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EVERY WEEK

MARCH 1

1924

RADIO WORLD

Title Reg. U. S. Pat. Off.

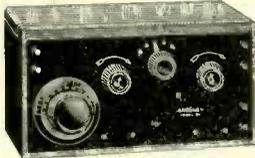


Miss Bird Millman, champion tight-wire walker, balances herself 25 stories above the New York streets and listens in on a portable radio set. Woolworth Building in background.—(C. Kadel & Herbert.)

BROADCAST PROGRAMS FROM FAR AND NEAR

Crosley Again Astounds *the* Radio World

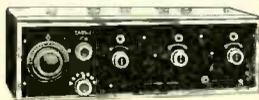
*Greatly increased production allows lowered prices
New Two Tube Regenerative Set at \$18⁵⁰*



Crosley Model 51
New Two-Tube Armstrong
Regenerative
Price Only.....\$18.50



Crosley Model VI
Former Price.....\$30
Present Price.....\$24



Crosley Type 3-B
Former Price.....\$50
Present Price.....\$42

Ever since we started making radio apparatus it has been our fixed policy to offer to the public the best possible receivers at the lowest possible cost. That this policy has been appreciated is proven by the fact that a shortage of Crosley radio apparatus has existed at all times, although The Crosley Radio Corporation has been producing more radio receiving sets than any other organization in the world. Heretofore constantly added improvements have forced us to maintain steady prices, but so great has been the response of the public for Crosley instruments that greatly increased production allows us to lower the price of the entire line and still maintain our constant research for improvements.

As an astounding example of the results of this research,

we now offer a new and wonderful two-tube receiver, consisting of Armstrong regenerative detector and one stage of audio frequency amplification, giving loud speaker volume on local stations at all times and on distant stations under fair receiving conditions. Otherwise head phones should be used for distant reception. This instrument, known as the Crosley Model 51, sells at the remarkably low price of \$18.50. It has been thoroughly tested in our laboratories, and its satisfactory performances have even surprised us.

Other Crosley instruments are well known. Their exceptional performances have given pleasure to hundreds of thousands of people in all parts of the United States. Note the following price reductions on these well-known Crosley receiving sets:

CROSLEY TYPE V, single tube Armstrong regenerative receiver, the same instrument used by Leonard Weeks in Minot, North Dakota, in his established communication with the McMillan expedition at the North Pole, formerly \$20.00, now reduced to \$16.00.

THE CROSLEY TWO-STAGE AUDIO FREQUENCY AMPLIFIER to match the Crosley Type V, formerly \$20.00, now \$18.00.

THE CROSLEY MODEL VI, two-tube receiver incorporating radio frequency amplification and detector, formerly \$30.00, now \$24.00.

THE CROSLEY TYPE 3-B, a three-tube Armstrong regenerative receiver, consisting of detector and two stages of audio frequency amplification, in a beautiful solid mahogany cabinet, formerly \$50.00, now \$42.00.

THE FAMOUS CROSLEY MODEL X-J, a four-tube receiver, consisting of one stage of radio frequency amplification, detector and two stages of audio frequency amplification, probably the biggest selling radio receiver in the world, formerly \$65.00, now \$55.00.

THE CROSLEY TYPE 3-C, a three-tube Armstrong regenerative console model with built-in loud speaker, formerly \$125.00, now \$110.00.

THE CROSLEY MODEL X-L, a four-tube set, consisting of one stage of radio frequency amplification, detector and two stages of audio frequency, formerly \$140.00, now \$120.00.

It is our firm belief and hope that these new lowered prices will enable every family to enjoy the benefits in pleasure and education that only the radio can give. Take advantage of this astonishing announcement. Choose a Crosley Radio Receiver today.

For Sale by the Best Dealers and Jobbers Everywhere

The Crosley Radio Corporation

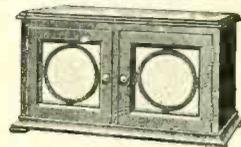
POWEL CROSLEY, Jr., President
Formerly Called

The Precision Equipment Company and Crosley Manufacturing Company
3401 ALFRED STREET CINCINNATI

Crosley Regenerative Receivers are manufactured under
Armstrong U. S. Patent Number 1,113,149



Crosley Type V
Former Price.....\$20
Present Price.....\$16



Crosley Type 3-C
Formerly \$125
Now 110

Crosley Model X-L
Formerly \$140
Now 120



Crosley Model X-J
Former Price.....\$65
Present Price.....\$55

CROSLEY

Better-Cost Less
Radio Products

RADIO WORLD

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

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A Ringing System for Radio Telephony Remarkable Radio Selective Signaling Plan Described

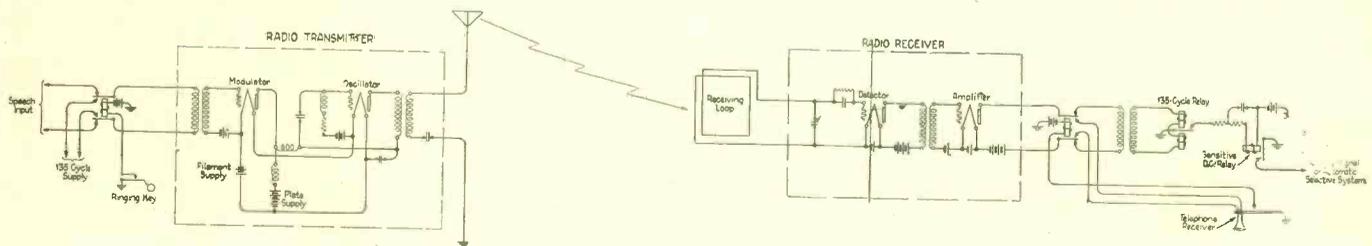


Fig. 1—Simplified diagram of basic system for 135-cycle signaling.

WITH the increased application of the telephone in the administration of business, demand will come for connections with various kinds of ships. Obviously the radio telephone must be resorted to for such connections and it will be desirable to have it function as nearly as possible like the ordinary line telephone.

It will be very desirable in many cases not to have a ship operator in attendance at all times, but instead be able to signal him by some device such as a ringing bell. It is furthermore advantageous to be able to call one station without signaling others. A design which meets these requirements has been produced by the Bell System engineers.

This design functions much the same as the ringing methods used on the wire telephone lines now extensively employed for despatching trains. This meth-

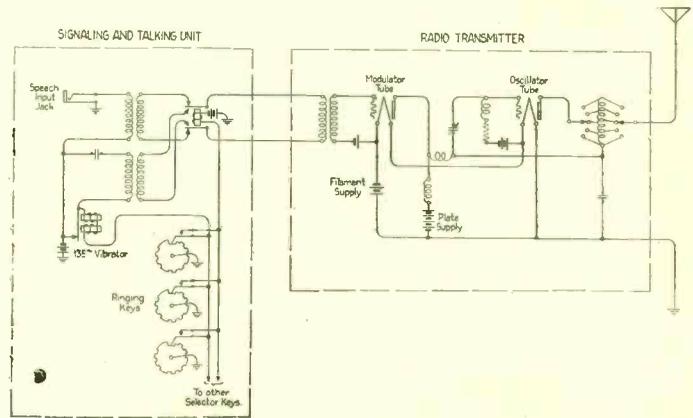


Fig. 2—135-cycle selective signaling system. Circuit arrangement of transmitting apparatus.

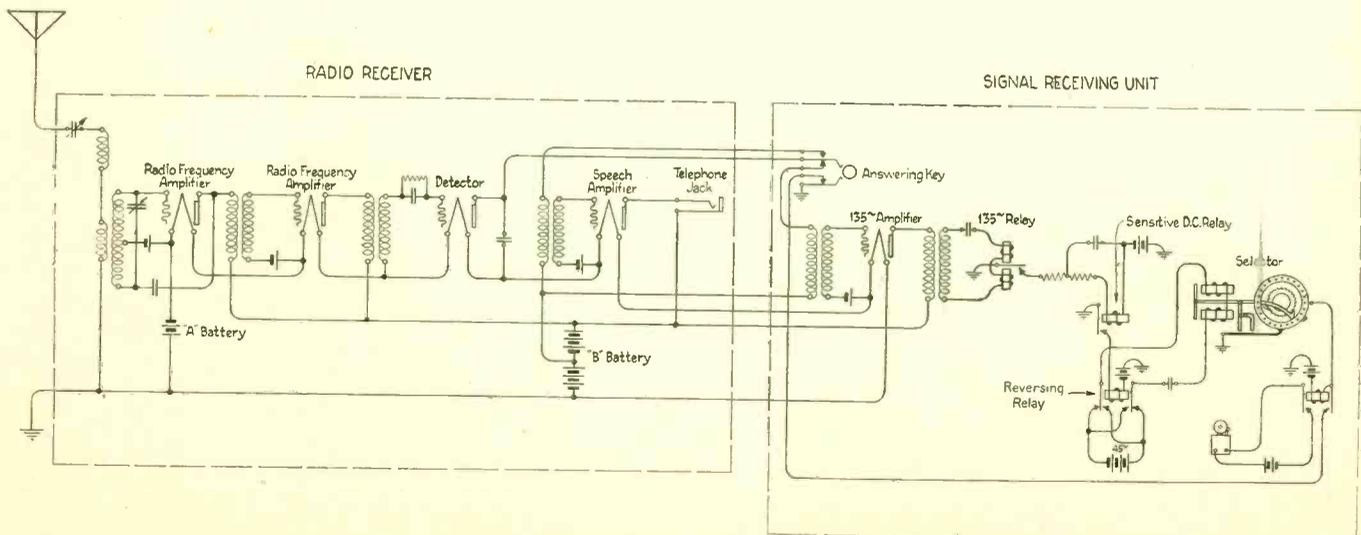


Fig. 3—135-cycle selective signaling system. Circuit arrangement of receiving apparatus.

od is now designed to include about seventy-five stations in a single system.

The essential features of this system were set forth in a paper by C. S. Demarest, M. L. Almquist and L. M. Clement, which was read before the midwinter convention of the American Institute of Electrical Engineers, held recently in Philadelphia. The authors stated that with their system, ordinary types of radio transmitting and receiving devices may be used, without modification. They claim a high degree of freedom from interference either static or I. C. W. telegraph. This point was demonstrated in tests in which it was found that radio telegraph signals similar to those from I. C. W. or spark transmitters would cause the received speech to become unintelligible when the energy level of the interference was only 20 or 30 per cent of that required to cause the signaling system to fail.

The reliability and range of operation of this system are due in a large measure to the characteristics of the particular type of alternating current relay used. This relay is unusually sensitive, as it will operate

on as little power as 30 microwatts corresponding to a current of about 0.25 milliampere.

Fig. 1 shows this scheme in its simplest form which may be made to serve as the basis for a variety of systems, suited to different purposes. As seen in this diagram, the outgoing signal is produced by applying an alternating current of a particular frequency to the radio transmitter in the same manner as the speech currents are applied. Modulation of the radio carrier wave at the signaling frequency results. In this particular system the signaling current frequency employed is 135 cycles.

At the receiving end of the radio carrier wave, modulated by the signaling current, is detected in the radio receiver in the usual manner. The output of the detector thus includes a component similar to the signaling current originally sent into the radio transmitter at the outgoing end.

The received signaling current is sent into the alternating current relay shown in Fig. 2. This operates a very sensitive system of D. C. relays which in turn send certain impulses into a device known as a selector and indicated in Fig. 3. Though many combinations of impulses may be sent into this selector, only one will actuate it so as to ring the local annunciator bell.

The selector consists essentially of a polar relay with a ratchet attachment so arranged that successive operations of the relay, at the proper speed, cause the stepping around of a contact wheel. Stop-pins are provided at certain points to prevent the contact wheel from returning to its normal position when the regular sequence of stepping is interrupted at these points. Any interruption of the regular sequence of stepping when the contact wheel is at any other point causes it to release. When the contact wheel has operated over 17 steps a contact is made which operates a signal. Thus, it is seen that to operate the selector so as to give a signal, the direct current pulses must occur in the proper sequence and the pauses between the groups of pulses must occur at points where stop-pins are located.

In Fig. 4 the system is shown arranged for two-way operation. This embodies a duplication at both ends of the features of the one way system. With such an arrangement any one station of a number operating on a given wave length may signal any other station in the same system without calling in stations not desired.

Fig. 5 shows a typical assembly arrangement for panel mounted radio receiving and signaling apparatus on a standard rack.

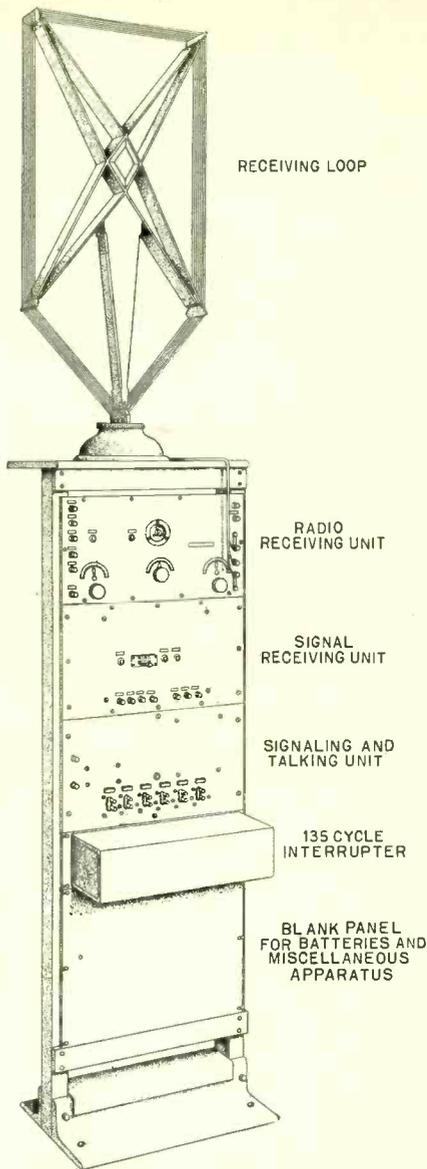


Fig. 5—Typical assembly arrangement for panel mounted radio receiving and signalling apparatus on standard rack.

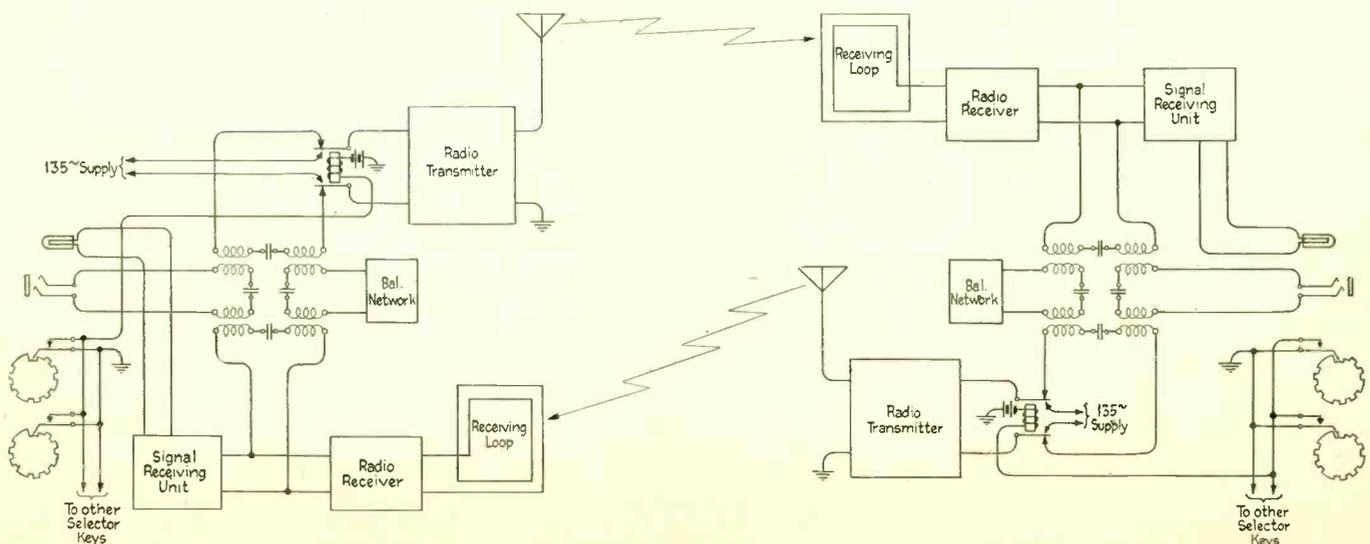


Fig. 4—Simplified diagram of the two-way radio system arranged for automatic selective signaling.

Solving the Apartment House Antenna Problem

ONE of the big reasons why radio is sometimes restricted in congested districts is that the owners of apartments refuse to allow more than a certain number of antennae to be erected. In some cases they will not allow any.

However, with an idea of allowing the use of more than one set on a single antenna, the Radio Division of the Navy Department sought to find out just why more than one set could not be efficiently operated on a single antenna without causing undue trouble, due to de-tuning of one receiver by the manipulation of a second or third receiver.

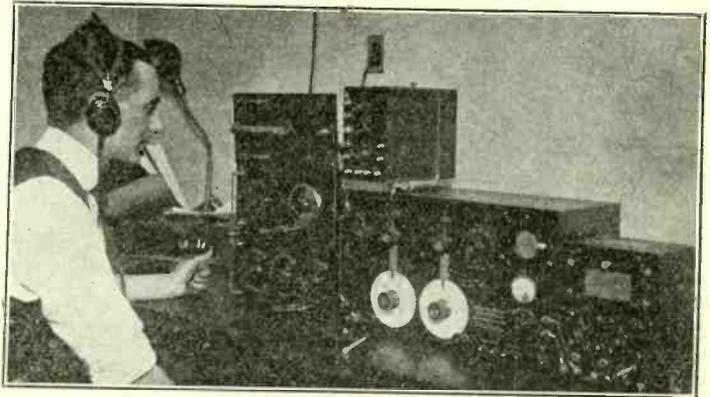
A solution of this problem was finally found, much after the manner of the resonance coil antenna. The apparatus is herewith shown, with several sets operating on one single wire antenna. The specific apparatus used is not ready for publication just yet, due to lack of information about it outside of official circles. However, it is stated on information furnished by sources that are supposed to be reliable, that this device will work to perfection on five or more receivers, and it is also stated that the type of receiver does not matter in the least.

The device is shown in the accompanying illustration, hooked up to different types of receivers, two of which are regenerative sets. It is located on the left hand side of the receivers and is labelled "SE1970 Coupling Resistance Panel."

The device was perfected primarily for use on battle-

ships of the navy, to permit the use of one antenna for all the receivers used on board, so that the rest of the several antennae could be used for the transmitters, without the trouble of switching from sending to receiving.

This apparatus will no doubt fill a long felt want in the field, as most apartment house roofs are at the present time so encumbered with wires stringing this way and that that they resemble a trap, and many tenants are prevented from using a set mainly because they cannot erect another wire on the roof.



Research engineer of the Naval Radio Laboratory testing the new coupling device that allows the using of one antenna for several receiving sets. Note that two of the receivers used are regenerative. It is claimed that this does not affect the device in the least, nor the operation of any of the sets.

Great Gathering of Amateur Radio Operators Will Meet in New York March 3-7

By E. Laufer

THE greatest gathering of radio amateurs New York City has ever seen will meet March 3-7 inclusive for the fourth annual amateur convention and radio show under the auspices of the Executive Radio Council, Inc. The convention will be held at the Hotel Pennsylvania.

The First District, which comprises the New England states and the Third and Eighth District, which take in upper New York, Pennsylvania, New Jersey, Delaware, Washington, D. C., etc., will have delegates present.

Everyone of the affiliated clubs of the Executive Council will have a booth at the show. The interesting, instructive and novel exhibits by the various clubs are well worth going to see. These give the layman an excellent opportunity to talk with experienced radio men. The membership of most of these clubs includes a great many laymen and advanced broadcast listeners.

In conjunction with the convention there will be a radio show at which more than fifty of the world's best manufacturers will exhibit their latest in the way of new apparatus. Many devices will no doubt be on view for the first time. A large lecture room has been set aside and some of the most prominent men in the radio world are scheduled to talk. The speakers will include such men as Major Armstrong, Paul Godley, K. B. Warner, secretary of the American Radio Relay League, and Professor Hazeltine.

The annual banquet will be spread the evening of March 5. Excellent speakers, good entertainment and a fine time is promised all those who attend. The awards for various contests will be presented on this night.

The first New York initiation of the Royal Order of the Wouff-Hong, a secret amateur radio organization, will be held the night following the banquet. In a short time this famous organization has grown to a membership of many thousands who carry out principles that incorporate the most solemn of amateur traditions.

The Executive Council, which is composed of delegates from practically every radio club in New York and New Jersey, has as representatives the most influential and important amateur radio men. Under their jurisdiction and with the full backing of the radio inspector and the Department of Commerce, it has enforced local operating rules and co-operated with the American Radio Relay League in every way.

The council has policed the air to maintain the nightly quiet period between 8 and 10:30 P. M. and it has secured a better cooperation between amateurs and listeners in New York and vicinity.

Tickets for the banquet and full admission to the show, as well as reservations, may be obtained by writing to the offices of the council at 120 Liberty Street, New York.

Shall Amateur License Fee Be Charged?

By Carl H. Butman

(Copyright, 1924)

WASHINGTON, D. C.—The question of whether or not commercial and amateur radio operators should be licensed by the government is very likely to come up in connection with Congressman White's bill to regulate radio communication. Like the former bill, which did not pass last year, the new bill, it is understood, will require that existing regulations for the licensing of all operators be continued and in addition that fees be established, whereas no fees are charged today. Since the question affects over 18,000 amateurs, about 6,000 commercial operators, and a large percentage of the public, an outline of the situation, with some of the pros and cons, follows:

Certain governmental officials, acting for what they believe the best interests of the government and public, seek to abolish the present requirements for both commercial and amateur licenses, which they claim are unnecessary, making unnecessary work for the Department of Commerce and its inspectors. Transmitting station licenses for commercial, ship and shore stations and amateur stations, they believe, are necessary and adequate, as far as the government need concern itself. The ship operators, commercial station owners, and amateurs possessed of transmitting stations, they claim, would see to it that regulations were observed and proper operation maintained. Locomotive engineers do not have operating licenses, even though handling trains filled with people, they point out, explaining that the railway companies are responsible in case of accidents, and sufficiently interested in efficiency to keep only skilled and experienced men at the throttles. It is also shown that the navy and Signal Corps operators are not subject to regulations and requirements for commercial or amateur operators, the two government departments being responsible. In this connection, it will be recalled that these two services protested violently a year ago when the proposed radio bill threatened to require that their operators be subjected to the regular commercial examinations. They won out. Naval and army radio operators are not required to take the Commerce Department's standard examinations, except when they enter commercial service. Many examples are given by those who advocate the abolition of the operators' examinations, of lack of government control where the safety of the public may be at stake, some even citing that the Steamboat Inspection Service is unnecessary.

On the other hand, other government officials insist on the necessity of standardized commercial and amateur examinations and licenses in the interest of efficiency, safety of life at sea and the minimization of radio interference. One of their chief defenses is that it is in accordance with the international agreement, especially on ship stations. Article X, of the International Radiotelegraph Convention, London, 1912, they explain, provides:

"That service of the station on shipboard shall be carried on by a telegraph operator holding a certificate issued by the government to which the vessel is subject, or, in case of necessity and for one voyage only, by some adhering government."

The regulations go further, prescribing two classes of certificates and specifying the requirements of operators. Our own national law now requires that each ship carrying fifty or more passengers must be radio-

equipped and supplied with two or more skilled operators.

If the question comes up in the forthcoming public hearings, officials of the radio section of the Department of Commerce will probably testify that it would be practically impossible to control radio stations without controlling the operators who transmit. Station licenses do not require any technical ability or knowledge on the part of the owner. Unskilled operators, if used, would increase interference and break rules as to operation before the department inspectors could detect and inspect the station offending. The field force of 53 inspectors and supervisors is busy all day now, it is said.

Aboard ships the risk of permitting unlicensed operators to handle sets and transmit is more than the present officials care to assume responsibility for. There is constant need for ship stations to be in operating condition in the interests of safety at sea. If a set was burnt up by an incompetent operator or he could not send an SOS properly, resulting in the loss of a ship, it would be too late to close the station, it is pointed out. Who would be responsible? Advocates of eliminating licenses say the owners, just as on railroads.

Shippers and commercial operators do not object to the licensing system used in the past 12 years, and the department records do not show the failure of a single operator licensed in that time. American ships could not clear from foreign ports unless their operators were licensed, it is explained. During the past year, American inspectors cleared 11,305 American and foreign ships from our ports, each of which carried two licensed operators. Defenders of the bill's provisions say that the four radio operating companies serving shipowners, who their opponents say would be responsible, do not control all ships, there being hundreds of independently equipped ships.

On the status of the amateur, the Department of Commerce records show that most of the trouble today is with the unlicensed amateurs, through breaches of the law and radio interference. Licensed amateurs behave very well, and most of them are proud of their certificates, it is claimed.

One value in licensing both commercial and amateur operators is the establishment of lists of efficient operators from which the military arms of the government can draw men, as was done during the past war. These lists change, as the licenses are for two years' duration, and only 50 per cent. of the licensed operators renew their licenses. During the past two years, 5,966 commercial operators were licensed. Out of 3,131 applicants in 1923, only 1,877 qualified, showing that 1,254 who thought they were efficient, found they were not. This tends to show the necessity of government licensing. Amateurs to the total of 18,828, were licensed in 1922-23, of which 16,846 were new men.

Instead of eliminating examinations and licenses, the department is understood to favor making qualifications harder in order to establish a high class of operators both for commercial and amateur work.

Congressman White has not yet expressed a willingness to change his bill or eliminate operators' licenses, but it is known that both sides of the question have been called to his attention.

The Last Step of Amplification

Choke Coil System Almost Distortionless with Power Tube

By Brainard Foote

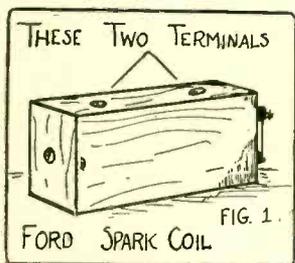


Fig. 1—Sketch of "flivver" spark coil, the secondary winding of which is used as a choke coil in the amplifier of Fig. 2.

JUST a little more volume" is the oft-expressed wish of the B. C. L. who has a three-tube receiver and a fairly good loud speaker. There are sets, it is true, operating with a third stage of audio-frequency amplification, but as a rule, the less said about such a method of increasing volume the better! This applies to an amplifier using three audio transformers, for the results,

while enormous in volume, are usually distorted beyond passable speech or music.

The distortion is due to the fact that no "step-up" transformer amplifies uniformly at all frequencies when a large amount of current is applied to the primary. Then again, the audio transformer doesn't amplify two frequencies satisfactorily at the same time when overloaded as it is on the third stage. A 1 to 1 ratio instrument would do quite well, however, and this is what a choke coil amplifier amounts to.

The choke coil system doesn't "boost" the volume so very much unless the energy is already quite strong, for it is only the tube amplification constant and not that of a transformer, which can increase the output. Hence, the best combination seems to be that of one or two stages of straight transformer-coupler audio-frequency and a final stage of choke coil audio-frequency.

As a matter of fact, the addition of the choke coil amplifier to a two-tube set already using one step of audio will result in plenty of volume for all of the local stations that are received loudly on the detector. Moreover, the quality of such amplification is remarkably good, and a good loud speaker will give nearly the clarity and full tonal values that one experiences when listening with the head receivers.

However, a well-designed two-stage transformer-coupled audio amplifier compares quite favorably with the choke coil system of the same number of tubes as far as quality goes, but the volume with the choke coil system is considerably less. For ordinary purposes, therefore, it is best to use two steps of straight audio-frequency and to fall back upon the choke coil additional amplifier for the extra volume needed for a dance or for the entertainment of a dozen or more people, where there is a good deal of conversation and other noise to interfere with the volume secured with the two stages alone.

A further modification of this audio and choke coil combination scheme is in use by the writer and is illustrated herewith. This consists of a two-stage audio amplifier with transformers for inter-stage coupling, and an extra tube with the choke coil connections. This latter is used with a short length of phone cord and an extra phone plug, so that the choke coil stage may be "tacked on" either to the second transformer-coupled stage or to the first. This plan provides plenty of volume and unusual clearness for local reception, using one stage of regular amplification and the choke

coil tube. But for weak signals, as received from DX stations, the choke coil amplifier may be added to the second stage, so that there are then three tubes amplifying at audio-frequency. This is successful in putting stations like WDAP or WLAG on the loud speaker even though they don't happen to be pounding through in the manner in which they are occasionally received.

To add the choke coil amplifier to a receiving outfit, the following parts are needed: Two Ford spark coils (obtainable from Ford service station), one .006 mfd. fixed condenser, one .0005 mfd. fixed condenser, one 1/2-megohm grid leak resistance and mounting, one standard tube socket, one power tube (UV201A nearly as good), one 1/4 mfd. fixed condenser, one 1/2 mfd. fixed condenser (radio transmitting equipment house), eight binding posts, one rheostat.

See Fig. 1 for the proper terminals of the Ford coils to use. These are the secondary terminals, and the primary coils are not used at all. Indeed, if the garage or service station happens to have some old coils whose secondaries are intact but whose vibrators are ruined, these will do just as well and can be bought very

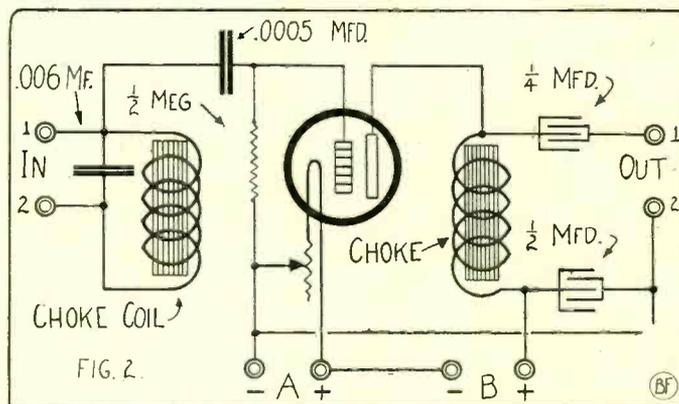


Fig. 2—Circuit of one stage of choke coil coupled audio amplification, with Ford spark coils for the "chokes." This is useful for the second or third stage of amplification for increasing volume without allowing distortion.

cheaply. Fig. 2 gives the wiring diagram. The input posts are connected to a phone cord and plug so that they may be plugged into the amplifier jacks, or they may be joined directly to the inside springs of a double circuit jack in the plate circuit of the second stage tube.

It is important that input terminal No. 1 go to the plate side of the jack. Otherwise the amplifier will not work, and the leads from the phone plug should be reversed. No harm will result from a wrong connection, however. The .006 mfd. condenser acts as a by-pass and reduces tube noises and cuts down the volume of code interference to quite an extent. Otherwise it has no value and has no effect upon speech or music. Note that the grid leak is placed to the filament circuit and not across the grid condenser. The capacity of the latter is not critical and a value between .00025 and .0001 works satisfactorily.

Coming to the tube, a few words on its selection may be helpful. The VT2 or UV202 gives the very best of quality, but the UV201A is far more economical

and amplifies almost as faithfully. The large size telephone condensers are of the type ordinarily used in amateur transmitting apparatus and may be purchased from a supply store carrying this sort of apparatus. The $\frac{1}{2}$ mfd. condenser is merely a by-pass condenser placed across the "B" battery. This is very helpful in the case of batteries having a fairly high internal resistance—as old cells—and reduces inter-stage coupling of the resistance variety within the battery. This form of coupling often causes howling when old or undersized "B" batteries are attached to a two- or three-step audio amplifier.

Note the method of connecting the loud speaker. It is not directly in the plate circuit of the amplifier as is usually done, but is connected through the $\frac{1}{4}$ mfd. condenser across the second choke coil. Thus the speaker is shunted across the choke coil and operates by reason of the voltage and current fluctuations going on in the choke coil. The latter conveys the plate current from the "B" battery to the plate of the tube, and thus the "B" battery "juice" doesn't pass through the windings of the speaker. This is desirable for several reasons, chief among them being the reduction in "B" battery frying and hissing sounds and reduction in various crackling and scratchings which are often heard. Quieter operation is the result, and little is

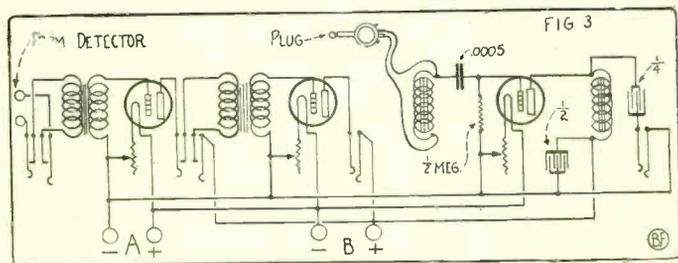


Fig. 3—Combination hook-up for an ordinary audio-frequency amplifier with the choke coil added. Provision is made to use the choke coil stage after either of the audio stages, or for using the loud speaker with either of them.

heard when voice or music has ceased except the slight commutator hum which always signifies the fact that a broadcasting station is tuned in.

The return lead (No. 2 output) of the loud speaker is connected to the negative "A" battery—or it may go to the positive with the same results. The experimentally inclined may try one or two other locations for the speaker, leaving one of its leads connected to the No. 1 binding post on the output side, where the condenser intervenes between the speaker and the choke coil. The other lead may be connected to the

lower end of the choke, and quite frequently it happens that even clearer amplification is obtained when it is connected to the No. 1 input connection. This is the same as bridging the loud speaker from the plate of the last tube to the plate of the tube just previous and there is plenty of voltage variation going on between these two points to actuate the speaker. As a rule, the circuit shown is O. K. in all respects.

Passing to Fig. 3, the reader is given a circuit which the writer strongly recommends as being both very flexible and efficient. This has been mentioned already, and depicts the wiring of the ordinary audio-frequency amplifier with the choke coil added. In both of the circuit diagrams, it is assumed that the same filament battery is used for both transformer-coupled stages and the choke coil stage. Otherwise there wouldn't be a "grid return" for Fig. 2. This takes place through the "B" battery, where the "A" battery is commoned. The same "B" batteries are also used, and 90 volts are sufficient for ordinary purposes. Sometimes volume is improved a bit by raising the "B" battery to 120 volts, but the increase in strength of speech and music isn't very great, and the addition of voltage usually means the insertion of "C" batteries and further complications.

The circuit arrangement of Fig. 3 is such that the loud speaker may be employed in the familiar manner—directly in the plate circuits of either of the two transformer-coupled steps of amplification, or it may be used with the choke coil amplifier. In the last-named instance, the extra phone plug shown is inserted in the first jack for local work and into the second for weak signals. It is, therefore, possible to use one stage of transformer coupled audio and one of choke coil coupling, or to employ both of transformer coupling. This will be useful in comparing the nature of the amplification in the two cases where the same number (3) of tubes are in service, including the detector tube.

Observation will point out that a reversed connection of the extra phone plug will connect the grid condenser end of the choke coil to the plus "B" battery, and naturally, there will be no amplification, because there will then be no voltage fluctuations between the upper end of the choke coil and the filament. The choke coil amplifier plug might also be inserted into the detector jack, but it seldom happens that broadcasting is received with sufficient strength to amplify very much in that way. The choke coil method requires a fairly "husky" input—but when this is obtained by regular audio amplification—it certainly *does* function.

Now Comes the "SOS" on Land

MOST amateurs and some fans are acquainted with the ominous SOS of the sea, and its significance—a vessel in distress, calling for aid. These letters, or another national call, may come to be a distress call on land if airships get carried away, railway trains get stalled and other means of communication are put out of service by storms.

When the "Shenandoah" was torn from her moorings the navy cleared the air in an effort to locate and aid the airship. Recently, when some western trains were stalled in a heavy snow storm which carried down practically all the available wire circuits, a literal land SOS was sent out from the local train dispatcher.

Four broadcasting stations, and perhaps more, are known to have aided stalled railway trains that night. Listeners-in in Washington heard WPAH, at Waupaca, Wis., transmitting a message from the Chicago & Northwestern train dispatcher to the superintendent

of the division in Chicago. The message told of the stalling of a train by snow near Green Bay, Wis., and WPAH tried to get the message to KYW in Chicago. This station was in the midst of a program and didn't come in. WOAW in Omaha, however, heard WPAH, and advised that it was standing by for a message to be relayed to KYW. Eventually the message got through, and snow plows and aid were sent the stalled train. Later in the evening, WLAG at Minneapolis also broadcast relative to a Burlington train in difficulties.

Such experiences as these point to the use of an emergency radio service on land, not unlike the SOS of the sea, which can come to the aid of the public when disaster befalls carriers or wire circuits give way. It may lead to definite regulations providing for silence when a land SOS is broadcast, and prescribing the relaying of distress messages as in marine service.

New York's Acting Mayor Listens In



(C. Kadel and Herbert)

Acting Mayor Murray Hulbert of New York City, listening in on a radio set, during a few spare moments that he had at a recent social function. How many of you knew that the Acting Mayor was a radio enthusiast?

One Experimental Broadcaster in France

FRANCE has no regularly licensed radio transmission stations assigned to broadcasting, according to advices from the Under Secretary of State on Posts and Telegraphs.

Until the matter has been definitely settled by the government, there will be no special broadcasters. There is, however, one private station authorized to try out radio dissemination, with the aid of three government stations, under provisional authority.

The three French government stations co-operating are: the Military Station in the Eiffel Tower, "FL," operating on a wave length of 2,600 meters and five KW power; the Superior School P. T. T. at Paris, "ESP," with a wave length 450 meters and 450 watts; and the Lyons station "YN," wave length 740 meters and 250 watts. The private experimental station is that of the French Radiotelephony Co., in Paris "8AJ," wave length 1,789 meters and 6 KW power.

Agriculture via Radio

THE Department of Agriculture's radio broadcasting service this year will reach a still greater proportion of the rural listeners-in through the co-operation of about 100 broadcasting stations. These newcomers are in addition to

about 75 already distributing matter daily on crops, produce and live stock. The plan of expansion provides a distribution of the information from Washington by mail in the form of weekly reviews on the several commodities. In the past, many stations could not co-operate on a daily telegraph schedule, but now they hope to broadcast every day a short weekly review of each specific form of agricultural data received.

Government Wants Radio Engineers

THE U. S. Civil Service Commission has broadcast a call for radio engineers in the Army Signal Corps service. The govern-

A "Safety Pin" Radio Set



(C. Kadel and Herbert)

Miss Helen Frey, 2700 Connecticut avenue, Washington, D. C., and the "safety pin" radio set she constructed at a total cost of eighteen cents—and the darn thing works! The set is made on a stiff piece of cardboard, and the coil is 80 turns of fine wire on a piece of paper, with a ten-cent-store crystal detector. Heaven help economizers on a set like this!

ment needs one radio engineer, and will pay a salary of between \$4,000 and \$5,000; an associate engineer, at between \$3,000 and \$4,000, and an assistant engineer at between \$2,000 and \$3,000 per annum. These civilian engineers are required for signal service work at the McCook Air Service Field, Dayton, Ohio, and Camp Alfred Vail, N. J., the Army Signal School. Applications, together with data as to experience and training must be filed with the Civil Service in Washington before March 11,

An Early Fixed Detector

BACK in 1906, when there were no such things as tube receiving sets and no fixed crystal detectors, a naval officer, now in charge of radio development and research work of the Bureau of Engineering of the Navy, tells of an early makeshift detector.

On board the U. S. S. "Georgia," during some gun fire tests, the operators experienced great difficulty in copying code, even from the ships in the immediate vicinity. Every time the ship fired a salvo, the crystal detectors jumped off and had to be readjusted. Consequently parts of the messages were never received. Another war-time difficulty was the old top-side radio shack exposed to enemy fire. This the radio officer moved below on the gun-deck as an experiment, the lead-in wires being run below through a conduit from the aerial between the masts. Even though less exposed to the roar of the guns reception was difficult, and the cat whisker continued to be shaken off the crystal.

Something had to be done. The radio officer secured a lump of hard coal and a heavy needle from the ship's tailor. Driving the needle into the lump of coal, he provided a fixed crystal detector—perhaps the first known detector of this type. It functioned poorly, although it stayed fixed. By putting on the "Georgia's" very best operator, messages from the flagship, which was 400 yards away and sending at full power, came in faintly, were copied, and no more reports were missed.

Caught With His Mouth Open



(C. Miller-Fotograms)

Secretary of Labor James J. Davis delivering his famous speech against radicalism before the microphone of WCAP, Washington, D. C. Secretary Davis is one of the foremost antagonists of the radicalists and his speech through the air was so forceful that it made lots of people think on the several new ideas he advanced.

The Vacuum—There's Something in It

By Dr. W. R. Whitney

Director, Research Laboratory, General Electric Co.

I WANT to show that in a vacuum, of which one might say "there is nothing in it" (and surely less than in anything else), there is, indeed, an endless amount of interest and utility. The American public now buys over a million dollars worth of glass vacua a week, but that is far from being the most interesting part of the subject.

Everybody pretends to know that "Nature abhors a vacuum." But the man who started that tale merely meant that a good vacuum was hard to produce. As probably no one has ever made a vacuum with less molecules of gas in a cubic inch of it than there are people in the world, we can maintain that perfection in vacua is still precluded by Nature.* * *

While the vacuum is not essential to the work of Millikan in isolation of the electron, yet the earlier work by Thomson and others, and much of the recent work on this ultimate constituent of matter, has been necessarily carried out in vacuo. Today there seems to be no end to the studies which can be based on the fact that any atom or molecule of material may be separated electrically into a positively charged ion (carrying most of the mass) and a negatively charged electron (carrying most of the current).

These two interesting entities may be followed through their activities, and it is by these activities that we are now enabled to rectify alternating current and also produce alternating current from direct. By means of vacuum tubes we may now also produce from current of one alternating frequency, current of all other desired frequencies, and this has opened up a broad new field of high frequency power studies.* * *

Electrons, as negative charges, distil from a heated filament and pass under voltage-drop across a vacuum to an electrode, now commonly called the "plate" in wireless tubes. This pure emission current is the basis for the so-called rectifiers because only when the filament is negative does any current flow across the gap. When gases are present greater currents may be carried because of the ionization of the gases, and so the tungar rectifiers, containing a little argon, and the older mercury vapor rectifiers, involve the same principle. Without some gas present the negative electrons by their very concentration constitute a space charge which limits the current. This space charge is removed by the ions produced within the gas introduced.

When we interpose a grid or inter-connected wires between the hot filament and the plate of the above two-electrode tube, we have what we now so commonly use in wireless for receiving, for amplifying, and for production of high frequency currents. The discovery of the controlling or triggering action of the intermediate electrode was made by De Forest. A negative charge applied to this third electrode or grid may easily stop all current from the hot filament to the plate. As it takes practically no energy to charge this grid, only a token of energy (voltage), the slight power attained from a wireless antenna in its fluctuation may be used to control or to trigger, or to let through corresponding jolts of much greater energy, which, are in turn supplied by a local battery or power circuit.* * *

A loud speaker devised by Dr. Hewlett consists of a 26" flat conducting disc in a magnetic field. The vibra-

tions of the disc corresponding to the voice currents produce the sound waves without the intervention of a horn. The use of vacuum tubes in this device consisted in the following:

A microphone was placed near the speaker and the sound waves of his voice caused to be generated in this microphone feeble electromotive forces which were applied to the grid of a pliotron. These feeble electromotive forces caused relatively large variations in the electric current flowing between filament and plate, which in turn were used to secure larger electromotive forces to be applied to the grid of another pliotron. By the use of several amplifying pliotrons the original feeble electrical currents were multiplied several thousand times and supplied to the loud speaker which reproduced the original sounds with many times the original volume and great faithfulness of quality. To operate this amplifier of pliotrons required a direct current of several hundred volts. This was obtained by first transforming the power from the ordinary alternating current lighting circuit to a relatively high voltage, next rectifying this high voltage alternating current by means of kenotrons, and finally smoothing out this pulsating current by means of appropriate electric circuits.

The high degree of faithfulness of reproduction realized in this loud speaker is due partly to the absence of a horn, eliminating horn resonance (one of the usual sources of distortion in a speech reproducer), and partly to the method of vibrating the diaphragm by forces which are distributed fairly uniformly over its surface, instead of being acted upon in a very limited region, as is the case in most other loud speakers. This feature eliminates rattling and ringing of the diaphragm or the production of high overtones by the diaphragm.

Broadcast Changes

LIST of limited commercial or broadcasting stations licensed during the week ending February 15th:

Call	Class A Stations	Frequency Kcys.	Wave Lgths. Meters	Power Watts
KFNC	Alonzo Monk, Jr., Corsicana, Texas	1280	234	20
KFNF	Henry Field Seed Co., Shenandoah, Iowa	1130	266	500
WBBV	Johnstown Radio Co., Johnstown, Pa.	1210	238	5
KFNY	Montana Phonograph Co., Helena, Mont.	1150	261	5
KFNX	Peabody Radio Service, Peabody, Kansas	1250	240	10
Transferred from Class C to Class A				
WEB	The Benwood Co., St. Louis, Mo., "A"	1100	273	250
Transferred from Class A to Class B				
WHAA	State University of Iowa, Iowa City, Iowa, "B"	620	484	500

A Non-Reradiating Regenerative Circuit

By C. White, Consulting Engineer

THE popularity of the regenerative receiver has been solely based upon two facts—first, its ability to give good volume with a minimum number of tubes, and its simplicity and economy. If it had not been for these two facts, the regenerative receiver would never have obtained such a strong hold on the radio market. It is a good, efficient receiver when operated properly, but very few users of regenerative receivers ever operate them with any regard for the other fellow.

Owing to the fact that a single circuit regenerative receiver, especially, is a good transmitter when it is in oscillation makes it an especially undesirable type of receiver in crowded city districts. It has been proven that even the ordinary single-circuit regenerative set when in oscillation is capable of sending a disturbance three or more blocks. Any radio fan who operates such a type of receiver can just as easily tune in without causing this type of interference, if he will only take care in turning his dials. A great many times radio fans are too eager to pick up a station to take care to prevent their tube from oscillating. The receiver outlined in this article is a simple regenerative receiver with a filtering tube in front. This filtering tube prevents serious radiation of energy from the receiving antenna no matter how the receiver is operated. It not only affords a rapid and simple method of tuning a very efficient circuit but also takes the circuit out of the pest class.

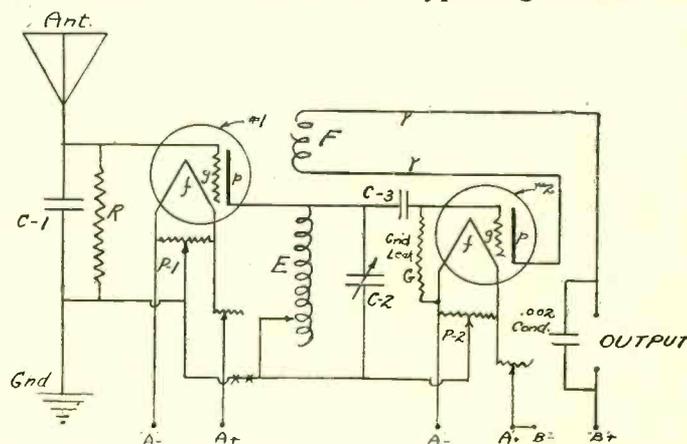
The simplicity of this circuit is one of the key-notes of its success. There are very few paths for energy to get lost, and it is equally as simple to wire as the average regenerative receiver. In tuning it affords a quality which is not present in the single circuit receiver alone, and sounds in operation much like a neutrodyne. When a station is passed on the dials there is that sandy sound in the phones much similar to the sound encountered while tuning a neutrodyne. This smooth action makes it possible to secure better results in quality and volume on distant stations.

The anti-radiation feature is incorporated by the use of tube No. 1. This tube is the standard type of UV199 or C299, and uses a small Eveready "3" battery for filament supply. It will be noticed that no B battery is used but the plate return is connected to the slider on the potentiometer P-1. This potentiometer affords a method of balancing the grid bias voltage impressed on the grid of tube No. 1 and the voltage impressed on the plate. Sometimes, however, much better results are secured when the connections XX are opened and another No. 3 cell battery is inserted in the plate circuit. This battery should be of the same type as the A battery and should have its positive terminal connected toward the plate side of the circuit. In order to prevent strong A. C. hums the grid condenser C-1 and the grid leak R are inserted between antenna and ground. This path also effectively shuts out much extraneous noise.

The apparatus required in this circuit as symbolized on the diagram is as follows: The condenser C-1 is

a .0001 mfd. fixed mica condenser, while the resistor R is ¼ megohm leak. The condenser C-2 is an 11 or 23-plate air variable, while C-3 is a .00025 mfd. fixed condenser. The potentiometers P-1 and P-2 should have a resistance of 400 ohms apiece. The unit E-F is a 180° variocoupler, using the rotor as coil F. Any type of vacuum tube may be used as a detector. The UV199 can be employed, if so desired, and perfectly good results can be secured provided a good grid leak G and a rheostat of at least 30 ohms be used. Do not attempt to use the same A battery for tube No. 1 and tube No. 2, for by so doing, the efficiency of the circuit will be greatly impaired. Shielding with copper foil will only be necessary in the immediate vicinity of C-2. The movable plates of C-2 should connect to the ground side of the circuit. Sometimes far better results are secured when the tickler coil connections are reversed at the points marked YY.

Old users of the tickler coil type single-circuit re-



A two-tube regenerative receiver which, because of its peculiar connection with the blocking tube, effectively prevents the radiation of interfering oscillations. Note that the first tube has no plate battery, and that it is hooked in the antenna circuit with but a high resistance and condenser from antenna to ground. This circuit will allow you to let your tube oscillate to your heart's content—and not annoy your neighbors. If more volume is desired, a one or two-stage amplifier can be connected after the detector.

generative receivers will readily recognize that this receiver is a modification using a muffler tube and a parallel connection of the tuning condenser C-2. Any type of aerial can be used, but an outdoor aerial of 100' length will give very satisfactory results. Sometimes, however, it is possible to use a coil type of indoor aerial on strong local signals. In tuning the receiver is no more involved than its prototype. The tickler coil F still operates a definite control over volume, while the potentiometer P-1 in conjunction with P-2 affords a very effective way of clearing up static and other outside noises. In general, it will only be necessary to burn tube No. 1 very low. Any of the standard types of amplifiers can be used with the same common A and B batteries as for tube No. 2. The great benefit of this receiver is its smooth operation, pure tone qualities, and absolute assurance of not interfering with your neighbor's reception.

New Iowa Station Divides Time with WOC

THE new 500-watt broadcasting station at the University of Iowa, Iowa City, Iowa, will operate on 484 meters,

dividing operating time with The Palmer School of Chiropractic, WOC, at Davenport, Ia. The Iowa City station has been

assigned call letters WHAA and will be heard on Sunday afternoon and Tuesday, Thursday, Saturday and Sunday evenings.

Radio Music Fund Committee Appeals to Listeners-In for Contributions

By Laurence Blackhurst

THE first serious attempt to have listeners-in pay for broadcast programs was inaugurated last week when an appeal was made through the daily newspapers in New York by the Radio Music Fund Committee. This committee, according to a statement supplied to the press, consists of Clarence H. Mackay, Felix M. Warburg, Frederic A. Juillard and A. D. Wilt, Jr., all well known for their support of musical activities.

They have selected Station WEAJ to broadcast the proposed concerts by grand opera and other musical stars. The actual expense of broadcasting will be borne by the American Telephone & Telegraph Company, owners of WEAJ. The committee invites from the radio public contributions to the Radio Music Fund of one dollar upwards to be sent to the Central Union Trust Company of New York, subject to the order of the committee. If the contributions received are not sufficient, in the opinion of the committee, to warrant going ahead with the plan, all contributions will be returned by the trust company. If, after starting the broadcasting program, the committee deems it advisable to discontinue the concerts, whatever balance remains of the fund may be returned to the contributors "or disposed of for musical or educational purposes as may be determined by the committee." The members of the committee, as now or hereafter constituted, do not assume personal responsibility nor guarantee personally any radio music concerts under their present plans or as they may be later modified.

The statement concludes: "The success of the plan depends entirely upon the cooperation of the radio audience in making possible to themselves the best radio programs obtainable. Although any radio listener may avail himself of these programs, unless the response is instantaneous and wide-spread, it will be impossible to present the great artists now contem-

plated. The public benefits; it should respond promptly."

Officials of Station WEAJ were quoted in the daily press as saying that from \$100,000 to \$200,000 would be required to insure twice-a-week concerts for a season of grand opera stars. They expect listeners-in to contribute enough to pay for a few fine programs and then decide whether to give enough more to provide a program for next season. There is no intention of broadcasting grand opera, only concert programs by grand opera stars and well-known concert singers.

A writer in "The New York Times" expresses these views:

"It is not easy to see how collections are to be made from the listeners or fees exacted. They go to no ticket office, pass through no turnstile, and disclose the possession of a receiving set to no authority. That they should pay something for what they want and get seems only right; but unless all pay, any payment is unfair or at best a sort of charity, and the number who will pay for what they can so easily get for nothing, once it is put 'on the air,' cannot, without exaggeration, be called great."

An editorial in "The Sun and The Globe" offers this opinion:

"Radio is too strong to be incapable of a demonstration such as the committee call for. Yet it is quite plain that the voluntary basis of support cannot be a permanent basis. There must be some method of making delivery contingent upon payment. At present this is physically impossible—the noises of the air are to be had for the gathering. Yet with the problem of making them exclusive and vendable clearly needing solution, the scientists and inventors will probably find a way to make a song flung upon the air as safe from the unpaying listener as an aria at the Metropolitan is from the passer-by outside on Broadway."

Radiograms

Mr. Vanderlip appears to have done his broadcasting on a wave length of 386 rumors.—The New York Sun.

Man named Mroczkiewicz has applied to courts to have his name changed. No wonder. Lots of people thought the name represented a merger of several radio broadcasting stations.—The Pathfinder.

More than 12,260 miles of aerial wire have been erected in Great Britain in the past twelve months, according to a news despatch. It is estimated by officials of the British Broadcasting Company that 2,000,000 people are entertained daily at a cost of less than a cent each.

Radio was used at the opening last week of the National Congress of San Salvador to broadcast the message of President Molina. Amplifiers were also set up in Bolivar Park, in the city of San Salvador, where hundreds of citizens listened to the Congressional proceedings and the chief executive's speech.

Says "The Literary Digest," "all radio operators agree that the neighborhood of the Mexican coast is saturated almost continuously with squeaks, roars, clicks and scratches. Have our readers who live near the Mexican border any suggestion? Yes; the squeaks are coming from the captured bootleggers; the roars all originate in the Tampico oil fields, where rival companies are "spudding-in"; the clicks are made by the gun-trig-

gers of the Presidential candidates, and the scratching is what the peons must do for a living. There is no charge for these suggestions.—Laguna, Calif., Life.

Collegiate Debate by Radio

ON Friday night, February 29, the first debate ever staged between two universities by radio will be broadcast from Station KGW, The Morning Oregonian, Portland, Ore., and Station KLX, The Oakland Tribune, Oakland, Cal. The debate will be between the University of California and the University of Oregon; the debaters of the former institution speaking over the radio from KLX (509 meters) and those from the Oregon school speaking over KGW (492 meters). The subject to be debated is the Bok Peace Plan.

The unique event is the first of its kind attempted. The debaters for the University of California are Harold Cherniss and Raymond Sanders. Those representing the University of Oregon are Joe A. Frazer and Walter D. Malcolm.

How to Build a Reflex Distance Getter

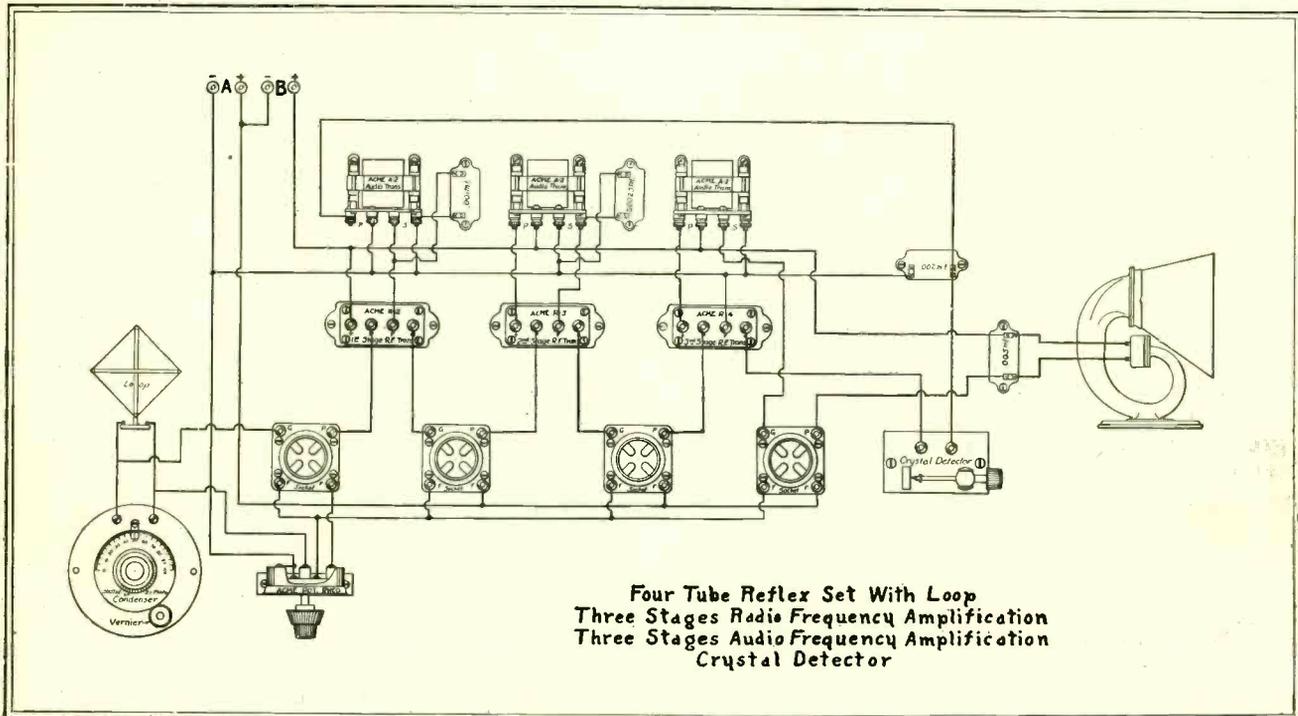
By G. R. Entwistle
Radio Editor, "Boston Traveler"

DID you ever wish for a radio set that would consistently bring in the distant stations loud and clear so the entire family could benefit, yet one which was inexpensive and extremely simple of operation? This article tells how to do it.

In the particular reflex circuit described below, developed by the Acme Apparatus Company, only two controls are necessary; one for selecting the different broadcasting stations at will, called the tuning control, the other for controlling the intensity of signals. Yet, with such a simple receiver, incorporating six stages of amplification, three of audio and three of radio, using only four tubes, the writer has consistently brought in most all of the popular stations east of the Mississippi and many others farther west on a loop and with sufficient volume to operate a loud speaker; in

persistent research and can be depended upon fully to give results if instructions are carefully followed. This circuit has been thoroughly tested and will work. The only tools required for its construction are a screwdriver and possibly a soldering iron.

The following apparatus is required: Three audio frequency transformers; three radio-frequency transformers (type R2, R3, R4); one Pot-Rheo; one loud speaker; four good sockets; one crystal detector; four fixed mica condensers of the following capacity: .00025, .001, .002, .005; 10' No. 14 solid bus wire; eight binding posts; one baseboard 21"x10½"x¾"; three radion terminal blocks; one loop; one low-loss vernier condenser (.0005 maximum capacity. Must be a low-loss condenser); four vacuum tubes (UV201A); six-volt storage battery; 67½-volt B battery (3-22½-volt units); 200



fact, telephones have not been used as yet with the receiver.

Just what is meant by a reflex amplifier? The reflex is a combination of radio and audio-frequency amplification, which uses the same tube for both kinds of amplification. The radio-frequency amplification makes the receiver more sensitive; that is, it brings in the distant stations. It is the radio telescope that reduces distance.

The audio amplification builds up the sounds so as to enable them to be reproduced by a loud speaker. It is the radio magnifying glass that gives the voice waves their volume. By reflexing, the passing back of the amplified radio waves through the same tube for further amplification at audio frequency, we obtain a very desirable economy of vacuum tubes.

The reflex circuit is one of the highest developments of radio today. In addition to using the same tubes for both kinds of amplification, it gives a greater number of stages of amplification than the number of vacuum tubes employed. A four-tube reflex permits at least six stages of amplification, three of each kind.

The circuit described is the result of two years of

to 400-ohm potentiometer and a six-ohm rheostat can be used in place of the Pot-Rheo.

The breadboard type of reflex, mounted in plain view on top of the board, where its parts are readily accessible and plainly visible at all times, is a good starting point, and will be described in detail. First, secure a board 21"x10½"x¾" and mount the various instruments as shown in the diagram.

As a starting point secure the first audio transformer 4" over from the left hand edge of the board and 2½" down from the rear edge. This will locate screw X. After securing the first audio transformer in place, the other two can be suitably mounted 1½" away from each other.

Next the radio-frequency transformers can be mounted end-to-end as shown, placing them 1½" from the audio terminals as is shown. It is important to arrange the different kinds of transformers so that the leads, CC, in common between the second and third audio and radio transformers, are in a direct line as shown. This will give a neater appearance in the wiring. The position of the remainder of the equipment is not important, except that you arrange it as

near as possible to the layout shown in Fig. 1. However, it might be well to turn the crystal detector around so that its adjustment will be made from the front instead of from the side. Follow the wiring diagram exactly.

No matter how much pains are taken with the wiring of the circuit itself, if the pickup circuit, consisting of a variable air condenser and loop, is not carefully selected, only mediocre results will be obtained. To this end a low-loss condenser must be used so as not to waste the feeble energy intercepted by the loop.

A good loop can be made as follows: Wind six turns of any available wire spaced $\frac{3}{4}$ " apart on a support $3\frac{1}{2}' \times 4'$, which can be easily rotated. Another smaller loop can be made by winding 16 turns of wire spaced $\frac{1}{4}$ " apart on a suitable support 20" on a side. The wires should be held by insulating supports. The frame can be of wood. The output of the reflex amplifier is connected to the loud speaker.

The following precautions will be found helpful:

Never attempt to wire up a reflex set using flexible leads connecting together the heterogeneous arrangement of parts.

Radio-frequency transformers should be mounted end to end to prevent interaction.

Use a No. 14 wire run directly to a waterpipe for a ground.

Low-loss condensers must be used and should preferably be fitted with a reduction gear or vernier

plate for fine adjustment, particularly in the secondary circuit if the antenna is used.

A potentiometer is required for controlling the operation of the first radio-frequency tube.

Use a quick contact crystal detector.

Use good sockets, as inferior products provide leaks which absorb practically all of the slight amount of energy received by the antenna or loop. Be sure that the grid wire of the first tube is connected to the stationary plates of the variable condenser.

Be sure to follow the diagrams exactly.

Considerable time has been spent to get the circuit right. Do not take liberties with it.

Although the breadboard type of receiver is suggested as a starter, it is possible to build up the amplifier with a possible view of enclosing it in a cabinet at a later date. The panel arrangement of such a reflex amplifier would be extremely simple. There would be one large control dial for different values of loop condenser for tuning in the different broadcasting wave lengths.

A snap switch could serve to make or break the filament battery current, while the concentric knobs of the potentiometer and rheostat could be mounted on one side of the condenser control, while the catwhisker knob for adjusting the sensitivity of the crystal detector could be placed on the other side. A loop could be mounted at one side on top of the cabinet, while the horn of the loud speaker could extend through the top on the other side.

The Los Angeles Radio Exposition

By Charles F. Filstead, 6CU

THE Second Annual Radio and Electrical Exposition, held at the Biltmore Hotel in Los Angeles, California, came to a close in a blaze of glory. This great radio exposition has splendidly shown the wonderful strides that radio has taken in the past year. In this single year radio has advanced from an infant industry to one of the big enterprises of the country. In any other trade a span of several years would not reveal such wonderful expansion and advancement as radio has shown in this one year.

The beautiful draperies and the wonderful decorations of the grand ballroom and foyer of the Biltmore Hotel, lent an artistic and appropriate background to the elaborate displays of manufacturers and dealers.

Receiving equipment from every part of the United States was on exhibition in such profusion that the prospective customer who knew nothing of radio was completely confused. Neutrodyne predominated; there was hardly a booth that did not have on exhibition some form of neutrodyne. All types of receiving sets from the lowly crystal to the lordly super-heterodyne were represented. Whether the spectator was an amateur or a professional, he could learn much of interest and value to himself.

The movie world of Hollywood was well represented at the show; every night this or that film luminary was on hand to shower his—or her—benign influence upon the exposition. Control wires were run from the two local broadcasting stations, KHJ and KFI, to the balcony of the grand ballroom, and between nine and ten each evening, film folks and talented musicians broadcast from the exposition. On one side of the ballroom was KHJ, and on the other side was KFI, and in between were gathered the common people "to listen and to see." This is probably the first time the general public has had an opportunity to see artists actually broadcasting by radio. That the words of the broadcasters might be made audible to the people gathered

below, Western Electric public address systems were connected to the microphones of the two stations, and through them the mighty voices of KHJ and KFI roared forth.

Even the transmitting amateurs were well represented, for the Southern California Radio Association, an organization of Los Angeles amateurs, had an interesting booth from which they solicited new members.

Night after night the exposition was packed to the doors with an eager throng of radio enthusiasts determined not to miss a single feature. It was a matter of standing in line and moving forward a foot at a time with the crowd, but so interested were the spectators in the exhibitions that no inconvenience, no matter how great, could daunt them. It was a record crowd for an exhibition of this kind, and far exceeded the expectations of the men who made the exposition possible.

Such an unusually large and prosperous crowd does not make the prediction that \$300,000,000 will be spent on radio in 1924 seem so impossible as it would appear at first glance. There is an excellent chance that this figure will be greatly exceeded, impossible though it may sound. This great radio exposition is but a shadow of those that will come in the future. Its invigorating influence will be felt by the radio trade for many months to come.

The Chamber of Commerce, the dealers and the manufacturers of Los Angeles are to be complimented on the splendid spirit of co-operation they showed in the presentation of this exposition. But all their efforts would have been in vain if it had not been for the enthusiastic response and hearty interest that the citizens of Radioland evidenced in the exposition. Let us hope that this exposition will foster even closer co-operation between the radio buyer and the dealer in the future.

A One-Tube Crystal Reflex Without Transformers

By Louis Porter

NOW that the fans have seen or heard about nearly every circuit embodying the reflex principle, the common notion is that they are both expensive and not developed far enough. They do not as a rule allow of portable or cheap construction, as heavy and expensive transformers are used as a general rule.

However, there are reflex sets that use tuned impedance radio-frequency, and the writer has had experience with them. It is because of this that the reflex circuit shown here was developed. It uses no transformers at all. Two 50 turn spiderweb coils, in a common mount, coupled closely together, and a condenser give all the amplification that can be used on an outside antenna, and the variometer and condensers give enough variation of the received energy across the grid of the tube to be really sharp tuned. The Porter fixed crystal detector gives wonderfully clear and perfect reproduction that is so necessary to good speaker work.

This circuit is not put forward with the idea that it is just a "freak" that once worked. It has been demonstrated, many sets have been made and they work to perfection. There is a clearness and freedom from distortion that make people wonder just what happened, and as fixed condensers are used in series with a variometer there is a freedom from interference that is also startling. Yet the tuning is easy enough for even the most mediocre of beginners.

In order to build this receiver, certain things must be purchased, which are herewith listed: one variometer, one Porter fixed crystal detector, five fixed condensers of the following capacitances: two .001, one .0001, one .00025, one .0005; one .0005 variable condenser, two 50 turn honeycomb coils, one tube and socket (UV201A), necessary A and B batteries and phones, three switch points and one handle.

Wire the condensers up as follows: With a small piece of perforated copper strip, fasten the three condensers together as shown in the drawing. Bring a lead from the other side of each of them down to the switch points. From the switch handle, bring another lead to the grid of the tube, and one side of the variometer. From the other side of the variometer bring a lead to the ground, and one side of the .001 reflex condenser. From the plate, bring a lead to the stator of the variable condenser and also to one side of the 50 turn honeycomb coil. From the rotor side bring the lead to the other side of the coil, and also to one side of the second .001 condenser. From the other side the lead goes to the minus post of the tube socket and the minus of the B, which can be made one lead. The plus side of the B goes to the phones, and from the phones to the rotor side of the variable condenser and coil.

From the outside lead of the second coil, bring a lead to the Porter fixed crystal detector, and from there to the ground side of the reflex condenser. From the other side of the condenser bring a lead to the inside connection of the second coil. Also bring a lead from the same side of the condenser to the plus lead of the filament circuit.

The set is now all wired up and ready to work. Place the tap switch on the central point and vary the variometer at the same time turning the variable con-

denser. If the signals heard are weak when the rotor of the variometer is near either 0 or 100, change the capacity of the antenna circuit by switching in either the larger or smaller condenser. Then return, until the signals are both loud and clear.

In hooking up the set, the flat perforated copper strip makes the wiring easy, as no soldering is necessary. Only a screwdriver, a good pair of pliers, and an assortment of nuts and machine screws are needed. Short connections, which would otherwise be impossible, can thus be made, and the resistance kept down to a minimum, as the strip affords a much greater surface than the wire or bus bar commonly used.

The writer has experimented with many circuits and has developed quite a few. One that is of interest

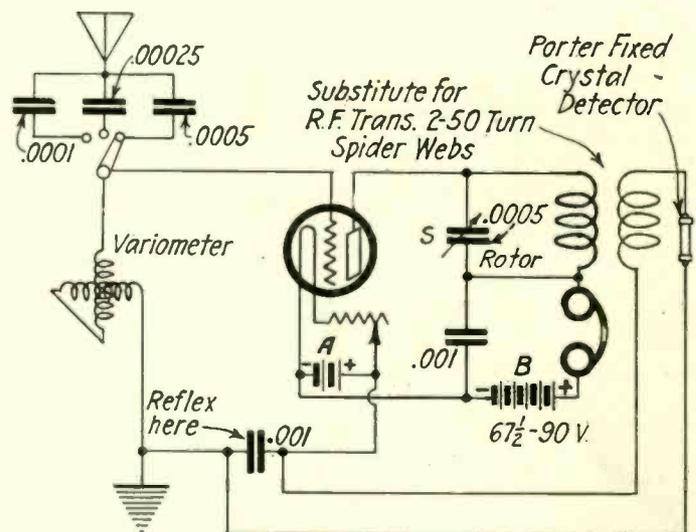


Diagram of the one-tube reflex receiver that uses no transformers. Note that two honeycomb cells are used as the radio-frequency transformer. It is advisable to have them in a variable mount so that tuning is possible.

is a circuit using the 110-volt A C line for both B battery current and antenna and ground. It is a two-tube circuit and is so loud that it is really painful to the ears of anyone within 50' of it. However, as it has to be developed considerably before it is ready for work in the hands of an amateur, it will not be disclosed until the time when the writer feels anyone can tackle it with certainty as to results. It might be of interest to state that the circuit has been demonstrated before the radio editor of "The Detroit News," who proclaimed it a wonder.

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MARCH 1, 1924

Can the Skin See?

A FRENCH physician and scientist, Jules Romains, is the author of a remarkable book which will be published shortly in this country. Its title is "Eyeless Sight." Dr. Romains has evolved the theory that the skin of the human body possesses powers of vision which, to a great extent, have been lost through many years of neglect. He has conducted a series of experiments before the French Academy during which interesting results are said to have been achieved in support of his theory. The sensitiveness of the skin and the underlying tissue with its intricate mass of nerves is well known. But no one, heretofore, has supposed them to be capable of picking up light waves in any manner to be compared with the process of seeing as we know it. In the search for a means of television, or seeing by radio, it is possible that this French savant may have progressed a step. The demonstration of his theory will be awaited with interest by many experimenters in the realm of radio.

Big Business and Broadcasting

ALFRED C. BEDFORD, chairman of the board of the Standard Oil Company of New Jersey, made a most interesting address the other evening before the American Institute of Banking at its annual dinner in New York City. In the course of his remarks he advocated the use of radio as a means of requiring the leaders of big business to account for their actions directly to the public and enabling them to lay their cases before the people when they seek vindication. Mr. Bedford evidently has taken the trouble to inform himself on the possibilities of broadcasting and has been greatly impressed in doing so. He is quoted as saying to his audience of bankers:

"As a result of the development of broadcasting, no man to whom large responsibilities are entrusted can longer hide in the misty background of impersonality. Radio is bridging the gap which has separated the administrators of modern business from their public. It has established personal contact and laid the foundations of sympathetic understanding. Now one may talk to a nation, and all may listen in, and, by becoming familiar with the tone, the inflection, and the timbre of the voice, get to know the man."

"Complete" Radio Sets

EFFORTS are being made to standardize radio apparatus and the nomenclature which describes sets and parts. Is it not time all manufacturers and dealers standardize descriptions of sets? When is a set complete? How much more must one expend for tubes, batteries, aerial and for phones?

Just after Christmas, a woman called the Chesapeake & Potomac Telephone Company and asked for aid, explaining that she knew WCAP was broadcasting, but she could not get it on her new set.

The operator inquired if the tubes lit up, whereupon she asked what they were; and being told, said there didn't seem to be any in the set. Further inquiry showed that she had neither tubes, batteries, aerial nor phones, but that the donor of the gift supposed he had presented her a radio receiver ready for operation.

Other examples, such as this, convince of the need of better salesmanship and also of better advertising, for some advertisements are found to be misleading, although probably not intended to be deceptive. The dealer who sold the above set lost the sale of accessories and the purchaser was embarrassed and disappointed when he

learned that vital parts were missing from the "set." The word "set" implies that it is a complete entity. An automobile salesman would not sell nor advertise a car without a battery, headlights and tires. If the set is not complete and ready to operate, why not say "without tubes, batteries or phones," as a few agencies do? Complete sets could also be advertised and then the purchaser would know just how much he would have to spend.

The Radio Subconscious

SEVERAL of our old friends defend the belief that experienced operators can copy or memorize more than one English message at a time, citing one expert in San Francisco credited with having taken three dispatches at once—all proving to be correct when written out. There is a former Naval operator, now in a high governmental radio position, who claims that while copying one message, he has often been able to note mentally other messages, interfering with the reception of the first, and later write them out. Whenever he was copying some dull and uninteresting report, he says, he always was able to note with accuracy messages pertaining to shore leave, pay or other features in which he was especially interested.

Another government official says he once got the same message from two shore stations, transmitting simultaneously, while he was aboard ship off California. An important message for his ship was routed via San Francisco and also via Los Angeles. Both KPH and KPJ called him at the same time, and when he told San Francisco to go ahead, both began to send simultaneously. He tried to take them both, which proved very easy when he discovered they were identical. His O. K., intended for KPH was considered by both stations as acknowledgment. The only trouble arose later, when both shore stations billed his ship for the message, each claiming credit for transmission.

RALPH WALDO EMERSON,

the great American essayist and philosopher, once said: "The reward of a thing well done is to have done it." Of course he meant this in a spiritual or moral sense. But today his thought has a very practical reward as well as the spiritual when applied to the construction by amateurs of radio receiving sets. The well built set, on which careful painstaking effort has been patiently expended, will work at the first trial and give more pleasure and enjoyment to its builder than any other home-made device.

The Radio University

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

I am the owner of a three-tube "Erla" reflex, using the parts recommended by the "Erla" concern, and I use UV199 tubes. They claim transcontinental reception on the loud speaker, but up to the present time I have been unable to get even one station to operate on the loud speaker. My parts are arranged just as they recommend, and the panel layout is just according to the measurements. I have rewired it three times and know I am correct. I have decided to rewire my set and place in either one of the following: The De Forest D7A Reflex set, the Improved Grimes Reflex, published in RADIO WORLD for May 19, or A Circuit for Real Clarity Plus Volume, published in RADIO WORLD for October 20, 1923. Which of these do you recommend? Can I use my present equipment for these circuits? Which stage does the Erla No. 1 and No. 2 transformers go in? Which is the best, the push-pull transformer circuit recently published, or the Single Tube Power Amplifier, published in the Answers to Readers department of RADIO WORLD for February 2?—Lee Gushma, Firth, Idaho.

Reflex circuits are a very critical form of radio receiver. Before you rebuild your set, would advise the following. Test out each and every transformer and condenser by the following method. Test the transformer windings by a battery and a pair of phones, connecting them in series with the battery and phones. If the click is heard, the winding is O. K. If no click is heard, the winding is no good. In this case, replace the transformer. In the case of the condensers, no click should be heard at all. If one is heard, replace the condenser with a new one. In the case of the three circuits mentioned either one of the two reflex circuits are good. You will get better volume and distance out of the reflex than out of the other circuit mentioned, as that one is simply a radio frequency circuit using a crystal detector, and audio frequency. It is simpler to construct than either of the others, but as far as volume goes, the others have more, and will operate on a loop more efficiently. You do not need a trap circuit in a reflex using a loop antenna, and in the case of an outside antenna, the trap circuit is simply inserted between the antenna of the set and the antenna post. You may use your present apparatus. The No. 1 goes in the first and the No. 2 goes in either the second or third, whichever you are building. Suggest the power push-pull circuit, using the special transformers. One of these was described by C. White in RADIO WORLD for February 19.

About a year ago I purchased in New York a crystal set made by a German concern. It uses a 26-plate precision condenser (Seibt) and the coils are all neatly bank wound. Could I remove this condenser and use it in the Superdyne circuit? Would it be of any advantage to bank wind the coils in the plate and secondary circuits? Why is the feed-back coil reversed? What is the efficiency of this set as compared to a Westinghouse R-C that I am now using? I have copied stations over 1,500 miles distant, and got loud speaker work on anything below 900 miles, using three UV201A tubes with 60 volts on the plate and a 100' antenna.—Wendal Philpotts, Brooklyn, N. Y.

It would be possible to use this condenser if it is possible to obtain another of the same type. They are very efficient and excellent condensers and should prove very good in this receiver. There would be no advantage gained in so doing. The coil is reversed to counteract any positive feedback in the leads of the first tube. You probably understand that the reason for the oscillation of a tube in a radio frequency circuit is the positive capacity feedback between the leads and elements of the tubes. This negative feedback just allows enough negative bias to be employed so that the positive feedback is stultified, or counteracted. The set is much more efficient than the one you mention. Loud speaker work on stations 1,800 miles distant has been verified on this circuit, using UV199 tubes and a 75' antenna. You will get more volume by the use of the UV201A tubes, but suggest that for sharp tuning that you make your antenna about 60' to 75'. This receiver is much louder than a regenerative set, and on tests in the Bureau of Standards it showed an audibility of nearly 1,000 against 100 of a regenerative set, proving that there is ten times more volume in it when properly operated.

Why is the wave length of a station also listed in Kcys. in your call list? Can a station be tuned in on a receiver using the Kcys. instead of the meters?—Martha Collins, Chicago, Ill.

Kcys. is an abbreviation for Kilocycles, or the frequency of the emitted wave. You can calibrate your set for Kcys. just as easy as for meters. The Kilocycles is the correct term, as meters does not signify anything at all—if you consider the term correctly.

Enclosed please find diagram of set I am using. It works fine with the exception of being broad in tuning. I am also bothered considerably with the fading of the signals, which seems to be worse in the night time than in the day. Can you suggest any changes that will improve this set?—J. C. De Forest, Newburg, Ind.

The circuit you are using is the conventional single circuit receiver. To improve the circuit, reduce the number of turns on the rotor of your coupler, which you are using as a tickler. About 15 turns on each side will be correct. Another point is to remove the condenser across it. The next thing is to reduce the number of turns on your primary. You have entirely too much wire in the circuit. Tap it at 15, 20, 25, 30 and last of fortieth turn, and take out the rest of the wire. Dead end losses are worse than too little wire. Place the three-plate condenser across from the antenna to the ground, and do your fine tuning with the three-plate condenser. You cannot stop fading.

I am located just 35' from the high tension lines supplying the Long Island Railroad. My antenna is pretty nearly at right angles to it, yet whenever a train passes the house, there is a tremendous noise that lasts until the train is out of sight. I have placed in a choke coil and condenser as you stated, but this just cuts it down a bit and tends to make the distant signals weaker and mushy. Is there anything that can be done to remove this terrible noise? The trains run on eight and ten-minute schedules during the rush hour and radio reception is impossible, as there is a continuous crackle and roar.—Howard Collins (no address).

You are located in a rather unfortunate position, being so close to such a large disturbing factor as a railroad. About the only solution that will aid you in the least is to use a loop antenna, with a metallic shield on the side facing the railroad, the shield being grounded. This shield can take the form of a piece of copper screening, tacked to the wall, the loop being located three or four feet away from it. It is a rather hard proposition to cut this kind of interference out. Several plans have been tried and all of them failed.

Where can I get in touch with W. K. Koelner, radio engineer, who is experimenting with the 8-tube super-heterodyne?—Howard E. Aller, 630 Catherine Street, Syracuse, N. Y. M. J. Moffat, New York City.

Write to the Experimenters Information Service Bureau, 236 West 46th Street, New York City. Mr. Koelner is radio engineer for these people.

In RADIO WORLD for February 2 you give the dimensions for making a loop antenna. As I am only a beginner I wish to have some additional information as I wish to build the receiver. Would the enclosed sample of wire be of any use in this loop? If not what type of wire should I use? Should the cross pieces on which the wire is wound be a non-conductor? If so what material is most suitable? How is the loop connected to the receiver? Does it matter how close to the receiver the loop is placed? Considering my location and my distance from the chief broadcasting stations of the United States, would it not be more advantageous to have about 15 turns on the loop? How far should the turns be spaced?—E. F. LeBlanc, Church Point, Nova Scotia, Canada.

The wire you enclose is entirely too heavy. Use single strand cotton covered wire. About number 16 or 18 will be sufficient. Use soft drawn copper if possible, or better yet get litz wire of the same size. Hard, well-dried wood is about as good as anything for the cross pieces, with small pieces of hard rubber as insulators where the ends of the cross pieces are located. The two terminals of the loop are connected across the antenna and ground terminals of the set, and a condenser is used to tune the set with. No. Most sets place the loop directly on top of the set itself. No—the greater the number of turns on a loop the higher the wave length value. The ten turns specified will be sufficient. As your set is a single circuit regenerative, it is of little use to employ a loop. A loop antenna is generally used with a reflex or radio frequency receiver—not with a plain regenerative set. That is if you expect to cover distance. The turns should be spaced about 1/2" apart.

I would like to know if the New Superdyne described in RADIO WORLD for December 15th will produce as much volume as a single circuit receiver, in connection with a two step amplifier

as described in the September 8th issue? Would it be possible to make a Superdyne receiver to respond to the higher wave length as well as the lower ones?—C. R. Barnett, Hagerman, N. Mex.

This receiver is much more sensitive than a single circuit receiver ever could be. You do not need two extra steps, as the receiver shown already has two stages of audio frequency amplification. It is a four tube receiver. The second tube is the detector, and the third and fourth tubes are the audio frequency tubes. By higher wave lengths we suppose you mean above 3,000 meters. It would be possible to do this, but what is the sense. All spark stations operate above 600 meters. The set shown responds to all wave length up to and including 600 meters.

What direction should the wire of the 4 turn aperiodic primary in the Superdyne be wound in as related to secondary? Would it be of any value to use a 180 degree variocoupler, wound as specified. Is the cushion mounting that I have outlined correct?—C. F. Allen, W. S. Nott Co., Minneapolis, Minn.

It is wound in the same direction as the secondary. When hooking it up, reverse the antenna and ground connection until the best connection for the particular set is found. It should not make very much difference in the operation one way or the other. You cannot use the coupler you mention, as magnetic coupling between the two coils has to be avoided. Use the coupler mentioned. The mounting you suggest is perfectly O. K.

Enclosed is the copy of the circuit published in RADIO WORLD for January 19. I want to make it, but do not understand the connections of the radio transformer to the first audio frequency transformer. How are they connected?—C. W. Seadner, 420 Washington Avenue, Elizabeth, N. J.

There is but one way to connect transformers, as the posts are all marked. However, for your information, the following is the method, in the circuit you mention. In the radio frequency transformer, the upper left hand connection is the P side. The lower left hand connection is the B plus side. The upper right hand winding is the G side and the lower right hand winding is the F side. On the audio frequency transformer the upper left hand winding is the P side and the lower left hand connection is the B plus side. On the secondary the upper left hand connection is the G and the lower is the F. This is simple if you stop to figure the circuit out.

I recently bought a Fada neodyne receiver which when first operated brought in signals as far west as Nebraska on the loud speaker. I use UV201A tubes, never turn my rheostat up more than necessary, and have never touched the rheostat on the amplifying tubes since it was bought. Now there is a terrible noise in the receiver and it is hard to bring in even the locals. I can take the last tube out and it will function almost as well as with it in. What is my trouble and how can I remedy it? I use a light plug in the electric light for an antenna.—Floyd Hammer, 1912 Bonton Street, Detroit, Mich.

Your trouble seems to indicate that you have a burnt out audio frequency transformer which would cause the reflex tube to act as you mention. Take your set around to some expert and let him test it out. It might be that there was a high frequency surge along the light system you are using which burnt out the windings of the transformer. At any rate have the set examined thoroughly. The fact that you can take the last tube out seems to make this a conclusive proof of the burnt out part.

I have a nine-tube super-heterodyne which is giving wonderful results. The signals are so loud sometimes that the second detector (216A) seems to block. What is the correct value of grid leak and condenser that is necessary to prevent this blocking?—F. O. Welch, 506 West Third Street, Oil City, Pa.

There are two means of correcting this blocking. One is by the use of a grid leak from the grid of the second detector to the filament instead of shunting the grid condenser, and the other is by using a variable grid leak of the compression type which allows a wide variation of values. In the first case a leak of three megohms will prove correct, while in the second a leak of approximately 1 1/2 megohms will be about right. It is also of advantage to use a grid condenser of about .00015 instead of larger.

Would it be possible to arrange the two-tube radio frequency unit described in RADIO WORLD for December 8 by A. E. Herron, so that it would work on a three-tube Cockaday?—E. J. Muzzy, 142 Prospect Street, Jamestown, N. Y.

This cannot be done. Due to the particular circuit arrangement of the Cockaday four-circuit tuner, it is not possible to add radio frequency to it.

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

Name

Street

City and State

Wherever the Radio News Brea



(C. Kadel and Herbert)

Miss Catherine Jay Moore, of New York City, one of the very few feminine fans who take a real heartfelt interest in radio listeners, and who is carrying on an anti-squeal campaign in her neighborhood. She very kindly junked her old regenerative receiver, and bought a neutrodyne, which gives her better results.



(C. Kadel and Herbert)

American sport enthusiasts, wintering at Chateau Frontenac, Quebec, Canada, listening in on American concerts, after a strenuous afternoon of skating and skiing on the ice and snow clad hills surrounding the city.



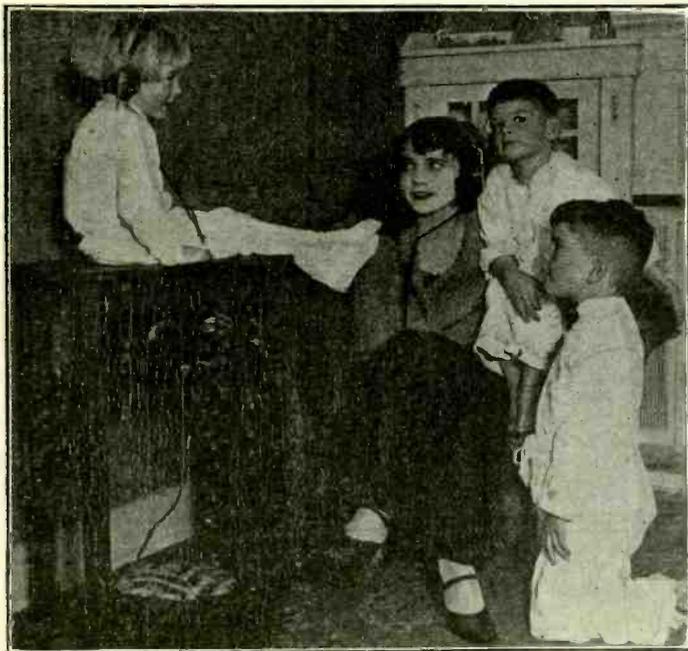
(C. Western Electric)

Mrs. Robert Hatfield, and her family, improving their bridge game by listening to the lectures delivered through WEAF by Raymond F. Rhode, a weekly feature of that station.



(C. Wide World Photos)

Chief Wireless Officer Mandley, of the S. S. "Clysmic," who has established several high speed records for taking down messages on the typewriter. He can and has copied messages on his "rail" up to forty words per minute, which as any code man will tell you is "going considerable."



(C. International Newsreel)

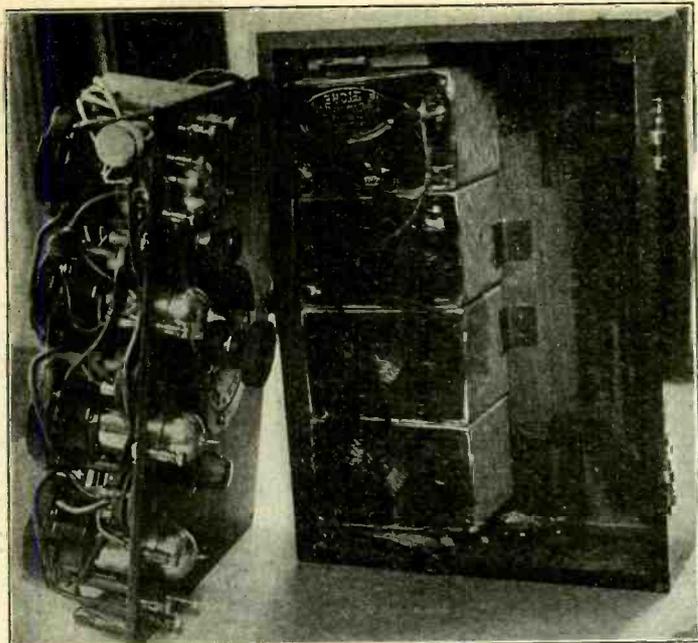
This Los Angeles fan, wanting a set that the kiddies could play with, and yet which could not be damaged, arranged the set as shown, using the small "cozy corner table" as a cabinet. Mother and the kiddies are listening in to bed-time stories, before the sand man starts in to sprinkle his magnetic eye-closers.



(C. Foto Topics)

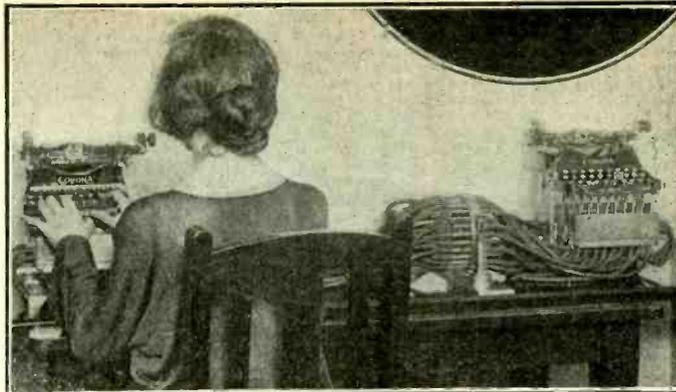
M. N. Murray, well known and beloved back-stage doorman of the Globe Theatre, New York, who has a speaking acquaintance with more famous personalities of the stage than you can shake a stick at, listening in between-whiles to the show playing there, which was being broadcast from a station over a mile away.

ks, Our Cameramen Record It!



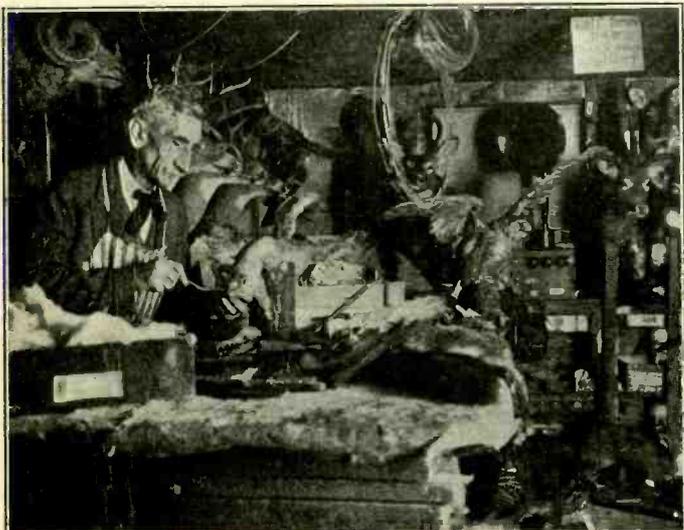
(C. Photonews)

Four-tube receiver built by Alfred Caldwell, of New York City, which is a marvel of compactness, the tuning, batteries, tubes and all being encompassed in a cabinet and panel 6 x 7 x 4 inches. For local signals, no antenna is necessary, and the set operates a loud speaker on DX with antenna and ground.



(C. Gilliams)

Invention of Sidney Hole, English scientist, which automatically codes and decodes messages by means of a vacuum tube trip circuit. One machine sends the material in code, and it is translated in type on the other machine. Ordinary typewriters are used, with special key-coupling arrangements, connected to a coding and decoding wheel under the base of each machine.



(C. Western Electric)

Robert A. Bosnell, famous taxidermist, whose fine work adorns the dens of some of the most famous nimrods in the country, always works with the radio set going full blast, as he claims that it shortens his working day and he can concentrate and work faster.



(C. Foto Topics)

Richard Carlisle, president of the radio club at the College of the City of New York, at the official station of the college, 2XNA, the transmitter of which was constructed by members of the club. Practically every state in the country has been covered by this 20 watt transmitter, as well as several stations in Canada, Cuba and Mexico. Richard Carlisle at the key.



(C. Foto Topics)

The latest photo of Baby Peggy, child film artist, in her home on the Pacific Coast, who just succeeded in getting WEAF through on her new Federal DX 61, which she took back west with her after completing her eastern tour. She looks as though she had China instead of just little old New York, with its powerful 1000 watter.



(C. Kadel and Herbert)

Dr. E. F. W. Alexanderson, Chief Engineer of the RCA, experimenting in his home at Schenectady, N. Y., on a new wave trap which enables him to tune out WGY, located less than a mile from his home in Schenectady. The patent on this device has been granted Dr. Alexanderson, and bears the number 1,477,613.

Here Are Good Broadcast Programs

Station KYW, Chicago, Ill.

536 Meters (560 Kcs.) C. S. T. Feb. 29.—9:30 A. M.—Late news and comment of the financial and commercial markets. (This service is broadcast every half hour during the twenty-four.) 11:35 A. M.—Table talk by Mrs. Anna J. Peterson. 12:30 P. M.—"The Progress of the World," furnished by Review of Reviews. 6:30 P. M.—News financial and final market. 6:50 P. M.—Children's bedtime story. 7:00-7:30 P. M.—Dinner concert from the Congress Hotel. 10:00 P. M.—2:00 A. M.—Midnight revue.

Mar. 1.—9:30 A. M.—Late news and comment of the financial and commercial markets. (This service is broadcast every half hour during the twenty-four.) 10:30 A. M.—Farm and Home Service. 11:35 A. M.—Table talk by Mrs. A. J. Peterson. 6:30 P. M.—News, financial and final market. 6:50 P. M.—Children's bedtime story. 7:00-7:30 P. M.—Dinner concert furnished by the Congress Hotel. 8:00-8:58 P. M.—Musical program—Courtesy of the Salvation Army Staff Band. 9:05 P. M.—"Safety First," talk furnished by the Chicago Motor Club. 9:15 P. M.—"Under the Evening Lamp," service including stories, articles and humorous sketches furnished by the Youth's Companion. 10:00-12:00 P. M.—Late show from KYW's Studio in the Congress Hotel.

Mar. 2.—11:00 A. M.—Central Church Service broadcast from Orchestra Hall, Chicago. Dr. F. F. Shannon, pastor. Musical program under the direction of Daniel Protheroe. 2:30 P. M.—Studio Chapel Service direction Chicago Church Federation. The Rev. Martin Luther Thomas, chairman on radio evangelism. The speaker will be Dr. Gilbert Wilson, pastor New First Congregational Church. 7:00 P. M.—Chicago Sunday Evening Club Service broadcast from Orchestra Hall, Chicago. Special musical program under the direction of Edgar Nelson. The speaker will be Dr. Hugh Black.

Station WGI, Medford, Mass.

360 Meters (830 Kcs.) E. S. T. Feb. 29.—Noon—Selection on the Ampico in the Chickering; Amrad Round Table; Selections on the Brunswick. 12:40 P. M.—Weather forecast. 12:45 P. M.—Closing report on farmers' produce market. 3:00 P. M.—Amrad Women's Club program: "The Sinking of the Titanic" by Archie Butt, read by Miss Brita Heurlin; Musicale by the Brunswick. 3:30 P. M.—Talk by Miss Dorothy Dean, Girl Scouts. 5:30 P. M.—Closing stock market reports; live stock markets report. 6:15 P. M.—Code practice, lesson No. 242. 6:30 P. M.—Meeting of the Big Brother Amrad Club. 7:00 P. M.—Boston police reports. 7:30 P. M.—Verses by Mr. Charles L. H. Wagner, radio poet; Red Cross health talk, by Henry Copley Green; Concert by Frederic Joslyn, baritone; Debate by radio arranged by Robt. W. Kelso, executive secretary, Boston Council of Social Agencies.

Mar. 1.—6:30 P. M.—Meeting of the Big Brother Amrad Club. 6:45 P. M.—Code practice, lesson No. 243. 7:05 P. M.—Weather forecast; New England crop notes. 7:30 P. M.—Talk on New England business industry by Arthur R. Curnick; Arthur Murray's course in ball room dancing; Musicale.

Mar. 2.—4:00 P. M.—"Adventure Hour" by the Youth's Companion; Musicale. 8:30 P. M.—Talk on "World Unity," under the auspices of the Greater Boston Federation of Churches; Evening's musicale.

Station WEF, New York City

492 Meters (610 Kcs.) E. S. T. Feb. 29.—11 A. M.—Lecture by Prof. Marguerite Clement, direct from Town Hall, New York City, under the auspices of the League for Political Education. 11:50 A. M.—Consolidated Market and Weather Reports. 4:5-30 P. M.—Wallace Drewes, Jazz pianist; Tutzi Leyton, soprano, accompanied by Martha Ungar; Stories and songs for children. 7:15-12 P. M.—Health talk by Dr. Paul Kammerer of Vienna, under the auspices of the New York Tuberculosis Association. Daily sport talk by Thornton Fisher. Elizabeth Gibbs, contralto; "The Happiness Boys," Billy Gibbs, and Ernest Hare. Music by the World Mutual Automobile Casualty Insurance Company, and talks by Major A. A. Stewart. B. Fisher and Company's "Astor Coffee" Dance Orchestra. Popular songs by Al Bernard and Lucille Hegamin.

March 1.—1:45-3:30 P. M.—Luncheon of the Foreign Policy Association direct from Hotel Astor. 4:5-30 P. M.—Dance program by the Carolinians Orchestra, Charles Koch, director; Arthur Levasseur, entor, accompanied by Mary Stetzel. 7:15-8:15 P. M.—"The Chiclet Quartette," assisted by the "Chiclet Trio," of the American Chic Company. 8:15-10 P. M.—Special musical program.

Station KPO, San Francisco, Calif.

423 Meters (710 Kcs.) P. T. Feb. 29.—Noon—Time signals from the Naval Observatory. Reading of the Scriptures. 1:00-2:00 P. M.—Rudy Seiger's Fairmont Hotel Orchestra, by wire telephony. 2:30-3:30 P. M.—Organ recital by Theodore John Irwin. 4:30-5:30 P. M.—Rudy Seiger's Fairmont Hotel Orchestra, by wire telephony.

Mar. 1.—Noon—Time signals from the Naval Observatory. Reading of the Scriptures. 1:00-2:00 P. M.—Rudy Seiger's Fairmont Hotel Orchestra, by wire telephony. 2:30-3:30 P. M.—Virginia Miller, pianist. The Paramount Orchestra, direction Al. Todt, will present a "Jazz" program. 3:30-5:30 P. M.—E. Max Bradford's Orchestra. 8:00-12:00 P. M.—Art Weirmer's Fairmont Hotel Dance Orchestra, broadcast by wire telephony.

Station WJZ, New York City

455 Meters (660 Kcs.) E. S. T. Feb. 29.—12:15 P. M.—Friday Noon Hour of Music direct from the Brick Presbyterian Church. 3:00 P. M.—Organ recital by Leo Riggs on the Hotel Astor Organ, direct from the Hotel Astor. 4:00 P. M.—Jimmy Moore's Popular Songs. 4:15 P. M.—Evelene Spencer, "Frozen Fish," a Middle Atlantic Fisheries talk. 4:30 P. M.—Fashion developments. 4:35 P. M.—Recital by Olga Erika Schotte. 5:00 P. M.—"The Larger Aspect of World Affairs." 5:15 P. M.—"Systematic Psychology," by Dean James Lough. 5:45 P. M.—Closing reports of the New York State Department of Farms and Markets; Farm and Home reports; closing quotations of the New York Stock Exchange; foreign exchange quotations; "The Condition of the Leading Industries," by the "Magazine of Wall Street"; "Evening Post" news. 7:30 P. M.—Burr McIntosh, the Cheerful Philosopher. 7:50 P. M.—Recital by Dorothy Mac-Donough, soprano. 8:05 P. M.—Looseleaf Current Topics. 8:20 P. M.—Dorothy Mac-Donough, soprano. 8:35 P. M.—Cousins Double Male Quartette. 8:45 P. M.—William Harmon Beers, "Home Building." 9:00 P. M.—New York Music Week Contest Winners Concert. 9:15 P. M.—Cousins Double Male Quartette. 9:40 P. M.—"Mistakes Mah Jong Players Make" by R. F. Foster. 9:55 P. M.—Time signals and weather forecast from NAA, Arlington. 10:00 P. M.—Piano recital by Felian Garzia direct from Aeolian Hall. 10:30 P. M.—Dance program by Paul Specht's Alamac Hotel Orchestra.

Mar. 1.—3:00 P. M.—Memphis Synchronators. 3:15 Harold Dellon's Popular Program. 3:30 P. M.—Memphis Synchronators. 3:45 P. M.—Harold Dellon's Popular Program. 4:00 P. M.—Tea concert by the Hotel Belmont Stringed Ensemble, Harry Lerner, leader. 5:00 P. M.—Lora Green, mezzo-soprano. 5:30 P. M.—Closing reports of the New York State Department of Farms and Markets; Farm and Home reports; closing quotations of the New York Stock Exchange; foreign exchange quotations; Bradstreet's financial report; "Evening Post" news. 7:30 P. M.—Erva Lucille Giles, soprano. 7:45 P. M.—Vincent Desautis, violinist. 8:00 P. M.—"Sausage," by John C. Cutting. 8:15 P. M.—Vincent Desautis, violinist. 8:30 P. M.—Elis A. Lundberg, baritone. 8:45 P. M.—Music Week Contest. 9:00 P. M.—Elis A. Lundberg, baritone. 9:15 P. M.—"Employers and Satisfactory Service," by K. M. Weinger. 10:30 P. M.—Harold Stern and his Hotel Majestic Orchestra, direct from the Hotel Majestic.

Mar. 2.—11:00 A. M.—1:00 P. M.; 7:00-10:30 P. M.

Station WFAA, Dallas, Texas

476 Meters (630 Kcs.) C. S. T. Feb. 29.—12:30-1:00 P. M.—Address, Dr. Robert Stewart Hyer, Southern Methodist University, on the Sunday school lesson, "Revival Under Samuel." 8:30-9:30 P. M.—Varied program, chiefly popular music in song and orchestra, broadcast from the Adolphus Hotel, presenting the annual meeting of Dallas Greeters.

Mar. 1.—12:30-1:00 P. M.—Address, Dr. J. D. Boon, Southern Methodist University, department of astronomy, "The Stars in March." 8:30-9:30 P. M.—Magnolia Petroleum Company Band, playing at Beaumont, Texas, broadcast through Station WFAA, 391 miles away. 11:00-12:00 P. M.—Musical program of the Adolphus Hotel Orchestra, broadcast from the junior ballroom of the hotel.

Mar. 2.—6:00-7:00 P. M.—Radio Bible class, Dr. William M. Anderson, Jr., pastor First Presbyterian Church, teacher; half hour Bible study and half hour Gospel song. 7:30-9:00 P. M.—Service of First Unitarian Church, Dr. M. L. Sullivan speaking; choir and soloists in music. 9:30-11:00 P. M.—Harris Brothers' Orchestra in popular program.

Station WDAF, Kansas City, Mo.

411 Meters (730 Kcs.) C. S. T. Feb. 29.—3:30-4:30 P. M.—Regular "request" program by the Leo R. Davis "Radio" Orchestra. 6:00-7:00 P. M.—Piano tuning in number on the Duo-Art. Market program, weather forecast, time signal and road report. Address—Speaker from the Kansas City Children's bureau. The children's story and information period. Music—Fritz Hanlein's Trianon Ensemble, Hotel Muehlebach. 8:00-9:15 P. M.—Program arranged by Alma Nash. 11:45 P. M.—1:00 A. M.—(Nighthawk Frolic.) The "Merry Old Chief" and the Coon-Sanders Novelty Singing Orchestra, Plantation Grill, Hotel Muehlebach.

Mar. 1.—3:30-4:30 P. M.—The Riley Ehrhart Orchestra. 6:00-7:00 P. M.—Piano tuning number on the Duo-Art. Market program, weather forecast, time signal and road report. Address—Edgar A. Linton, tenth of a series of travelogues. The children's story and information period. Music—Fritz Hanlein's Ensemble, Hotel Muehlebach. 11:45 P. M.—1:00 A. M.—(Nighthawk Frolic.) The "Merry Old Chief" and the Coon-Sanders Novelty Singing Orchestra, Plantation Grill, Hotel Muehlebach.

Station WJY, New York City

405 Meters (740 Kcs.) E. S. T. Feb. 29.—7:30 P. M.—Frank Shevitt, "Income Taxes," 7:45 P. M.—Leon Gilbert Simon, baritone, accompanied by Josef Adler. 8:00 P. M.—The Honorable Julius Berg, "The Work of the New York Assembly." 8:15 P. M.—Leon Gilbert Simon, baritone, accompanied by Josef Adler. 10:00 P. M.—Breau & Tobias.

Mar. 2.—2:30-5:00 P. M.; 8:00-10:30 P. M.

Station WOC, Davenport, Iowa

484 Meters (620 Kcs.) C. S. T. Feb. 29.—10:00 A. M.—Opening market quotations and household hints. 10:55 A. M.—Time signals. 11:00 A. M.—Weather and river forecast. 11:05 A. M.—Market quotations. Noon—Chimes concert. 2:00 P. M.—Closing stocks and markets. 3:30 P. M.—R. G. Maybach on "The Liver as a Transformation Plant." 5:45 P. M.—Chimes concert. 6:30 P. M.—Sandman's visit. 6:50 P. M.—Sport news and weather forecast. 7:20 P. M.—Sunday school lesson—International lesson for next Sunday discussed by Dr. Frank Willard Court, pastor St. John's Methodist Episcopal Church, Davenport, Iowa. 8:00 P. M.—Musical program by the Choir of St. John's Methodist Episcopal Church, of Davenport, Iowa. A. W. Barlow, director.

Mar. 1.—10:00 A. M.—Opening market quotations and household hints. 10:55 A. M.—Time signals. 11:00 A. M.—Weather and river forecast. 11:05 A. M.—Market quotations. Noon—Chimes concert. 12:30 P. M.—Closing stocks and markets. 3:30 P. M.—Lecture by C. C. Hall on "Chemical Constituents of the Human Body." 5:45 P. M.—Chimes concert. 6:30 P. M.—Sandman's visit. 6:50 P. M.—Sport news and weather forecast. 7:00 P. M.—"Some Facts About Balloon Type Tires," by J. F. Block. 9:00 P. M.—P. S. C. Orchestra. Gerald M. Barrow, director. V. B. Rochte, baritone soloist.

Station WWJ, Detroit, Mich.

517 Meters (580 Kcs.) E. S. T. Feb. 29.—9:30 A. M.—"Tonight's Dinner," and a special talk by the Woman's Editor. 9:45 A. M.—Public health service bulletins and talks on subjects of general interest. 10:25 A. M.—Official weather forecast. 11:35 A. M.—Arlington time relayed by the Western Union. 12:00 P. M.—Dance music by Jean Goldkette's Orchestra, broadcast from the Graystone Ballroom. 3:00 P. M.—The Detroit News Orchestra. 3:30 P. M.—Official weather forecast. 3:35 P. M.—Market reports. 8:30 P. M.—The Detroit News Orchestra; Anne Campbell, Detroit News poet; Mrs. Lillian Selden, soprano; Walter Peglow, baritone.

Mar. 1.—9:30 A. M.—"Tonight's dinner," and a special talk by the Woman's Editor. 9:45 A. M.—Public health service bulletins and talks on subjects of general interest. 10:25 A. M.—Official weather forecast. 11:55 A. M.—Arlington time relayed by the Western Union. 3:00 P. M.—The Detroit News Orchestra. 3:30 P. M.—Official weather forecast. 3:35 P. M.—Market reports.

Mar. 2.—4:00 P. M.—The Detroit News Orchestra; Cyril Wezemaal, baritone and Leo Robitaille, tenor. 11:00 A. M.—Services at St. Paul's Episcopal Cathedral broadcast from the cathedral.

Station KHJ, Los Angeles, Calif.

395 Meters (760 Kcs.) P. T. Feb. 29.—12:30-1:15 P. M.—News items, weather report, music. 2:30-3:30 P. M.—Matinee musicale. 6:40-7:30 P. M.—Children's program presenting Richard Hendrick, screen juvenile. Bedtime story by "Uncle John." 7:30 P. M.—Organ recital from First Methodist Episcopal Church, Arthus Blakeley, organist. 8:10 P. M.—Continuity program, "A Trip to the Moon," arranged by O. G. Pirie. 10-12 P. M.—Broadcasting Art Hickman's Orchestra by line telephony from the Los Angeles Biltmore Hotel.

March 1.—12:30-1:15 P. M.—News items, weather report. Music. 2:30-3:30 P. M.—Matinee musicale presenting Junita Ruth Cure, soprano, and Mildred Irene Cure, pianist. 6:40 P. M.—Live stock and vegetable reports. 6:45-7:30 P. M.—Children's program presenting Helene Pirie, screen juvenile. Richard Allen White, reader, 3 years old. Bedtime story by "Uncle John." 8-10 P. M.—Program presenting Kathryn Thompson and her Southern California Saxophone Band. 10-12 P. M.—Broadcasting Art Hickman's Orchestra by line telephony from the Los Angeles Biltmore Hotel.

Station WBZ, Springfield, Mass.

337 Meters (890 Kcs.) E. S. T. Feb. 29.—11:55 A. M.—Arlington time signals; weather reports; Boston and Springfield market reports. 6:00 P. M.—Dinner concert by the WBZ Orchestra. 7:00 P. M.—"Three Is a Crowd," a dramatized story prepared by the Youth's Companion. 7:30 P. M.—Bedtime story for the kiddies by the original Dream Daddy. Current Book Review, by R. A. MacDonald. 9:55 P. M.—Arlington time signals. 11:00 P. M.—Program of chamber music by the WBZ Orchestra, and Harriet Chamberlain, lyric soprano.

Mar. 1.—11:55 A. M.—Arlington time signals; weather reports; Boston market report. 7:00 P. M.—Dinner concert by the Hotel Kimball Trio transmitted from the Hotel Kimball dining room; Jan Geerts, violinist and director. 7:30 P. M.—Bedtime story for the kiddies. "Bringing the World to America," prepared by "Our World Magazine." 8:00 P. M.—Concert by the WBZ Trio. 9:00 P. M.—Bedtime story for the grown-ups by Orison S. Marden. 9:55 P. M.—Arlington time signals.

Station WOAN, Lawrenceburg, Tenn.

352 Meters (850 Kcs.) C. S. T. Daily except Saturday, 8:30-9:30 P. M.—Popular and standard orchestrations, Vaughan Radio Orchestra, vocal solos, duets and quartets. The famous Vaughan quartets, well known throughout the South, nightly.

Station KDKA, East Pittsburgh, Pa.

326 Meters (920 Kcys.) E. S. T. Feb. 29.—9:45 A. M.—Union Live Stock Market reports. 11:55 A. M.—Arlington time signals. Noon—Weather forecast; United States Bureau of Market reports. 6:15 P. M.—Organ recital by Lucile Hale, from the Cameo Motion Picture Theatre, Pittsburgh, Pa. 7:15 P. M.—Radio Boy Scout meeting. 7:45 P. M.—The children's period. 8:00 P. M.—Special feature. 9:00 P. M.—Program arranged by the American Legion. 9:55 P. M.—Arlington time signals; weather forecast.

Mar. 1.—9:45 A. M.—Union Live Stock Market reports. 11:55 A. M.—Arlington time signals. Noon—Weather forecast; United States Bureau of Market reports. 1:30 P. M.—Concert by Daugherty's Orchestra from McCreery's dining room, Pittsburgh, Pa. 6:15 P. M.—Dinner concert by the Westinghouse Band, T. J. Vastine, conductor. 7:30 P. M.—"Bringing the World to America," prepared by "Our World." 7:45 P. M.—The children's period. 8:15 P. M.—The Golden Anniversary of the Woman's Christian Temperance Union, Mrs. R. B. Robinson, secretary Pennsylvania State W. C. T. U. 8:30 P. M.—Concert by Westinghouse Band, T. J. Vastine, conductor, and the Edgar Thomson Male Quartet. Selections by quartet will be announced by radio. 9:55 P. M.—Arlington time signals; weather forecast.

Station WSB, Atlanta, Ga.

429 Meters (700 Kcys.) Feb. 29.—Noon—Entertainment. 4:00-4:30 P. M.—Howard Theatre overture. 5:00-5:30 P. M.—Vick Myers' Melody Orchestra, featuring "Mutt and Jeff" blues; news, etc. 5:30 P. M.—Miss Bonnie Barnhardt's songs and Burgess bedtime story. 8:00-9:00 P. M.—Agnes Scott college girls glee club, Decatur, Ga. 10:45-11:45 P. M.—"Campus Days," concert by Suwanee Glee Club, University of the South, Sewanee, Tennessee.

Mar. 1.—Noon—Entertainment. 4:00-4:30 P. M.—Howard Theatre overture. 5:00-5:30 P. M.—Music, news, foreign trade message by B. C. Gettsinger, U. S. Department of Commerce. 5:30 P. M.—Miss Bonnie Barnhardt's songs and Burgess bedtime story. 8:00-9:00 P. M.—J. Kell Martin instrumental quartet in variety program. 10:45-11:45 P. M.—Kimo Kalohi's Moonlight Five. Hawaiian serenaders; Radiow! skylark.

Mar. 2.—11:00 A. M.—First Presbyterian Church service; the Rev. J. Sprole Lyons, pastor; Dr. Charles A. Sheldon, organist. 5:00-6:00 P. M.—Sabbath twilight studio broadcast by Gertrude S. Johnson, vocal quartet and instrumental soloists. 7:30-9:00 P. M.—Wesley Memorial M. E. Church service; the Rev. Marvin Williams, pastor; Mr. and Mrs. A. C. Boatman, musical directors.

Station KFI, Los Angeles, Calif.

469 Meters (630 Kcys.) P. T. Feb. 29.—4:45-5:15 P. M.—Evening Herald news bulletins. 5:15-5:45 P. M.—Examiner news bulletins. 6:45-7:30 P. M.—Jean Smalley, whistler; Lloyd Head, vocalist. 8:00-9:00 P. M.—Evening Herald concert. 9:00-10:00 P. M.—Examiner concert. 10:00-11:00 P. M.—Vocal and instrumental concert. 11:00-12:00 P. M.—Ambassador-Lyman's Coconut Grove Orchestra.

Mar. 1.—4:45-5:15 P. M.—Evening Herald news bulletins. 5:15-5:45 P. M.—Examiner news bulletins. 6:45-7:30 P. M.—Bedtime story and concert. 8:00-9:00 P. M.—Women's Lyric Club. 9:00-10:00 P. M.—Examiner concert. 10:00-11:00 P. M.—Vocal and instrumental concert. 11:00-12:00 P. M.—Ambassador-Lyman's Coconut Grove Orchestra.

Mar. 2.—10:00-10:45 A. M.—L. A. Church Federation Service, 4:00-5:00 P. M.—Federated Church Musicians Vesper service. 6:45-7:30 P. M.—Bedtime story and concert. 8:00-9:00 P. M.—Ambassador Hotel concert. 9:00-10:00 P. M.—Examiner concert. 10:00-11:00 P. M.—Theron Bennett's Packard Six.

Station KGW, Portland, Oregon

492 Meters (610 Kcys.) P. T. Feb. 29.—11:15 A. M.—Market basket. 11:30 A. M.—Weather forecast. 12:30 P. M.—Concert. 3:30 P. M.—Lecture by Ester Cooley, clothing specialist; extension service, Oregon Agricultural College; subject, "Clothes Lines." 7:30 P. M.—Weather forecast and market reports. 8 P. M.—Radio debate—Resolved: That the Bok Peace Plan should be adopted. University of California, affirmative, through station KLG; University of Oregon, negative, through station KGW. 10:30 P. M.—Hoot Owls.

March 1.—11:30 A. M.—Weather forecast. 3:30 P. M.—Children's programme. Story by Aunt Nell. 10 P. M.—Weather forecast and dance music by George Olsen's Metropolitan Orchestra of the Hotel Portland (2 hours).

Station KFAE, Pullman, Wash.

330 Meters (910 Kcys.) P. T. Feb. 29.—Vocal solos. Mining investments, Dean L. O. Howard, school of mines. Evolution of fire arms, Lieut. A. B. Pence, U. S. A. Trees for ornamental planting, Prof. E. H. Steffen. Instrumental numbers. Apple Scab, George L. Zundel. Music.

Mar. 3.—Music. What the army does besides fight, Lieut. H. Twitchell, U. S. A. Plants for the early garden, Prof. C. L. Vincent. Why go to high school? Dr. A. A. Douglass. Instrumental solos. Chemistry talk, Prof. J. L. Culbertson.

Station WOS, Jefferson City, Mo.

441 Meters (680 Kcys.) C. S. T. Feb. 29.—3:00 P. M.—Program of varied musical numbers and other features presented by the students of Christian College, a girls' junior college at Columbia, Missouri.

Station WHAS, Louisville, Ky.

400 Meters (... Kcys.) C. S. T. Feb. 29.—4:00-5:00 P. M.—Selections by the Walnut Theatre orchestra, Walter Davison, conductor; police bulletins; weather forecast; "Just Among Home Folks," a daily column appearing in The Courier-Journal; selections by the Strand Theatre orchestra, Harry S. Currie, conductor; selections by the Weidner Institute choir of Mulberry, Ind.; address, Baron Eugene Ferson, founder and president of The Lightbearers; late important news bulletins. 4:50 P. M.—Local livestock, produce and grain market reports. 5:00 P. M.—Official Central Standard time announced. 7:30-9:00 P. M.—Concert by Carl Zoeller's Melodists; reading, An Interesting Historical Episode; late important news bulletins; official Central Standard time announced at 9 o'clock.

Mar. 1.—4:00-5:00 P. M.—Selections by the Strand Theatre orchestra, Harry S. Currie, conductor; police bulletins; weather forecast; "Just Among Home Folks," a daily column appearing in The Courier-Journal; selections by the Walnut Theatre orchestra; Walter Davison, director; late important news bulletins. 4:50 P. M.—Local livestock, produce and grain market reports. 5:00 P. M.—Official Central Standard time announced. 7:30-9:00 P. M.—Instrumental trio: Miss Sara King, piano; Vertner Allen, violin; Aileen Meekbeck, cello; soprano solos: Miss Myrtle George Stinger, accompanied by Miss Marie Dover; piano solos, D. Harry Daley; reading, Cordia Greer Petrie; late important news bulletins; official Central Standard time announced at 9 o'clock.

Station WGY, Schenectady, N. Y.

380 Meters (790 Kcys.) E. S. T. Feb. 29.—11:55 A. M.—Time signals. 12:30 P. M.—Stock market report. 12:40 P. M.—Produce market report. 12:45 P. M.—Weather forecast. 2:00 P. M.—Music and fashion talk, "The New Spring Millinery," Robert L. Smith. 6:00 P. M.—"Produce and stock market quotations; news bulletins. 6:30 P. M.—Children's program. 7:35 P. M.—Health talk, N. Y. State Department of Health. 7:45 P. M.—Radio drama—Comedy, "A Tailor Made Man" (Smith), presented by WGY Players. Late program: WGY Orchestra and soloists.

Mar. 1.—11:55 A. M.—U. S. Naval Observatory time signals. 12:30 P. M.—Stock market report. 12:40 P. M.—Produce market report. 9:30 P. M.—Dance music by Romano's Orchestra, New Kenmore Hotel, Albany, N. Y.

Station WAAM, Newark, N. J.

263 Meters (1140 Kcys.) E. S. T. Feb. 29.—7:00 P. M.—"Star Spangled Banner." 7:05 P. M.—"Metchnikoff's Elixir of Youth." 7:25 P. M.—Emanon Dance Orchestra. 8:00 P. M.—Victor Wilbur, singing. 8:15 P. M.—Piano selections by Joseph Macy. 8:30 P. M.—Frtzi Leyton, songwriter. 8:40 P. M.—Martha Unger, pianist. 8:50 P. M.—Fritzi Leyton, singing. 9:00 P. M.—"The Turn of the Wheel of Events," by the Rev. Arthur W. Brooks, followed by questions and answers. 9:15 P. M.—Ray Southwick and Ajax Records Orchestra. 9:45 P. M.—Benjamin Friedman, singing. 9:50 P. M.—Elsie Blum and Sylvia Goodman, duet. 10:00 P. M.—Benjamin Friedman, songs. 10:15 P. M.—Ray Southwick's orchestra.

Station WRC, Washington, D. C.

469 Meters (640 Kcys.) E. S. T. March 1.—5:15 P. M.—Instruction in international code. 6:00 P. M.—Stories for children by Peggy Albion. 7:45 P. M.—Bible talk under the auspices of the Men's Bible Class of the Y. M. C. A. 8:00 P. M.—Concert of dance music. 8:45 P. M.—Song recital to be announced. 9:00 P. M.—"Radio in Other Countries," by L. E. Whittemore, Secretary of Inter-Department Radio Advisory Committee of the Bureau of Standards. 9:15 P. M.—Concert of instrumental music. 9:35 P. M.—Song recital to be announced. 9:55 P. M.—Re-transmission of time signals and weather forecasts. 10:00 P. M.—Concert of Hawaiian music.

Station KGO, Oakland, Calif.

312 Meters (960 Kcys.) P. T. Feb. 28.—8:00 P. M.—Musical program. Mar. 1.—8:00 P. M.—Musical program.

Station WIP, Philadelphia, Pa.

500 Meters (590 Kcys.) E. S. T. Feb. 29.—1 P. M.—Luncheon music by the Tea Room Orchestra, Ray Steen, director. 1:30 and 6 P. M.—Weather forecast. 3 P. M.—Recital by pupils from Frank Oglesby studios. 6:05 P. M.—Dinner music by the Jordan-Lewis Dance Orchestra, Bob Lewis, director. 6:45 P. M.—Livestock and produce market reports. 7 P. M.—Uncle Wip's bedtime stories and roll call for the children.

March 1.—1 P. M.—Recital by Karl Bonawitz on the Germantown Theatre organ. 1:30 and 6 P. M.—Weather forecast. 3 P. M.—Popular program under the direction of Harry Link. 6:05 P. M.—Dinner music by the Greenwich Village Serenaders, Dave Martin, director. 6:45 P. M.—Livestock and produce market reports. 7 P. M.—Uncle Wip's bedtime stories and roll call for the children. 8 P. M.—"Sugar as a Medicine, Food and Poison," by Dr. Horatio C. Wood. 8:15 P. M.—Broadcast from the Metropolitan Opera House of the 1st musical revue given by the Western Electric Installation Department. 10:15 P. M.—Ted Weems and his Cafe L'Aiglon Orchestra.

March 2.—4 P. M.—Broadcast from Germantown Theatre of a meeting held under auspices of Germantown Y. M. C. A. 7:30 P. M.—Evening Service from Holy Trinity Church, Philadelphia. 9:30 P. M.—Sunday night symphonic concert under the direction of Mr. Ben Sead, with Karl Bonawitz at the organ.

Station WJAR, Philadelphia, Pa.

395 Meters (760 Kcys.) E. S. T. Feb. 29.—11:45 A. M.—Daily almanac. 12:02 P. M.—Organ recital from the Stanley Theatre; feature from the studio, Arcadia Concert Orchestra, Feri Sarkozi, director. 2:00-3:00 P. M.—Arcadia Concert Orchestra. 4:30 P. M.—Scranton Sirens. 7:30 P. M.—Bedtime stories by Uncle Jim. 7:40 P. M.—Dream Daddy's Own Music Man will be with the children; Herman Widmaier. 8:00 P. M.—Book review by Robert Bruce. 8:10 P. M.—Fred T. Sully, on "The Income Tax and You"; Stanzone Quartette; broadcasting the opera, direct from the stage of the Metropolitan Opera House, by the Philadelphia Civic Opera Company, "Pagliacci," by Leoncavallo, and "Cavellera Rusticana"—Mascagni. 10:10 P. M.—Howard Lanin's Dance Orchestra.

Mar. 1.—2:00-3:00 P. M.—Arcadia Concert Orchestra; artist recital from the studio. 4:30 P. M.—Dance music by The Cotton Pickers. 7:30 P. M.—Bedtime stories by Uncle Jim.

Station WOR, Newark, N. J.

405 Meters (740 Kcys.) E. S. T. Feb. 29.—2:30 P. M.—Ernie Crickett's Phonograph Orchestra. 3 P. M.—"Half Hour of Sports," under direction of Helen G. Kittredge, President, School of Sports, assisted by Miss J. A. Wildenrath, horsewoman. 3:30 P. M.—Manhattan Serenaders of New York. 6:15 P. M.—Lillian Spitzer, pianist. 6:30 P. M.—"Man in the Moon Stories for the Children." 7 P. M.—Concert by the Bronx Male Quartet.

Station WLW, Cincinnati, Ohio

309 Meters (870 Kcys.) C. S. T. Feb. 29.—11:30 A. M.—Weather forecast and business reports. 1:30 P. M.—Market reports. 3:00 P. M.—Stock quotations. 4:00 P. M.—Special program by Wurlitzer Concert Company. Mar. 1.—10:30 A. M.—Weather forecast and business reports. 1:30 P. M.—Market reports. 3:00 P. M.—Special program by the Wurlitzer Concert Company.

Station WBAP, Forth Worth, Texas

476 Meters (620 Kcys.) C. S. T. Feb. 29.—7:30-8:30 P. M.—Concert by the Hemphill Heights Masonic Lodge. 9:30-10:45 P. M.—Novelty Leap Year concert.

Mar. 1.—7:00-7:30 P. M.—Review of the interdenominational Sunday school lesson and radio Bible class by Mrs. W. F. Barnum.

Station KSD, St. Louis, Mo.

546 Meters (550 Kcys.) C. S. T.—Mar. 1.—9:00 P. M.—Orchestra concert, organ recital, vocal and instrumental specialties broadcast direct from the Missouri Theatre.

Who Is America's Most Popular Radio Entertainer?

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

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

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

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

Dear Sir:

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

Name.....

Street Address.....

City and State.....

Latest Radio Patents

Wireless Receiving System

No. 1,479,146; Patented January 1, 1924. Patentee: R. E. Marbury, Edgewood Park, Pa.

My invention relates to means for amplifying received signal currents and particularly to means for amplifying received radio-signal currents, and it is applicable to either radio telephony or telegraphy and for the receipt of either damped or undamped waves.

One object of my invention is to amplify received signals in terms of applied mechanical power.

Another object of my invention is to change the flux in a dynamo-electric machine by means of signal currents to produce an amplified signal-current effect in the output of the machine.

A still further object is to devise apparatus that is simple in construction, durable and suitable for accomplishing the above named objects.

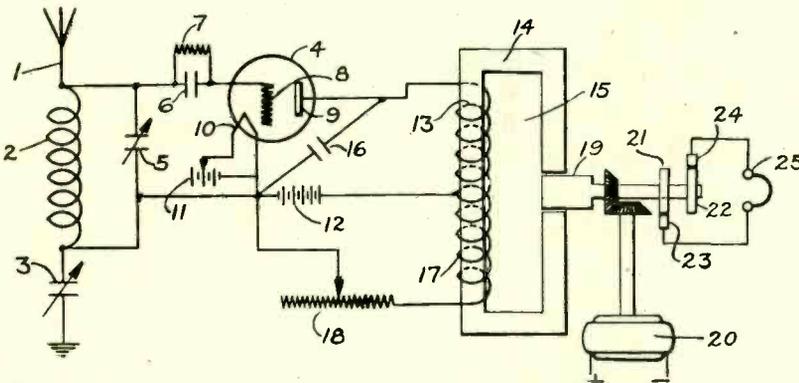
For the amplification of current effects, such as received signal currents,

of a machine suitable for this purpose.

In one form of my apparatus, I employed a receiving circuit connected to the grid of a three-electrode vacuum tube in which the received current operates to change the potential of the grid of the tube. Connected in the plate circuit of the tube is a magnetizing winding, on the stator of a dynamo-electric machine. The machine has another balancing magnetizing winding on its stator, and the current from the plate battery of the vacuum tube traverses the two balanced magnetizing windings in opposite directions, normally producing no magnetization of the stator.

A variable resistance may be adjusted to so balance the fields of the two magnetizing windings that they will cancel each other.

A condenser, operating as a by-pass for radio frequency, is shunted across the plate and filament of the electron tube.



Method of utilizing a bi-polar dynamo electric machine, with bi-polar windings on the field, to actuate the audible circuit of a receiver, making undamped signals of a high degree of rectified audibility possible without vacuum tube amplification.

amplifier vacuum tubes are customarily employed. The receiving circuits of vacuum tubes, operating as amplifiers, comprise plate and filament batteries and a grid battery or a grid-leak resistance and condenser, which, together with the means for coupling the circuits, tends to complicate the apparatus. The vacuum tubes are quite delicate and subject to breakage, and, particularly where subjected to sudden shocks and jars, the elements within the tube may be displaced whereby the tube is rendered inoperative. This often occurs when vacuum tube amplifiers are used in places where the apparatus receives heavy jolting, as in war tanks or aeroplanes. Not only is the above true, but the life of vacuum tubes under the most ideal conditions is comparatively limited.

In the use of my invention, the rectified signal current produces magnetic effects in a dynamo-electric machine, and these magnetic effects produce greatly amplified changes in the output of the dynamo-electric machine by reason of the mechanical power applied to the rotor

Means for rotating the rotor of the dynamo-electric machine and means for detecting the current induced therein are provided. Current will be induced only upon the receipt of incoming signals which disturb the balancing of the two magnetizing windings on the stator.

The above outlined system is typical of one which may be employed for the receipt of undamped or unheterodyned telegraphic signals.

Where damped signals are received, it is unnecessary to use balancing magnetizing windings on the stator since a change in the normal current output of the dynamo-electric machine may be easily detected. I may employ, if found necessary, means comprising saturation coils to bring the stator to a degree of magnetization close to the knee of the saturation curve so that received signals of unusual loudness or static will be damped out.

In other forms of apparatus embodying my invention to avoid the generator ripple, I may use homopolar machines, and for greater amplification, I may cascade the same.

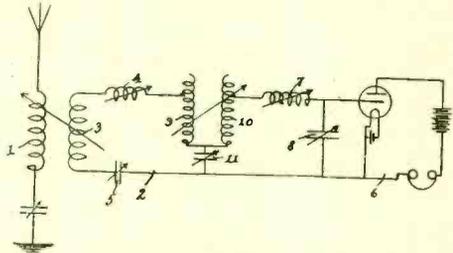
Radio Receiving System

No. 1,481,945; Patented January 29, 1924. Patentee: J. Weinberger, New York City.

This invention relates to radio communication and aims to provide means for eliminating interference.

Since all electromagnetic waves reaching a receiving antenna produce an effect to a greater or less extent, it is necessary to adopt means for eliminating or reducing the effects of all waves but the ones proceeding from the desired sending station. Various means have been pro-

posed for this purpose, the most common probably involving the tuning of the antennae in receiving circuits to the wave length to be received. This is more or less successful when the desired wave and the interfering waves are of the same order of strength and of widely different frequencies, but it is of little use when the interfering waves are much stronger than the desired waves and of nearly the same frequency. Interference of this nature is encountered when the receiving station is near to an interfering transmitting station as compared to its distance from the transmitting station being received.



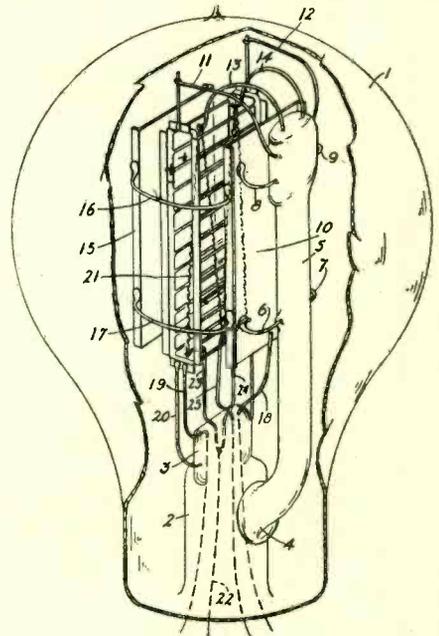
Circuit devised to eliminate the interference of a nearby strong signal from a powerful transmitter, and allow the reception of a relatively more distant and weaker signal of a frequency near that of the powerful station.

The aim of my invention is to overcome relatively strong interference of this kind, though it may be used for the prevention of interference regardless of the strength of the interfering current.

Vacuum Tube Device

No. 1,479,778; Patented January 1, 1924. Patentee: H. J. Van der Bijl, New York City.

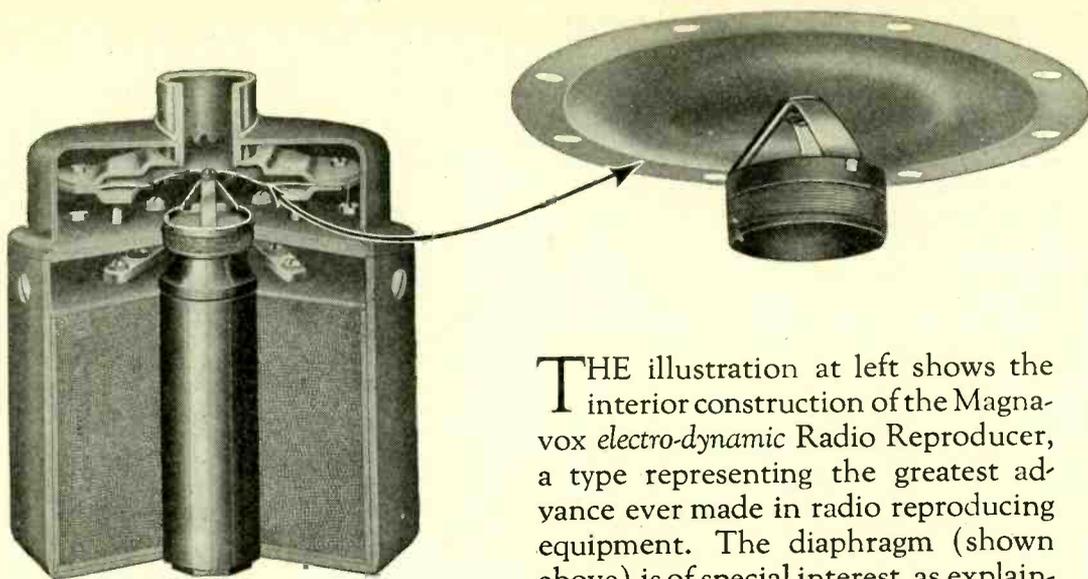
The invention relates to vacuum tubes of the audion type, such as are commonly employed for repeaters, amplifiers, detectors, oscillators, etc.



Method of suspending the elements of a vacuum tube, so that one arbor can effectively support all three elements.

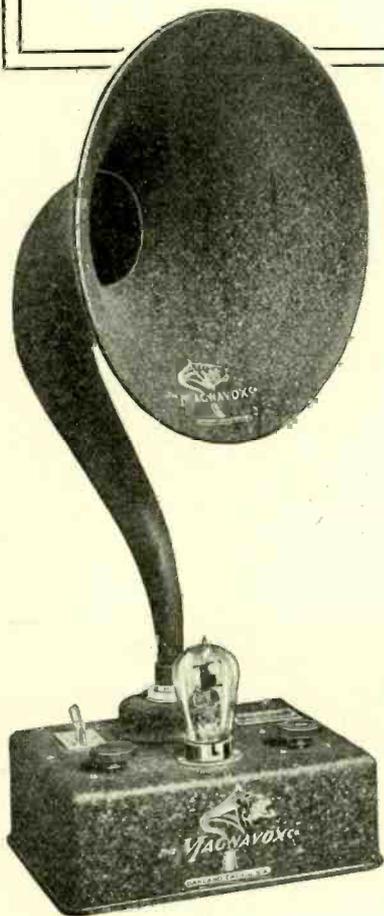
Such devices may have only two electrodes, an anode and a cathode when used as rectifiers, or they may have three electrodes, the additional electrode being usually in the form of a grid which is adapted to control the space current between the cathode and the anode.

The present invention relates to improvements in mounting the electrodes and provides means whereby one of the electrodes is adapted to support the other.



THE illustration at left shows the interior construction of the Magnavox *electro-dynamic* Radio Reproducer, a type representing the greatest advance ever made in radio reproducing equipment. The diaphragm (shown above) is of special interest, as explained in the body of this advertisement

MAGNAVOX-True Radio Reproducer



A1-R—\$59.00

This instrument (Magnavox Combination Set) consists of Magnavox Electro-dynamic Reproducer combined with a Magnavox Power Amplifier in one unit. It is an important addition to Radio in the home.

THE basis of the operation of a Magnavox Reproducer is its diaphragm, the importance of which can be seen from the fact that it is required to render an almost human service in recreating every tone and quality of instrumental music as well as speech.

This diaphragm (as illustrated) has been designed and constructed in accordance with entirely new principles. Its shape, size and special character make it capable of responding to the widest range of tones.

But even this highly efficient diaphragm might be handicapped by operating restrictions—every diaphragm must have a vibrating force applied to it, and the inherent ability of any diaphragm will be injured if it is affected by mechanical operation or other foreign influences.

The use of the electro-dynamic principle of operation (found only in Magnavox Reproducers) removes all objectionable influences. This principle, utilizing the famous "movable coil" permits the Magnavox diaphragm to respond in perfect unison to the original tone.

These exclusive features, fundamental to radio reproduction, account for the superiority of Magnavox Radio equipment.

There is a Magnavox for every receiving set: Type R for storage battery sets, and M1 for dry battery sets.

THE MAGNAVOX CO., Oakland, Calif.

New York Office: 370 SEVENTH AVENUE

PERKINS ELECTRIC LIMITED, Canadian Distributors Toronto, Montreal, Winnipeg

BUSINESS NEWS OF THE INDUSTRY

The Selectoformer

THE need of variocouplers, switches, taps, etc., is claimed to be largely done away with by the "selectoformer" just designed by the Electrical Research Laboratories, of Chicago. It permits of greater selectivity in practically any tuning unit now using a variocoupler, except the one-tube reflex sets. It requires no adjustment and has for its main object the coupling of the antenna to the receiver without causing a broadening of signals.

The antenna circuit is never tuned to resonance with any particular incoming signals and coupling of signal to the receiver is only sufficient to excite the receiver at the wave length to which it is tuned, without adding the resistance of the antenna circuit to the secondary circuit, which always causes a broadening and loss of signals.

With the usual type of variocoupler it is possible to reduce the inductive coupling between the primary and secondary to a very low value, but capacitive coupling exists which allows as full a coupling as if the total inductive coupling were maximum. The inductive and capacitive coupling between the primary and secondary circuits is always fixed at a very low value by the selectoformer. With other fixed couplers, reducing the coupling reduces the volume of signals. The selectoformer, due to its particular construction, reduces the resistance of the

secondary circuit and therefore increases the signal volume.

The selectoformer increases the selectivity when substituted for a variocoupler, or loose coupler, and is especially good in the two and three tube reflex circuits. It also makes an excellent wave trap when used with a 23-plate variable condenser and when so used it actually adds to the strength of the incoming signals. It also prevents reradiation from sets which oscillate when it is used as an absorbing circuit for such oscillations.



The selectoformer permits greater selectivity in practically any tuning unit.

Radio Trade Notes

The Maxam Radio Company, Inc., 55 Tremont St., Boston, Mass., operating a number of chain stores, are in the market for all kinds of radio apparatus and materials.

Frank R. Byam, 107 Salem avenue, Burlington, N. J., intends to open a retail radio store.

Newark Company Sued for Infringement

IN the Federal Court at Newark, N. J., suit was filed last week against the Koehler Machine & Tool Company, of Newark, by the newly formed Hazeltine Corporation and 13 radio manufacturing firms charging infringement of patents on the Hazeltine neutrodyne circuit. The suit asks for an accounting and preliminary and permanent injunctions against the Koehler company.

De Jong Blue Prints Now Available

HAROLD DE JONG, consulting engineer, 118 India street, Brooklyn, N. Y., has prepared and is ready to distribute among fans desiring them, a complete set of blue prints for his receiver. The plans, which are five in number, are most complete. Each sheet deals with one part of the receiver, and complete bills of material and apparatus needed are specified. Measurements are most accurately chart-

ed for the make of apparatus given, and if the builder can read a plan at all, he can understand these and construct the receiver as outlined. With the plans comes a photograph of the receiver, which is a reproduction of the original from which the plans were drafted, and if the instructions are followed out, the completed receiver will resemble the photograph. For the radio enthusiast desiring blue prints from which to build a three-tube receiver, these plans will prove welcome information.

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:

H. Schlegel, 16 Wangoos street, Oshkosh, Wis.
W. D. Notch, Middlesboro, Ky.
B. K. Marsh, 2188 East 74th street, Cleveland, Ohio. (Dealer and set builder.)
Frank A. Barner, 3 Oxford Road, Albany, N. Y.
James C. Burlingham, R. F. D. No. 1, Attica, N. Y.
W. C. Kruger, Monett, Mo.
Albert F. Martin, Vivian Ave., Pittsfield, Mass.
H. E. Carlton, 212 Church St., Norfolk, Va.
Radio Chain Stores Co., 245 Fairfield Ave., Bridgeport, Conn.

Coming Events

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

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

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

FOURTH ANNUAL RADIO SHOW, EXECUTIVE RADIO COUNCIL, SECOND DISTRICT, INC., Hotel Pennsylvania, New York City, March 3-7, 1924.

RADIO SHOW, New Haven, Conn., March 15-22, 1924. Thomas M. Friscoe, Manager, 30 Congress Ave., New Haven, Conn.

New Radio and Electrical Firms

Liberty Radio Corp., New York City, 1,000 shares common stock, no par value; L. T. Corbin, J. J. Bernzott. (Attorney, G. T. Hoar, 14 East 58th St.)

Elite Radio Co., New York City, \$5,000; L. Pell, B. Shaw, H. B. Altman. (Attorney, S. Zaculy, 116 Nassau St.)

Hunts Point Radio and Electrical Central, New York City, \$20,000; S. H. Posselle, H. and E. Harr. (Attorneys, Buckowitz & Miller, 299 Broadway.)

—did **YOU** get **LONDON**

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

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

—no carbon or graphite.

\$1.00

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

TURN-IT ADJUSTABLE GRID LEAK

TURN-IT RADIO SALES, Inc.

Sole Distributors for Charles E. Bonine
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DEALERS WRITE FOR DISCOUNTS

BRISTOL AUDIOPHONE

MORE THAN A LOUD SPEAKER
 Bristol Audiophone, Sr., 15-in. Horn. \$22.50
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 Bristol Single Stage Power Amplifier. \$25.00
 Write for Bulletin 3006-W
The Bristol Company
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For Maximum Amplification Without Distortion and Tube Noise
 use the well known

Como Duplex Transformers
 Push-Pull
 Send for literature
COMO APPARATUS COMPANY
 446 Tremont St. Boston, Mass.

TO BUILDERS OF SETS

We Specialize in the Famous **AMBASSADOR** Long Distance Circuit

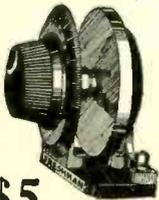
A Real Achievement! The Ambassador set, which took the country by surprise! Coast to coast reception. The beauty of this hook-up lies in its simplicity and sharp tuning. Guaranteed outfit of complete parts for 3-bulb set includes \$7.00 Ambassador Tuning Coil, full .0005 Mfd. 23-plate R.C. Condenser, 3 genuine Bakelite Sockets, 3 nickelplated Jacks, 2 Supertran 10-1 and 5-1 Transformers, 3 Percent Rheostats, 1 Cutler-Hammer Switch, .00025 Don Mica Grid Condenser, Robbins Perfect Grid Leak, a .001 Don Mica Fixed Condenser; H.R. Panel, drilled, 7x18, black; finely finished imitation mahogany Baseboard; Bus Wire, Box of Assorted Screws, Nuts, Bolts, Lugs, etc., 1 Binding Post Mounting Strip, 7 Engraved Top Binding Posts, 3 Nickelplated Bezels, 2 3-in. Dials H. R., Strip of Solder. Also a beautiful 7x18, 3-ply Veneer Wood Cabinet, covered with durable Du Pont's Fabrikoid Leather, built to last a lifetime of service—\$30.00. (Free diagram and full instructions with each set.) Completely assembled and wired, ready for use, \$40.00.

ROBBINS & FUERST CO.

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"FRESHMAN SELECTIVE"

Mercury Variable Condenser



For **Transmission** or **Reception**

\$5

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

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

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

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

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

Chas. Freshman Co. Inc.
Radio Condenser Products
 106 Seventh Avenue New York

\$ 25 for \$ 10



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 THE ACOUSTICAL AMPLIFIER

THE FAMOUS BEL-CANTO ACOUSTICAL AMPLIFIER

Direct from Manufacturer to You

You cannot buy the BEL-CANTO through any dealer. Only direct from us. We save you these three profits, Distributor, Jobber & Dealer.

GUARANTEE
 Money back any time within 10 days if dissatisfied. We further guarantee to the publication carrying this advertisement that each and every speaker sold will be exactly as advertised in this issue.

7 Points of Bel-Canto Superiority.

1. Our own fiber horn Crystalline finish.
2. Our own adjustable loud speaking unit, giving a wide range of tone quality and volume without distortion.
3. The base of cast iron, weighing four pounds, eliminating top heaviness.
4. All other metal parts are of heavy cast aluminum, highly polished.
5. Complete instrument stands 34 inches high, 10 inch bell.
6. Guaranteed for one year from date of purchase against mechanical defects of any kind.
7. No auxiliary batteries required. Just plug in on 2nd stage.

PRICE \$10.00

Call at our factory, send us your check, money order or pay the postman \$10.00. Prepaid to any part of U. S. and possessions. *Tel. Vanderbilt 8959*

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 417-419-421 E. 34th St., NEW YORK CITY

C. O. D. Delivery Free To Your Door

For best reception you need



The Goodman

The slightest short wave tuner on the market. Great for present broadcasts, local and DX. Used in all parts of the world. Certificates of merit from testing laboratories. Pamphlet on request.

L. W. GOODMAN, Mfr., Drexel Hill, Pa.

PATENTS Domestic and Foreign, Trade Marks and Copyrights, Infringement Suits and Interference Cases.

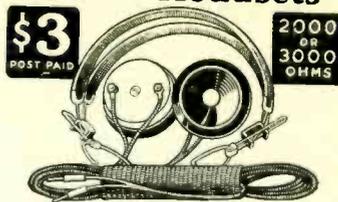
Booklet "More Light on Patents" Sent Free

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KNOBS
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MAHOGANITE
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SOCKETS
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BINDING
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ALL STOCK SIZES, Also CUT TO ANY SPECIAL SIZE

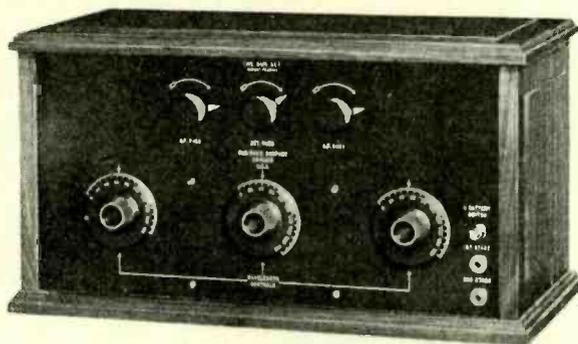
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WHOLESALE Send for Our Complete Price List. RETAIL

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212R CENTRE STREET Telephone: Canal 8315 NEW YORK, N. Y.

**Marvelous New "Sun" Receiver
Guaranteed Non-Regenerative**

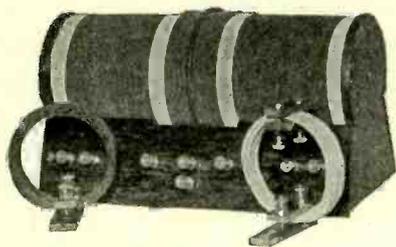
Most Important
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in Three Years



(Patent Applied for)

Phenomenally successful results through development of accurately balanced counter Electric Motive Force. Superior in range and selectivity to most 5 and 8 tube sets. Wonderful new principle brings in quality and volume of tone unequalled. Reproduces piano or the elusive notes of the soprano as faithfully as if the artist were in the room. Loud-speaker volume at long range surpasses local reception of other sets at any price. Entirely free from distortions, howls, squeals or hissing spill-overs common to other sets. There is no other set like the "Sun."

With This "Sun" Tuner Unit and Standard Parts
It Is Easy to Assemble a Genuine "Sun" Set.



Special "Sun" Tuner Unit, Including Sun Loading Coil and Sun R. F. Transformer,

Only \$24.00

We furnish complete list of parts required, easily understood wiring diagram and instructions for assembly so comprehensive that any one can understand and follow them. If you prefer to order a "Sun" Receiving Set, as illustrated, the price is \$150. Established dealers everywhere are prepared to furnish the "Sun" Tuner Unit at \$24.00, or completely assembled "Sun" Receiver Sets at \$150. (If your dealer cannot supply you, we will ship either complete "Sun" Receiver Set or "Sun" Tuner Unit direct on receipt of check or money order.)

SUN RADIO COMPANY
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18 times more



ADJUSTED TO ALL TUBES

FIL-KO-STAT has a fine adjustment area many times greater than any other rheostat. It is the only rheostat assuring minute control over the maximum audibility range of the vacuum tube; bringing in DX stations you never heard before and eliminating tube noises.

30 ohms full resistance.
No adjustment to puzzle.
No discs to break.
No Carbon Powder.



FIL-KO-STAT

Made and Guaranteed by
DX Instrument Co., Harrisburg, Pa.
Radio Stores Corp., 218 W. 34th St., New York
Sole International Distributors

THE RASLA REFLEX

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

KNOCKDOWN COMPLETE PARTS

(Tube and batteries not included)

\$24.50

- DIAGRAM AND INSTRUCTIONS FOR WIRING
- 1 7x10 Drilled and Engraved Genuine Bakelite Panel
 - 1 6 3/4 x 9 1/4 Base Board
 - 1 Millimeter Jack
 - 1 Amco 20 Ohm Rheostat
 - 1 Dubilier .00025 Mica Condenser
 - 1 Duplex Precision .0005 Var. Condenser
 - 1 Standard Bell Socket
 - 1 Pathe Variometer, Molded
 - 1 Z-T Semi Fixed Crystal Detector
 - 1 Modern 10-1 Audio Transformer
 - 1 Rasla Radio Transformer
 - 8 Eby Engraved Binding Posts
 - 2 Genuine Bakelite Dials
 - Bus Bar, Bolts, Screws and Bakelite Strip for Binding Posts

These Parts are the Best Obtainable. Ask Any Engineer.

Set completely wired in Walnut cabinet \$32.00

Sent prepaid East of the Mississippi. West of the Mississippi and Canada add \$2.00. Also sent parcel post collect. Money cheerfully refunded if dissatisfied. Mail orders only

Superior Radio Service Co.
500 Fifth Avenue Room 405
New York City

Relatives of Unknown Dead Located by WOC

STATION WOC, Davenport, Iowa, checked up another score for locating missing persons a few days ago in the case of a young man who died in a hospital at Maryville, Tennessee, and whose relatives were unknown.

A special delivery letter from F. A. Zoller, M.D., of Maryville, giving all known facts about the young man was broadcast immediately by the Davenport station.

L. H. Fredericks, city editor of the Rockford (Illinois) Morning Star, listening at his home in Rockford, recognized the description of the young man as being the son of a Rockford citizen, L. O. Berg.

In less than an hour the parents had communicated with Maryville authorities and arranged for shipment of the body just as the undertaker was about to make other plans for its disposition.

Statistics compiled at WOC show that results are obtained in twelve per cent of all such reports broadcast from the Davenport station.



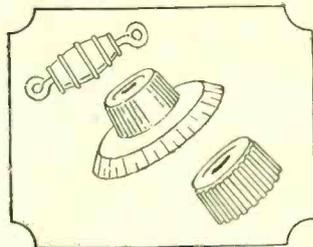
RADION

The Supreme Insulation

PANELS

They Do Not Chip When Drilled

Drill, saw or engrave a Radion Panel. Use what tools you will, dull or sharp, this material will not chip or show ragged edges. Its proven electrical values make RADION the supreme insulation both from a scientific and a practical standpoint.



Made in the beautiful MAHOGANITE, or polished black with Dials and Knobs to match.



Sold at all good radio stores or write

AMERICAN HARD RUBBER CO.

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Lattice Coil Specialties



Variometers
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R.F. Transformers
Micro-Mfns
Condensers
Plain Coils
Tapped Coils

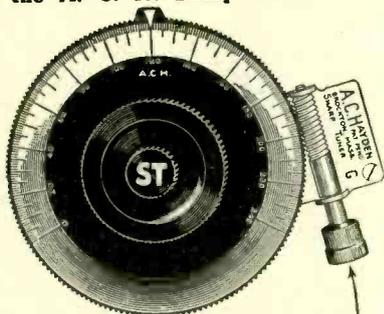
ESTRU LATTICE COIL PRODUCTS have been designed so as to produce as nearly as possible IDEAL INDUCTANCE in various forms. It was not the intention in designing, to produce Miniature Apparatus, the small size being the result of careful electrical design with no UNNECESSARY Mechanical parts which would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

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



2905 WEST MADISON STREET

A Pleasant Surprise Awaits the User of the A. C. H. Sharp Tuner Dials



Why the A.C.H. is different

3 in. DIAL (156-t0-1)
4 in. DIAL (215-t0-1)

Will improve any receiving set, making difficult tuning easy

Money Back Guarantee

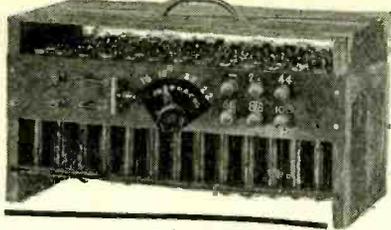
Price 3-inch size, \$2.50 Price 4-inch size, \$5.00
Regular fitting 5/16 shaft ¼ and 3/16, 5c each extra

Extra Advantage of the A C H

1. Can be attached or removed from any instrument.
 2. Rough tuning same as any dial.
 3. Movement so fine that the eye cannot detect but the ear can.
 4. Automatically locks instrument so no jar can disturb it.
 5. Dial grounded reducing the body capacity to a minimum.
 6. Special dial 2 graduations where ordinarily one.
- MAIL ORDERS SENT PREPAID IN U. S. A.
A. C. Hayden Radio & Research Co.
BROCKTON, MASS., U. S. A.

GET A REAL "B" BATTERY!

Powerful—Durable—Rechargeable



↑ Drip Pan ↑

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

Roberts Rechargeable "B" Battery
LASTS A LIFETIME
MADE OF EDISON ELEMENTS
SATISFACTION GUARANTEED

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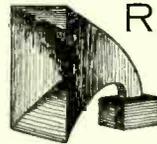
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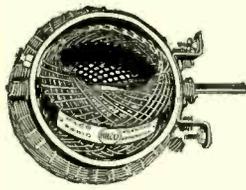
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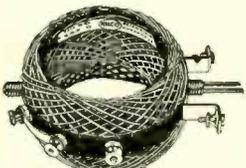


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The HILCO Type E Variocoupler contains a primary and secondary winding of the HILCO Lattice Banked Type and is ideal for use in single, two or three circuits. The primary winding is so tapped as to give very close adjustments to wave lengths of 200 to 600 meters. The position of the secondary winding makes this instrument very selective, sharp tuning and its coupling is variable thru a wide range. Price \$7.00.

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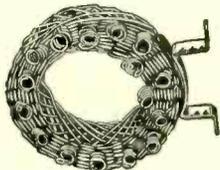
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The HILCO Type A Variometer contains four sections of HILCO Lattice Banked Winding, assembled so as to give a wide range of inductance thruout the entire movement of the rotor. This instrument is very selective, sharp tuning and can be mounted in any desired position. Note suspension of wires in air with successive turns crossing at right angles, and minimum amount of energy-absorbing material. Price \$6.00.

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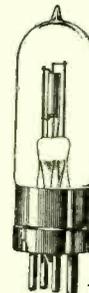
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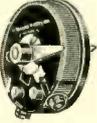
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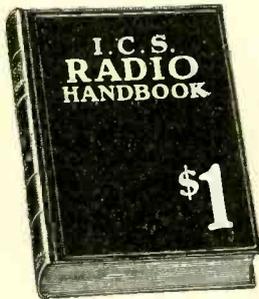
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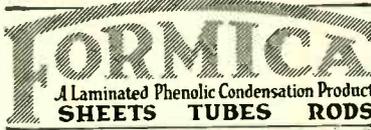
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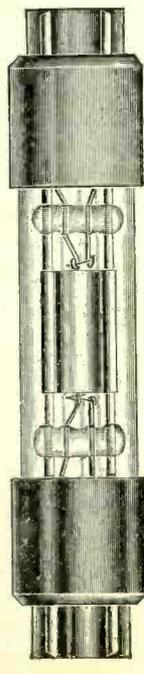
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Chats About Broadcasting Stations

By Hirsch M. Kaplan

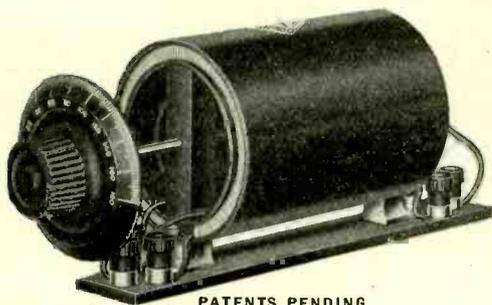
The other evening we tuned in station CKAC as Joseph Smith and his Mount Royal Orchestra were entertaining with a splendidly performed program of dance music. Just to prove how good they really were let us cite that our feet became itchy after listening for a short while, so as a cure we grabbed partners and a merry time was soon had by all.

How do you like station WAAM these days? We will say that they are great and getting better and better at each performance. The other evening they offered Fritz Leyton entertaining with a well arranged program of popular numbers, which we greatly enjoyed. We have heard her perform at other stations but her recital this time was the best ever. Just a little inside dope. Mr. Gilliam of station WAAM dropped in on us the other morning and confidentially told us that he had booked some wonderful features for the near future. Just a word to the wise ought to be sufficient, so don't forget to tune down to 263 meters.

WHAZ gave us a treat in the form of the Troy Burns Club and their Scotch concert. Of course the main feature on their program was the Scotch folk songs, ballads and the selections played upon the familiar instrument known as the bagpipes. The gentleman who played this instrument sure did show his nationality, for his playing was all to the mustard.

All insects are not bad, H. E. Hodgkiss of Penn State College told us through
(Concluded on next page)

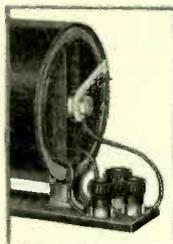
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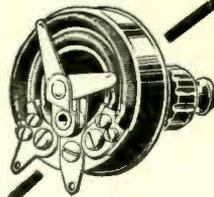
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Professor Todd Wins Aerial League Prize

THE prize for this month's report in the World Radio Checkup has been awarded to Professor David Todd, of Amherst College, for data collected by him showing the effect of the polar lights (aurora borealis and aurora australis) on both space and wired telegraphy and telephony.

At Professor Todd's suggestion, an additional first prize and four second prizes of ten dollars each, with ten diplomas of merit are to be awarded to the best reports received by the League during the next two months. These will be awarded the man furnishing the most complete data on the effect of these strange electrical disturbances. These reports will be listed under the title "Aurora Checkup."

Anyone may enter the contest, and the field is large. It is necessary to list and chart the various disturbances heard over the air, and compute them in terms of auroral disturbances, checking up to make sure that the clicks and spits coming through the air originate at the auroral sources, and not from some nearby extraneous source. These reports will then be carefully checked with experts living within the auroral band, in the Arctic or Antarctic regions, who will compare the number of auroral disturbances, and check these with the written reports. The person closest to the number of actual disturbances caused by the aurora will win the prize.

These disturbances may be charted by anyone owning a receiving set, as they present themselves in a series of clicks, spats and rushes, peculiar to themselves, but often confused by the listener as static or interference. All communications in regard to this matter should be addressed to Henry Woodhouse, president of the Aerial League of America, 280 Madison avenue, New York City.

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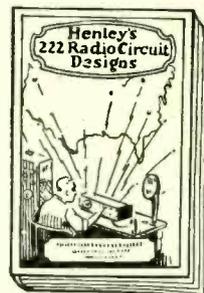
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IVORY RADIO PANEL: White pyralin ivory makes the most beautiful set of all. Guaranteed satisfactory. Any size 3/16 inch thick. Three cents per square inch. Sample sent. E. P. Haltom, 614 Main, Dept. W., Fort Worth, Texas.

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MAGNAVOX R3 or M1—Latest nationally advertised reproducers. List, \$35. Introductory, \$25. The factory sealed carton is your guarantee. RADIO CENTRAL, Dept. W., Abilene, Kans.

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

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

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

\$100.00 a week to agents. Box 732, New Britain, Conn.

RADIO SHOW
and CONVENTION || MARCH
 3d to 7th
 Executive Radio Council, 2nd District
 Grand Ballroom,
 HOTEL PENNSYLVANIA
 Adm. 55c (inc. tax) : 7th Ave. and 32d St.

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BIG MONEY
IN A BIG FIELD
 Wanted — and wanted quick
 are men who can qualify for
 big pay positions in the enormous,
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 Once in a lifetime chance. Fast, easy
 to learn. No previous experience needed
Be A Radio Expert
\$3000 to \$10,000 a Year
 Learn at home, by actual practice, to design, construct,
 install, operate, repair and sell Radio Equipment. Pleasant,
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 clear and successful. Turn your spare time into cash.
FREE WONDERFUL 1000 MILE TUBE RECEIVING SET.
 Write today for Booklet "Radio Facts" FREE.
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"PARAGON"
 Type RB 2A, \$125.00
Parts for Acmedyne in Stock
 BALLANTINE Tuned Radio Frequency Transformer \$9.60
 LANGBEIN & KAUFMAN Variometers and Variocouplers..... 7.00
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 Service That Is Certain
RADIO & MECHANICAL TRADING CORP.
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SUBSCRIBE NOW AND TAKE THE WORRY OFF YOUR MIND. RADIO WORLD, 1493 Broadway, New York City.

KFEY Co-operates with Local Schools

STATION KFEY, operated by the Bunker Hill & Sullivan Mining & Concentrating Co., at Kellogg, Idaho, will co-operate with the schools of the district in an endeavor to stimulate public speaking and has offered the services of its broadcasting equipment to the high school students for broadcasting their arguments in debates, etc., when such arguments are considered exceptionally good and worth while.

S. G. Garrett, of the Auto Supply Company, of Wallace, Idaho, has volunteered to install in the Wallace High School assembly room loud speaking equipment, and the Bunker Hill & Sullivan Mining & Concentrating Company will install similar equipment in the assembly room of their high school where the student bodies of both schools may listen in to arguments submitted by debaters. H. H. Hoffman, superintendent of schools in Mullan, Idaho, is going to request the radio fans in that vicinity to offer the use of their radio receiving sets for the students of Mullan.

Station KFEY is very much interested in the problem of daylight transmission, and will appreciate receiving any cards or calls from radio fans who may hear any broadcast during daylight hours.

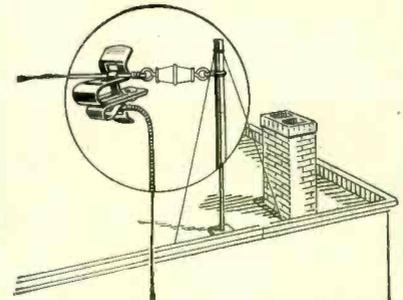
Radio Stimulates Cable Business

CLARENCE H. MACKAY, president of the Mackay companies, in his annual report, states that the influence of radio as a whole had a stimulating effect on the cable business instead of a harmful one as was expected. Business was exceptional during the year 1923 and the volume handled increased.

The laying of new cable lines from Emden, Germany, to the Azores, and from there to New York were delayed because of the protracted nature of the negotiations with the Portuguese government due to landing rights.

PATENTS
 promptly prepared. Trade Marks designed & registered
FREE INVENTION RECORDING BLANK
 Phone Vanderbilt 7313
FREE MANUFACTURERS PATENT CO., INC.
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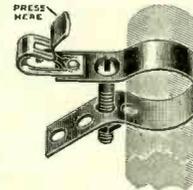
FAHNESTOCK'S RADIO PRODUCTS



No. 31

The Antenna Connector

Snap larger connector over Antenna Wire; insert Lead-in Wire into smaller clip and a perfect connection is the result.



Improved Ground Clamp

Equipped with Fahnestock Patent Wire Connectors. Easily Attached.

No Soldering—For Radio Use Only
 Our name stamped on all products, none genuine without it.

At Your Dealers
FAHNESTOCK ELEC. CO.
 LONG ISLAND CITY, NEW YORK

ARE YOU GOING TO BUILD A SET?

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

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

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

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

We pay transportation charges, and we guarantee satisfaction.

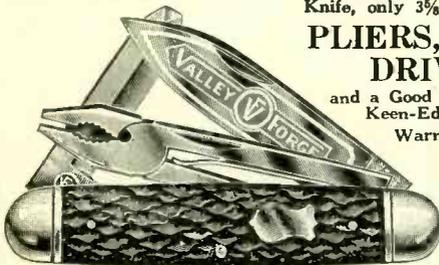
1. Autoplex. One tube. Operates a loud speaker. The simplest set that has yet been designed \$12.00
2. Flewelling. One tube. Equal to three tube sets for distance..... 10.50
3. Reflex. One tube. Operates a loud speaker. 2000 to 3000 miles with phones. No howling. No re-radiation. This set incorporates one stage of radio frequency amplification, detector, and one stage of audio frequency amplification with only one tube..... 15.00
4. Reflex. Two tube. 500 to 1000 mile loud speaker range 23.00
5. Reflex. Three tube. Up to 3000 mile loud speaker range 33.00
6. Neutrodyne. Five tube. Save \$105 by building your own Neutrodyne..... 45.00
7. Ultradyne 45.00
8. Superdyne. Four tube. The Wonder Set. The set just described in Radio World. Results equal those obtained on an eight tube super-heterodyne..... 38.00
9. Major Armstrong's Radio Filiver. Two tube. This set is the most powerful ever made. In actual tests, using only a loop, this set has given greater volume than a regenerative set, using an outdoor antenna, three stages of audio frequency amplification, and three stages of power amplification. Slightly harder to operate than an ordinary set at first, but it is well worth while 25.00

If you wish to make any set which is not listed here, write us. We make outfits of all kinds of sets, and use only the best of apparatus.

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

THE RADIO POCKET KNIFE

The Compact pocket size outfit that fits all requirements. Folds up to the size of an ordinary Knife, only 3 3/8 inches over-all.



PLIERS, WIRE CUTTER, SCREW DRIVER, WIRE SCRAPER
 and a Good Sturdy, CUTTING BLADE
 Keen-Edged

Warranted Finest Cutlery Steel, Guaranteed American Workmanship and Beautifully Finished.

\$2.50 each, Post Prepaid

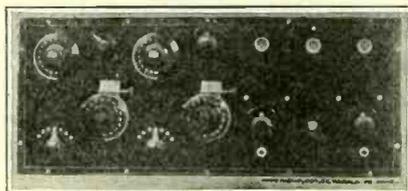
R. J. ROBERTS AGENCY

101-103 Duane Street New York City
 Dealers Write for Attractive Proposition

THE RADIO RECEIVER FOR ALL TIME

OPERATING FEATURES

- Volume
- Distance
- High Selectivity
- Non-Interference
- Simplicity
- Reliability



Constructional Features

- Regenerative
- Non-Reradiative
- Compactness
- Dry Cell or Storage Battery
- Minimum Upkeep

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OPERATES ON AERIAL OR LOOP

Complete Constructional Blueprints and Specifications for

- Set No. 100—Detector and Two Step Amplifier (one unit as shown)..... \$1.00
- Set No. 101—Detector and Two Step Amplifier (separate units)..... 1.25
- Set No. 101—Detector Only, \$1.00. Set No. 102—Two Step Amplifier Only..... .50

Sent Postpaid Anywhere—Value and Reliability Guaranteed

DESIGNERS OF RADIO RECEIVING SETS

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 118 INDIA STREET
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CONSULTING ENGINEER
 Jr. Am. Soc. M. E.

SPECIAL OFFER TO RADIO OPERATORS

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

BE A GOOD RADIO FAN

Have some applause cards on your radio table. Fill in the blank spaces as program comes in, and they are ready to mail. 12 for 25c, 28 for 50c, 60 for \$1.00. Sent prepaid, stamped, ready to mail. Satisfaction or money refunded.
RETAIL AND WHOLESALE
The Powell Radio Applause Card
PRESCOTT, ARIZONA



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

VACUUM TUBES REPAIRED

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

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

THOMAS BROWN CO.
511-519 ORANGE ST. NEWARK, N. J.

"Dream Daddy" to Tour Broadcasting Stations

EVERYONE knows the answer to the question "Where does a ball-player go when he has a day off?" Yes, that's it, he goes to a ball game. This same funny idea presents itself in the announcement from Philadelphia that Harry E. Ehrhart, nationally famous as "Dream Daddy," the bed-time story-teller at WJAR, will spend his mid-winter vacation this year in a tour of the principal broadcasting stations of the middle west and east. "H. E. E." as he is known when he announces from Lit Brother's station in Philadelphia, will be accompanied by Carl Zoehrens, one of the co-authors of the song "Dream Daddy" and other songs and a splendid singer, who will entertain from the stations they visit.

The first stop will be at KDKA, East Pittsburgh, Pa. From there the following will be visited: Louisville, Ky.; Cincinnati, O.; Chicago, Ill.; Detroit, Mich.; Cleveland, O.; Buffalo, N. Y.; Schenectady, N. Y.; Springfield, Mass.; Boston, Mass.; Medford Hillside, Mass.; New York, N. Y., and Newark, N. J.

The trip will be a whirlwind one. Each of the stations will announce its own date when these two well-known radio entertainers will be present; and it is expected that "Dream Daddy" will be heard again from his own familiar "mike" at WJAR on March 4.

Army Graduates 25 from Radio School

TWENTY-FIVE enlisted men from all branches of the army were graduated from the army radio school at Camp Vail, N. J., last week. Major Owen S. Albright, commandant of the school, said they would be placed at army stations throughout the country, making possible twenty-four hour service over the War Department Radio net.

The Ultimate Radio Receiver
THE FLEX-O-DYNE CO.
1674 Broadway (At 52nd St.)
New York, N. Y.
Circle 4569

KELLOGG Switchboard & Supply Co.

Has openings for exclusive dealer territory in New York, New Jersey, and Connecticut.

APPLY
CLARENCE E. MORRISON
GENERAL DISTRIBUTOR
2 STONE STREET NEW YORK

Workman Radio Service

"THE ACCENT IS ON SERVICE"

14-16 Vesey St. NEW YORK

VARIOCOUPERS	
\$3.50 Workrite 180° Silk Wound	\$2.95
3.50 Fisher, Large, 90°	2.75
2.75 Fisher, 180°	2.25
VARIOMETERS	
\$3.50 Workrite	\$2.95
5.00 Pathé Moulded	2.25
3.50 Fisher, Large	2.85
CONDENSERS	
\$2.00 R. C. 11 plate	\$1.05
2.35 R. C. 23 plate	1.35
2.75 R. C. 43 plate	1.65
VERNIER CONDENSERS	
\$4.00 R. C. 23 plate	\$2.25
5.00 R. C. 43 plate	2.95
PHONES	
\$18.00 DR. SEIBT IMPORTED "SUPER HEADSET"	\$5.90
\$12.00 N. & K. Imported	\$5.00
We specialize in the FAMOUS AMBASSADOR LONG DISTANCE CIRCUIT. Write for list of parts for this set. Either single or three tube set. Price of parts for single tube set.....\$15.00 Price of parts for THREE TUBE SET.... 28.00 Mail orders promptly attended to. All orders amounting to \$5.00 or more will be shipped prepaid. Will ship C. O. D. unless remittance accompanies order.	
The above items are just a few of our numerous attractive priced articles, which are contained in our BULLETIN OF RADIO PARTS. Gladly sent to you upon request.	

COMPLETE PARTS FOR THE original "C. White Power Amplifier"

with Como Duplex Transformers

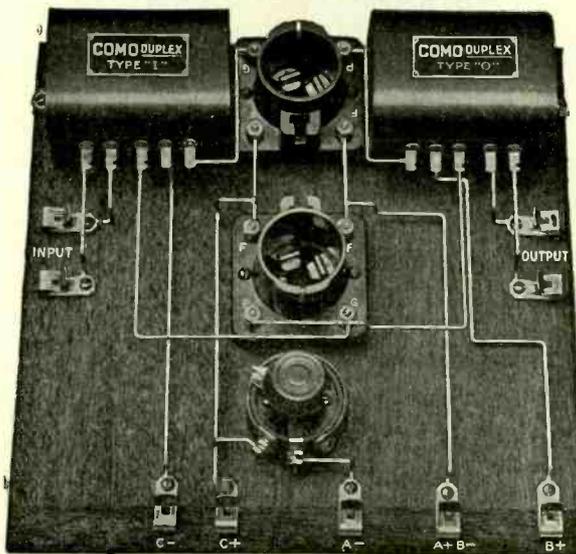
This amplifier has been considered the best that can be made for **QUALITY AND VOLUME**

Parts for one stage Como Push-pull amplifier as illustrated consisting of:—

- 1 Pr. Como Duplex Transformers
- 2 Tube Sockets
- 1 Rheostat
- 1 Mahogany Mounting Board, Wire, Screws and Terminals
- 1 Photographic Diagram.

Price \$16.00

Complete



Parts for two stage Power Amplifier consisting of:—

- 1 Pr. Como Duplex Transformers
- 3 Tube Sockets
- 1 Rheostat
- 1 Audio Frequency Transformer
- 1 Mahogany Mounting Board, Wire, Screws and Terminals.
- 1 Photographic diagram

Price \$21.50

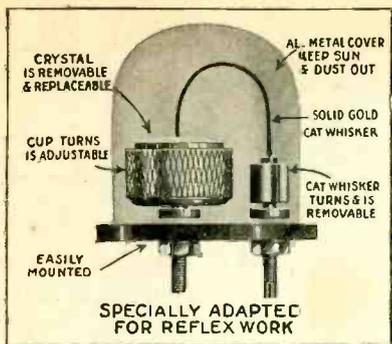
Complete

Above illustration shows the hook-up for one stage Como Duplex Push-Pull

These parts are complete and nothing else is required. Results are absolutely guaranteed. For those who do not wish to assemble the parts we can furnish the board all wired with everything in place and ready to use at an additional cost of \$3.00 for one stage and \$4.00 for two stage; Radio tested in our laboratory.

POND RADIO LABORATORIES, 264 So. Huntington Ave., Boston, Mass.

"Kills Your Reflex Troubles"



**"LINCOLN"
Enclosed
Fixed
Adjustable
Detector**

This wonderful new invention has caused a sensation. Thousands are in use already and radio fans throughout the United States are clamoring for it.

Study the illustration — note that the solid gold cat's whisker can easily be turned, adjusted or removed. Observe that the crystal can be turned or replaced at a moment's notice. See that a metal cover—handsome nickel-plated metal—prevents breakage and keeps out light and dust.

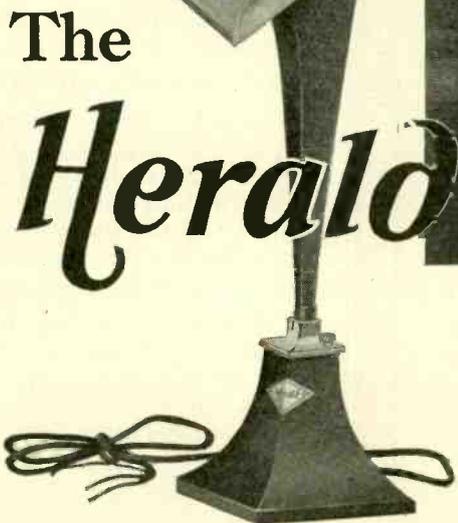
Every one carefully set and tested when shipped. Guaranteed—any faulty part will be replaced within one year. Defective crystal within six months will be replaced. That's fair— isn't it? This wonderful Enclosed Fixed Adjustable Detector costs only \$2.00. Ask for it at any dealer or write us—today.

Jobbers and dealers: Radio fans want this unique invention. Wire or write us.

Mention this advertisement.

Address:
Dept. RW-31

LINCOLN MFG. CO.
Los Angeles



**Loud Speaker
is CLEAR**

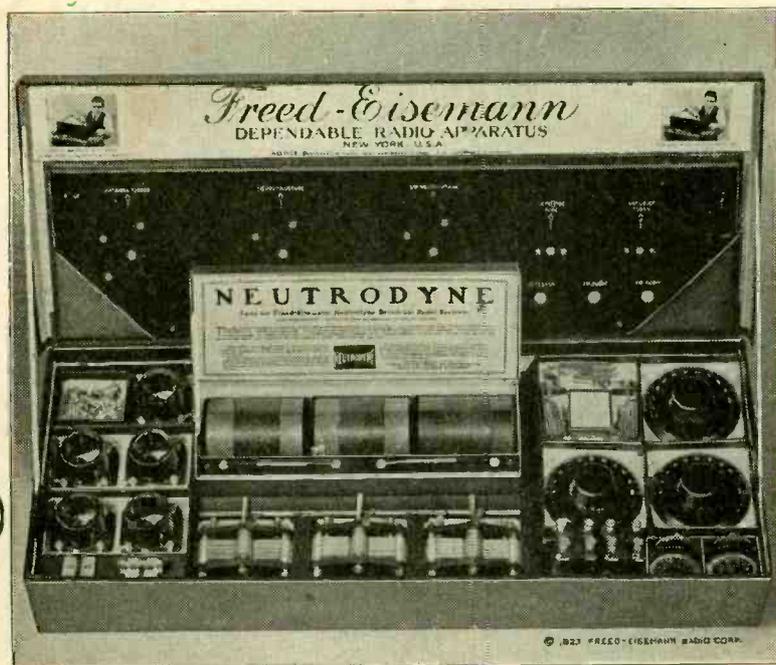
DINE out—at home! A famous restaurant, a great orchestra playing, and you there—in the life, the thrill, the glorious music—because the clear Herald brings it all right into your own dining room.

Broadcasting sounds so real because Herald makes it so clear! No blast, no blur, no blare. But every tone of every program—pure, strong and satisfying.

THE Herald, like other good musical instruments, improves with age because of its laminated core, mica diaphragm and permanent magnet. It stands up under power without rattling. The adjustable diaphragm makes it possible to get the most out of a weak set. Height 30 inches. 6-foot cord. Price \$30. Slightly more on Pacific Coast and in Canada. Write for folder and enclose your dealer's name.

Herald Electric Co., Inc., 113 Fourth Avenue, New York

A *Freed-Eisemann* KNOCKDOWN NEUTRODYNE RECEIVER



Unassembled, Model KD-50
Freed-Eisemann Neutrodyne Receiver

NOW the opportunity is presented to obtain a complete set of parts, recommended by the manufacturer, to work with each other in building your Neutrodyne set. An illustrated 32-page book on how to build the Neutrodyne with full-sized diagrams and templates included.

Complete
With Full Instructions

\$80

DEALERS!
Write for Name
of Nearest Distributor.



Front View KD-50 Neutrodyne Being Assembled

NEUTRODYNE has taken the country by storm. It is the remarkable distance getting, powerful, non-oscillating and non-whistling receiver.

A 32-page book answers every question. The panel is accurately drilled. A baseboard is furnished; in fact, everything down to the very last screw and nut, including all necessary parts excepting the cabinet.

Besides the book there is furnished schematic blueprints and template for drilling the baseboard, also full-size pictorial perspective

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

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

For sale by dealers of the better class throughout the country, for amateur and experimental building. Builders are cautioned against attempting to build a Neutrodyne Set with parts which are not recommended and designed by the manufacturer to work with each other.



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

Freed-Eisemann Radio Corporation

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