

MORE ABOUT THE "SUPERDYNE" FOUR-TUBE RECEIVER

A SPARK COIL C-W TRANSMITTER—(See Inside)

15c. a Copy

December 22

1923.

RADIO WORLD

Title Reg. U. S. Pat. Off.

ILLUSTRATED

EVERY WEEK

THE PRESIDENT'S MESSAGE REACHES MILLIONS BY RADIO



(C. Wide World Photos)

President Calvin Coolidge delivering his annual message to Congress from the clerk's desk in the House of Representatives, Washington, D. C., December 6, 1922. The message was broadcast by radio to millions of people through an inter-connected system of land telephone lines and radio stations WCAP and WEAJ, of the Bell System; KSD, St. Louis Post-Dispatch; and WFAA, the Dallas, Texas, News. This was the first time a presidential message was broadcast by radio. Two of the microphones may be seen on the clerk's desk just in front of the President. Another is placed below facing the reporters' table. Senator Cummins, president pro tem of the Senate, and Speaker Gillette, of the House, are seated back of the President, facing a fourth microphone.

BROADCASTING PROGRAMS FROM ALL OVER

CHRISTMAS SPECIALS

SHIPPED IMMEDIATELY ANYWHERE

IF YOU HAVE ELECTRIC POWER BUY A SET OF STORAGE "B" BATTERIES THEY WILL LAST 5 YEARS

A "B" Battery Built for Radio

By Radio Experts

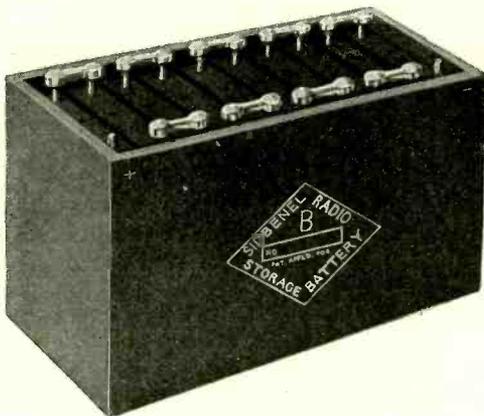
An Improved Re-chargeable "B" Battery Insures Noiseless Radio Circuits

The SIDBENEL Re-Chargeable "B" BATTERY is not a group of glass cells nor does it contain any war-time Edison elements. No Sir, the container is made of genuine solidly constructed hard rubber; the sections are cast into the walls, making it absolutely leak-proof.

Extra large twenty-five hundred mil. amp. plated plates are used giving it double the capacity of other Batteries but yet sells at the same price.

SIDBENEL STORAGE "B" BATTERIES are universally recognized as "Perfect for Radio Work."

Its many SPECIAL NEW FEATURES include: One piece hard-rubber container, Separate sealed cover for each cell. Extra large plates. Hard-rubber vent-caps.



SPECIAL PATENTED PLATES ARE USED

Chemically treated so that low current can be drawn without causing the tubes to howl or squeak. (Only Battery containing this feature.) A Single charge will last from four to six months. Can be re-charged direct from your lamp socket or an A battery charger with attachments or farm lighting generator at a cost of about one cent. A wonderful Christmas present.

Variable Type 201D	Assembled	Knocked Down
1 unit 22½ volts.....	\$ 5.00	\$4.00
2 units 45 volts.....	9.80	7.75
4 units 90 volts.....	18.00	14.75
5 units 115 volts.....	22.50	17.75
A, C. Rectifier.....	1.50	.85

Complete illustrated directions for charging from your lamp socket or from your generator and how to assemble come with each battery.

Trade in your old Sidbenel with \$2.00 for new type.

A Two-Year Guarantee with Every Battery

If Not, a Set of Dry "B"'s Will Be Appreciated



GUARANTEED Dry B Batteries

Shipment prepaid at the following prices direct to consumer:

	large	medium	small
22½ volt variable.....	\$1.55	\$1.25	\$0.80
45 volt variable.....	2.85	2.55	

Guaranteed money back if you're not satisfied.

In all parts of the world Sidbenel dry batteries are used—they do not come better—they will supply as much as six tubes for eight months. For Christmas you can buy them at a special Reduced price, the lowest in history—money back guarantee.

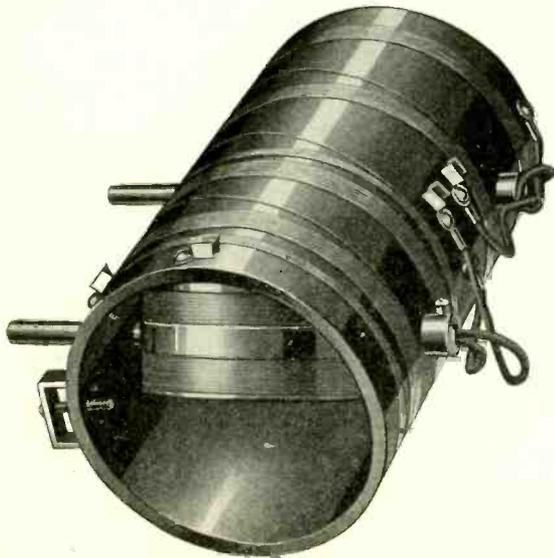
0-50 Volt Meter.....\$1.25

STORAGE A—SPECIAL—120 AMP—6 VOLT—MAHOGANY CASE—\$16.50

2000 MILES GUARANTEED. LAST CHANCE TO BUY A

REGENEDYNE SET

THE SET THAT STOPS RE-RADIATION. THE GREATEST RECEIVING SET THE WORLD HAS KNOWN—2725 MILES ON ONE TUBE



If you want a set that will cut through local stations and bring in real distance on your loud speaker at all times at the exact same dial settings, then what you want is a super Regenedyne receiver, and this is your last chance to get it. Yes, sir; just think of having all your local stations banging away, and at your wish, just turn the dial and get the sensation of hearing stations 2,000 miles away. For example turn

Dial One	Dial Two
12	28 and hear WOR
46	21 " " KDKA
61	80 " " WXC
45	74 " " KSD

Prices are for sets knocked down complete, with genuine tubes, dry batteries, drilled panel, sockets, transformers, full directions, etc.:

Blue print alone.....	\$2.00
Dial Coil alone.....	5.25
Complete One Tube Set, 2,000 Miles Guaranteed.....	19.00
With cabinet, extra quality.....	21.00
Complete Two Tube Set, Works Loud Speaker.....	29.00
With Cabinet, extra quality.....	32.00
Complete Three Tube Set, Works Loud Speaker.....	40.00
With Cabinet.....	44.00
Special Loud Speaker Phones.....	5.25
Special Super Regenedyne, The Rolls Royce of Radio. Complete with 7x24 cabinet, 4 inch dials, relizing condensers, Tubes, Batteries.....	75.00

(Publishers are warned not to publish this circuit)

Storage "A" Batteries	Light Plates	Heavy Plates
6 Volt 80 Amp. Battery.....	\$9.75	\$11.00
6 Volt 90 Amp. Battery.....	11.00	13.50
6 Volt 120 Amp. Battery.....	13.75	16.50
6 Volt 160 Amp. Battery.....		22.50

6 Volt Tubes are furnished with sets when storage battery is purchased or at request.

BIG CATALOG FOR THE ASKING. DEALERS INVITED.

Sidbenel RADIO EQUIPMENT MANUFACTURING CO.
Address Dept. L4, 25 West Mt. Eden Avenue New York City

RADIO WORLD

[Entered as second-class matter, March 23, 1922, at the Post Office at New York, N. Y., under the Act of March 3, 1879]

A Weekly Journal Published Every Wednesday and Dated Saturday, by Hennessy Radio Publications Corporation from Publication Office, 1493 Broadway, New York, N. Y. Phones: Lackawanna 6976 & 2063.

Vol. IV, No. 13. Whole No. 91

December 22, 1923

15c. per copy, \$6.00 a year

The New "Superdyne" Four-Tube Receiver—Part II

Layout of Panel, Drilling, and Mounting Apparatus

By R. L. Dougherty

IN last week's issue of RADIO WORLD we explained just what this receiver is, its method of working and the circuit used. In order to complete it, these other parts are necessary: Four rheostats (30 ohms resistance), four sockets (UV199—do not use adapters), one panel 24" x 7" x 3/16" of bakelite or formica, one double-pole double-throw anti-capacity switch (push-pull panel mount type), two audio-frequency transformers, three jacks (1 single circuit, 2 double circuit), two 4" dials, one 3" 90° dial, one filament switch, three 1 1/4" brass or nickel bezels, 6 lengths of bus wire and spaghetti.

panel: Obtain a try-square and rule a line 3 1/2" from the top, right across the panel, from one side to the other. That is the guide for laying out the condensers, the dimensions and location and size of holes being given in the accompanying panel layout. Use clamps to hold the panel steady, and drill carefully. Drill each hole slowly and drill from the wrong side. As the drill is just about to break through, turn the panel over, and drill from the opposite side. This is to prevent the drill from breaking through and marring the surface and makes a nice neat job. Do not rush the work, take it easy and when the drill or panel starts to heat up—

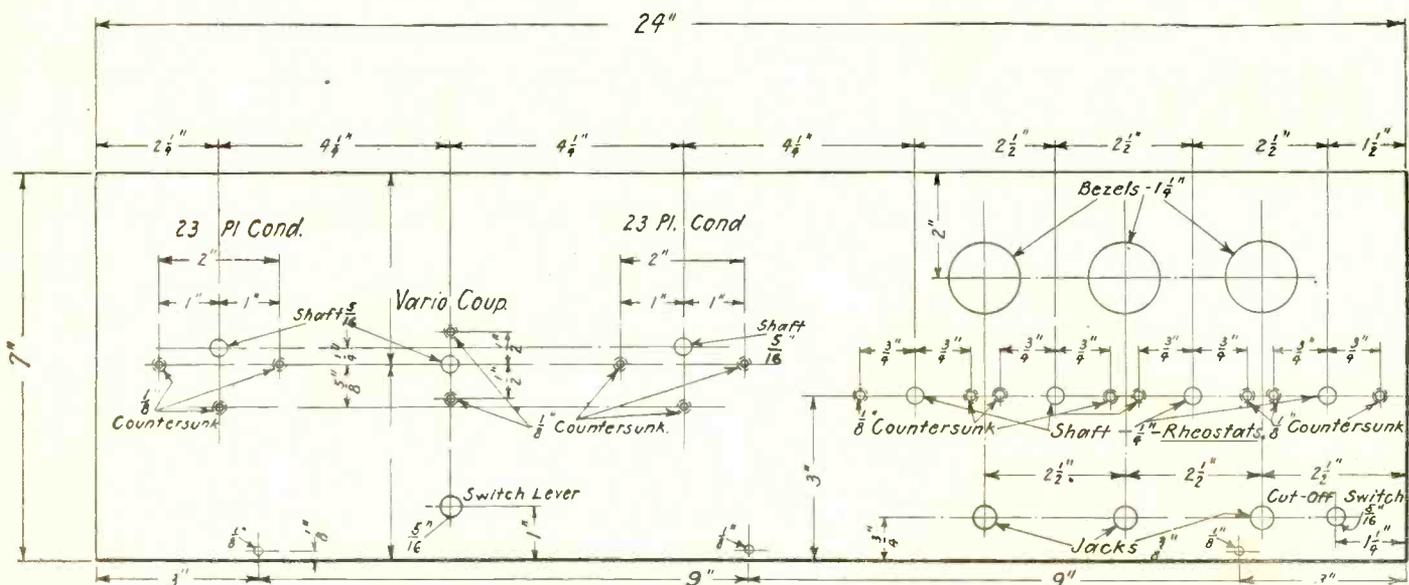


Fig. 1. Panel layout drawn to exact scale. All measurements given are for standard parts unless specific apparatus is mentioned.

The first job, and by far the most important, is the winding of the coils and the coupler. The exact number of turns used in the coils was given in the last issue, and should be followed. No advantage is gained by using more, and needless work, worry and trouble will be saved if the exact tapping and number of turns is closely adhered to. Do not use shellac when winding the coils. If binding is necessary, use a strip of narrow adhesive tape on each side of the coil, to hold it in place.

Proceed in the following manner to lay out the

stop, and let the drill and panel cool off. Otherwise, you will have the job of taking a broken drill out of the hole. As the holes for the bezels are rather large, it is best to mark your centers, and take the job to a machine shop and let them do it for you. An expansion drill cannot be used successfully in the hands of an amateur on bakelite and a hard messy job is or probably will be the result if it is attempted.

After the holes are all drilled, sandpaper the front of the panel with rather coarse sandpaper or emery
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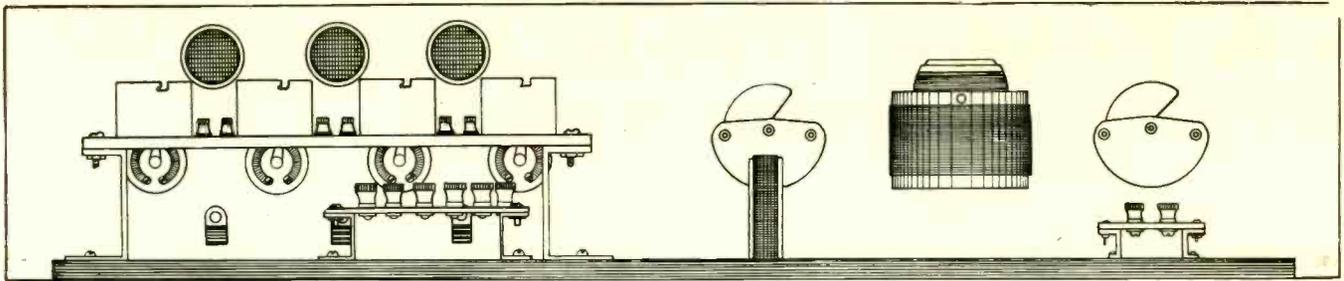


Fig. 2. Rear view of apparatus as mounted. Note mounting of sockets to accommodate transformers. The binding posts project through back of cabinet.

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cloth. Rub from right to left and not up and down. After a very coarse grain has been given, go over it again with fine sandpaper and machine oil, making sure that all the spots are taken out. If a real satin finish is wanted, this can be obtained by using rotten stone or powdered pumice, a little oil, and plenty of elbow grease.

For the engraving it is much simpler to go to an engraving shop and have the work done, or even to obtain the decalcomania engravings and transfer them to the panel, than to attempt to scribe it on yourself. The next operation is mounting the apparatus on the panel itself. Place the baseboard (a piece of hardwood 1" x 22" x 6") on the panel by means of three 2" narrow shank wood screws. Then place the condensers, coupler, rheostats, jacks, filament switch, and double-pole double-throw switch in place. The last named switch being flat and not taking up much space can conveniently be mounted under the coupler, and leave plenty of room for the wiring.

The sockets are mounted on a separate piece of bakelite or hard rubber by means of two brass angles as shown. It is not possible to get three or four gang UV199 sockets for this work, so a four gang socket will have to be made by the builder by mounting them himself. This is done to allow space directly under the sockets to mount the transformers which should be placed directly under the third and fourth tube, at right angles. This allows short leads from the jacks and the tubes to be brought down to the transformers.

The next thing necessary is to mount the binding posts for the battery connections. They are mounted on a separate piece of bakelite 4" x 2½". Two brass angles are used to raise them from the base, allowing the connections to be made through the back of the cabinet, and the wiring to be done from under the smaller panel.

When this is accomplished, the first thing that will be done is to hook up the filament connections to the tubes. This is done first, because of the fact that the rheostats being in an unhandy place, they need all the space for wiring up first that can be had. Bring one lead from the plus side of the battery connector block over to the tubes, and make your connections.

You will note that the rheostats are wired in the negative side of the filaments. Make all your connections sure and solder every one. It is more convenient to use the little brass or copper lug connectors and screw them under the heads of the posts.

Then wire up the antenna post and ground post to the four-turn primary. Make your leads short. The next thing is to wire up the secondary. The diagram should be followed very carefully, making your leads as direct as possible, yet not running your leads parallel for any great length. In this receiver the manner of running the leads plays a great part in the actual working of the receiver. In bringing the taps of the two coils to the double-pole double-throw switch, make sure that they are separated until they actually make contact with the poles of the switch. Note that this switch is used for the wave length change, and should be wired carefully, so that both circuits will be in resonance when operated.

After the receiver is carefully wired, and carefully checked, the leads of the tickler or resonance coil should be attached by means of short flexible leads. This is done so that the reversing of the leads is easy and the correct manner can easily be determined by its operation.

It is of the utmost importance that the plate and grid leads of the first two tubes do not run close together, and at the same time they should be as short as can be. The manner in which the apparatus is laid out makes it possible for the grid and plate leads to be connected with a space difference of about 4" between them, and you can connect them on different planes so that they have no chance to interfere.

Do not let the wires straggle all over the place. Make them short and direct, yet do not let them run close together. The manner in which the tickler is located with regard to the tuned coil, allows almost direct contact with the flexible leads, but the other leads should also be short. Have the leads that cross do so at right angles, and bring no unnecessary wire into the circuit by introducing fancy bends in the wire.

(The next and final installment of this series will deal with the correct tuning of the set, some of the troubles likely to be experienced by the man handling it, and their solutions.)

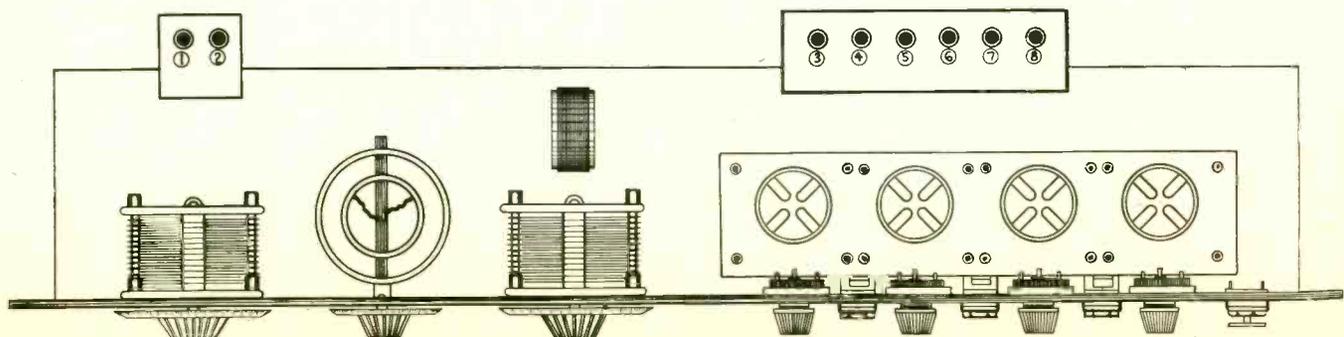


Fig. 3. Top view of the apparatus mounted on base and panel. Binding posts 1 and 2—antenna and ground. 3—A minus. 4—A plus. 5—B minus. 6—B plus 22½. 7—B plus 45 volts for R. F. tube. 8—B plus amplifier (67½ volts).

A Negative Feed-back Circuit for Experimenters

By C. White, Consulting Engineer

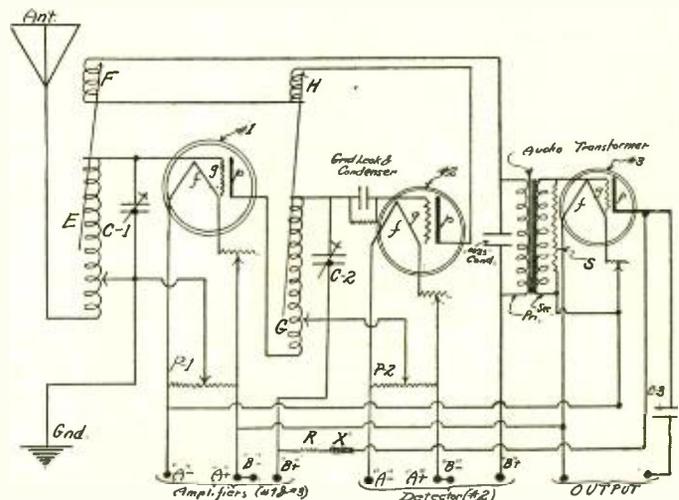
WHEN playing around with various circuits and arrangements of apparatus one often runs into peculiar results obtained from some strange assemblage of apparatus. Within the past year I have done much work on the combining of radio-frequency with regeneration and at times I have obtained some peculiar but very remarkable results. Once while working with a special circuit I happened to run upon a combination that gave most astounding amplification at 200 to 250 meters. With two tubes I could pick up very low-powered broadcasting and amateur stations working in that wave band, but somehow it was not possible to get this circuit to give any remarkable results on the higher wave bands although the constants of the circuit were altered in every way to fit reception at these wave lengths. Many of these interesting things I have withheld from publication owing to the fact that their peculiar or erratic nature rendered them impractical for the average radio fan who is building his own receiver for the first time.

But recently many of my reader friends have either told me personally that they are more than anxious to try out new and undeveloped circuits or signified that they would like to conduct a little laboratory work of their own. If you are under the impression that a lot of apparatus is required for this work you are mistaken. A good radio circuit testing laboratory easily can be rigged up in your spare hours at a very small expense. I do not advise that you tear to pieces your regular radio set every time you want to try something out, but I recommend that for this work you purchase separate apparatus of the table mounting style.

A test board is the first essential. This is nothing more than an ordinary bread board of some soft wood that allows screws to be sunk easily and quickly and still is inexpensive enough to burn up when it is worn beyond all future usage. Two or three good table mount style condensers. A 23-plate condenser and two 11-plate condensers will suit for nearly all purposes. A flock of fixed mica condensers from .00025 mfd. to .006 mfd. capacity approximately; about five condensers in all will suffice. A couple of fixed grid leaks and one or two good variable leaks will materially aid the equipment. Two variocouplers of the inexpensive type with the rotor on the end of a tube, and two cheap variometers that would allow their windings to be split if necessary. A couple of tube units which include a socket and a rheostat combined, two AF transformers, two RF transformers, two 6" 3½" diameter bakelite tubes, No. 22 SCC magnet wire, bus and connecting wire, soldering iron (preferably electric) and other miscellaneous items will give you an excellent working laboratory with parts for testing nearly any circuit that might come out. Of course, you do not have to purchase all at once, but gradually let them accumulate, or better still, organize a club of your friends and let the club furnish the laboratory equipment. To many fans, trying out circuits is far more interesting than even good clear DX work.

The receiver illustrated herewith has great possibilities if it is developed to a stable point. Its amplification at certain wave lengths when properly adjusted is enormous but improvement is needed to give it the right amount of stability. The main tuning circuit is

composed of the variocoupler E-F using the coil F as the rotor and E as the stator, and the condenser C-1 which is an 11-plate variable. The plate tuning unit for tube No. 1 is exactly similar to the grid tuning unit for the same tube. In other words G-H is a variocoupler, H is the rotor and G is the stator, while C-2 is the 11-plate tuning condenser. Both E-F and G-H should be so constructed that their rotors can turn completely around (360 degrees) if necessary. These two rotors can be used to establish stability for both tube No. 1, the radio-frequency amplifier, and tube No. 2, the detector. The rotor F can be so turned as to give regenerative feed-back to the coil E while H can be so turned as to give negative feed-back to G which



Three-tube radio-frequency receiver employing negative feedback as a stabilizer. This circuit should prove of interest to experimenters as it has many possibilities.

will materially aid in stabilizing the detector circuit. You will notice that stabilizing potentiometers, P-1 and P-2, are used in addition to insure stability at all times. In fact, you will soon discover that there are many ways of tuning F and H that will give peculiar and interesting results. It is advised that tubes No. 1 and No. 3, the radio and audio-frequency amplifiers respectively, be the UV201A type, while tube No. 2 can be either a WD-11 or 12, or a UV199. The reason for this is the fact that a separate "A" as well as "B" battery is needed for the detector tube (No. 2), but, of course, UV199s can be used throughout if so desired. The use of a dry cell tube as a detector insures minimum expense in providing the additional "A" battery required.

To try out this receiver it is of course not necessary to build the one stage audio-frequency amplifier shown on the diagram. But the amplifier itself incorporates some features which in reality makes it almost a subject for separate experimentation. Some radio experimenters have tried a power tube in the last stage of their amplifiers and have found that when the proper plate voltage was applied to make the tube "take hold" there was plenty of volume but also plenty of distortion. This distortion was in a measure largely due to the heavy plate current passing through the phones or loud speaking element. To prevent this a 2.0 mfd. (C-3) telephone

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Argentina Operators Enter Radio Tests

HARTFORD, CONN.—Can amateur radio men in this country hear amateur CW transmitters in South America?

It is not improbable that the tremendous expanse of 5,000 miles between the United States and Argentina may be covered by radio during the fourth series of transatlantic tests organized by the American Radio Relay League between December 22 and January 10. In response to the urgent request of members of the Radio Club of Argentina the A. R. R. L. is sending a schedule of the tests to South America.

As the tests this season will be primarily a listening contest for American and Canadian amateurs, this will mean that amateurs in this country, in addition to tuning up their receivers for incoming signals from France and England,

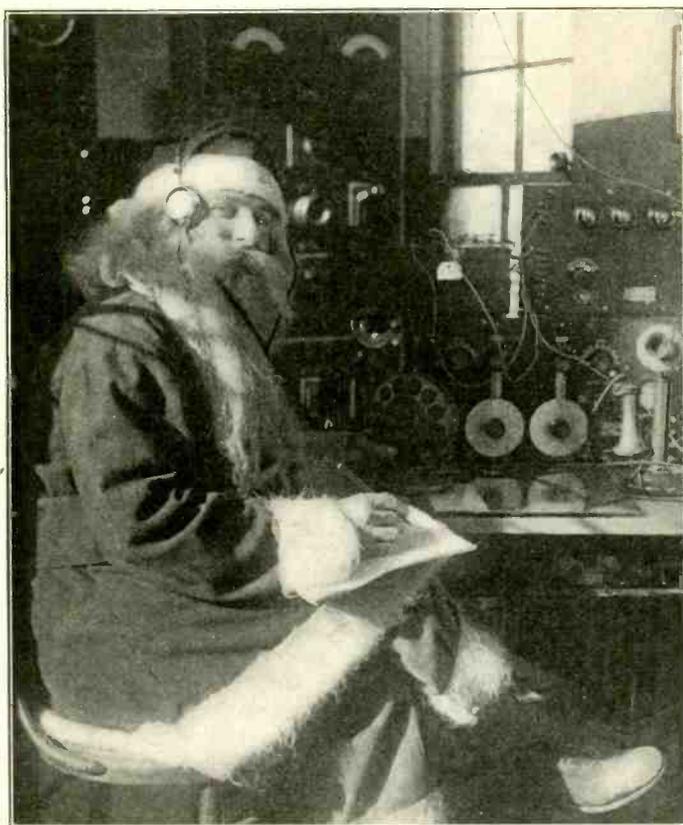
will listen also for the faint note of CW stations operated by their South American brothers.

A communication addressed to the A. R. R. L. from amateurs in Argentina states that between twenty-five and thirty transmitting stations are prepared to send their signals on schedule time. They will base their calculations on Greenwich mean time.

The greatest obstacle with which the South American amateurs will have to contend in sending their signals as far north as the United States is the difference in temperature and atmospheric conditions which are bound to accompany their summer climate.

The radio technical publication called the "Revista Telegraphica" is interested in South American amateur participation.

The Radio Christmas Spirit Picturized



(C. Underwood & Underwood and Kadel & Herbert)

Here is Santa Claus himself, way up North at his modern radio station, getting all the requests of the kiddies via the air.



"Twas the night before Xmas" and the only thing stirring was the radio set, while the kiddies listened for Santa's coming.

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condenser is used to bypass the audio-frequency currents while the direct plate current is fed through a 12,000 ohm non-inductive resistance (R) and a .1 henry choke coil (X) which in combination with the non-inductive resistance (R) prevents audio or radio-frequency currents from passing either one way or the other, but affords a ready path for direct current. In some cases, or with certain loud speaking elements, the use of R is not altogether essential, but it is better to include it in the circuit. Both R and X are rather hard to purchase at all places if it is not known who the manufacturer is. The Federal Tel. & Tel. Co., Buffalo, N. Y., manufactures R and X for amateur use at a

reasonable price. A one megohm leak S is shunted across the secondary terminals of the audio-frequency amplifying transformer to insure quiet operation at high amplification.

As I have stated previously this circuit offers very excellent material for development and perfection, but I would not recommend it to a man building a radio set for the first time; since to construct and operate it efficiently as well as effectively a man well grounded in the game is necessary. There are indeed great possibilities in negative feed-back if well developed and perfected. Maybe you are the man to either do it or help do it? Here is a starter and perhaps a blazed trail leading to something good.

Henry Anniversary Jointly Celebrated by WGY-WHAZ

BRIDGING almost a century, the tinkle of a tiny bell, the first in the world that ever rang in response to an electro-magnet, was heard from coast to coast and across the Atlantic Ocean when, on December 17, programs in memory of Prof. Joseph Henry were broadcast from WGY, the General Electric radio station at Schenectady, N. Y., and WHAZ, the Rensselaer Polytechnic radio station at Troy, N. Y. The date was the 122d anniversary of Prof. Henry's birth.

It was in 1831, while Prof. Henry was connected with the Albany Academy, that he discovered an electro-magnet by which he was able to transmit signals to a distance. His discovery was basic, and is one to which telegraphy and wireless are much indebted.

Dr. Phillip Ten Eyck, one of Prof. Henry's assistants, carefully preserved the little bell and electro-magnet which the professor used in his experiments, feeling that they might some day be of historical value. The bell was taken from the Ten Eyck dining table for use in the tests, and was preserved by the Ten Eyck family until it came into possession of the New York State Museum, where it is now preserved.

The Henry memorial program was held under the auspices of the New York State Museum, which also owns the magnet the professor used in his experiments. At different times during the Schenectady and Troy programs the little bell was rung from both stations, for the inventions which make it possible for the bell's note to be broadcast are largely based on the electro-magnet which caused it to sound during the experiments in 1831.

E. W. Rice, Jr., honorary chairman of the board of the General Electric Company, delivered an address over WGY on this occasion. He recalled



(C. International Newsreel)

E. W. Rice, Jr., right, holding the original electro-magnet invented by Joseph Henry, pioneer electrical inventor. Dr. J. W. Clark, left, is holding the tiny bell which was the first device actuated by Henry's electro-magnet, and which was rung "over the air" by radio last week at the Henry memorial celebration.



(C. Kadel and Herbert)

Miss Catherine Moore, of New York, not satisfied with simply tuning her own set, insists upon erecting her antenna and is shown putting the finishing touches on a new mast that she has installed.

something of Prof. Henry's life and his work in the realm of physics. The speaker at the Troy station was Dr. John M. Clarke, director of the New York State Museum, at Albany, N. Y., who sketched Prof. Henry's boyhood days and discoveries.

In estimating the value of Prof. Henry's contributions to science, Prof. Michael I. Pupin, of Columbia University, has said: "Modern electrical theory in general, and radio in particular, was born in Albany, where Henry was born. He was, and still is, the greatest American physicist and the greatest American idealist in science, and his life work is the best proof that democracy can do great things in higher scientific endeavor."

Senator Dupuy Tries to Reach France by Radio

ON the eve of leaving America last week for France, Senator Paul Dupuy, noted French publisher, tried to reach his home in Versailles via stations WJY and WGY. He spoke from the Radio Corporation of America's station and his words were relayed to Schenectady and broadcast there.

His wife and children had been informed by cable and amateur messages that he would speak, and they replied that they would listen in for him. He broadcast at 10 o'clock here, which is 3 A. M. in France. This time was chosen as spark interference is at a minimum at these hours and distance transmission is better.

Ship Traffic Spoils Broadcasting

WASHINGTON, D. C. — With the elimination of amateur interference with broadcast reception through the government regulation providing for evening "quiet hours," the Department of Commerce is now faced with a serious situation that threatens the pleasure of many thousands of listeners—namely, the interference which is being caused nightly by scores of ship telegraph stations.

It was comparatively an easy matter to obtain the co-operation of the amateur through his organization, the American Radio Relay League, but the proposal to keep silent ship radio stations that are handling life and death messages is another matter. Ship transmission is vital to safety at sea and to commerce.

On the one hand are thousands of listeners clamoring for relief from interference that is spoiling their concerts and on the other the positively essential ship and commercial air traffic. Commercial stations, both ship and shore, use that band between 300 and 3,000 meters. The navy employs waves from 600 upward, while the army, which causes very little interference, follows the navy.

Among the national organizations which have announced their intention of bringing this matter before the Department of Commerce officials is the National Association of Broadcasters, the executive chairman of which, Paul B. Klugh says: "We agree that ship-to-shore and commercial stations on radiophone wave-lengths, during popular broadcasting hours, are the real disturbance to uninterrupted reception. We hope to bring some regulation of this at Washington."

"The uninformed broadcast listeners, enraged by interference, feels that he must blame someone, and the amateur seems to be the inevitable target. This condition can be much relieved."



(C. Fotograms, N. Y.)

At the time the Stevens Institute football team was playing Swarthmore, one of the cheer leaders was announcing the returns of the Yale-Princeton game at New Haven, which was received on a neutrodyne receiver on the field at Stevens. This same scheme has been successfully used on other football fields, thus allowing the people in the grand stands to be present at one game and yet in full information of other big games going on at other places.

The Radio Primer

ACCUMULATORS (STORAGE BATTERIES)—

There is another type of battery that is commonly used in radio. In appearance, construction and principle, it differs entirely from that of the dry cell. The dry cell is a producer of electrical energy through chemical action. The storage cell, as its name suggests, does not do anything but store energy—it does not make it. In order to get any current from a storage cell you first have to put current into it.

In general, the storage cell of today consists of a water and acid-proof case in which the elements are placed. Three of these cells are placed together to form a "battery." The plates of the battery or cell are of two kinds—a positive and a negative. These plates are made up of sheets of lead, perforated in various manners and filled with either red lead or litharge (black lead). The plates containing the red lead are for the positive plates, those with the litharge are the negative plates.

These plates are filled with the active materials under considerable pressure, and placed in groups of fours or fives in the cell. Separators of treated wood keep the positive and negative plates from touching. Then the positive plates are connected to the positive side of the charging circuit and the negative plates to the negative side of the circuit.

While charging, the red lead is changed to lead peroxide, and the litharge to sponge lead. When this change has taken place the battery is fully charged and

ready for work. When being used a gradual change takes place, turning the plates back to their original condition. When this has taken place the battery is said to be "discharged" or "dead." It is then charged and made ready for use again.

The solution used in this type of cell is sulphuric acid in distilled water. The acid never evaporates, but the water frequently needs replenishing.

In the commercial type used for radio, the average battery is classified as a 6 volt 60 ampere hour battery. It consists of three cells, in a hardwood case, with heavy lugs and insulating material poured over and around the cells.

Certain precautions must be observed in the handling of these cells or batteries. They should always be kept charged. On a radio set using more than three tubes, this generally means about every three weeks. The tops of the plates should always be kept covered with water. For this purpose only pure distilled water is used. The reason for this is that water that has not been distilled often contains metallic particles such as iron or some other injurious matter.

A cell should never be used when its specific gravity registers less than 1.150 on a hydrometer. To do this will cause the battery to "sulphate" or the active material to fall out of the plates. It is always safer to give the battery a slight overcharge every once in a while than to allow it to stand on the regular charge. This does not mean that it should be overcharged every time, but about once in every eight or ten times, an extra two hours' charge (until it gasses very freely, but does not heat) will aid in keeping the battery up to "tick."

Announcement of Standard Frequency Transmissions

THE Bureau of Standards is transmitting special signals of standard frequency about twice a month. The next schedule is announced below. The signals can be heard and utilized in general east of the Mississippi River.

These special signals of standard frequency are of use to testing laboratories, transmitting station operators, and others, in checking wave meters and adjusting transmitting and receiving apparatus. Their accuracy is better than three-tenths of one per cent. Information on how to use the signals was given in the May 19, 1923, issue of RADIO WORLD. More detailed information is given in Bureau of Standards Letter Circular No. 92, which may be obtained, on application, from the Bureau of Standards, Washington, D. C.

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

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

Schedule of Frequencies in Kilocycles

(Approximate wave lengths in meters in parentheses)

Eastern Standard Time	Jan. 7	Jan. 21	Feb. 5	Feb. 20
11:00 to 11:05 P. M.	150 (2000)	500 (600)	1300 (231)	150 (2000)
11:12 to 11:20 P. M.	205 (1463)	600 (500)	1400 (214)	205 (1463)
11:24 to 11:32 P. M.	260 (1153)	700 (428)	1500 (200)	260 (1153)
11:36 to 11:44 P. M.	315 (952)	833 (360)	1600 (187)	315 (952)
11:48 to 11:56 P. M.	370 (810)	900 (333)	1700 (176)	370 (810)
12:00 to 12:08 A. M.	435 (689)	1000 (300)	1800 (167)	435 (689)
12:12 to 12:20 A. M.	500 (600)	1200 (250)	1900 (158)	500 (600)
12:24 to 12:32 A. M.	570 (526)	1400 (214)	2000 (150)	570 (526)

A Tip on Tuning

MANY fans think that a condenser in the primary of a receiver must be in series with the inductance to provide any means of tuning. This is not so. Added ease of tuning, and sharper and ever finer tuning can be accomplished by the use of the right inductance, and the right capacity in parallel, providing the natural period of the antenna itself is not too great. In this case,

the natural back inductance or back EMF overcomes any sharpness that could be gained by the use of condensers. Each antenna has a natural capacity, and if a proper antenna is used, not too long and not too close to any mass of metallic material, sharper tuning can be accomplished by the use of parallel connections between the inductance and the capacity.

A Non-Regenerative, but Sensitive, Receiver

By Clarence E. Morrison

WHEN the regenerative radio receiver was brought to its present stage it was thought that the radical change then made had brought such instruments very near perfection. Immediately all amateurs and most manufacturers changed over and today most of the sets on the market contain this feature. But regeneration, while it produces volume, nevertheless has many annoying features, notably that of screeches and howls while tuning, and the length of time taken to learn the machine and time required for tuning.

Any set which gives every advantage of regeneration with none of its disadvantages is bound to prove interesting to all persons desiring good reception. The electrical engineers of the Central Station Equipment Company attacked the problem from this viewpoint, determined to evolve a circuit which would be easily tuned, would work well on local and long distance stations and would supply the volume necessary to give the listener real pleasure.

Such a set has finally been produced, but only by introducing many new features and a circuit hitherto not discovered. It consists of detector and two stages of audio-frequency, with specially designed and manufactured parts.

The inductance is a patented design, bank-wound, auto-transformer type having a range of up to and including 3,000 meters. The wire used is of special type, giving extra large surface area and still maintaining proper inductance value. There are 10 form-wound sections, each separated from the other by an insulating ring. The first bank is split into two sections so that any combination of turns from one to 100 can be had.

The audio-frequency transformers are of high efficiency type, with windings properly proportioned to operate in conjunction with the special inductance. They are designed along the same lines as the inductance and are novel in themselves. The transformers are so designed that while they are opposed to the set (due to construction space) they may be placed parallel to each other and immediately next to each other without any choking effect being noted. It is the combination of the inductance and these special transformers which gives the "Skyola" the volume and

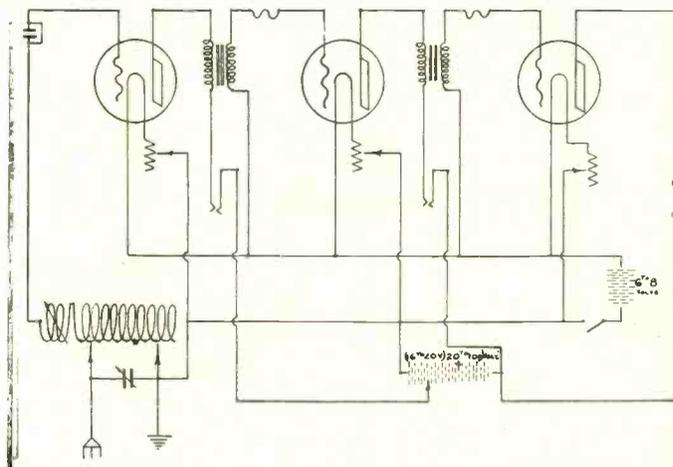
clear tone which are so necessary for the critical listener.

Other features are the special socket of the gang type, so arranged as to take up any variation of the tube pins; a control switch which automatically shuts off both the A and B batteries at the same time; and an arrangement to give variable voltage on the detector plate.

The set may be tuned with the inductance alone, or with the inductance in conjunction with the condenser. The setting for a certain wave length once obtained, the setting is constant, and the station will always be found in approximately the same place.

Due to its construction, capacity effects are never felt, and the entire apparatus may be promiscuously handled without causing any squeals or howls.

While not designed for distance reception, but for



Three-tube Skyola receiver embodying special inductances and transformers.

good, clear loud speaker work on the medium or local stations, good reception has been had when conditions favored such work.

The writer will be glad to answer any questions as to the technical construction of the set and will give particular information on any of the points in which it differs radically from anything in the field.

The Radio Woman

THE other day I had a little party of friends at the house for dinner. Two of them brought along their offspring. Everything was going fine and dandy, we women were having much to discuss and consequently did not notice the absence and the quiet of the youngsters. When it was almost time for my guests to depart the children showed much reluctance. Later I discovered the reason for their having such a wonderful time—three bulbs in our radio set were burned out!

* * *

President Coolidge's message was heard by me perfectly. It seemed almost as if he were in the room talking direct to me. Friend Husband could not hear

it because he was at the office and of course he was sorry to miss it.

* * *

I dropped into Aeolian Hall one Friday afternoon recently during the lunch hour and heard a very good concert. At one end of the platform I saw a stand with a funny little device on the top of it and kept wondering what it was for and if one of the singers would do some stunts with it. Finally it dawned upon me that it was a broadcasting microphone and that probably thousands of women in their homes were listening to the same concert at that moment.

* * *

A broadcast appeal for a subject for blood transfusion has resulted in a woman volunteer giving half a pint of her blood to another woman in a London hospital. The operation was successful.

Important Radio Advances in 1923

By John Liston

Of the General Electric Company

IMPORTANT improvements in vacuum tubes for radio purposes marked developments in 1923. These were mostly in the direction of increased efficiency of operation and a general betterment of electrical characteristics.

It is also interesting to note that during the year there was started in regular production a new tube of the highest power so far standardized, and also the smallest tube requiring the least power expenditure in the filament that has up to the present been made available to the public for radio receiving sets.

The smallest standard receiving tube, UV-199 operates with an expenditure of only .18 watt for the filament which is of a new type and insures high electron emission, silent operation and long life.

The development of the new filament made possible the remodeling of the radiotron UV-201, the previous standard receiving tube, so that it required only one-quarter the former amount of filament power. At the same time the characteristics of the tube were changed so that it became a better detector and amplifier.

A new highly efficient 50-watt transmitting tube, UV-203-A, was developed and put into production. This tube also incorporated the new filament which enabled the filament energy required to be cut to one-half its former value for this size of tube and at the same time the characteristics were greatly improved. The operating life was also increased several fold by the change to the new filament.

A new tube of 250 watts output, UV-204-A, also employed the new filament which decreased the power consumption to about one-quarter of its former value and also improved the life.

A transmitting tube of 20 kw. output operates from a direct current source of 12,000 to 15,000 volts. In this tube, UV-207, the anode is also the container and the tube is designed to operate with the anode container immersed in running water so as to dissipate the heat developed in the interior of the tube. Several of these equipments were placed in service and more than a dozen other sets are being installed or are under construction.

Many important improvements were made in the design and production of radio apparatus, the advance being especially notable in broadcast receivers. The public's interest in broadcasting continued unabated and the demand for apparatus was so insistent that a considerable number of new styles were standardized.

The sectional units which were formerly standardized were combined in various groups so as to meet different requirements. One of these units, a detector amplifier, was used in conjunction with the tuning unit, and suitable means were devised for combining the two to form a receiver set, suitable for use with an outside antenna. The set is very simple in operation, having a single tuned circuit and is provided with regeneration when operated with a tube detector. A crystal detector is a part of the receiver for giving head telephone reception on near-by broadcasting stations when desired. These sets were adapted for the dry battery radiotrons, thereby entirely eliminating the necessity of storage batteries.

Another set was made by combining the same detector amplifier unit with a three-stage radio-frequency amplifier unit to make a set suitable for use with a

loop aerial. This set is very simple in operation, there being but one tuning control, the variable condenser in parallel with the tuning loop.

The component parts were added to the line of standardized parts already available for use by amateurs and those desirous of constructing their own sets. The principal additions included socket and rheostats for the new low filament current radiotrons as well as adapters for using these tubes in the sockets originally supplied in many sets.

A loud speaker was developed for use as an addition to sets not already equipped with one. It is very sensitive and reproduces signals with clear equality and a single adjustment is provided for the diaphragm, which gives good operating efficiency over a considerable range of signal intensities.

Early in the year, the requirements for receivers took on a new aspect. Portable and self-contained receivers had become possible due to the new tube developments, and these suddenly were widely demanded. The receiver designed to meet this need utilizes a single-circuit regenerative system with a detector and an audio amplifier tube, functioning well over the broadcast range. The method of control is exceptionally simple. The telephones and plug are carried in the front cover, while the batteries are in the rear. Having a complete weight of but 18 pounds the set is made easily portable by the addition of a leather carrying handle.

The small crystal receiver previously standardized was also adapted to meet the changing demand. It is now housed in a wood case and is fitted with a carrying handle for portability, the telephones being carried in a compartment in the rear cover.

Perhaps the best example of this adaptation of the new radiotrons to a complete receiver is to be found in the self-contained cabinet receiver which utilizes a single circuit tuning system with regeneration and has a detector and two audio-frequency stages. The batteries are supported inside the cabinet, and the loud speaker is built into it. The tuning controls, two in number, are easily accessible.

Developments in the line of commercial receivers included the standardization of those used in the trans-Atlantic and trans-Pacific stations of the Radio Corporation of America. The layout of these communication channels consists of three separate divisions—first the transmitting station usually located at some advantageous position near the coast for sending the communications across the sea; second, a receiving station, also advantageously located for the reception from across the seas but usually removed from the transmitter; and third, the operating division, usually located in the heart of the business or financial center to which the communication service is to be rendered. The operating division may frequently be separated by 100 to 200 miles from either of the two other divisions, but it directly controls through suitable remote control relays the operation of these two divisions. Thus, communication is directly carried on from the desired point without transcription by the other divisions.

The equipment in the receiving stations consists of eight separate large units, not including the relays necessary for transposing the signals on the land wires.

It is interesting that both the stations which took part in bringing the news of the Japanese disaster in September, 1923, to the world, were equipped with the above standard receiving equipment. On the Japanese side, the operating division of Station JAA was located in Tokyo, while the transmitting division was in Haranomachi, some 155 miles away, and the receiving division 187 miles away at Tomioka. On the American side, a similar situation existed. Station KET has its operating division in San Francisco, its transmitting station at Bolinas, about 50 miles away, and its receiving station at Marshall, 44 miles away.

Station JAA usually works through the Radio Corporation station at Koko Head, Honolulu, but in this emergency communication was carried on directly across the water. The personnel of both stations worked incessantly at fever heat, while Japan told of her terrible calamity and needs. With all other communication systems out of order radio stood as the only means by which the call for assistance could be brought to mankind.

For the purpose of securing a high voltage direct current supply for the operation of radio tube transmitters, and for experimental work, there was developed and built for the U. S. Navy Department, a kenotron rectifier, rated at 30 kw. at 15,000 volts direct current. It contains twelve model UV-219 kenotrons, so connected that so-called three-phase full wave rectification is obtained.

The rectifier has associated with it the necessary controls, whereby its output can be adjusted from full output to a small fraction thereof. The filter system is associated with the rectifier, which smooths out the remaining ripple in the rectified alternating current to less than one-tenth of one per cent. This rectifier is now installed in the Navy Department laboratories at Bellevue near Washington, D. C.

As a link in the communication system of the U. S. Signal Corps, there was built for installation at Fort Douglas, Utah, a 10 kw. vacuum tube telegraph transmitter. Many novel features of construction were included due to the wide band of wave lengths which it covers, and to the necessity for including switching mechanism whereby wave length (frequency) could be readily changed to any one of five predetermined values. Air condensers of a new design were utilized.

A number of vacuum tube telegraph transmitters were built for the communication system of the United Fruit Company. These transmitters are mostly installed in Central and South America and will, when in service, form what will probably be one of the most modern commercial radio communication systems in existence. They have an output of 20 kw. at any wave length between 2,500 and 4,500 meters and include switching mechanism, so that any one of the two predetermined wave lengths can be readily obtained.

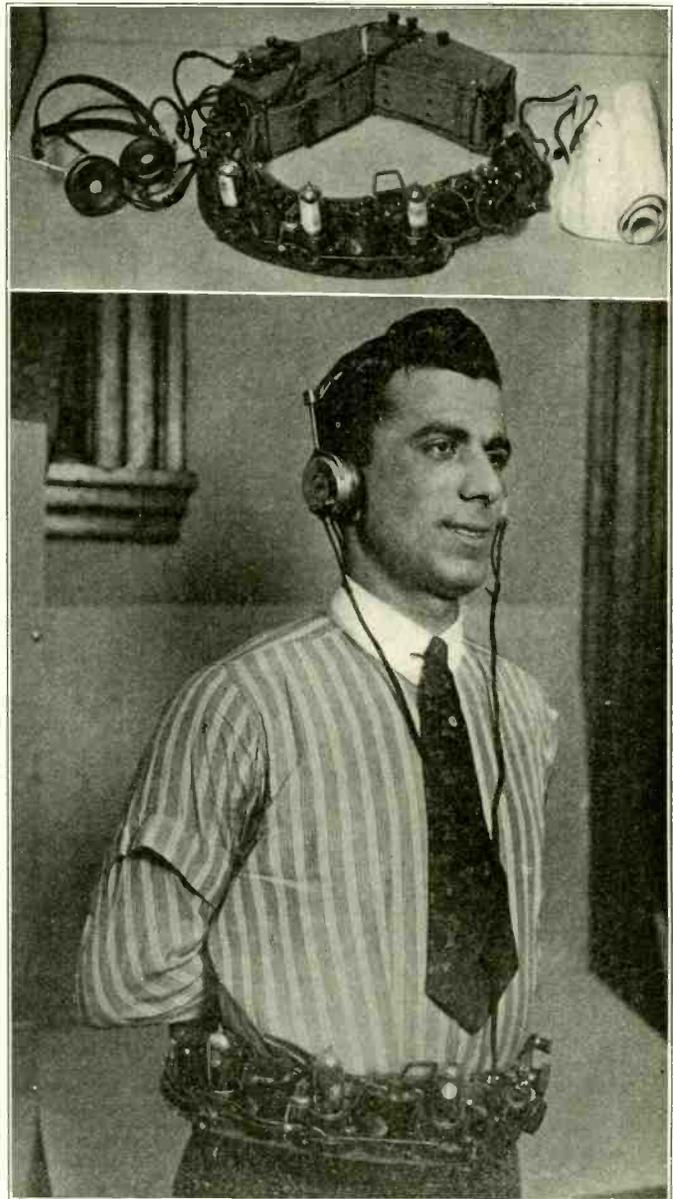
The sets include recently developed circuits which insure constant frequency of the output and the practical elimination of harmonics. The transmitters consist primarily of a so-called "master oscillator," the output of which is amplified by means of a water-cooled pliotron, which delivers its output to a "tank circuit," which is coupled to the antenna. They are designed to operate on antennas of the multiple tuned type, having two tuning points.

In connection with the air mail service of the U. S. Post Office Department, there was designed an air craft transmitter and receiver for use on the air planes. The transmitter of this equipment puts approximately 200 watts into a trailing wire antenna. The power for the operation of the set is obtained from storage batteries which are kept charged by the engine of the

plane and these batteries operate a high voltage dynamo, which supplies high voltage direct current power for the operation of the transmitter.

The set consists of three major units—the transmitter, receiver and control box, together with a number of auxiliaries. The equipment was designed so that it can be advantageously installed in the fuselage of the plane, and so that the maximum accessibility is given to the operator. The planes which will utilize the sets are built to carry the pilot only, and it was necessary to develop and design this equipment so that it can be readily operated by the pilot without interfering with the navigation of the plane.

Here Is the Radio Belt



(C. Gilliams Service)

Henry Farkouh, designer and builder of the portable "belt line receiver" shown in the pictures. It is a three-tube receiver operating on small batteries, and is complete in itself, even to an antenna. The details of the set are shown above. The antenna consists of a number of feet of fine wire sewn between two sheets of canvas so that it may be worn under the shirt, or rolled up and shoved in a convenient pocket. It is shown on the right of the belt. Each tube has its own rheostat and a potentiometer to control the oscillations is provided, making a really remarkable portable set that is portable in every sense of the word. It is all fastened to a canvas web belt, and is strapped on as shown.

The Best Broadcasters Will Survive

By Carl H. Butman

WASHINGTON, D. C.—By the first of the new year there will be fewer than 500 broadcasting stations in operation, officials of the Department of Commerce predict. These stations will be the best and most popular in the country, and will be more than enough to serve their communities; in some instances there will still be several in a single city.

The deletion of broadcasting stations during the past six months has been quite rapid, the total reaching 149, whereas only 107 opened, showing a loss of 42 stations. During the past month 33 stations fell by the wayside, so to speak, and only 15 new ones entered the field.

Apparently, as in many lines of endeavor, it is to be a survival-of-the-fittest race. On December 1, there were 549 broadcasting stations still serving the public; 47 were the more powerful Class B stations; 281 were in Class A; 219 in Class C, and two were listed as Class D, or development stations. Officials hope that the 219 Class C stations, all of which are operating on the single wave length of 360 meters, will qualify as Class B stations, transfer to Class A, or quit, thus eliminating considerable existing interference chiefly among themselves. The result would be a group of about 100 big stations with distinctive wave lengths, and approximately 350 smaller stations with exclusive district waves.

The broadcasting service in this country, which is, of course, privately owned and operated, and also leads the world in number of stations, is still holding public interest, the Department of Commerce believes. Moreover, its permanency is assured. Its real value, however, has not yet been fully realized, and will not be until there has been a wider distribution of receiving sets suitable for the reception of varied programs from several stations, permitting the listener to select at will the class of service of greatest interest and value.

The recent changes in wave lengths grouped weaker stations between 220 and 280 meters and gave the more powerful stations the wave lengths between 280 and 546 meters. In this class, the longer waves usually are assigned to the more popular stations. It is only natural that the more powerful stations are the most popular since listeners in naturally tune in on accustomed channels where they get the big stations with no interference. These stations all broadcast good programs and have a transmitting power which cannot be approached by Class A or C stations. When fans try for smaller stations on the lower wave lengths, unless they have very selective receivers, they immediately get interference from the larger stations, and the volume is appreciably less.

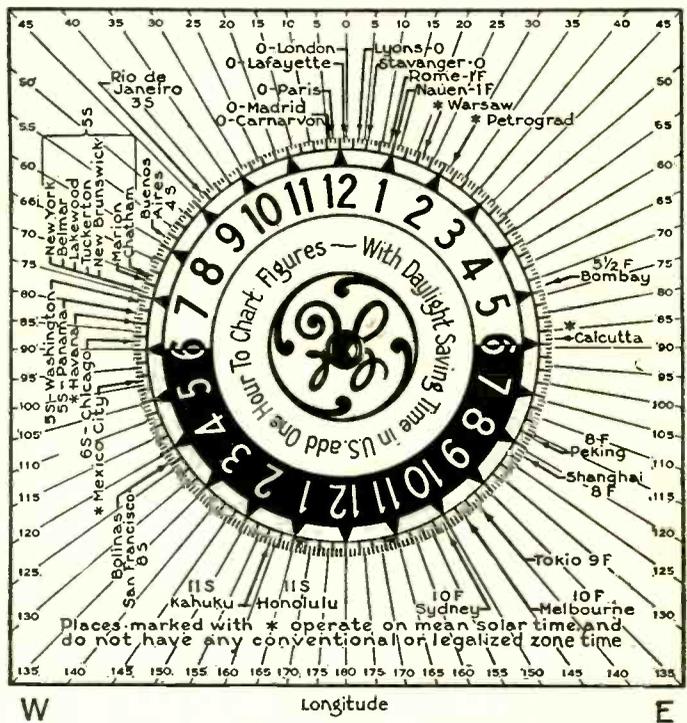
The weaker stations are "out of luck," so to speak, in another line. They find that the larger stations come into their territory, if not into their actual stations, and get the best talent together with their following. The cost of maintenance is tremendous, besides the initial cost averaging about \$125,000, and few small operating companies can keep up the pace. The big electric manufacturing companies are exempt, of course, as well as some other interests which got off with an early start, expecting no return. These include some big department stores, large municipal daily papers, some national organizations and manufacturing companies, such as comprise the present 47 Class B stations. For the small concerns, the maintenance for good operation is a steady drain on the exchequer which they cannot meet and the advertising is not of sufficient value to warrant the expense.

Students of the situation today declare there is no need for smaller broadcasters in cities where there are one or two large stations in constant service. The craze to broadcast, which was at first a popular fad, is now established on a positive operating basis, serving a practical need in almost every big community.

While some minor stations may continue in smaller districts where farmers are served, others, such as the more prosperous newspapers, may function despite the cost, just for the intangible good will; and some churches and hotels may operate to extend their scope and advertising. Many believe our broadcasters will eventually be reduced to one-half the total today.

A Handy Time Chart

THE General Electric Company, Schenectady, N. Y., have evolved a novel time chart for the purpose of finding the time in different cities of the world. The device consists of a wheel of cardboard, fastened to the



A handy time chart with revolving dial.

center of a chart on which the different cities of the world are listed according to longitude.

For instance, take the dial as it is set in the illustration. It is 7:05 A. M. in New York, and we want to find the time in San Francisco. The dial is turned until the white portion denoting daylight is uppermost. The figures 7:05 are placed on the line with New York time, and then we look back to San Francisco, which will be found on the black portion and see that the time there is 3:45 A. M. The same method is pursued to find out the time in any city.

The dial has five minute divisions and very accurate time settings may be had for any city in the world. This makes the chart of value to the amateur as well as the novice. A man with an amateur station desiring to try to reach French or English amateurs can accurately log his time and calculate the hours and minutes in the English or French cities he desires to reach.

A Four-Tube Set Combining Radio-Frequency Amplification and Regeneration

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

THE four-tube set herein described is recommended to those who are contemplating adding one stage of radio-frequency amplification to their three-tube sets and to those wishing to build a set which will bring in distant stations on the loud speaker.

From the sketch of connections it can be seen that the set makes use of one stage of radio-frequency amplification, a tube detector and two stages of audio-frequency amplification, and that the first amplifier tube has its internal capacitance balanced out. This balancing out of the tube capacitance makes tuning very easy, eliminates a lot of distortion, improves the receiving range and prevents tube oscillations. These advantages make it well worth while to put in the

tuned with one of the variable air condensers, as shown by the sketch. In connecting the condenser, the movable plates should be connected to the filament lead as indicated.

The radio-frequency transformer C can be wound on the same size tube, using the same size wire and should be very carefully constructed as follows:

About $\frac{1}{2}$ " from one end wind on 26 turns for the primary and then starting from the same place and winding in the same direction, put on 65 turns, taking a tap off at the fiftieth turn. This winding is the secondary, the tap being connected to the balancing out condenser D, as indicated. In connecting the transformer the sketch should be followed very carefully. It should be noted that the primary and secondary ter-

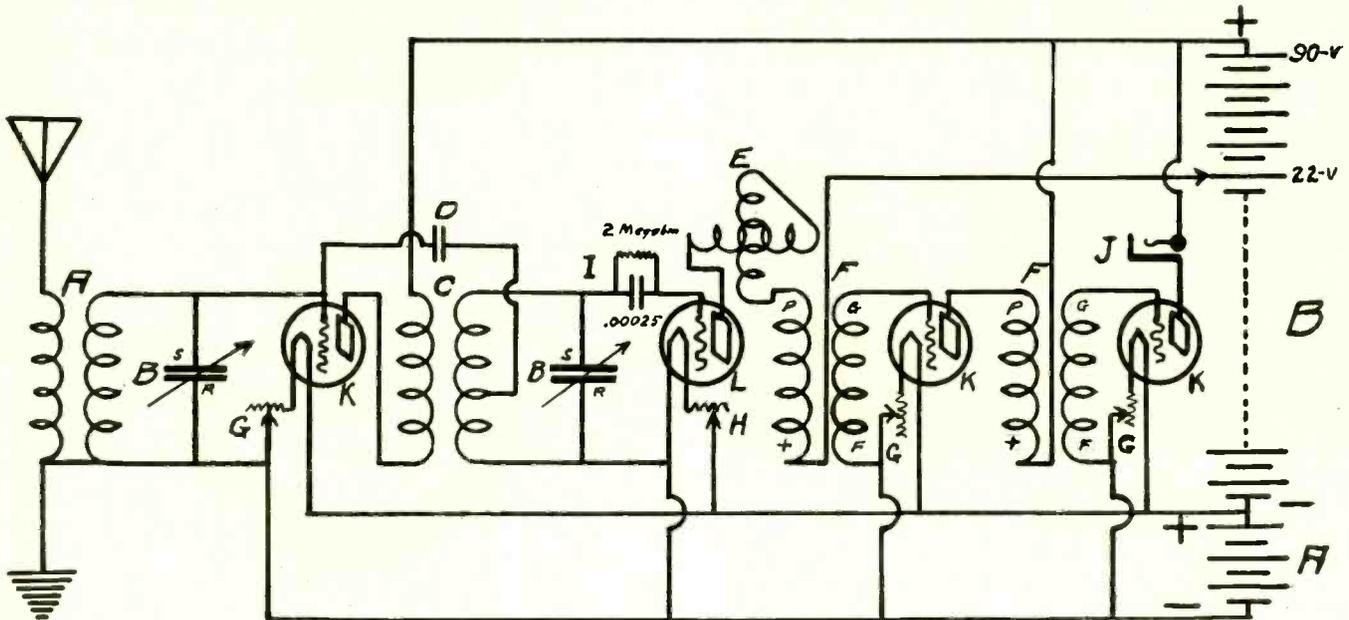


Diagram of a four-tube set embodying one stage of tuned radio-frequency, with the radio-frequency circuit neutralized. Regeneration is produced by means of the variometer in the plate lead of the second or detector tube.

additional care and patience necessary to build this receiver.

In the diagram of connections, each part has been lettered, these letters corresponding to those given herewith in the list of materials necessary for the construction of the set: A—tuner unit; B—two variable air condensers (.0004 mfd.); C—radio-frequency transformers (special); D—balancing out condenser; E—variometer; F—two audio-frequency transformers; G—three amperites; H—one vernier rheostat; I—grid condenser; J—single circuit jack; K—three amplifier tubes; L—one detector tube; M—four tube sockets; panel, connecting wire, binding posts, etc.

The tuning unit A and the radio-frequency transformer C can be made by the builder at a very slight expense. In constructing the tuning unit a 2" bakelite or cardboard tube, 3" long, is wound with No. 22 DCC wire as follows: Starting about $\frac{1}{2}$ " from one end wind on 65 turns for the secondary and over this winding place 15 turns for the primary. The secondary is

minals on the end where the winding was started, should be connected to plate and filament, respectively, this being necessary for proper operation.

The amperites G may be replaced by proper rheostats, although it will add three more controls to the set.

The other apparatus necessary is standard in every way, and when purchasing, the buyer should keep in mind that the best is none too good.

In assembling the set, great care should be taken to keep the units A, C and E as far apart as possible and so placed as to have no coupling between them. In wiring, the plate and grid circuit wires from the first tube should be kept apart and at right angles to each other.

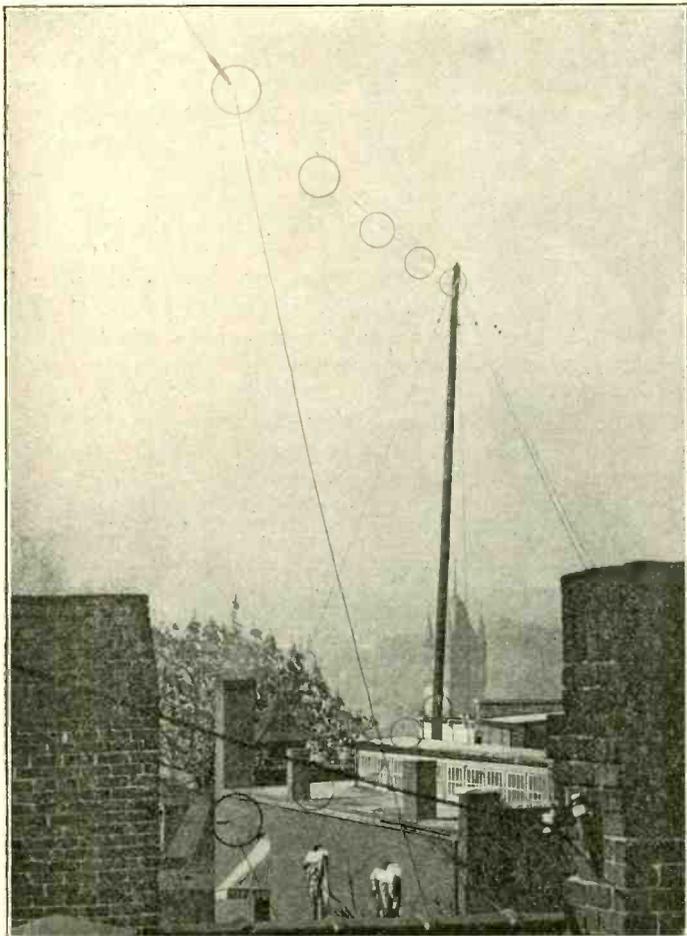
The balancing out condenser D can be purchased at almost any radio store and should have three terminals so that it can be adjusted for any tube.

After the set has been completely wired, the initial
(Concluded on next page)

Telephone Company Operates Broadcasting Station WNAV

ONE of the pioneer radio telephone stations of Tennessee is WNAV, located in Knoxville, Tennessee. It is operated by the People's Telephone & Telegraph Company, whose headquarters are in that city.

about a quarter of a mile away from the station, the music and voices being carried over a pair of special wires to the operating room. In order to keep all extraneous sounds and echoes out, the studio is lined to a depth of four inches



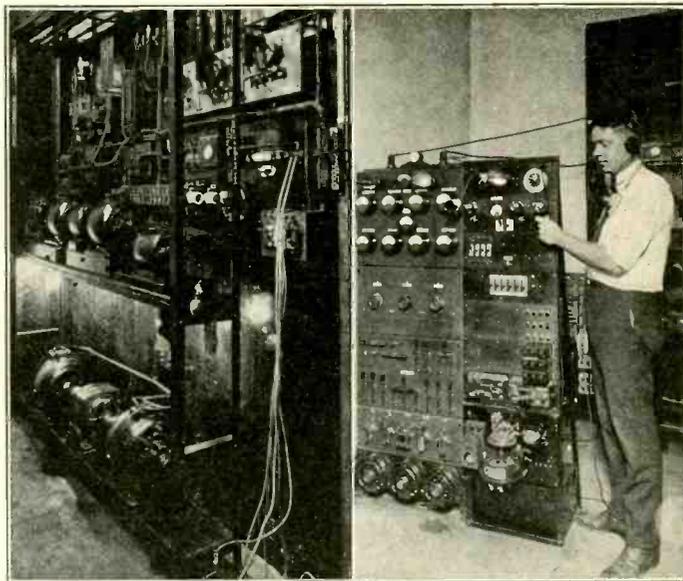
Antenna equipment of WNAV, Knoxville, Tenn. Two cage antennae are used, one as counterpoise and one as antenna.

The station operates on 500 watts, using the standard present day apparatus and circuits. The studio is located

(Concluded from preceding page)

adjustment is as follows: Connect the batteries, the head set, antenna and ground, and place the tubes in the proper sockets. Turn up the detector tube filament until a hissing is heard and then tune in some local station with the two condensers and variometer. Lift the amplifier tube from its socket and replace after putting a piece of paper over one of the filament prongs. The tube will now be out and the station will still be heard. Now adjust the balancing out condenser D until the signals die out entirely. This will denote that the balancing has been completed and the set is ready for use. The piece of paper should be removed from the tube prong and final adjustments of the two condensers and variometer will bring the signals to maximum strength.

The writer has found that this set, which combines regeneration and radio frequency amplification, gives results which are equivalent to those given by three stages of untuned radio-frequency amplification when regeneration is not used, and in addition is far more selective.



Operating room of station on left, showing generator and controls on back of board. On right is shown the operator listening in on a program by means of plugging in on the power amplifier circuit.

with cotton, covered with draperies. The floor is heavily carpeted and the studio is just as "dead" as it can be made.

The station operates on a wave length of 236 meters (1,270 Kcys). It uses two cage antennae, one under the other, the lower one being utilized as a counterpoise. When operating under full power, the antenna current is 8.5 amperes.

All generators are remotely controlled, and the rectifying system and the generating system are so interlocked that it is impossible to start the set under any but the best conditions. Due to the method of control used, it is possible for one man to operate the entire apparatus without any particular attention to one unit. Once the set is in readiness, the generators are started, the rectifiers placed in the circuit, the studio switched on, the apparatus linked with the studio, and the station is "on the air."

Who's Who in Government Radio

HERE are so many radio bodies now listed as governmental agencies that it seems advisable to point out for those concerned which of Uncle Sam's offices controls the administration of radio.

All matters pertaining to the enforcement of the laws regulating commercial, radio transmission on land and sea, including broadcasting, and private transmission, including amateur operation, are under the supervision of the Bureau of Navigation of the Department of Commerce.

The Bureau of Navigation has no jurisdiction over radio projects operated by other governmental departments, such as the Naval Communication Service, the Army Signal Corps, or the Coast Guard and Post Office radio services.

Matters affecting commercial or private transmission by radio may be referred to the nine District Supervisors or the Commissioner of Navigation, Department of Commerce, Washington, D. C.

The Radio University

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

I am enclosing a circuit diagram of a hook-up of a receiver that a friend of mine built for himself. We have gone over the circuit several times, but cannot get the tubes to oscillate. What is the trouble? We are using a DX transformer in the first stage and an Acme in the second. 90 volts on the plates of all the amplifying tubes.—Earle Engle, Mellinville, New York.

The circuit you enclose is a five-tube radio-frequency receiver using two stages of radio-frequency, detector and two stages of audio-frequency. It is not supposed to oscillate. However, unless neutralizing capacitances are used, the circuit will oscillate a bit, regardless. For the proper working of radio-frequency, no oscillations should be noticeable. Suggest that you use the radio-frequency transformers as specified in the diagram. The circuit is supplied by a perfectly reliable firm, having a good name in the trade, and is nothing unusual outside of the regular radio-frequency receiving circuit.

Would it be possible to use a six-volt storage battery with the WR21 tube? If so what resistance should the rheostat have? Are they as good as the UV201A tube? Can I use a Reinartz coil in the reflex circuit?—M. R. S. Kaplan, Boston, Mass.

This tube calls for four volts, therefore you may use the tube by using but two cells of your battery. However, care will have to be taken in its use. A six ohm rheostat will do. We do not see the advantage of using a Reinartz coil in a reflex circuit. If any coupler is used we suggest one that is capable of rather loose coupling. This is because a reflex is rather broad in tuning unless used with a coupler.

Does a neutrodyne circuit always have transformer coupled radio-frequency or can tuned radio-frequency be used?—Tom Fletcher, Scott, Arkansas.

The neutrodyne circuit is a highly developed type of tuned radio-frequency. It does not use transformers—they are specially wound coils called neutroformers, being tuned by means of a condenser. Your other question cannot be answered at the present time because we do not happen to have any knowledge of the firm you mention.

I enclose a diagram of my five-tube neutrodyne receiver. I use five WD11 tubes with the regulation parts. Will you kindly let me know why it is that I can only get the nearby stations with loud speaker intensity while other stations such as WGY and others only come in on the phones using the entire five tubes? Would UV199 tubes be of any use in this circuit? What changes should be made when they are used?—Leon P. Tracy, 20 N. Champlain Street, Burlington, Vt.

The WD11 tubes are entirely unfitted for use in this circuit. Best results will be had by employing the UV201A and UV200 tubes. UV199 may be used with fair results. It is not advisable to use any but the tubes specified. Do not, however, use the dry cell tubes as they are unfit for any work where this type of radio-frequency is concerned.

Why is it that my friend who has a three-

tube set can get PWX using an inside antenna, while I am using a three-tube reflex with loop or outside antenna and cannot succeed in getting anything outside of New York stations, for east, with Atlanta for the southern stations, and Omaha for the West?—Charles K. Weikner, The Loop, Chicago, Ill.

Contrasting the working of one set against another is a rather difficult job. However, a reflex, if properly operated, should be able to get everything that a three-tube regenerative set gets, with a lot added. The operation of these sets should be thoroughly understood before you try to get distant stations with them. The first requisite of operating any set is to know the set itself; then when you thoroughly understand all its little kinks, you can easily tune in stations.

I have constructed the neutrodyne receiver (4 tubes) according to plans, but fail to neutralize them. Have you any means of instructing me in the details of this adjustment?—Joseph Jarvine, 2321 Wood, Texarkana, Texas.

Before starting to neutralize these receivers it is necessary to obtain an inductance of approximately 70 turns on a 3" tube. This is put in series with a key battery and buzzer, and shunted by a 13-plate condenser. A wire is attached to one end of the inductance and placed on the antenna post of the set. The ground post is placed on the ground connection. Put the tubes in their sockets, phones in the jack, and start the buzzer. Turn the condenser shunting the inductance in the buzzer circuit about 1/5 in (20 to 25 degrees). Rotate all three dials on the receiver until the buzzer signals are loudest. If the receiver is correctly wired, all dials should have approximately the same settings (within a few degrees of one another). Remove the first tube from its socket. The signals will in all probability fade out. Turn the three dials until the signals are again at their maximum. When this is done, place the first tube back in its socket, placing a piece of paper or other insulating material over one of the pins of the filament, so that it will fit and make contact with all pins but will not light. Then, when it is in the socket, move the first neutralizing condenser until the buzzer signals disappear. To make sure that you have the right adjustment, remove the tube again. The signals will then come in with the usual intensity, but upon placing the tube in the socket with the paper still in place they will again disappear. Do this with the second tube in the same manner, of course removing the paper from the first tube and lighting it to normal brilliancy. When both tubes have been through this process, tuning the receiver in on regular signals should be done without hearing the usual carrier wave of the station. In other words, the signals should come in with the clearness of a crystal receiver yet with the intensity of a radio-frequency amplifier. Suggest that you send to F. A. D. Andrea, or Freed-Eiseman Radio Co. for handbooks on the neutrodyne receiver.

I have built the receiver described in RADIO WORLD for August 11 and September 22, but do not seem to get the results that I should. I am using UV199 tubes, the same coils as specified, and my antenna is good and works on any set I have constructed. What is the trouble?—John Frigar, 3rd, 133 South Twelfth Street, Philadelphia, Pa.

The set you mention while easy to handle when the trick is found, will give poor results until you find out how to get all your circuits in perfect resonance. Until this is done, the receiver will probably not give as good results as a regular regenerative receiver, as there is just one correct setting for all circuits on certain wave lengths. Learn to tune it correctly. The B battery voltage in this receiver should be variable for the best results.

I have seen several answers in radio journals and elsewhere that combining radio-frequency and regeneration is impossible. If this is so, why are so many circuit diagrams published containing both radio-frequency and regeneration? Are C301A tubes good amplifiers?—James Katzean, 1334 N Street, Fresno, California.

Ideal radio-frequency amplification is, of course, only possible where there are no oscillations. However, unless several tubes are used there is

no point in "neutralizing" the radio-frequency circuits. Where a single stage of radio-frequency is used, the results with a non-regenerative detector are far from satisfactory from the viewpoint of ultimate results, so therefore regeneration is used. It can be done, and if care is taken in the tuning and construction of the set, good results will be achieved. The receiver will be inclined to be noisy, but for that matter so is any receiver that employs regeneration. The tubes you mention are good amplifiers for both radio and audio-frequency.

I wish to build a five or six tube receiver that will give distance, selectivity and volume. What circuits do you advise me to build?—S. N. Murphy, 132 Hemeway Street, Boston, Mass.

Any circuit that combines radio-frequency ahead of either a non-regenerative or regenerative detector, and at least two stages of audio-frequency will accomplish what you desire. Also, reflex circuits allow good reception over distances with fewer tubes.

Can I use a VT-2 tube in my two-stage amplifier, using a UV201 as the first stage? Can these tubes be run on a six volt storage battery? What is their operating current and voltage?—L. L. Hamilton, Topsham, Me.

You can use the tube you mention with very good results. They are excellent audio-frequency amplifiers. They can be run on a six volt storage battery. Their operating voltage is five volts, and their operating current is around .98. They operate best on 120 volts plate voltage.

I have written the manufacturers of the Grimes inverse duplex receiver for details as to the construction of this receiver (panel layout, instrument layout and list of apparatus) but they reply that they do not have such material for general distribution. Can you tell me where I can obtain it?—Glenn G. Patterson, Ellsworth, Kansas.

If the manufacturers of the receiver cannot supply you with such data, it is impossible to say where you can obtain them. We do not keep or furnish blue prints.

What resistance rheostat should be used with WD12 or UV199 tubes? If I use three tubes, should I use three 1 1/2 volt dry cells connected in series? Which is the grid, plate and filament terminals of the tube sockets? Is the .0005 variable condenser the only control in the Grimes inverse duplex?—W. Jennings, Burrowswood, Cold Spring Harbor, Long Island, N. Y.

A six ohm rheostat is correct for the WD12, but a 30 ohm rheostat must be used for the UV199. Connect them in series for the UV199 but in parallel for the WD12. The UV199 tubes do not operate on 1 1/2 volts. The terminals are always plainly marked on the sockets. Yes, outside of turning the loop.

Is it possible to use UV199 and WD11 tubes in the same circuit without rebuilding the entire set? The set uses two stages of radio-frequency, and I do not get success with the WD11 tubes so have decided to use the UV199. Can this be done?—Clarence Cox, East Pittsburgh, Pa.

While this is possible we do not understand your purpose in doing it. Such a procedure will necessitate your rewiring your filament leads, as the tubes mentioned use different voltages. The UV199 is a good detector and audio-frequency amplifier when properly installed. Better results will be had by using them throughout. Otherwise you will have to wire your UV199 circuits for the higher voltage, and the WD11 for the lower voltage, and replace all the six ohm rheostats with 30 ohm rheostats.

Will a steel pipe erected to hold one end of the antenna above the roof, detract from the signal strength of distant stations? I intend putting one up but do not want to have any trouble later in this respect.—Henry L. B. Collins, 22 Elm Place, Boston, Mass.

If your antenna is properly insulated, the steel pipe will have no effect on it.

Which will give me the best results, a single-tube reflex with crystal, a single stage of radio-frequency with crystal detector and one stage of audio, or a regenerative receiver with two stages of audio-frequency?—A Constant Reader.

For distance we recommend a well constructed regenerative receiver with two stages of audio-frequency. For local work on a loop or small indoor antenna, the single tube reflex with crystal detector. For quiet medium distance reception, the single stage of radio-frequency with crystal detector and one stage of audio.

I am using a home-made single circuit receiver and have had the following experience: Tuning in on WOC can be done at both 90° on the condenser dial and 46°, with different dial readings. How do you account for this?—Kenneth H. Jones, London Mills, Ill.

You are balancing your condenser against your inductance, and by increasing the inductance and decreasing the capacity you can accomplish the same thing. If you can get the station at different condenser readings without changing your inductance values at all, you have some inductive coupling between your circuits that is changing with a different value of capacity in the antenna circuit. See that all your circuits are well insulated and separated.

RADIO WORLD

TELEPHONES:
LACKAWANNA 6976 and LACKAWANNA 2063
PUBLISHED EVERY WEDNESDAY (Dated
SATURDAY OF SAME WEEK)
FROM PUBLICATION OFFICE,
1493 BROADWAY, NEW YORK, N. Y.
BY HENNESSY RADIO PUBLICATIONS
CORPORATION

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M. B. HENNESSY, Vice-President
FRED S. CLARK, Secretary and Manager
1493 BROADWAY, NEW YORK, N. Y.

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European Representatives: The International News
Co., Breems Bldgs., Chancery Lane, London, ENG.
Paris, France: Brentano's, 37 Avenue de l'Opera.

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SUBSCRIPTION RATES

Fifteen cents a copy. \$6.00 a year. \$3.00 for
six months. \$1.50 for three months.
Add \$1.00 a year extra for foreign postage.
Canada 50 cents.

Receipt by new subscribers of the first copy of
RADIO WORLD mailed to them after sending in
their order, is automatic acknowledgment of their
subscription order. Changes of address should
be received at this office two weeks before date
of publication.

ADVERTISING RATES

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

CLASSIFIED ADVERTISEMENTS

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

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

IMPORTANT NOTICE

While every possible care is taken to state
correctly matters of fact and opinion in technical
and general writings covering the radio field, and
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DECEMBER 22, 1923

Congress Must Enact Radio Legislation

THE enactment of adequate and
stringent radio legislation by
the present Congress is an ab-
solute and immediate necessity if
the rapid forward march of radio
development and broadcasting ad-
vancement are to progress in an
orderly and efficient manner.

It not only is highly inefficient but
stultifying to expect Secretary
Hoover, of the Department of Com-
merce, to regulate and control this
great new radio industry with no
better authority than legislation
passed in 1912, when not a single
broadcasting station existed and
radio was practically unknown to
the public. That he has admin-
istered the radio division of his
governmental department as well as
he has is not only a tribute to Sec-
retary Hoover's innate ability but
it also is a tribute to his under-
manned and overworked staff of
faithful employees.

President Coolidge evidently has

been impressed with the necessity
for new and competent radio legis-
lation for, in his message to Con-
gress on December 6, he said:
"Revision is needed of the laws reg-
ulating radio interference."

In his annual report, just com-
pleted, Secretary Hoover says: "The
rapid growth of radio communica-
tion makes necessary an affirmative
declaration by Congress of a gov-
ernmental policy in accordance with
which the art is to be conducted,
and the empowering of some agency
to carry that policy into effect. This
can only be done through an officer
with discretionary powers and un-
der the regulations which will be
made by him in conformity with the
general terms of the law."

Naturally the chief interest of the
radio public in the matter is to
have some means provided to elim-
inate interference with broadcast
programs or to at least minimize
this unnecessary evil. The way to
accomplish this is to enact care-
fully considered legislation, to place
the enforcement of properly drawn
regulations in the hands of Sec-
retary Hoover who is eminently qual-
ified by experience and inclination
to handle this important task, and
to make available sufficient funds
to provide a personnel large enough
to produce results.

Representative Wallace H. White,
Jr., of Maine, the author of the
White Bill which failed of passage
in the Senate last year after passing
the House, informs RADIO WORLD
that he is engaged in drafting a
new bill which he hopes to be able
to introduce before the end of this
month. He is working in harmony
with the Department of Commerce
and has had contact with many peo-
ple in the radio field. It is to be
inferred that whatever bill Repre-
sentative White introduces will have
not only the support of Secretary
Hoover, but the moral backing, at
least, of President Coolidge.

The radio public in all parts of the
United States can help themselves,
their fellow listeners-in, the radio
industry and the Department of
Commerce if they will at once write
to their Senators and Representa-
tives urging them to vote for the
new White Bill when it is intro-
duced. The weight of public opin-
ion, properly expressed in the right
quarters, will do wonders in secur-
ing the passage of meritorious
legislation.

Every reader of RADIO WORLD,
therefore, is urged to write at once
to his Senator and Representatives
about this important matter and, if
possible, secure pledges from them
that they will help to enact the very
necessary legislation which will be
covered in the new White Bill.

We Radio The Season's Greetings

RADIO WORLD wishes
a Merry Christmas and
a Happy and Prosperous
New Year to the many
thousands of its unseen au-
dience in all parts of the
world.

Our subscribers, readers,
advertisers, correspondents,
contributors and staff have
our best thoughts for health,
wealth and happiness.

The year just closing has
been a good and progressive
one in the radio industry and
RADIO WORLD has shared
in the general prosperity.

The year about to begin
promises to be even better
than 1923. There are no
clouds in the business
heavens. Technical ad-
vancement in the radio art
is encouraging, and stability
in the industry is marked-
ly on the increase. More
people every day are form-
ing the habit of reading
RADIO WORLD.

We are thankful for the
past, sure of the present and
hopeful for the future. We
radio these sentiments to
our friends.

The President and Radio

THE wonderfully successful
radio broadcasting of Presi-
dent Coolidge's message to
Congress and his tribute to the late
President Harding opens up a new
vista of possibilities which may
have a far-reaching influence on the
economic and social life of our
people and the whole world. It
gives to one man a means of per-
sonal appeal of such magnitude and
influence as to involve new and
serious responsibilities. With the
attuned co-operation of even a few
of the many broadcasting stations
an audience of millions awaits the
spoken word, and thereby instantly
is swerved from previous concep-
tions or is attracted to a proposition
by the intimate pleading of the
human voice.

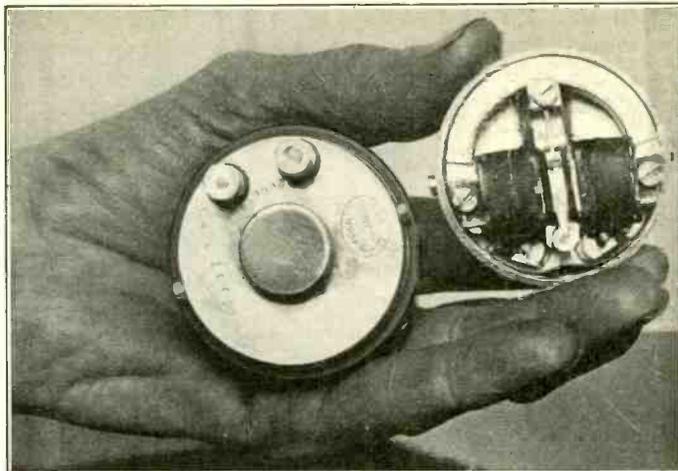
In commenting upon this epoch-
marking occurrence an editorial
writer in the New York "Times"
happily expresses himself by saying
that "the voice of the people will
probably be responsive as never be-
fore to the voice to the people, for
that voice has literally as never be-
fore the ear of the people."

Camera Men Picture Radio News Items



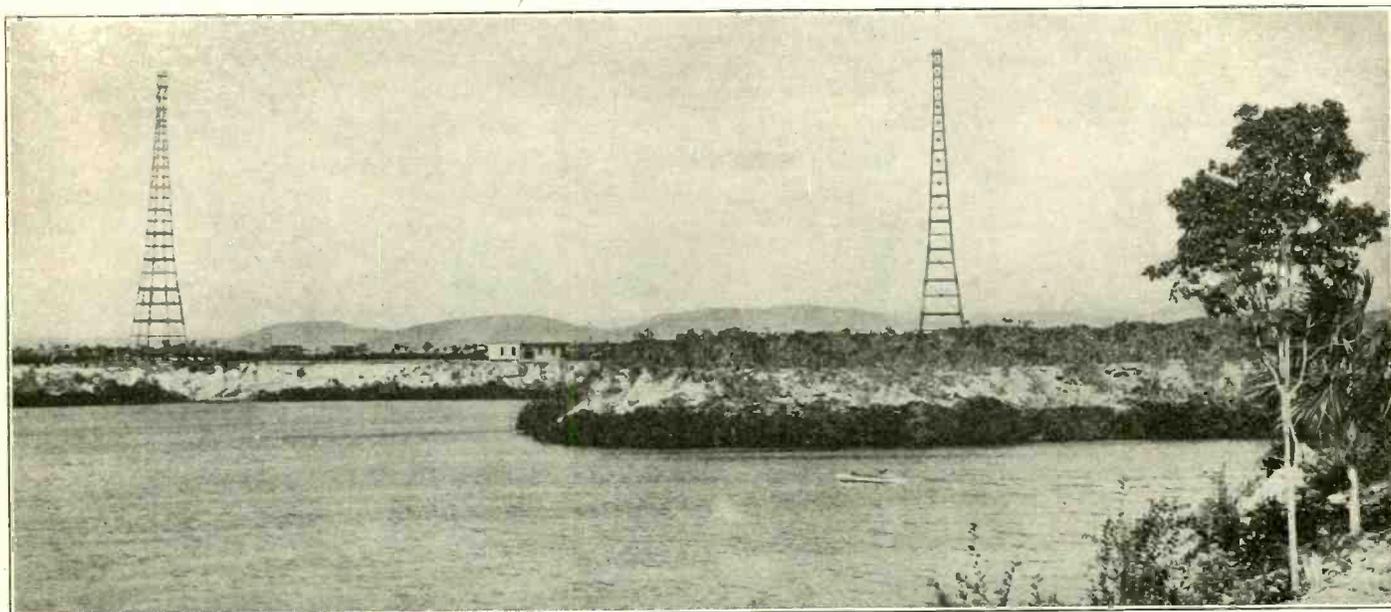
(C. Kadel and Herbert)

Captain J. J. Brangan giving instruction to New York police reserves on the care and operation of a modern short and long wave regenerative receiver. This is part of the plan to equip all the police stations with radio equipment so that orders may be given direct from headquarters, by aid of radio, to all the stations. There are 100 police reserves enlisted in the class at present.



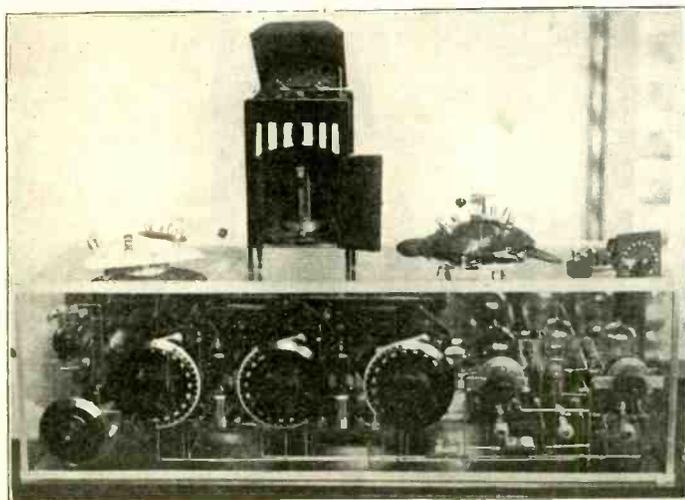
(C. Kadel and Herbert)

A phone which is popular in England, and has been found to make a good loud talking unit over here—the Brown telephone unit, one of the first phones to make use of adjustable field pieces, showing the "works" as well as the screw which makes the fine adjustments possible. The unit stands quite heavy plate currents without undue distortion and rattling.



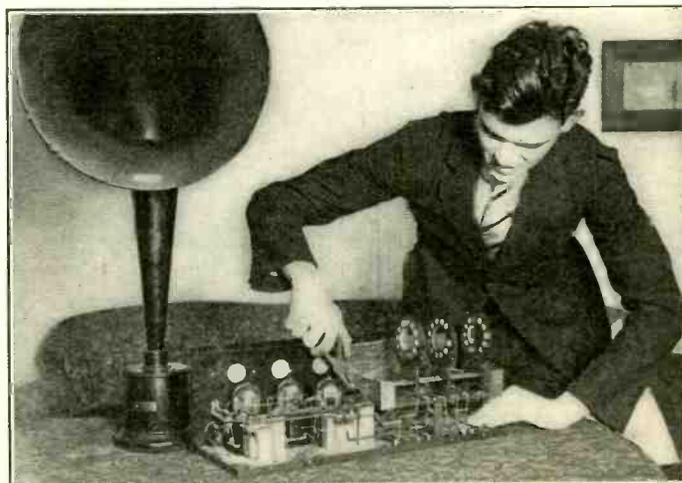
(C. International Newsreel)

Uncle Sam's radio station on the island of Guam. This island is considered one of the most picturesque places in the world, being a large coral patch surrounded by uncountable coral reefs. The station, which is one of the most powerful operated by Uncle Sam, is one of the "key stations" of the Pacific Fleet. Through this station is transmitted official business with the U. S. fleets throughout the world.



(C. International Newsreel)

Five of the exhibits at the Boston Radio Show. The first is a five-tube neutrodyne receiver entirely enclosed in glass. On top and at the extreme left is a radio set built around an ordinary clam shell. The next is a crystal set enclosed in a miniature victrola cabinet, the tuning coil and slider showing through the open doors. Next is a crystal set mounted on a stuffed turtle. Then there is a small crystal set made from odds and ends.



(C. Foto Topics)

M. Michaels, of New York City, and the "DX Devil" that he has just finished. It is a three-tube circuit, using detector and two stages of audio-frequency, with "Curkoid" inductances. Instead of using them as straight primary, secondary and tickler, he uses the outside as the primary, then connects it variometerwise to the secondary, and leaves the tickler pretty loosely coupled. It is claimed that by so doing, WOC, WOAM and several others can be brought in through local interference.

Here Are Good Broadcast Programs

Station KYW, Chicago, Ill.

536 Meters (560 Kilocycles). Central Standard Time. December 21.—9:30 A. M.—Late news and comment of markets. (Broadcast every half hour during the twenty-four.) 11:35 A. M.—Table talk by Mrs. A. J. Peterson of Peoples Gas Company. 12:30 P. M.—"The Progress of the World" by Review of Reviews. 6:50 P. M.—Children's bedtime story. 10:00-12:30 A. M.—Late show—Artists and program will be announced. KYW, "The World Crier Station," will broadcast the latest news of the world every half hour, day and night.

December 22.—9:30 A. M.—Late news and comment of markets. (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 of Peoples Gas Company. 6:50 P. M.—Children's bedtime story. 8:00-8:58 P. M.—Musical program: This evening is being held for opera. 8:58 P. M.—Naval Observatory time signals. 9:05-9:25 P. M.—"Under the Evening Lamp" service furnished by Youth's Companion, including stories, articles and humorous sketches.

December 23.—11:00 A. M.—Central Church Service broadcast from Orchestra Hall, Chicago. D. F. F. Shannon, pastor. Musical program under the direction of Daniel Protheros. 6:30 P. M.—Excerpts from The New Testament—An American translation by Prof. E. J. Goodspeed, read by William Ziegler Nourse. 7:00 P. M.—Chicago Sunday Evening Club service broadcast from Orchestra Hall, Chicago. Musical program under the direction of Edgar Nelson. Speaker will be announced.

Station WGI, Medford, Mass.

360 Meters (830 Kilocycles). Eastern Standard Time. December 21.—12:00 Noon—Program of phonograph selections. 12:40 P. M.—New England weather forecast furnished by the U. S. Weather Bureau. 12:45 P. M.—Closing report on farmers' produce market report. 3:00 P. M.—Amrad Women's Club program. 5:30 P. M.—Closing stock market reports; Government reports; live stock markets reports. 6:15 P. M.—Code practice, lesson No. 194. 6:40 P. M.—Boston police reports. 7:30 P. M.—Evening program: Verses by Mr. Charles L. H. Wagner, radio poet; concert by Miss Flora MacDonald, operatic prima donna and soprano; church soloist; Red Cross health talk by Henry Copley Green of the Metropolitan Chapter of the American Red Cross entitled "Winter Holidays"; radio debate.

December 22.—6:45 P. M.—Code practice, lesson No. 195. 7:05 P. M.—New England weather forecast; New England crop notes. 7:30 P. M.—Evening program: Thirty-eighth of a series of talks on New England business problems by Arthur R. Curnick, of the New England Business Magazine; Arthur Murray's course in dancing; concert by WGI Mandolin Club.

December 23.—4:00 P. M.—Twilight program: "Adventure Hour," conducted by the Youth's Companion; music by the Treble Clef Club. 8:30 P. M.—Evening program: Talk on "World Unity"; concert by the First Unitarian Parish Choir, Woburn, Mass., Harold L. Child, director.

Station WLW, Cincinnati, Ohio

309 Meters (970 Kilocycles). Central Standard Time. December 20.—10:30 A. M.—Weather forecast and business reports. 1:30 P. M.—Market reports. 4:00 P. M.—Piano selections by Adelaide Apfel. Speaker from the Cincinnati League of Women Voters. Mrs. Robert Taft. Subject: "Why I Am a Member of the League of Women Voters and a Republican." 10:00 P. M.—Special Christmas program. Dickens' Christmas Carol, read by Professor Van Wye of the University of Cincinnati, and Christmas Carols from the class of Thomas Kelly of the Cincinnati Conservatory of Music. Other features to be announced.

December 21.—10:30 A. M.—Weather forecast and business reports. 1:30 P. M.—Market reports. 3:00 P. M.—Business reports. 4:00 P. M.—Lecture recital by Mildred Templeton Williams.

December 22.—10:30 A. M.—Weather forecast and business reports. 1:30 P. M.—Stock Exchange and business reports.

Station WFAA, Dallas, Texas

276 Meters (630 Kilocycles). Central Standard Time. December 21.—12:30-1:00 P. M.—Address by Dr. Robert Stewart Hyer, Southern Methodist University, on "The Universal Reign of Christ." 8:30-9:30 P. M.—A. Harris & Co. Orchestra, Prof. A. Cruze, director.

December 22.—12:30-1:00 P. M.—Address, W. M. Reilly, editor of the Craftsman, on "Why Labor Must Organize." 9:30-10:30 P. M.—Music of the orchestra. Don Albert conducting, and of the organ, Emil Velazco playing, broadcast from the Palace Theatre. 11:00-12:00 P. M.—Recital by the Reuben Davies Club of pianists.

December 23.—6:00-7:00 P. M.—Radio Bible Class, Dr. William M. Anderson, Jr., pastor First Presbyterian Church, teacher; half hour of Bible study and half hour of Gospel song. 9:30-10:00 P. M.—Choristers from Christ Church, Episcopal, Oak Cliff, Mrs. J. W. Ohl, director. 10:00-11:00 P. M.—Jessie McKee's Orchestra.

Station WJZ, New York City

455 Meters (660 Kilocycles). Eastern Standard Time. December 21.—3:00 P. M.—Organ recital by Leo Riggs on the Hotel Astor organ, by direct wire from the Hotel Astor. 5:00 P. M.—"The Larger Aspect of World Affairs," by Frederick Dixon of the International Interpreter. 5:30 P. M.—Closing quotations of the New York State Department of Farms and Markets; farm and home reports; closing quotations of the New York Stock Exchange; "The Condition of Leading Businesses," by "The Magazine of Wall Street"; "Evening Post" news; foreign exchange quotations. 7:00 P. M.—"Jack Rabbit Stories," by David Cory. 7:30 P. M.—Burr McIntosh, the Cheerful Philosopher. 7:45 P. M.—Looseleaf current topics. 8:00 P. M.—Christmas Carols by the Plandome Singers. 9:00-11:30 P. M.—"Annual Forefathers Day" dinner of the New England Society of Orange; speeches by George Wickersham, President John Hibben of Princeton University; Joseph Frelinghausen, the Honorable James Victor Barry, Commander Bainbridge, and Governor Silzer of New Jersey.

December 22.—3:00 P. M.—Recital by Wanda Norman, pianist. 4:00 P. M.—Tea music, Hotel Belmont Stringed Ensemble, Harry Lerner, leader, by direct wire from Balcony Tea Room, Hotel Belmont. 5:00 P. M.—Recital by Edna Marie Scheller. 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 reports; "Evening Post" news. 7:00 P. M.—"Santa Claus Stories," by Burr McIntosh. 7:30 P. M.—Piano recital by Samuel Aronson. 7:45 P. M.—"Feeding Broadcast Receivers" one of the "High Lights of Modern Radio Broadcasting" series of talks by Dr. Alfred N. Goldsmith, Director of Research, Radio Corporation of America. 8:00 P. M.—Piano recital by Samuel Aronson. 8:15-11:00 P. M.—Grand Charity Concert of the Liederkranz Society.

Station WOR, Newark, N. J.

405 Meters (740 Kilocycles). Eastern Standard Time. December 21.—2:30 P. M.—Jean Lambert, contralto. 2:45 P. M.—Elizabeth Steele, six-year-old piano prodigy. 3:00 P. M.—Contralto solos, by Jean Lambert. 3:15 P. M.—"Health Hints," Dr. Harriet Van Buren Peckham. 3:30-4:00 P. M.—Eldorado Jones, woman inventor, in a talk on "What Barnum Taught Me." 6:15 P. M.—"Icele," Santa Claus' assistant at his toy factory will speak to the children. 6:20 P. M.—Piano selections, by Irving Rudeman. 6:30-7:00 P. M.—"Man in the Moon Stories" for the children.

December 22.—2:30 P. M.—Violin solos, by Francis Goldenthal. 2:45 P. M.—Bradford Dixon, Shakespearean actor, on "Stage Folk I Have Met." 3:00 P. M.—Ethel Bryan, contralto, accompanied by Mme. Amy Ray Sowards. 3:15 P. M.—Violin solos, by Francis Goldenthal. 3:30 P. M.—Contralto selections, by Ethel Bryan. 3:45 P. M.—Dr. Joseph F. Craigen, psychologist, in his semi-weekly talks on practical psychology. 6:15 P. M.—"Icele," Santa Claus' assistant at his toy factory will speak to his children. 6:20-7:15 P. M.—"Music While You Dine," by the Green Brothers' Orchestra. 7:15 P. M.—Fred J. Bendel, sporting editor of the Newark Morning Ledger, in his weekly talk on "Sporting News Up-to-the-Minute." 8:00-9:00 P. M.—Halsey Miller and his Newark Athletic Club Orchestra. 9:00-9:30 P. M.—Dr. Robert McElroy, of Princeton University. 9:30-10:00 P. M.—Vocal selections, by James Phillips, basso. 10:00-11:00 P. M.—Jimmie Shearer.

Station KFAE, Pullman, Wash.

330 Meters (910 Kilocycles). Pacific Time. December 24.—7:30 P. M.—Prof. H. D. Nasmyth, baritone solos. "Controlling Diseases in Home Orchards," Geo. L. Zundel. Christmas reading by members of the dramatic department. Piano solos, Mrs. E. Louise Nasmyth. Christmas Carols, Pullman Women's Choral Club.

December 26.—7:30 P. M.—Piano solos, Miss Jean Fulmer. "Shooting as a Sport," Capt. D. M. Bartow. "The Care of Clothing," Miss E. Belle Alger. "Securing a Position," Dr. D. W. Hamilton. Violin solos, Raymond Howell.

December 28.—7:30 P. M.—Marimbaphone duets. "Pruning the Orchard," M. W. Armstrong. Piano solos, Miss Florence Carpenter. Books for the New Year, Miss Alice Lindsey Webb. Soprano solos, Marial Holloway, LaCrosse, Kan.

December 31.—7:30 P. M.—Sinfonia Stringed Trio. "The Extension Program for 1924," R. M. Turner. Piano solos, Ivar Melander. Songs.

January 2.—7:30 P. M.—Contralto solos, Mrs. LaVerne Askin Kimbrough. "Steps to Success," Dr. D. W. Hamilton. Educational talk on Architecture. Prof. Stanley A. Smith. Piano solos, Mrs. C. M. Brewster.

January 4.—7:30 P. M.—"Mining Investments," Dean L. O. Howard. Songs, Pullman High School Girls' Sextette. "Taxation," Dr. H. W. Cordell. "Resolved: To Read more in 1924," Miss Alice L. Webb. Soprano solos, Miss Doris Payne.

January 7.—7:30 P. M.—Soprano solos, Mrs. Glade Burnette, Portland, Oregon. "Something for Nothing," Dr. C. C. Todd. Piano solos, Miss Beryl Squires.

Station KDKA, East Pittsburgh, Pa.

326 Meters (920 Kilocycles). Eastern Standard Time. December 21.—9:45 A. M.—Union live stock market report. 11:55 A. M.—Arlington time signals. Weather forecast. 12:00 Noon—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.—Santa Claus' visit to the children. 8:00 P. M.—National Stockman and Farmer market reports. 8:15 P. M.—"The Universal Reign of Christ"—the Sunday school lesson for December 23, to be presented by Dr. R. L. Lanning. 8:30 P. M.—Concert by Fred E. Weber, baritone; George C. Muth, violin and assisting artists. 9:55 P. M.—Arlington time signals; weather forecast.

December 22.—9:45 A. M.—Union live stock market report. 11:55 A. M.—Arlington time signals. Weather forecast. 12:00 Noon—United States Bureau of Market Reports. 1:30 P. M.—Concert by Dougherty's Orchestra from McCreery's dining room. 3:00 P. M.—Special Christmas program for the children. 6:15 P. M.—Dinner concert by the Westinghouse Band, T. J. Vastine, director. 7:30 P. M.—"Bringing the World to America," prepared by "Our World." 7:45 P. M.—"The Worker in Sandal Wood"—the children's period. 8:00 P. M.—Address. 8:30 P. M.—Concert by the Westinghouse Band, T. J. Vastine, director. 9:55 P. M.—Arlington time signals. Weather forecast.

Station WRC, Washington, D. C.

469 Meters (640 Kilocycles). Eastern Standard Time. December 20.—3:00 P. M.—Fashion developments of the moment, by Agnes M. Callen. 3:10 P. M.—Song recital by Wanda Lyon. 3:25 P. M.—The Magazine of Wall Street. 3:35 P. M.—Piano recital by Ella Garrison. 3:50 P. M.—Current events by the Review of Reviews. 4:00 P. M.—Violin solos by Jose de la Huerta. 5:15 P. M.—Instruction in code practice. 6:00 P. M.—Children's hour, by Peggy Albion.

December 21.—5:15 P. M.—Instruction in code practice. 6:00 P. M.—Children's hour, by Peggy Albion. Marine Corps Night—8:00 P. M.—A talk on the Coast Guard by Oliver M. Maxon, Chief of the Division of Operations of the United States Coast Guard. 8:15 P. M.—Song recital by Edgar Perkins. 8:30 P. M.—Piano recital by Helen Corbin Heintz. 8:45 P. M.—Song recital by Hazel Arth. 9:00 A. talk on the Marine Corps by Major General John A. Lejeune, Commandant of the United States Marine Corps. 9:15 P. M.—Concert by the United States Marine Corps.

December 22.—5:15 P. M.—Instruction in code practice. 6:00 P. M.—Children's hour, by Peggy Albion. 8:00 P. M.—Concert by the Happy Walker Golden Pheasant Orchestra. 8:30 P. M.—Song recital by Harriet Murphy. 8:45 P. M.—Piano recital by Frances Lloyd. 9:00 P. M.—Song recital by Alice Goodwin. 9:30 P. M.—Violin recital by Anton Kasper. 9:45 P. M.—Song recital by John Shattuck. 10:00 P. M.—Concert by the Harmonious Quartet.

Station WIP, Philadelphia

509 Meters (590 Kilocycles). Eastern Standard Time. December 21.—1:30 P. M.—Official weather forecast. 3:00 P. M.—Recital by the Beethoven string quartette. 6:00 P. M.—Official weather forecast. 6:05 P. M.—Dinner music by George Thomas and his Little Club Cafe Orchestra. 7:00 P. M.—Uncle Wip's bedtime stories and roll call for the children.

December 22.—1:00 P. M.—Organ recital by Karl Bonawitz on the Germantown Theatre organ. 1:30 P. M.—Official weather forecast. 3:00 P. M.—Popular program by Chet West and his Orchestra. 6:00 P. M.—Official weather forecast. 6:05 P. M.—Dinner music by the Greenwich Village Follies Orchestra. 7:00 P. M.—Uncle Wip's bedtime stories and roll call for the children. 8:00 P. M.—"The Romance of Insulin," talk by Ivor Griffiths, assistant professor of pharmacy, Phila. College of Pharm. and Science. 1:15 P. M.—Recital of two violins, by John Richardson and Jules Sternberg; piano recital by Harry Tucker. 10:15 P. M.—Charlie Kerr and his Orchestra from the St. James Hotel.

Station WGY, Schenectady, N. Y.

380 Meters (790 Kilocycles). Eastern Standard Time. December 21.—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 address. "The Right Kind of Moving Pictures," Mrs. William Mead, Schenectady Woman's Club. 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 comedy-drama, "Grumpy," by WGY Players. 10:30 P. M.—Dramatic reading, "Enoch Arden," with music, by Clara Swanker, reader, and Irene Cooley, pianist.

December 22.—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 Jack Symond's orchestra, Hampton Hotel, Albany, N. Y.

Here Are More Good Broadcast Programs

Station WOC, Davenport, Iowa

464 Meters (620 Kilocycles). Central Standard Time. December 21.—10:00 A. M.—Opening market quotations. 10:55 A. M.—Time signals. 11:00 A. M.—Weather and river forecast. 11:05 A. M.—Market quotations. 12:00 Noon—Chimes concert. 2:00 P. M.—Closing stocks and markets. 3:30 P. M.—Educational program—(Musical numbers to be announced.) Lecture by C. A. Russell, "Discovery and Uses of the X-Ray." 5:45 P. M.—Chimes concert. 6:30 P. M.—Sandman's visit. 6:50 P. M.—Sport news and weather forecast. 8:00 P. M.—Musical program (1 hour)—Erwin Swindell, musical director. Choir of St. Paul of the Apostle Church, Davenport, Iowa.

December 22.—10:00 A. M.—Opening market quotations. 10:55 A. M.—Time signals. 11:00 A. M.—Weather and river forecast. 11:05 A. M.—Market quotations. 12:00 Noon—Chimes concert. 12:30 P. M.—Closing stocks and markets. 3:30 P. M.—Educational program—(Musical numbers to be announced.) Lecture by C. C. Hall, "The Products of Corn." 5:45 P. M.—Chimes concert. 6:30 P. M.—Sandman's visit. 6:50 P. M.—Sport news and weather forecast. 9:00 P. M.—Orchestra program (1 hour), P. S. C. Orchestra.

Station KHJ, Los Angeles, Calif.

395 Meters (760 Kilocycles). Pacific Time. December 20.—12:30-1:15 P. M.—News items; music. 2:30-3:30 P. M.—Matinee musicale. 6:45-7:30 P. M.—Children's program. 8:00-10:00 P. M.—Program presented by Lincoln High School Chorus. 10:00-12:00 P. M.—Art Hickman's Orchestra, Los Angeles Biltmore Hotel.

December 21.—12:30-1:15 P. M.—News items; music. 2:30-3:30 P. M.—Matinee musicale. 6:45-7:00 P. M.—Children's program. Virginia Knapp will tell a Christmas story. 7:00-7:30 P. M.—Organ recital from First Methodist Episcopal Church, Arthur Blakeley, organist. 8:00-10:00 P. M.—Program presenting Scandinavian Male Singing Society, and Sammy Kalenofsky and his Band Simfonica. 10:00-12:00 P. M.—Art Hickman's Orchestra, Los Angeles Biltmore Hotel.

December 22.—12:30-1:15 P. M.—Immanuel Male Quartet. 2:30-3:30 P. M.—Matinee musicale by the Immanuel Male quartet. 6:45-7:30 P. M.—Children's program presenting play "The Night Before Christmas." 8:00-10:00 P. M.—Immanuel Male Quartet. 10:00-12:00 P. M.—Art Hickman's Orchestra, Los Angeles Biltmore Hotel.

Station WBZ, Springfield, Mass.

337 Meters (890 Kilocycles). Eastern Standard Time. December 21.—11:55 A. M.—Arlington time signals; weather reports; Boston and Springfield market reports. 6:00 P. M.—Dinner concert by the WBZ Quintette. 7:00 P. M.—"\$200 Reward," a dramatized story prepared by the Youth's Companion. 7:30 P. M.—Bedtime story for the kiddies. Current book review by R. A. MacDonald. Farmers' period—Talk by a member of the Eastern States Farmers' Exchange. 9:55 P. M.—Arlington time signals. 11:00 P. M.—Program of Chamber Music by the WBZ Quintette.

December 22.—11:55 A. M.—Arlington time signals; weather reports; Boston and Springfield market reports. 7:00 P. M.—Dinner concert by the Hotel Kimball Trio direct from the Hotel Kimball dining room. 7:30 P. M.—Twilight tales for the kiddies. "Bringing the World to America," prepared by "Our World Magazine." 8:00 P. M.—Concert by Stanley Fletcher, pianist; Mme. Von Mitzlaff, kontralto. 9:00 P. M.—Bedtime story for grownups, by Orison S. Marden. 9:55 P. M.—Arlington time signals.

Station WDAR, Philadelphia

395 Meters (760 Kilocycles). Eastern Standard Time. December 20.—12:00 Noon—Organ recital from the Stanley Theatre; features from the studio; Arcadia Concert Orchestra. 2:00-3:00 P. M.—Arcadia Concert Orchestra. 4:30 P. M.—Program of dance music. 7:30 P. M.—Dream Daddy, with the boys and girls. 7:50 P. M.—Book review. 8:00 P. M.—Poet's and authors' corner; musical recital; W. R. Van Dyke, of the Interstate Collie Club, a talk on "The Thoroughbred Dogs," a basket ball talk; recital; radio play, "Edith's Burglar," by Walter Greenough and his players; recital. 10:10 P. M.—Howard Lanin's Dance Orchestra, from the Arcadia Cafe; Frank Craven and his co-stars, from his play at the Garrick Theatre—"The First Year." Genevieve Tobin and her co-stars, from the Walnut Street Theatre—"Polly Preferred."

Station WJY, New York City

405 Meters (740 Kilocycles). Eastern Standard Time. December 20.—7:30 P. M.—Musical program by the Brooklyn Mark Strand Theatre. 8:30 P. M.—11:30 P. M.—Yale Glee Club Concert by direct wire from Town Hall.

December 21.—7:30 P. M.—"Income Taxes," by Frank Shevit. 8:15 P. M.—Readings by Louis Joseph Vance. 8:30 P. M.—Concert of the Williams College Music Club direct from the Hotel Plaza. 10:00-11:00 P. M.—Popular program by Breau and Tobias.

A Popular Battery Demonstration

A DEMONSTRATION board which graphically illustrated the factors affecting "B" battery current drain attracted attention at the recent Philadelphia Radio Show. The same board was moved to Chicago for the show there, and later was sent to Boston for the Boston show. The board was part of the exhibit of the National Carbon Company, and was manipulated by F. T. Bowditch, physicist of the associated company, the Union Carbide and Carbon Research Laboratories, Inc.

Just how much interest was shown in this battery demonstration may be imagined from the fact that the radio fans took away with them 20,000 National Carbon Company booklets describing battery operation, during the time the Philadelphia show was on. And the fans literally took them as the photograph shows. Each demonstration closed with the announcement that the new booklet, "How to Get the Most Out of Your 'B' Battery," might be had for the asking. Fans at once surged forward toward the booth, seizing the booklets the instant they came

tention was called to these by a card which pointed out that a flashlight was a necessary and valuable accessory in every radio set, in order that all connections might be clearly illuminated at an instant's notice while making adjustments within the dark cabinet. The display case was so arranged that on withdrawing a flashlight battery from a storage drawer underneath, the battery came in automatic contact with a wire leading to a small bulb inside the case. The contact flashed a light from the bulb, illuminating the display and at the same time showing the customer that the battery was working properly.

In addition to Mr. Bowditch, the National Carbon Company was represented by G. C. Furness, manager of the radio department; A. M. Joralemon, sales manager, radio department; E. E. Horine, radio engineer; and E. Harold Boudwin, Philadelphia representative.

Interesting Facts About WGI and 2-LO

WHEN two-way communication by voice was established for the first time in the history of radio on the eve-



Crowd at the recent Philadelphia Radio Show besieging the National Carbon Company's booth for battery literature.

within arm's reach. One of these onslaughts is shown in the photograph, made during one evening at the show. The booklets rehearsed the information by Mr. Bowditch during his talk and demonstration.

The demonstration board stood at one side of the booth and was constructed with a huge ammeter running across the top. As Mr. Bowditch explained the effects on battery life of the number of tubes, "B" battery voltage, use of a "C" battery, etc., the needle of the ammeter swung backward and forward across the dial, clearly visible to the farthest corner of the crowd. The demonstrator was able to talk in a natural voice by means of a unit of the Western Electric Public Address System in front of the board.

Besides the demonstration board, the National Carbon booth contained two large display stands which carried all the different types of Eveready radio batteries, with large lettered cards explaining the use of each in different radio installations.

There was also a new flashlight display case, in which were all the various kinds of flashlights manufactured by the National Carbon Company. Radio fans' at-

ning of November 30, between station WGI, Medford Hillside, Mass., and station 2-LO, London, England, it was a remarkable coincidence that the first American station to participate successfully in this two-way communication was Amrad WGI, the world's oldest broadcasting station operating today, erected in 1915. It was a further significant coincidence that H. J. Power, founder and active head of the American Radio & Research Corporation, who conducted the early broadcasting in 1915 and 1916 and now known as the Father of Broadcasting, was at the microphone when the successful broadcast was made.

According to the schedule, two-way communication was not to be tried until December 1, but when 2-LO received the American station, November 30, the British amateurs could not refrain from calling back and were heard by many American listeners.

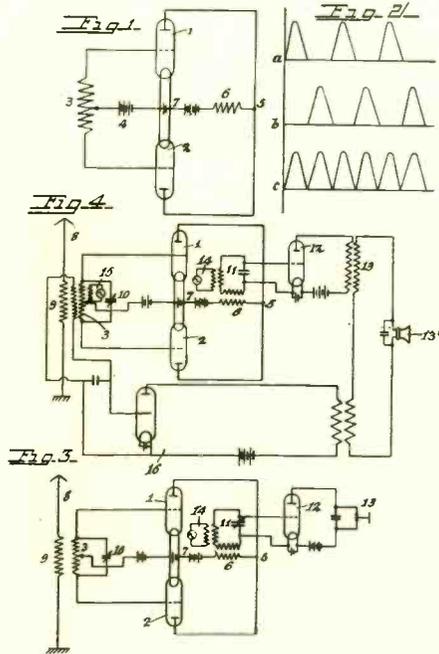
Again on December 1 two-way communication was maintained between WGI and 2-LO London, and complete confirmation followed after an exchange of cablegrams. The achievement was all the more remarkable as the American station used only 150 watts in the antenna.

Latest Radio Patents

Method of Receiving Electrical Oscillations

No. 1,474,726: Patented November 20, 1923.
Patentee: A. Meissner, Berlin, Germany.

The invention relates to a method of and arrangement for receiving electrical oscillations, by the use of which important advantages are obtained, especially in heterodyne reception of undamped oscillations. In accordance with an important feature of the invention, received energy, previous to the heterodyning, is passed through a device



Receiver for high wave undamped reception embodying the heterodyne principle, but which differs in several details.

which increases its frequency. The increase of frequency may be obtained by such a transformation of distortion respectively of the received energy as to give rise to a harmonic of the basic frequency of such energy. For this purpose, for instance, coils having iron cores may be used with or without saturation. Other suitable means for increasing the frequency of the received energy include vacuum tube rectifiers; thus from the plate circuit of a vacuum tube relay current of a frequency greater than that of the current supplied to the relay may be taken. The received energy may be supplied directly to the frequency increasing means at the received high frequency, or a

lower frequency derived from the received energy after any suitable transformation of such energy may be supplied to the frequency increasing means. It is essential, however, that in the receiving system as a whole the received energy is changed to a higher stage of frequency previous to a heterodyning.

The invention affords a particularly large degree of freedom from troubles, but its most important advantage is considered to be that it enables the number of senders operating simultaneously on a given scope of waves to be considerably increased. In the use of long distance stations, which generally use relatively long wave lengths, the number of senders which can be operated side by side is soon reached, since to every sender a certain scope of frequency is allotted which must also be available for receiving, in order that full use may be made of the transmitter energy. The scope of frequency of each sender must include 2,500 oscillations both above and below its operating frequency, and to prevent interference, other senders must remain outside of these limits. The consequence of these facts is that within a range of wave lengths from 20,000 to 50,000 oscillations, for example, only from 6 to 10 senders can be operated side by side with heterodyne reception, if signals are to be received in an unobjectionable manner. When, however, in accordance with the present invention, the frequency of the received energy is increased previous to heterodyning, the interference prevention range of 2,500 cycles is to be taken into account with regard to the increased frequency, i. e., if, for instance, frequency of the received energy is quadrupled. Four times as many senders, can be operated simultaneously side by side in the same scope of the received frequency without trouble in heterodyne reception.

The invention will be explained herein, by way of example, in connection with an arrangement in which the increase of frequency is effected by means of a vacuum tube rectifier.

Fig. 1 shows a frequency increasing device comprising two vacuum tubes; Fig. 2 shows curves explanatory of the action of the device shown in Fig. 1; Fig. 3 shows a receiving system in which the frequency of the received energy absorbed by the antenna is increased before it is transformed into useful energy; and Fig. 4 shows a modified form of receiving system enabling the elimination of disturbances by means of a compensating circuit.

consequence a change of charge in a neighboring aerial gives rise to greater variations of potential at the grid end of the winding than at the battery end thereof so that a difference of potential is created between the ends of the winding no matter what is the cause of the initial variation in charge.

According to this invention the winding is enclosed in a metal screen or sheath so arranged as not to form a completely closed circuit, and the sheath is connected to the battery which heats the filament. The effect of this arrangement is that no difference of potential as mentioned above will occur.

The invention is illustrated by the accompanying diagram. A is an aerial system including a variable condenser B and the primary C of a transformer of which the secondary D is connected to a condenser E and to the grid and filament of a valve F.

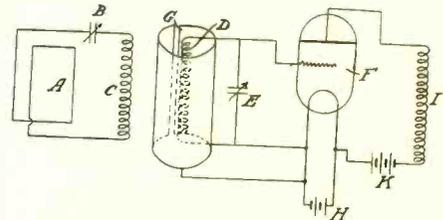
The winding D may be so arranged that its self-capacity is a minimum. Around this winding is placed a sheath G formed of a metal sheet bent so that its edges nearly but not quite meet and connected to the filament battery H.

The anode and filament of the valve F are connected as is usual to an inductance I and a battery K.

In direction finding work when using frame aerials the forced currents produced in the frame system acting as a plain vertical aerial through its capacity to earth are liable to give a potential difference between the grid and filament. This potential difference being independent of the direction of the frame distorts the normal frame again.

By the insertion between the frame and the coil attached to the receiver of the above screening sheet connected as shown to the filament battery this error is avoided.

In simple reception on a vertical aerial with a valve, the valve grid and battery



Invention relating to receivers especially adaptable to work where induction or other bothersome effects are liable to be noted.

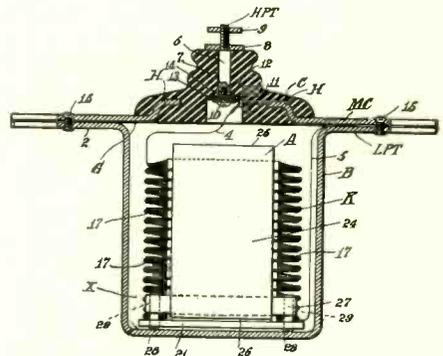
are commonly connected across the aerial tuning inductance. This arrangement simplifies tuning, but has the disadvantage of permitting very short forced waves to affect the grid, the inductance being much too great an impediment for them. The effect of these short waves is eliminated by employing a metal sheath as aforesaid connected to the valve battery and arranged in between the two windings of a tightly coupled transformer, of, say 1/1 ratio.

In both these arrangements the invention is of especial value in aeroplane work where magneto induction is a serious matter.

Electrical Condenser

No. 1,474,486: Patented November 20, 1923.
Patentee: B. MacPherson, Roxbury, Mass.

This invention relates to improvements in electrical condensers of the plate or sheet type, especially of the type wherein the condenser is divided into sections and the sections connected in series for high potential service and the invention consists of certain improvements in the condenser stack



Improved condenser of the sectional type designed for high tension work.

and the means for connecting the sections together.

Broadly the object of this invention is to provide an improved condenser adapted for high potential service.

In particular the object of the invention is to provide a connection or strip between the sections of the condenser which insures a better distribution of potential between adjacent sections, which prevents an accumulation of heat within the condenser and which allows ready inspection.

Apparatus for Wireless Telegraphy and Telephony

No. 1,474,382: Patented November 20, 1923.
Patentee: H. J. Round, London, England.

In apparatus comprising three electrode valves dependent for their working upon the mere change of potential of the grids troubles frequently arise owing to the effects of parasitic capacities.

In order to obtain maximum sensitiveness the maximum potential obtainable from the available energy is usually applied to the grid. This is done by connecting the grid to one end of a winding of minimum self-capacity, the other end of which is connected to the battery which heats the filament. The capacity of this battery is of course larger than that of the grid and in

These DX Records Will Make Some One Burn the Midnight Oil

DX Nite Owls, Attention!

THE DX season is now upon us.

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Send your records to the DX Editor of RADIO WORLD.

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

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

Here Are a Few From Our Friends

From Mr. and Mrs. J. E. Bradley, Justin, Tex.

I enclose a copy of my log for November 9, 1923:

WCAE, 6:00 p. m., orchestra opera selection, 1,125 mi., Pittsburgh, Pa.; KDKA, 6:10 p. m., organ, Cameo Theatre, 1,125 mi., Pittsburgh, Pa.; WDAF, 6:11 p. m., school of the air program—lady reading, 460 mi., Kansas City, Mo.; WLAG, 6:12 p. m., sport review—10:27 p. m., a reading, "Irish," 880 mi., Minneapolis, Minn.; WDAP, 6:14 p. m., markets, Drake Hotel program, 825 mi., Chicago, Ill.; WOAI, 6:29 p. m., weather report, 300 mi., San Antonio, Tex.; KYW, 6:30 p. m., financial report; WOC, 6:32 p. m., sandman bedtime story, 725 mi., Davenport, Ia.; WMAQ, 7:15 p. m., piano music, 9-year-old girl, 825 mi., Chicago, Ill.; WEAH, 7:25 p. m., news items, 325 mi., Wichita, Kans.; WOQ, 7:30 p. m., piano solo, 460 mi., Kansas City, Mo.; WSB, 8:00 p. m., announcement—8:45 p. m., Sundodgers orchestra music, "Maggie Yes Mam," 800 mi., Atlanta, Ga.; WLAL, 8:10 p. m., announcement football, etc., 300 mi., Tulsa, Okla.; WEAY, 8:15 p. m., announcement football, etc., 300 mi., Houston, Tex.; WAAW, 8:16 p. m., announcement football, etc., 600 mi., Omaha, Neb.; WHAS, 8:20 p. m., piano solo—later Donaldsons orchestra, 775 mi., Louisville, Ky.; WOS, 8:30 p. m., program from talent from Columbia, Mo., 500 mi., Jefferson City, Mo.; KSD, 8:31 p. m., Maplewood Baptist Church choir, 575 mi., St. Louis, Mo.; WWJ, 8:35 mi., Hawaiian orchestra, 1,065 mi., Detroit, Mich.; WMC, 8:37 p. m., news, 475 mi., Memphis, Tenn.; WGY, 8:41 p. m., solo, lady—later Corn Huskers orchestra in original barn dance music, 1,450 mi., Schenectady, N. Y.; WTAS, 9:10 p. m., announcement about "Forget Me Not" Day, 825 mi., Elgin, Ill.; KFKB, 9:15 p. m., dance music, waltz, Marquita, 320 mi., Milford, Kans.; WCB, 9:18 p. m., McElroy Saxophone Quintette, Richard F. Hyer, 850 mi., Zion, Ill.; KFBB, 9:40 p. m., announcement about D—soprano solo, 1,250 mi., Havre, Mont.; WKY, 9:45 p. m., waltz, "Marquita," 300 mi., Oklahoma City, Mo.; WPAD, 10:02 p. m., announcement, 825 mi., Chicago, Ill.; KFFQ, 10:03 p. m., contralto solo with orchestra, 560 mi., Colo. Springs, Colo.; KFCL, 10:07 p. m., market report—sign off, 1,175 mi., Los Angeles, Calif.; KFJF, 10:18 p. m., music and announcement, 300 mi., Oklahoma City, Okla.; WGR, 10:20 p. m., Hotel Statler orchestra, 1,250 mi., Buffalo, N. Y.; WJAZ, 10:25 p. m., soprano solo, Oriole orchestra, 825 mi., Chicago, Ill.; WOO, 10:35 p. m., orchestra from Adelphi Hotel, 1,325 mi., Philadelphia, Pa.; KHJ, 10:45 p. m., talk on schools, 1,175 mi., Los Angeles, Calif.; KFI, 11:00 p. m., program from the Examiner, 1,175 mi., Los Angeles, Calif.; KFJK, 12:10 a. m., phonograph music and announcement, 200 mi., Bristow, Okla.; CFAC, 12:30 a. m., dance music from Dancing Academy and sign off 11:58 mountain time, 1,525 mi., Calgary, Can.; KGW, 12:40 a. m., Hoot-Owls meeting, 1,575 mi., Portland, Ore.; CJCA, 12:50 a. m., solo lady, "Jerusalem," also Land of the Sky Blue Water, and announcements, 1,650 mi., Edmonton, Can.; WCAH, 1:15 a. m., phonograph—announcement, 950 mi., Columbus, O.; KPO, 1:20 a. m., a trio—in operatic music, 1,450 mi., San Francisco, Calif. Total mileage, 33,395.

November 22, 1923—WBAK, 5:00 p. m., market and police reports, Harrisburg, Pa.; WGY, 5:15 p. m., market reports, Schenectady, N. Y.; KOP, 5:30 p. m., piano solo—police reports, Detroit, Mich.; WCAE, 5:50 p. m., Wm. Penn Hotel orchestra, Pittsburgh, Pa.; WOR, 6:00 p. m., Tom Cooper's orchestra, "Rose of My Dreams," Newark, N. J.; WDAF, 6:03 p. m., announce; school of air program, Kansas City, Mo.; WEAY, 6:04 p. m., weather report, Houston, Texas; WDAP, 6:05 p. m., markets, Chicago, Ill.; KDKA, 6:06 p. m., Pittsburgh Athletic Club orchestra, Pittsburgh, Pa.; WDAW, 6:07 p. m., announcement concerning football; dinner orchestra, Omaha, Neb.; WOAJ, 6:15 p. m., news items, San Antonio, Texas; WIP, 6:25 p. m., sign off, Philadelphia, Pa.; WOC, 6:28 p. m., announcement; Sandman story, Davenport, Iowa; KYW, 6:35 p. m., financial review, Chicago, Ill.; KDZQ, 7:35 p. m.,

announcement and sign off, Denver, Colo.; WHAS, 7:45 p. m., announcement, Louisville, Ky.; WMAQ, lecture, Chicago, Ill.; WEA, 7:50 p. m., reading; piano solo, New York City; WSB, 8:58 p. m., announcement and sign off, Atlanta, Ga.; CFAC, 9:10 p. m., orchestra; reads letter from Santa Claus for children, Calgary, Can. WLAG, 9:15 p. m., announcement, Minneapolis, Minn.; WHB, 9:16 p. m., orchestra, Kansas City, Mo.; WEV, 9:18 p. m., piano solo, Houston, Texas; KLZ, 9:22 p. m., banjo solo, Denver, Colo.; WJAX, 9:24 p. m., Harold B. Smith University Orchestra, Cleveland, O.; WMC, 7:30 p. m., announce about hearing 2LO at London, E., Memphis, Tenn.; WSAI, 9:28 p. m., soprano solo; male chorus, Cincinnati, O.; WDAH, 9:41 p. m., Max and His 10 Troubadours, "I am Sittin' Pretty in a Pretty City," Minneapolis, Minn.; CYB, 9:46 p. m., baritone solo; announcement, "El Buen Tono," Mexico City; KSD, 10:03 p. m., sign off and weather by Miss Jones, St. Louis, Mo.; KYW, 10:05 p. m., opera, "Romeo and Juliet," Chicago, Ill.; WDAP, 10:10 p. m., Dr. Lee De Forest talks about the audion, Chicago, Ill.; WJAZ, 10:35 p. m., orchestra from Marine Dining Room, Chicago, Ill.; WLW, 10:37 p. m., American Negro Nite program, Cincinnati, O.; KHJ, 10:50 p. m., orchestra, Los Angeles, Calif.; WEA, 11:00 p. m., Gimbel Bros. orchestra program, New York City; WCAP, 11:10 p. m., "Indiana Moon," Meyer Doris Orchestra from Le Paradis Cafe, Washington, D. C.; WTC, 11:15 p. m., cornet solo; announcement, Manhattan, Ky.; 5LJ, 11:17 p. m., calling CQ, Jefferson, Texas; KFI, 11:27 p. m., announcement, Los Angeles, Calif.; KFKB, 11:40 p. m., comic song, laughing saxophone, Milford, Can.

Thirty-eight stations in all. This will keep somebody up nights, I guess. Hi-Hi.

Oh, You CW Boys—Here Is One Workin' WNP!

From D. C. Wallace (9ZT), 64 Penn Ave. No., Minneapolis, Minn.

Heard during November, all districts worked, three countries worked: (1ER), (1HX), 111, ISN, 1XM, 1VV, (1YB), 1YD, 1YK, 1ADA, 1AJA, 1AQI, 1BCG, 1BCK, 1BOO, (1CKP), (1CMP), 1CRW, 1CSU, (XAO), 2AH, 2BX, (2CK), 2IG, 2KF, 2KU, 2PA, (2RB), 2RK, 2SH, 2TS, 2WB, (2XQ), 2AFP, 2AGB, 2ANA, 2AWH, 2BMR, 2BRH, 2BRB, 2BRC, (2BTE), 2BXP, 2BXW, 2CFB, 2CJR, 2CKA, (2CQZ), 2CSL, (2CXD), (2CXL), 2XAO, 3AB, 3BW, 3HG, 3HS, 3JJ, 3ME, 3PZ, 3UR, 3VO, (3WF), 3XI, (3YP), 3ABN, (3ADB), 3AJD, 3ALN, 3AUM, 3AVP, 3CFV, 4CR, 4CS, 4DB, 3EB, (4FA), 4FG, 4KU, 4MB, 4QF, 5BW, (5CE), (5GA), 5GF, (5GI), (5GM), (5HY), SIN, 5JE, 5KC, (5KK), 5KP, 5LR, 5MI, (5MO), 5OL, 5QW, 5SK, (5TJ), (5UR), 5WE, 5WO, (5XV), (5ZA), 5ZG, 5ZM, 5AAW, (5ABG), 5ABH, (5ADH), 5AFQ, 5AGI, 5AGO, 5AHH, (5AHR), 5AIC, 5DAT, 5ZAS, 5ZAV, 6AK, 6AO, (6CU), 6FH, 6HP, (6KM), 6NX, (6PL), (6VE), 6ZH, 6ADP, (6AHP), 6AHU, 6AJD, 6AKZ, 6ALK, (6ALV), 6ANB, 6AOL, 6AOS, (6AVV), (6AWT), 6BBC, 6BBU, 6BBW, 6BCL, 6BFG, 6BHI, 6BIO, 6BJC, 6BJQ, (6BPZ), 6BRF, 6BUA, 6BUQ, 6BUR, (6BVG), 6CGP, (6CDG), 6CFZ, 6CGW, (6CKR), 6CNH, 6CWA, 6XAD, 6ZAH, (7HG), (7HW), (7IH), (7KS), 7LN, 7LR, (7OJ), 7RY, 7SC, (7SF), 7TO, 7WM, 7WP, (7WS), 7ZI, (7ABB), 7AEA, 7AEL, (7AFN), (7AGE), 7AGR. Canadian: 2BN, 2CG, (5CO), (5CN). Bowdoin: (WNP).

An Old Friend Comes in Once More

From S. A. Grogan, apartado num 6, Tampico, Tamps, Mexico.

I did a little DX work last Saturday night, November 17, and had very good luck, not so much for total mileage made during the time covered, but for the geographical extent of the area. WDAF, Kansas City, 1,180 miles, road report; WOAW, Omaha, 1,300 miles, orchestra; WFAA, Dallas, 750 miles, football scores; WBAP, Fort Worth, 740 miles, Sunday school lesson; PWX, Havana, 1,000 miles, song; WMC, Memphis, 1,000 miles, football scores; CYB, Mexico, D. F., 210 miles, piano solo; WOC, Davenport, 1,375 miles, announcing; KFI, Los Angeles, 1,480 miles, Sunny Land Six Orchestra; WJAZ, Chicago, 1,480 miles, piano solo; WSB, Atlanta, 1,150 miles, soprano solo; WGY, Schenectady, 2,000 miles, Romano's Rainbow Orchestra; KHJ, Los Angeles, 1,480 miles, announcing; KGW, Portland, Ore., 2,150 miles, orchestra; KPO, San Francisco, 1,800 miles, orchestra.

I have a home made three circuit set, two stages of radio frequency and two of audio, with regeneration. With that layout such stations as WMC, WBAP, PWX, WFAA and WJAZ come roaring in on the loud speaker.

With the exception of PWX, WMC, CYB and WOC all of the stations given above were heard on the detector with two steps of audio frequency and regeneration.

MAGNAVOX Radio Products



A1—\$27.50

MAGNAVOX Audio-frequency Power Amplifiers

THESE instruments offer the most ideal method for amplification of audio-frequency waves before they are reproduced into sound.

Wherever ordinary audio-frequency is replaced with Magnavox Power audio-frequency, stations previously out of range can be reproduced in excellent volume.

The new one-stage Magnavox Power Amplifier A1, illustrated above, is just what is needed in many cases to bring in the distant stations.

Magnavox Reproducers

R2 with 18-inch curvex horn \$60.00
R3 with 14-inch curvex horn \$35.00
M1 with 14-inch curvex horn. Requires no battery for the field . \$35.00

Magnavox Combination Sets

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

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

Magnavox Power Amplifiers

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

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

The Magnavox Company Oakland, California

New York Office: 370 Seventh Avenue
Canadian Distributors
Perkins Electric Co., Ltd., Montreal

Radio Merchandising

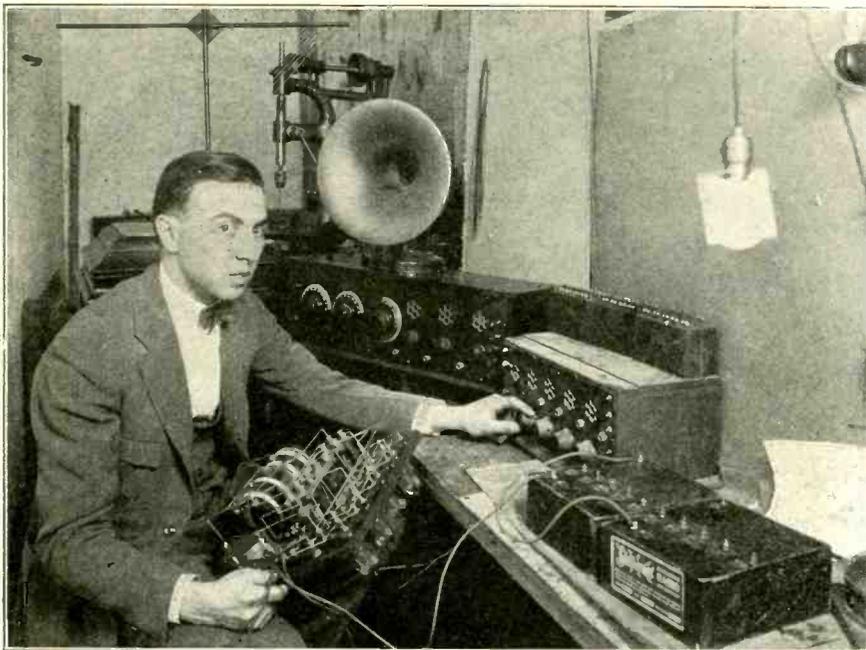
Advertising Rates: Display, \$5.00 an inch, \$150.00 a page. Classified Quick-Action Advertising, 5 cents a word. Phones: Lackawanna 6976 and 2063

New Radio and Electrical Firms

Mielke Eberhart Radio Stores, New York City, \$12,000; H. Mielke, C. Eberhart, H. G. Metz. (Attorney, H. H. Klein, 1349 Lexington Ave.)

Commutator Electric & Manufacturing Co., Schenectady, \$10,000; D. and A. H. and G. E. Thibaudeau. (Attorney, J. M. Frere, Wilmington, Del.)

Steinmetz Radio Service Corp., Brooklyn, \$10,000; B. and A. Maitin, E. S. Brothers. (Attorney, A. H. Simon, 189 Montague St., Brooklyn.)



Sidney Isaacson in the Sidbenel Radio Laboratory developing the new "regendyne" circuit on which he picks up Los Angeles practically every night. This circuit is claimed to be one of the greatest advances in radio.

International Radio Telegraph Co., Pittsburgh, has increased its capital from \$1,250,000 to \$26,250,000.

White Radio Devices Corp., Rochester, N. Y., 2,500 shares preferred stock, \$10 each; 2,500 common, no par value; W. E. Bush, V. G. Hartman, O. Frank. (Attorney, H. W. Ungerer, Rochester.)

Standard Electric Novelty Co., New York City, radio equipment, 300 shares preferred stock, \$100 each; 60 common, no par value; M. S. Rebarber, S. B. Felsenfeld, I. Baron. (Attorneys, Waxman & Rebarber, 171 Madison Ave.)

Radio Doesn't Hurt the Music Trade

C. L. DENNIS, manager of the trade service bureau of the Music Industries Chamber of Commerce, New York City, is quoted as saying: "While there is no doubt that radio hit some of the unprogressive retailers and a few phonograph firms, for the most part it has been a matter for adaptation and constructive merchandising. Piano rolls and phonograph records have gone up by leaps and bounds since radio brought to so many homes the liking for pieces that could be heard only once unless bought for reproducing devices."

Radio Trade Notes

Radio Service Station, 662 West Second street, Ottumwa, Iowa, is in the market for radio cabinets, particularly console models, as well as moderate-priced radio merchandise of all kinds.

* * *

Clyde C. Buckingham, 115 West Capitol Ave., Little Rock, Ark., contemplates entering the wholesale and retail radio business and would like to hear from manufacturers who are national advertisers.

Radio Literature Wanted

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

M. J. Geer, P. O. Box 62, Sabetha, Kansas.
Kentucky Radio Co., Corbin, Ky. (Distributors.)
Alvin M. Weeks, Route No. 7, West Heights, Rockford, Ill.
H. C. Shull, Rome City, Ind.
Arthur Vanus, 304 N. Chestnut St., Pana, Ill.
Wolber & Wolfram, Erzeugnisse der Elektrotechnik, Lubeck, Alfstrasse 33, Germany.
A. J. Richard, '09 East Elmira St., San Antonio, Texas.
The Radio Exchange, P. O. Box 434, Cottage Grove, Oregon.
Roy O. Rice, Hudson, S. C.
W. E. Damoth, Hammondspont, N. Y.
Glenn I. Smith, Box 85, R. D. 4, Warsaw, Ind.
J. Schultz, 3409 Beniteau Ave., Detroit, Mich.
R. D. Sheridan, Oakville, Iowa. (Dealer.)
Beitel & Carlson, Box 11, Lee, Ill. (Dealers.)
Howard E. Shoup, Winesburg, Ohio.
Clyde C. Buckingham, 115 West Capitol Ave., Little Rock, Ark.
L. L. Nicholson Repair Shop, Holyoke, Colorado.
Fred C. Bowles, 1830 Anita Place, Los Angeles, Calif. (Interested in parts. Will build sets.)
Ralph J. Golsen, 1128 Argyle St., Chicago, Ill.

Convenient New Head Band for Phones

THE Sterling Devices Mfg. Co., Chicago, have designed and perfected a head band for phones designed to meet the ever-increasing need for a device that will not muss "milady's" coiffure. The band is so made that ample space is allowed for the ladies' hair, while it still will keep the phones comfortably tight over the ears.

An adjustable clamp is used instead of the regular swivel arrangement. The headband is covered with patent leather of sufficient width to keep the phones in place comfortably, yet it cannot catch or muss the hair.

Larger Quarters for Next Boston Radio Show

THE fourth annual radio show to be held in Boston next year will be housed in the Mechanics Fair Building, according to arrangements already made. The third show, recently held in Horticultural Hall, overtaxed that building's capacity, both in regard to attendance and in the demand for space by exhibitors. Over 10,000 people visited the Boston show during the first two days.

Business Outlook for 1924 Excellent

BUSINESS and industrial conditions throughout the country never were more sound than at the present time, and there is nothing that can now be foreseen that is likely to occur to mar the continuance of a very prosperous and successful year for 1924, William M. Wood, president of the American Woolen Company, declared last week.

Coming Events

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

AMERICAN RADIO RELAY LEAGUE, Fourth Radio District and East Gulf Division Convention, Atlanta, Ga., December 27-29, 1923.

Radio and Electrical Business Opportunities

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

ELECTRIC contracting concern wants party with \$25,000; have \$56,000 bonded city contracts on hand; money absolutely secured; good profits. A. B. C., Radio World.

LATEST ELECTRICAL SENSATION

New automatic safety fuse plug, cannot burn out, lasts permanently; takes place of present style plugs; enormous market awaiting; requires responsible associate with about \$10,000 to fill orders; bank references. 1-2-3, Radio World.

A RADIO manufacturing corporation has decided to change its method of distributing its products and is organizing a sales force with a view of opening a system of chain stores for the sale of its product. They need six managers at once; must be prepared to invest some capital. G. L., Radio World.

Chicago Radio Show Managers Asked to Carry On

ON the closing day of the recent second annual radio show held in Chicago, 30 exhibitors presented the following petition to U. J. Herrmann, managing director, and James F. Kerr, manager:

"We, the undersigned, hereby petition the management of the Chicago Radio Show to conduct in New York City in the month of October, 1924, in Chicago in the month of November, 1924, and on the Pacific Coast in the month of January or February, 1925, the Official Radio Exposition; and we hereby agree in consideration of the Chicago Radio Show Management undertaking these three shows that we, the undersigned, will exhibit with them in these places, above named, and will not exhibit at any other shows in New York, Chicago or on the Pacific Coast."

Among those who signed the petition were: Herbert H. Frost, Inc., Chicago; The Colin B. Kennedy Co., St. Louis; A. H. Grebe & Co., Inc., Richmond Hill, N. Y.; Zenith Radio Corp., Chicago; Thorndarson Electric Mfg. Co., Chicago; De Forest Radio Tel. & Tel. Co., Jersey City, N. J.; Electrical Research Laboratories, Chicago; The Sterling Mfg. Co., Cleveland; Eiseman Magneto Corp., Brooklyn, N. Y.; Dubilier Condenser & Radio Corp., New York City; Radio Products Mfg. Co., New York City; L. S. Bruch Mfg. Co., Newark, N. J.; F. A. D. Andrea, Inc., New York City; Radio Stores Corporation, New York City; Buell Mfg. Co., Chicago; E. T. Flewelling, Chicago; C. Brandes, Inc., New York City; Rauland Mfg. Co., Chicago; Kellogg Switchboard & Supply Co., Chicago; French Battery & Carbon Co., Madison, Wis.; Radio Corporation of America, New York City.

Others of the Chicago exhibitors have since signed the petition and others are expected to sign. Messrs. Herrmann and Kerr have not as yet declared their intentions in the matter.

National Radio Chamber of Commerce Organized

THE National Radio Chamber of Commerce was organized last week at a meeting of radio manufacturers, broadcasters and retailers, with Scott Sanders as executive director and general counsel. Temporary headquarters of the organization are in the Columbian Building, Washington, D. C.

The object of the National Radio Chamber of Commerce is to cement the economic and commercial ties existing in the radio industry and to establish a national headquarters for convention purposes and to meet the constantly increasing public needs of radio.

A feature of this newly created Chamber of Commerce is the patent and trade-mark department, supplementing the work done by the United States Patent Office. A corps of patent attorneys will classify and digest the patents and trade-marks of the radio industry.

Uniform legislation, both national and state will be urged. A national educational advertising program will be shortly inaugurated. The radio industry will be placed on a sound economic basis.

In co-operation with the United States Bureau of Standards it will attempt to simplify and standardize manufacturing units. Production and distribution, export and import problems, make up an elaborate program attempted by the National Radio Chamber of Commerce with the co-operation of the radio industries throughout the United States.

Newsdealers, Attention!

How One Dealer Sells His Entire Supply of "Radio World"

SOME months ago we had something to say about the plan of S. Kahne, newsdealer, Fifth and North Avenues, New Rochelle, N. Y., who has a steady and increasing demand for RADIO WORLD. In August he had two or three unsold copies he was going to return to his wholesaler. He kept these in stock. He sold them all, and has been doing the same ever since. In other words, Mr. Kahne has not made any returns of unsold copies of RADIO WORLD since last

August. He finds that by keeping back numbers in stock he can sell them readily even after they are some weeks old. The reason for this, of course, is that every issue of RADIO WORLD contains something besides mere news of the week and is full of facts and figures that do not grow old.

It is suggested to other dealers that they follow Mr. Kahne's example. They will be able to sell all their back numbers in this way.

Radio Sensation of the Year

6 Points of Bel-Canto Superiority.

- (1) Unbreakable 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 is 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 24 inches high, 10 inch bell.
- (6) Guaranteed for one year from date of purchase against mechanical defects of any kind, and if found mechanically defective within that period of time we will replace it with a new one without charge to you.

DIRECT FROM FACTORY TO YOU. NO DEALERS NO SALESMEN NO JOBBERS

\$10

YOU SAVE THREE PROFITS

GUARANTEE—We Further Guarantee to the publication carrying this advertisement that Each and Every Speaker sold will be Exactly as Advertised in this issue—\$25.00 for \$10.00.

Our Complete Loud Speaker as described above sent on receipt of check, post office money order, or sent C. O. D., delivered to your door. Give the postman \$10.00 after you have received it. Try it ten days. If you are not satisfied, return loud speaker to us and we will immediately refund you your money in full.

Bel-Canto Manufacturing Company
BENSEL-BONIS CO., Inc.
 General Office and Factory Dept. A
 417-419-421 East 34th Street, New York City
 Telephone your order for immediate delivery
 Telephone Vanderbilt—8959

H. & H. RADIO CO.

P. O. Box 22-B
 Clinton-Hill Station Newark, N. J.

22½ Volt Plain.....	\$1.66	\$1.33	\$0.93
22½ Volt Variable..	1.84	1.50	1.00
45 Volt Plain.....	3.33	2.33	....
45 Volt Variable..	3.66	2.66	....

Radio World, 52 numbers, \$6.00 year.

Ask for Circular on other radio parts

ROSENDAL & CO

Chemical and Radio Engineers

2 and 4 Stone Street New York

THE WHOLE U. S. A. IS AT YOUR FINGER TIPS WITH A

OUT OF THE ETHER

Chats About Broadcasting Stations

By Hirsch M. Kaplan

What was our surprise to find that on tuning in Station KYW of Chicago that Wendall Hall, KYW's music maker, was present. He was telling the Chicago fans of his wonderful trip to New York City and of the great reception given him by the New York radio fans. He now has several new songs on his program and let me tell you that they are jim-dandies. Here is hoping he makes another trip East.

WJY is now offering as a regular Sunday evening feature the Waldorf Astoria Symphonic Orchestra, of which Joseph Knecht is the director. This orchestra, which is already known to many of you,

is the only hotel orchestra that approaches symphonic proportions.

Miss Florence Herr, contralto at Station WCBD, thrilled us with several classical numbers.

As part of Station WDAR's special program in celebration of the 100th anniversary of the promulgation of the Monroe Doctrine, December, 1832, the Honorable Roland S. Morris, former Ambassador to Japan, gave a most interesting talk on "The Monroe Doctrine As It Has Af-

fectured Our Policy in the Orient." Never before have I heard the subject of this address discussed so thoroughly. I suppose it must be due to the speaker's contact with those of the Orient.

This week we thought that we would listen to the one act play, "A Queen's Messenger," as offered by the Strawbridge & Clothier Radio Players. At the scheduled time we tuned them in and for our slight trouble we were presented with a very entertaining comedy.

(Concluded on next page)

RADIO

SEND FOR OUR COMPLETE
MONEY SAVING CATALOG

TIMES SQ. AUTO SUPPLY CO. INC.

MAIL ORDER DEPT.

1745 BROADWAY AT 56th STREET
NEW YORK, N. Y.

For Maximum Amplification Without
Distortion and Tube Noises

use the well known

Como Duplex Transformers

Push-Pull
Send for literature

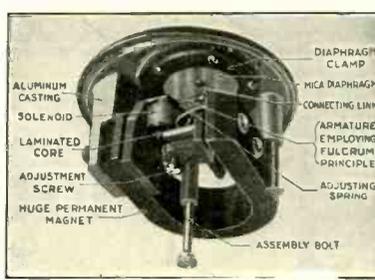
COMO APPARATUS COMPANY

446 Tremont St. Boston, Mass.

THE TRINITY LOUD SPEAKER



TYPE "A1"
21" FIBER
HORN
\$25.00



DIAPHRAGM CLAMP
MICA DIAPHRAGM
CONNECTING LINK
ARMATURE EMPLOYING FULCRUM PRINCIPLE
ADJUSTING SPRING
ASSEMBLY BOLT
HUGE PERMANENT MAGNET
ADJUSTMENT SCREW
LAMINATED CORE
SOLENOID
ALUMINUM CASTING

TYPE "B"
(For Phonographs)
\$12.50

INTERIOR CONSTRUCTION

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

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

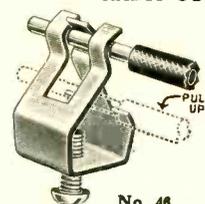
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TRINITY RADIO CORPORATION

446 TREMONT STREET, BOSTON, MASS.

Perfect Connections

are always sure with
Fahnestock Patent Wire Terminal
Grips Like a Vise
Eliminates Vibrations
Easily Attached—No Soldering
Best of All for RADIO OUTFITS



No. 46
Made in All Sizes and Shapes
At Your Dealer's

FAHNESTOCK ELECTRIC CO.

Long Island City, N. Y.

Dealers can obtain Fahnestock
Products from following distributors:

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F. D. Pitts Co. DETROIT

Detroit Electric Co. CHICAGO

Barawick Co. MILWAUKEE

Julius Andrae & Sons Co. PHILADELPHIA

H. C. Roberts Elec. Supply Co. PITTSBURGH

Ludwick, Hommel Co. WESTERN DISTRIBUTORS

Marshall & Co., Los Angeles, Cal.

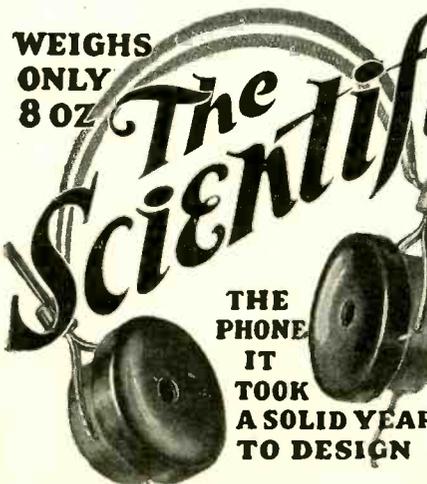
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The Scientific

A \$200,000.00 COMPANY stands squarely back of the guarantee on every Scientific headset

SEND NO MONEY!

20,000 TURNS EQUIVALENT TO 3,000 OHMS



THE PHONE IT TOOK A SOLID YEAR TO DESIGN

\$2.95

Order TODAY by Postcard and Pay Postman on arrival

LOUD SPEAKER UNIT \$1.95

POST-PAID

We Guarantee

The Scientific Headset to be the greatest value on the market. Try it for five days. If not satisfactory send it back and your money will be refunded immediately. Circular on request. Dealers wanted.

THE SCIENTIFIC ELECTRIC WORKS

98 Brookline Ave. DEPT. D

BOSTON, MASS.

G. W. 5 Circuit Radio Plug

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PHONES
LOUD SPEAKER
SERIES
PARALLEL
SHUNT

Accommodates Head Set and Loud Speaker or Two Head Sets—permitting instant choice of Five Circuits without removing plug or changing tips.

Price \$1.50

At Your Dealer or Direct From Us
MADE OF GENUINE BAKELITE
Jobbers Write for Quantity Discounts
Manufactured by

G. E. WALKER CO., Inc.

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WRITE FOR OUR MONTHLY
RADIO BARGAIN SHEET

FREE, on Request, 25c RADIO BOOK
WORKSMAN RADIO SERVICE
14-16W Vesey St. New York City

MERRY CHRISTMAS AND HAPPY NEW YEAR WISHES EXTENDED TO ALL RADIOPHANS AND READERS

- DR6 Sodiion Receiving Set with 2 stage Ampl. unit with tubes, phones. No batteries \$60.00
 - DR6 Sodiion Receiving Set, Complete with Sodiion tube and phones. No batteries... 29.50
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 - D11 Amplifier Unit Complete, No tube... 10.00
 - Sodiion Detector Tube S13. 3.8 volt..... 6.50
 - Sodiion Tube Socket..... 7.50
 - Sodiion Standard Tube Adapter..... 7.50
 - Sodiion Rheostat..... 1.00
 - Sodiion Potentiometer..... 1.00
 - Sodiion Potentiometer Resister..... .30
 - Sodiion Radio Frequency Transformer..... 3.00
 - Connecticut New Type Head Phones..... 7.00
 - Frost or Murdoch 2000 Head Phones..... 3.50
 - Reliance Variable Vernier Condensers with dials. .001...\$3.50 .0005...\$3.35 .00025...\$3.15
 - Columbia Mid. Variocoupler..... 5.50
 - Columbia Mid. Variometer..... 5.00
 - Shamrock Variocoupler, \$3.00; Variometer 3.00
 - Eria Audio Transformers 3 1/2:6 to 1..... 4.25
 - Hedgehog Audio Transformers 3:4:5 to 1..... 3.10
 - Frost Vernier Rheostats, \$.0.65; Potentiometers..... .55
 - Frost Rheo-meter 6 & 400 or 35 & 400 ohms..... 1.55
 - Filkestat, \$1.80; Magnavox M1 or R3..... 27.75
 - Cunningham Ampl. Tubes. State kind wanted..... 5.45
 - Eveready B Batteries 45 V., \$4.75; 22 V. 2.65
 - 1/4 lb. DCC No. 22, \$0.35; No. 24, \$0.45; No. 26..... .50
- Prices quoted Dec. 15th Radio World continued. Authorized subscription Agents of RADIO WORLD.

THE RADIO EXPERIMENTER SHOP
206 Logan Street Waseca, Minnesota

**IT'S A FRAME-UP
CAST ALUMINUM FRAMES**

FOR YOUR RADIO SET
MAKE IT RIGID and STRONG
NO WARPING SPRINGING NO SHORT CIRCUITS BROKEN WIRES
NO MORE CABINETS
JUST APPLY FLAT MAHOGANY OR PLATE GLASS COVERS TO THE FRAMES
A SIZE FOR YOUR SET. PRICE **85c. Each**
QUINBY RADIO CONSTRUCTION CO.
23 West Mount Eden Ave. New York City

**Ackerman
LOUD SPEAKER**

Complete, Ready for Immediate Use **\$9.50** Delivered to Any Part of the United States.



For the price of a headset you can have a loud speaker that actually speaks for itself. Not alone that, but a loud speaker superior to many of the much higher priced ones now on the market.

Standing 21" high, with 11" bell and made of heavy metal, eliminating vibration, together with its special loud speaking unit, this speaker reproduces voice and music far beyond expectations. Finished in plain black or brown, also special alligator grain in black and green or black crystalline.

If your local dealer is unable to supply you, send order direct to us and pay postman on delivery. Sold on a money-back guarantee.

Ackerman Brothers Co., Inc.
301 W. 4th St. (Dept. "RW"), New York, N. Y.

College Presidents, School Superintendents, Principals—!

The Haaren School, New York City, completed a series of tests on the advisability of installing radio and speech amplifying devices in the school in order to promote education. How it was done and the success it has achieved is clearly told in RADIO WORLD for April 21, 1935. 15 cents a copy, or start your year's subscription with this number. RADIO WORLD, 1493 Broadway, New York City.

Out of the Ether

(Concluded from preceding page)

"Icicle," Santa Claus' assistant at Toyland, who talks to the kiddies through Station WOR, certainly sounds convincing and it is no wonder that his short talks are eagerly awaited every evening at 6:15.

Haven't I been telling you folks, especially the ones interested in the sport known as prize fighting, to keep your eyes and ears open on Station KDKA? Why? Because it is my opinion that this station likes to offer that which is the least expected. The other night, being curious to know what was going on at this station, I tuned them in, and what do you think I heard? Yes, sir, it was the combat between Harry Greb and Bryan Downey for the title of middle-weight champion. Furthermore, let me tell you that this was one of the best fights that I have heard over the radio.

Those interested in radio further than broadcasting programs, certainly got a treat if they were fortunate enough to pick up some of the very interesting lectures as broadcast by the various stations during the past week. As an example of some of those interesting lectures, let me mention that by John Hogan, on "Getting the Right Radio Wave," and that by Edward Goodrich, on "Amplification of Speech and Music."

The Philadelphia Trio at Station WSB, "The Voice of the South," made a hit with us by rendering several old-time classical selections upon their stringed instruments. I know for a fact that most of you will agree with me when I say that there is no music so sweet as that played upon stringed instruments.

We city radio bugs may not have the chance of seeing a barn dance, but as long as there is radio in existence, it is in our grasp. The other night Station WDAF of the Nighthawks was tuned in during their offering of a barn dance and it sure was put over in great style. It appeared so realistic that I could imagine seeing the fiddler and the harmonica players in their corner playing many of the famous barn dance songs. Especially was this so when they played the music for the "Virginia Reel."

Harry Reser, who can "say it with a banjo," amused us with a short recital. His parodies especially took our fancy.

Irving Selzer and his Cafe Boulevard Orchestra helped us close a pleasant evening of jazz with a delightful program of dance music. This timely offering came through Station WJZ.

Guaranteed Tube Repairs

WD-11	.....\$3.50
WD-12	..... 3.50
UV-200	..... 2.75
UV-201	..... 3.00
C-300	..... 2.75
C-301	..... 3.00
UV-201A	..... 3.50
C-301A	..... 3.50
DV-6A	..... 3.50

All tubes positively guaranteed to be satisfactory. Special discounts to dealers. Tubes returned P. P., C. O. D.

HARVARD RADIO LABORATORIES
200-204 Old Colony Ave. So. Boston Mass.

RADIO PANELS

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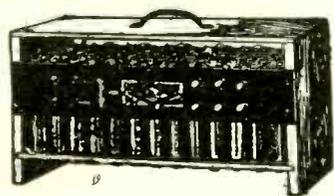
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Atlantic City's New Radio Station

BY the first of the year Atlantic City, N. J., expects to have its radio station in full operation for the reception of nationwide communications from which it will extract such police information as will assist the work of that department.

About Easter the broadcasting apparatus will be installed which will place the local department higher on the list for efficiency. Most of the credit for the installation of the station lies with City Electrician Frank Shinnen, who had the addition made to the plans for the new police bureau which has just been completed.

The police authorities are confident that when radio receiving apparatus is installed on all of the autos used by the department it will be a great help in the pursuit of fugitives. While the police will not be able to communicate with headquarters, they will be in receipt of the latest information from that point, and great assistance will be rendered in keeping in touch with the fleeing quarry.

Prizes for Amateurs Working the "Maud"

THE Aerial League of America is starting a world-wide check-up on what has proved to be one of the most puzzling problems that has come up in connection with radio. In an effort to solve it the league has offered sixty prizes and diplomas of merit for the best solutions.

When Amundsen made his latest North Pole dash, he equipped his ship "Maud" with a complete receiving and transmitting outfit, believed to be of sufficient power to keep in touch with the United States. Up to the present communication with him has failed. Amateurs and experimenters in Alaska, the United States or Canada have utterly failed to reach or hear from him, while those in Norway, Sweden and elsewhere on the other side of the pole are constantly in communication with him, though he is farther from them than he is from Alaska or Canada.

This puzzling problem popped up, and a solution to it is wanted. Just why the messages should take the course they do and not be able to reach the nearer stations is unknown, and over a hundred solutions to it have been advanced.

Thomas Alva Edison, who is a member of the Aerial League of America, for-

wards the idea of having amateurs and experimenters listen for Amundsen more carefully. The fact that the "Bowdoin," the MacMillan ship locked in the northern ice, is in hourly communication with all parts of Canada and the United States is even more puzzling, as it disproves the assumption that the North Pole is a "dead area." The Amundsen party is evidently in some magnetic or electric field which shields it from successful American communication.

Commander Robert A. Bartlett, who will accompany the "Shenandoah" to the North Pole, has conferred with Henry Woodhouse, president of the Aerial League of America, and will try to find the solution on the trip North.

Cash prizes will be awarded to the first amateurs who actually work the "Maud" within the next month. For full information concerning the prizes and complete details, readers of RADIO WORLD may write to Aerial League of America, 280 Madison Avenue, New York City.



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