarged Edition. **Price, $3.00.** THE COLUMBIA PRINT, 1493 Broadway, New York City.

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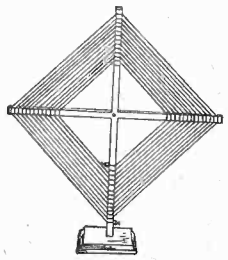

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.0005, .00025, made with ½, 1 and 2 Megs G. L.	25c.

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Brings you our new catalogue and radio information booklet illustrating and describing the Super-Regenerative and other latest and popular circuits. Our technical staff is at the disposal of our customers. Make use of their knowledge. Merchandise shipped immediately on receipt of order.

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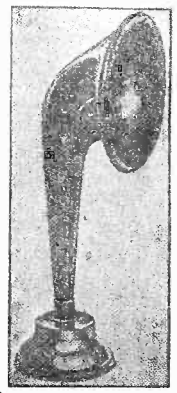

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Just What Major White Said in Reporting the Big Fight by Radio

MAJOR J. ANDREW WHITE, the veteran radio reporter of boxing bouts, had a ringside seat at the recent Dempsey-Firpo melee at the Polo Grounds, New York City, and gave a blow by blow account of the battle to thousands of listening fans through Station WJZ.

This was the roughest, toughest and shortest heavyweight bout on record.

The pace was so rapid, knock downs so frequent and events so crowded each other, that radio fans got only a general idea of what was going on and the final result. As a reminder of what they heard, radio fans are given below a stenographic report of exactly what Major White said:

"Dempsey enters the ring smiling nervously. He appears to be tense and looks down at the referee. Firpo receives translation of referee's instructions. Firpo, towering above Dempsey, shakes hands with him.

"The men are in the center of the ring.

"Dempsey leads, but misses. Firpo gives a return blow, but misses. Dempsey sends a left to Firpo's ribs. Dempsey blocks Firpo.

"Firpo down—one! He's up! Dempsey down for the count of three. Dempsey steps forward and knocks Firpo down for a count of nine.

"Firpo gets up and is bleeding considerably from the mouth.

"Firpo down, one, two, three, four! He's up, only to be knocked down again for a count of five.

"Again Firpo is knocked to the floor, one, two, three, four, five, six.

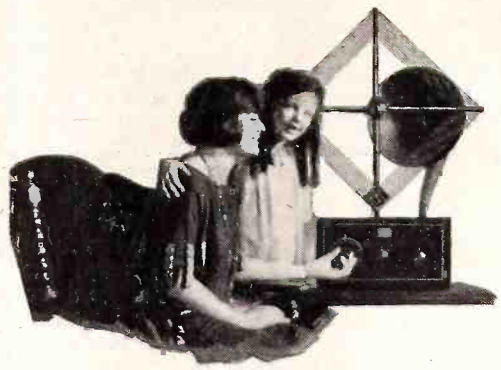
"Dempsey appears to be very cool. Firpo's face is nothing but a mass of red.

"Wow! Dempsey is knocked through the ropes, but quickly jumps to his feet. They clinch! Firpo sends a right and left to Dempsey. Dempsey appears to be tired. Firpo seems to be very tired, too.

"The bell has just rung, and apparently the round seems to be nobody's. Firpo being knocked down four times and Dempsey twice.

"The gong sounds for the beginning of the second round. The men meet in the center of the ring. They clinch. Dempsey gives Firpo an uppercut, another, and a stiff blow under the heart. Firpo is down once more. The referee counts to five. Dempsey leads a powerful left to Firpo's body and Firpo goes down. One, two, three, four, five, six, seven, eight, nine, ten! Firpo is knocked out! Jack Dempsey is still the heavyweight champion of the world."

Back numbers of Radio World supplied at regular price of 15c. a copy. Any 7 copies for $1.00. Radio World, 1493 Broadway, New York.



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