

15c. a Copy

May 12

\$6.00 a Year

52 Numbers

1923.

RADIO WORLD

Title Reg. U. S. Pat. Off.

ILLUSTRATED

EVERY WEEK

How to Construct and Tune a One Bulb Regenerative Set for Long Distance Work

By C. H. Stoup

THE writer, in this article, describes a one-bulb outfit from aerial to ground, on which we hear regularly broadcasting from Havana, Cuba; Denver, Col.; Canadian and California stations from a location near Pittsburgh, Pa. Any set may occasionally hear a long distant station but for regular long distance work this outfit, when correctly assembled, cannot be beaten for efficiency as a one-bulb set.

First, make sure that every part or instrument you purchase is of the very best. It takes high grade parts to get satisfactory results from a radio set. Buy only known apparatus at a reliable electric store which handles a complete line of radio supplies.

Be sure everything is wired correctly by making one connection at a time, then checking with the diagram to see

if the connection is exactly right. The accompanying diagram has been checked and rechecked to make sure it is O. K., so follow it in every detail.

Make all the leads as short as possible, particularly the

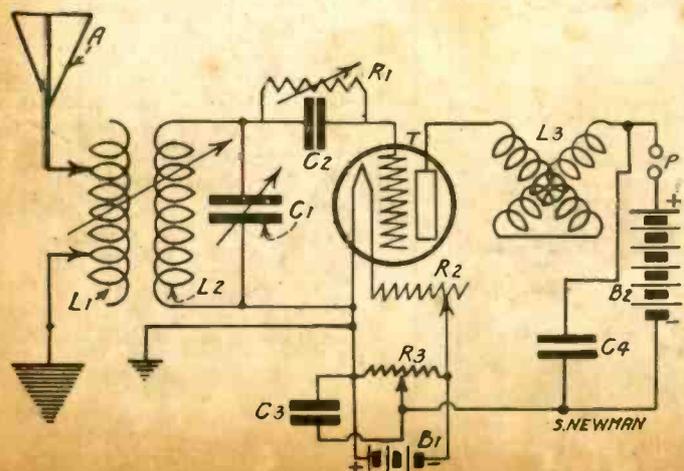


Fig. 1. Hook-up of Mr. Stoup's one bulb regenerative circuit.

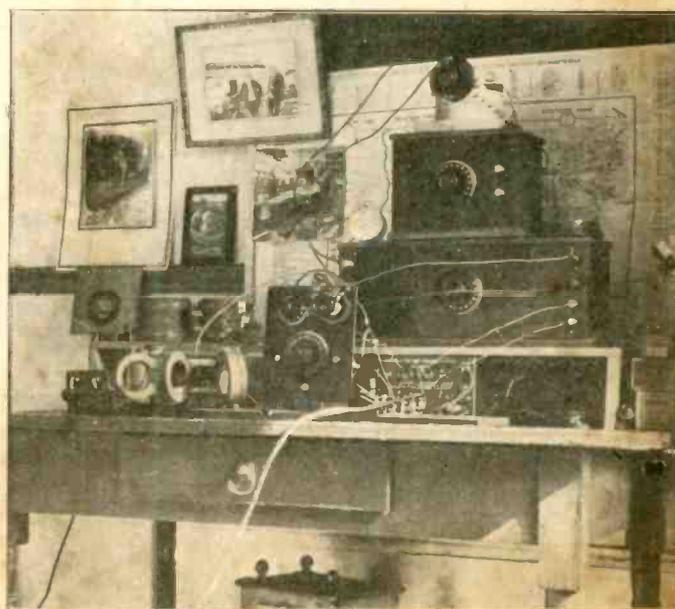


Fig. 2. One bulb regenerative set as built by Mr. Stoup and described herewith.

connection between the grid leak condenser and the grid. Solder wherever necessary. Don't run the connection wires of your set parallel. Insulate everything perfectly.

(Continued on page 8)

**Flewelling-Kaufman-Reflex
Ultra Reinartz - Neutrodyne**

and other circuits are greatly improved by using

"MICON" Tested Mica Condensers

Endorsed not only by experts, but by dealers, amateurs — in fact every one interested in radio.



Because The design of "Micons" is such that constant equal pressure is exerted on the condenser plates over the entire area. "Micons" assure absolute noiselessness, clarity of tone, accuracy, constant fixed capacity. "Micons" are invaluable as a protection against damage to the filament and their consequential short life.

.006 Micon	.....	\$1.00
.095 Micon	.....	.75
.001 Micon	.....	.40

Other "Micon" Sizes					
.00005	30c	.0025	.....	50c
.00025	35c	.003	.....	50c
.00085	35c	.01	.....	\$1.50
.0005	35c	.015	.....	\$2.00
.0015	40c	.02	.....	\$2.50
.002	40c	.025	.....	\$3.00

Ask for
FREE
Diagram of
KAUFMAN
Circuit

AT YOUR DEALERS — Otherwise send purchase price and you will be supplied, postpaid.

Chas. Freshman Co. Inc.
Radio Condenser Products

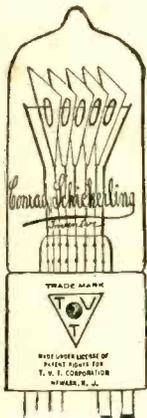
106 Seventh Avenue

New York

Ask for
FREE
Diagram of
Flewelling
Circuit

T. V. T. Detector Tubes

BELOW MARKET PRICES



We have just made an exceptionally fortunate purchase of T. V. T. Detector Tubes at much less than regular prices and we offer the public an opportunity to participate in an advantage, which seldom occurs.

The new Triangle Plate Tube is a new invention, making unnecessary the use of grid. It has been thoroughly tested by many of the foremost radio experts and claimed to be far superior to the fragile grid tube in strength, durability and results.

It completely eliminates all the rasping, howling grid noises and distortion caused by the vibration of the grid in all grid tubes.

T. V. T. Tubes are gridless. They are better tubes, scientifically made to reproduce the sound of voice or music free of distortion and harshness, in clear, soft, natural tones.

Every tube thoroughly tested before leaving our firm

6-Volt	.....	List Price, \$5.00	Sale Price, \$3.50
2-3-Volt	.....	List Price, \$6.50	Sale Price, \$4.00

P. O'BRIEN

310 LERNER BUILDING

JERSEY CITY, N. J.

ELEMENTS OF RADIO TELEPHONY

By **WILLIAM C. BALLARD, JR.**

Assistant Professor of Electrical Engineering, Cornell University

This is a standard book on radio telephony, the work of a recognized authority.

It is accurate, simple, clear, reliable and strictly up to date.

The man with a technical background who wants to post himself on radio will find this exactly the book for his purpose.

The radio enthusiast will find in it an excellent presentation of fundamental principles and their application.

SENT POSTPAID ON RECEIPT OF PRICE, \$1.50, BY
THE COLUMBIA PRINT, 1493 B'way, New York City

**Artificial Lightning
and Thunder Startle
Electrical Engineers**

FOUR hundred electrical engineers who attended the spring meeting of the American Institute of Electrical Engineers at Pittsburgh last week were startled while visiting the Westinghouse new high-voltage testing laboratory at Trafford when one million volts were shot into two brass spheres placed several feet apart. The unexpected display and its resulting blinding flash, similar to a streak of lightning out of a clear sky, and the crashing, man-made thunder, which could be heard a mile away, nearly knocked several of the engineers off their feet.

A wonderful illuminating effect was next produced by drawing a high-voltage arc over a distance of 25 feet. This demonstration, which lasted for three minutes, lighted up the entire laboratory.

The electrical engineers inspected every phase of the new laboratory and its facilities for testing power apparatus, insulators and line material that will be used on high-voltage hydro-electric transmission lines and also for the fast developing super-power systems that are being contemplated throughout the country.

The laboratory is equipped with 1,000,000 and 500,000 volt testing transformers and apparatus

J O B B E R S

AND DISTRIBUTORS

Something New in Batteries.
Exceptionally Good Proposition.
Assigning Territory Rapidly.

Write or Wire

SIDBENEL, 25 Mt. Eden Ave., New York

Cockaday Circuit

The newest and the most startling development in radio.

Exceedingly Selective. Simple to Operate. Highly Sensitive. Verified C.W. Range of 3200 Miles. Telephone Range of 2400 Miles.

Complete Parts for This Circuit.

\$12.71

Include the following:

1 Special Coil	.....	\$3.25
2 Variable Condensers (Bakelite Ends)	.....	3.00
1 Socket (Genuine Condensite)	.....	.50
1 Vernier Rheostat (Cutler-Hammer)	.....	1.50
1 Panel (Genuine Bakelite) 7 x 18	.....	2.50
1 Grid Condenser, Mica Dubiler .00025	.....	.50
1 Switch Lever, 7 Points, 2 Steps	.....	.51
8 Blinding Posts	.....	.40
1 Grid Leak (Cartridge Type) and Bakelite Holder	.....	.50
2 Dials, 3 inch	.....	.50
Total	.....	\$12.71

One Stage Amplifying Unit to This Set	.....	\$5.00
Additional	.....	1.00
Two Stages, Additional	.....	1.00
Cabinets, Plane Mahogany Finish, One Bulb Set	.....	\$3.75
Two and Three Bulb Set	.....	4.75

Complete Parts for Flewelling and Reflex Circuits.

U. V. 200 Tubes	.....	\$3.00
DeForest DVG. Wonderful as an amplifying tube	.....	6.00
22 1/2 Volt "B" Battery	.....	.99
Nathaniel Baldwin Type C, Double Phones	.....	8.50
Nathaniel Baldwin Type C, Single Phones	.....	4.50
Brandes (Superior) Phones	.....	5.95
45 V. "B" Batteries (each)	.....	2.25

All orders must be accompanied with a money order, postage included.

GRAND RADIO CO.

1789 Third Ave. 1714 Second Ave.
NEW YORK CITY

RADIO WORLD

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

A Weekly Journal, Published Every Wednesday and Dated Saturday, by Hennessy Radio Publications Corporation from Publication Office, 1493 Broadway, New York, N. Y. Telephone: Bryant 4796.

Vol. III, No. 7. Whole No. 59

May 12, 1923

15c. per copy, \$6.00 a year

A Home-Made Radiophone Set of Great Range

By Dr. B. S. Bickelhaupt

A NEAT and efficient amateur radiophone station is that with the call 2CBA built, owned and operated by Dr. B. S. Bickelhaupt, 376 East 162nd street, New York City. The entire apparatus for both the receiver and transmitter was constructed by the owner, who describes it as follows:

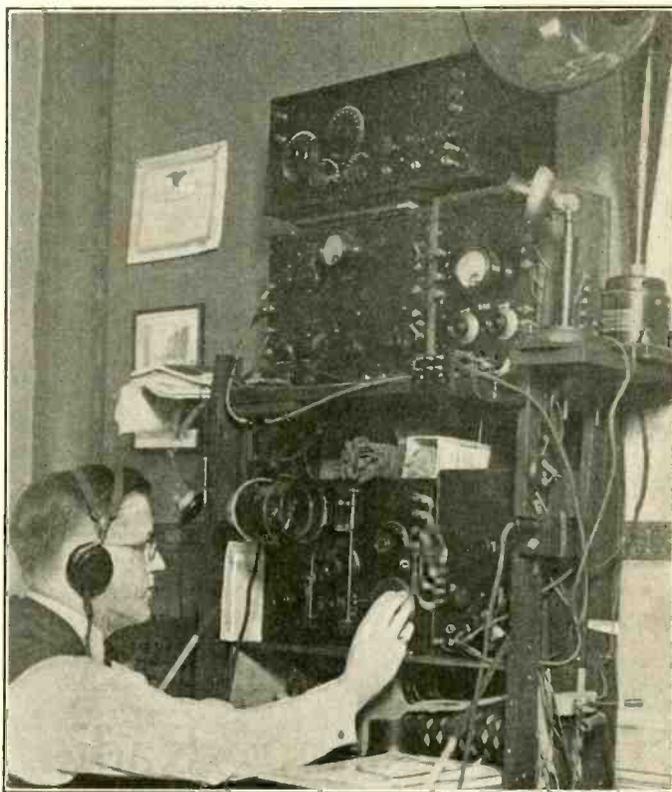
"The receiver shown is not the type that the reader usually runs across, in that it is not of the regular honeycomb type. It is a single layer coil set employing regenerative principles with both inductive and capacity feedback. The method is known to produce the best results. I have been using this for the past two years and have come to regard it as the most reliable outfit any one can handle. Any station broadcasting that is powerful enough to reach me will be heard and the statement is made with that reservation since freak reception of a weak station occurring once in a blue moon should not be accepted as representing the consistent range of a station. I have heard practically all stations within a 1,200 mile radius. Amateurs have been heard from practically every state.

"The transmitter is a tube set employing four 5-watt tubes. With a fairly low plate voltage (350) I have consistently covered a radius of 200 miles even in summer with all the attendant drawbacks. During the winter, of course, the range is materially increased, my station having been heard in Michigan and Missouri which means also the intervening territory as well. The set is tuned to 200 meters but provision has been made to reduce to 178 meters for testing purposes. Occasionally as low as 150 meters has been used, although I have as yet been unable to determine the efficiency of the set at this point.

"The entire outfit has been self-constructed and since I have first made it there have been many changes, with subsequent improvement in the outfit to bring it up to its present standard of efficiency. There is only one contemplated change, and that is the addition of

two steps of radio-frequency which may be switched on at will.

"I shall be pleased to advise anyone on the construc-



(C. Photonews, N. Y.)

Dr. B. S. Bickelhaupt, of New York City, and his long range station 2CBA.

tional details of any part of my equipment, should they care to write me."

Radio Transmission Records by Cruiser "Omaha"

NAVAL radio experts are delighted with the performance of the radio equipment on the new scout cruiser "Omaha," which recently broke all long distance records in transmitting during her "shake-down" cruise in the Pacific.

While maneuvering at sea off the coast of Washington, the newly installed radio transmitting sets were given a thorough test. Code messages transmitted with the 20 KW arc set such as the larger naval craft are now equipped with, were copied by all naval radio stations along the west coast from lower California to Saint Paul, Alaska, and on the east coast at Bar Harbor Me., Washington D. C., and Key West, Fla. One of the stations reached was San Diego, 1,800 miles away from the "Omaha." This new

cruiser's arc was copied by the battleship "California," which was 1,800 miles distant, but it is reported that the "Omaha" could not pick up the "California's" replies.

Not only in code dispatches did the "Omaha" radio experts excel, but with her 300-watt tube set, spoken messages were transmitted to Pearl Harbor, Honolulu, 2,300 nautical miles distant. They were also heard at Key West, Fla., approximately 2,100 miles over land and sea.

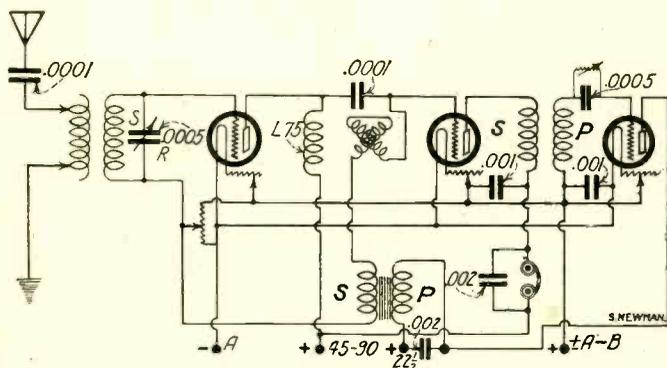
Part of the credit for the long-distant work is attributed to the 180-foot wooden masts, which carry the "Omaha's" aerials almost 50 feet higher than the steel masts on battleships. The mean effective height on the "Omaha" is better than 100 feet, it is stated by naval experts. Her radio equipment is also installed on the "top-side."

A Flexible and Selective 3-Tube Reflex Circuit

By H. Parsons

HAVING been experimenting during the past few months with the popular reflex type of receiver I finally hit on one that I think is about the best of them all. It is a modification of several and is very selective.

As every one knows, the main trouble with the reflex type of receivers is their lack of selectivity or "sharp tuning." If this set is carefully constructed and the best parts used the builder will be pleasantly surprised at the remarkable selectivity he can obtain if it is handled carefully and the tuning done systematically instead of just "turning knobs and dials."



Flexible yet very selective reflex circuit designed by Mr. Parsons. All the capacities and constants are specified in the drawing.

The tuner of this circuit consists of a Dayton moulded bank-wound variocoupler with secondary shunted with a 23 plate vernier condenser. It is imperative that the best apparatus be used.

The variometer which is used as a radio-frequency tuner is of the same make with all the condensers the popular micadon with brass cover. I specify this because of the liability of the paper condensers to blow if anything happens. If this should occur the circuit would be rendered inoperative and you would have to

test each one, so a little extra expense will save a lot of trouble. The rheostats are all vernier control, six ohms resistance. These will handle the current for all the now popular types of tubes.

The radio-frequency transformer is an Acme R-2 and the audio-frequency is a Federal 226-W. It is not absolutely necessary to use these types or makes if another of high quality is on hand, but be sure that it is of the same ratio as those specified. The honeycomb coil can be of any popular type, either the D-L or the regular wound. If it is desired, a non-inductive resistance can be used in place of the honeycomb coil, and the B battery increased. This will then give resistance-coupling—amplification on the first tube.

When hooking up it is absolutely necessary to see that the leads are all as short and straight as possible. It is better to incorporate "B" line leads using lighting cable (one strand of the twisted kind) than it is to use bare bus wire. Run your leads direct and prevent them from bunching and crossing at anything but right angles, or capacity coupling will result and the selectivity will be nil. Group your A and B leads to give as much inductance effect as possible and at the same time keep down the capacity.

When tuning in first set your primary at the approximate point of resonance and tune your secondary condenser. Then using the variometer bring in the signals until the volume is at its highest point and the noise is cleared up. Now tuning with the potentiometer bring the signals in as loud as possible with the least amount of scratching. If the potentiometer is turned too far the circuit may howl and scream. It is important that the grid leak is set at the right point for the detector you are using. At this stage it would be best to get a panel mounting condenser and leak combined, as they the resistance can be changed with the least amount of trouble. It is oftentimes necessary to tune with this leak when real distance work is being done and there is a great amount of local interference.

Long Distance Radio Tests on Pacific Planned

RECENT tests between the Shipping Board Steamer "Easterner" and some land radio stations showed reception from East Hampton, N. Y., at 6,000 miles, while several other stations were heard almost continually throughout a cruise from Panama to Australia. These results were so surprising that further tests between high-powered Naval stations and Shipping Board vessels in the Southern Pacific are planned.

This interesting report received via the Shipping Board from the radio operator of the S.S. "Easterner," which recently made a cruise to Eastern Australia via the Panama Canal follows in part:

"Conditions in the South Pacific appear to be ideal for radio work. On both passages, I was favored with negligible static and interference in mid-ocean except about the equator. Using one step of audio-frequency amplification, the following results were obtained:

Atlantic Stations—	Call	Miles
East Hampton, N. Y.....	WSA	6000
Cape May, N. J.....	WCY	5200
Point Isabel	NAY	4000

Atlantic Stations—	Call	Miles
Morehead City, N. C.....	NAN	3100
Key West, Fla.....	NAR	3000
Pensacola, Fla.	NAS	3000
Pacific Stations—		
Vancouver	VAE	5200
San Diego	NPL	4200
Honolulu	NPM	3400
New Zealand	VLC	2500

"Arlington was heard at 4200 miles. The high power stations Balboa (NBA), San Francisco (NPG), San Diego (NPL), Honolulu (NPM), and Guam (NPN) were all heard over practically the entire Pacific ocean from Panama to Australia. Longer wave stations could not be heard because the coils loaded only to 11000 meters."

The data from the "Easterner" was considered of such value in connection with the communications in the Pacific ocean, that immediate steps have been taken to arrange tests between high-powered Naval radio stations on the Pacific Coast and Shipping Board vessels making cruises to the South Pacific.

A Portable Loop Set That Works Easily and Well

By *Kenneth Malcolm, A. I. R. E.*

ONE of the easiest ways to secure great selectivity, and at the same time reduce static disturbances to a minimum, is to use a loop antenna. Loops are generally located indoors and at no great height, where strays or atmospherics are present only in negligible quantities. Due to their marked directional characteristics they allow differentiation between stations of equal power but which lay at varied angles from the receiver. Loop sets also offer the advantage of simplicity and portability.

The greatest drawback that stays the hand of the average fan, is the idea of cost; for he thinks of a

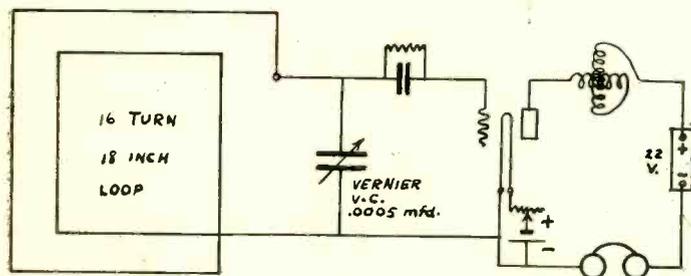


Fig. 1—Hook-up for Mr. Malcolm's Portable Loop Set.

loop set as always necessitating a half dozen or so stages of radio-frequency amplification. This is all well and true for DX work, but for reception over comparatively short distances—under 25 miles—a loop set can be constructed at small cost that uses but a single tube and at the same time employs a standard circuit. It is also the acme in portability and ease of operation.

Apparatus varies somewhat in size, but the dimensions given may act as a guide. The panel should be about $8\frac{1}{2}$ inches wide by $7\frac{1}{2}$ inches high. The cabinet should be about seven inches deep.

Other parts include a .0005 mfd. variable condenser (values depending upon the particular tube used), a variometer, rheostat, tube socket, tube (either dry cell or regular 6 volt), a single circuit jack with plug, three dials or knobs, about 70 feet of wire for the loop, several pieces of wood for the loop frame, A and B batteries, phones, and the necessary binding posts.

Secure the best apparatus that your money can buy and you will be more than repaid by the good results. If you desire, the set can be entirely self-contained by using a dry cell tube and securing a cabinet large enough to include the batteries.

Let us start by constructing the loop itself. Secure some wood about $\frac{1}{2}$ or $\frac{3}{8}$ -inch square, and cut one piece 25 inches long and another 19 inches long. These may be best fitted together by using the half-lap joint, the joint commonly used on the cheaper Christmas tree standards. The two parts might be glued and a small brass screw or bolt passed through the center to make it strong and rigid. The outside turn of the loop is a square whose diagonal is 18 inches. The turns are spaced $\frac{1}{4}$ -inch apart. There should be 16 in all, and they may be held in place by small brass screws, or small wood dowels that have been glued into holes bored in the cross-pieces. Iron or steel screws are especially undesirable. Most any sort of wire may be used, but Litzendraght has the lowest radio-frequency resistance and is therefore preferable.

The mounting of the loop is unique but simple. Secure a plug with a round insulating sleeve of a diameter sufficient to admit the end of the long loop shaft;

you may have to cut off part of the end of the sleeve to do this. Fasten the two leads from the loop to the terminals of the plug and anchor the shaft by means of sealing wax or some other insulating cement. The corresponding jack should be mounted near the rear left hand corner of the top of the cabinet. This combination forms a simple and efficient means of rotating the loop and also allows the loop to be dismantled from the set at a moment's notice, for facility in packing or for the inspection of the set.

Next we can drill the panel and mount the instruments. The arrangement shown in the drawing is highly recommended. The left hand dial controls the variable condenser, the right hand the variometer, and the small dial at the lower center controls the rheostat.

With this type of circuit a condenser having a vernier is absolutely necessary; however, a separate vernier may be used, if you have one. The grid leak and grid condenser may be of a fixed value, and mounted inside the cabinet. Too much stress cannot be laid upon the value of a good grid condenser. Those having a mica dielectric are the most dependable, but there are a few good manufacturers who use paper. If you use a very critical tube it may be an advantage to have a vernier on your rheostat, otherwise this is not very important.

If you want to make your set truly portable, the WD-11, WD-12, and the UV-109 tubes are ideal.

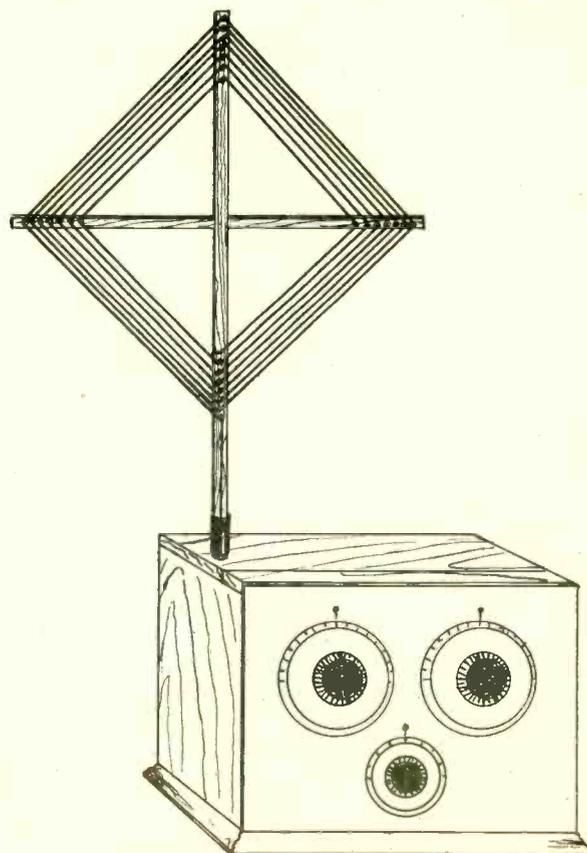


Fig. 2—Assembly of the Portable Loop Set Designed by Mr. Malcolm.

As, by its natural characteristics, a loop can absorb but a small percentage of the energy that could be absorbed by an open or regular aerial, every effort should be made to prevent losses. Whereas with the best of

(Continued on next page)

Radio and the Woman

By Crystal D. Tector



(C. International Newsreel)

Blanche Sweet, charming star of the silver screen, interprets various facial emotions while listening over the radio. Reading from top to bottom, at the left: Bedtime Stories—"The Big Bear Jumped on the Little Rabbit." "Every one keep quiet, sh-sh-sh!" "Ouch! What noises!" At the right, from top to bottom: "Well, that's a good joke!" "Isn't that a good song? It makes me laugh!" "Oh, boy, that's real jazz! Come on and strut your stuff!"

Friend Husband has been real busy of late, coming home late, tired and too worn out to even read the evening papers. The reason is that he recently went into a partnership with a bright young star in legal circles. He told me this morning that he never realized until now what a real comfort radio was to people who were tired. "I never appreciated it before because I took it more as a pleasant game to be played by turning dials, but now when I am tired it is a real pleasure to sit in my comfy chair and listen to all that beautiful music and the news of the day. I just close my eyes and rest, and the world passes in review through our loud speaker." Well, it certainly took him long enough to appreciate the work of the different broadcasters.

* * *

I have a letter from Mr. H. H. Taylor, advertising manager for the American Radio & Research Corporation, Medford Hillside, Mass., about the picture of Miss Thompson which appeared on the front cover of RADIO WORLD for April 28. Mr. Taylor takes issue with the title used over the picture, "Only Woman Graduate of a Radio School," and states that a year ago there were half a dozen women graduates of radio schools and that this number doubtless has increased since. My correspondent also informs me that Miss Eunice L. Randall, who gives the bedtime stories at WGI, his company's broadcasting station, is a graduate from the Eastern Radio Institute of Boston. Miss Randall is also a licensed operator (ICDP). If Mr. Taylor will read the caption below Miss Thompson's picture he will find her described as "the only woman graduate of the radio school she attended," etc. This is all very interesting and I would thank Mr. Taylor, or any others who read RADIO WORLD, to send me the names of women graduates of radio schools they may know. I have something I want to say to them.

(Concluded from preceding page)

instruments, assembled with the greatest care, very satisfactory results can be secured with the instrument described, it must also be remembered that with poor or less efficient instruments that have been thrown together with utter disregard of details, the set might not work at all.

So be careful. Use only the best thoroughly seasoned wood for the cabinet if any of the instruments are mounted on it; it is better that the instruments should not be, however. See to it that there can be no leaks in the loop on account of puncturing the insulation of the wire with a screw head. Make all the wiring as short and as rigid as possible, using No. 14 copper wire, or bus bar; this need not be insulated if you take care to arrange it so that there cannot possibly be a short-circuit. It is absolutely imperative that all joints be soldered. A good tube and a sensitive pair of phones will often change an absolute failure into a marked success.

The jack for the loop plug is connected by flexible leads to the other instruments, so that the cover may be opened without hindrance. No mention has been made of the battery and the phone connections, for individual taste varies much on this question. A very neat job may be engineered by mounting a small strip of some insulating material on brackets, inside the cabinet; on this strip are arranged the necessary binding posts for the A and B batteries, and for the flexible

leads to the jack. The battery wires may be led in through small holes drilled near the lower part of the back of the cabinet.

Another method is to cut away a portion of the wood of the lower cabinet back, and mount the strip with the binding posts over this. Still another, but more unsightly, way is to mount the binding posts directly on the front of the panel. The phones may be attached to binding posts on the panel, or a plug and jack arrangement may be used.

The tuning is quite simple. First rotate the loop to a position approximating that of the station from which it is desired to receive, the cross-bar being the pointer. Turn on the filament of your tube to an arbitrary value; then manipulate the variable condenser dial. You may rotate the variometer at the same time. At some point you may hear a whistle; now you must carefully re-adjust the condenser and the variometer, and in a moment you will have your station. This may be brought in louder by moving the loop, regulating the vernier on the condenser, and regulating the filament current. The actual operation is really easier than the description.

If at any time you desire to get a greater range than is afforded by the loop, a variocoupler may be added, thus converting the set into an excellent three circuit regenerative receiver, and a regular aerial and ground may be used. Amplification may be added in the same manner as to any other set.

The Improved Cockaday Four Circuit Receiver

By Russell P. May, R. E.

THOSE who have used regenerative receivers know the critical nature of the adjustments, especially that of the regeneration control. This is characteristic of all regenerative receivers, and extremely so in the ultra-audion. A new receiver, the creation of Lawrence M. Cockaday, the adjustments of which are very simple and the results surprisingly gratifying, is herewith illustrated and described. (See also RADIO WORLD, April 28, 1923.) Before going into details it will be well to briefly review the functioning of the regenerative receiver.

The action of the grid in a vacuum tube is to control the amount of current flowing from the plate of "B" battery to the filament. When a slight impulse is received it is impressed upon the grid. This impulse is of alternating character, and the voltage impressed on the grid rises and falls with it. These variations of grid voltage permit a relatively large current to flow in the plate circuit, the result being a true reproduction of the incoming signals.

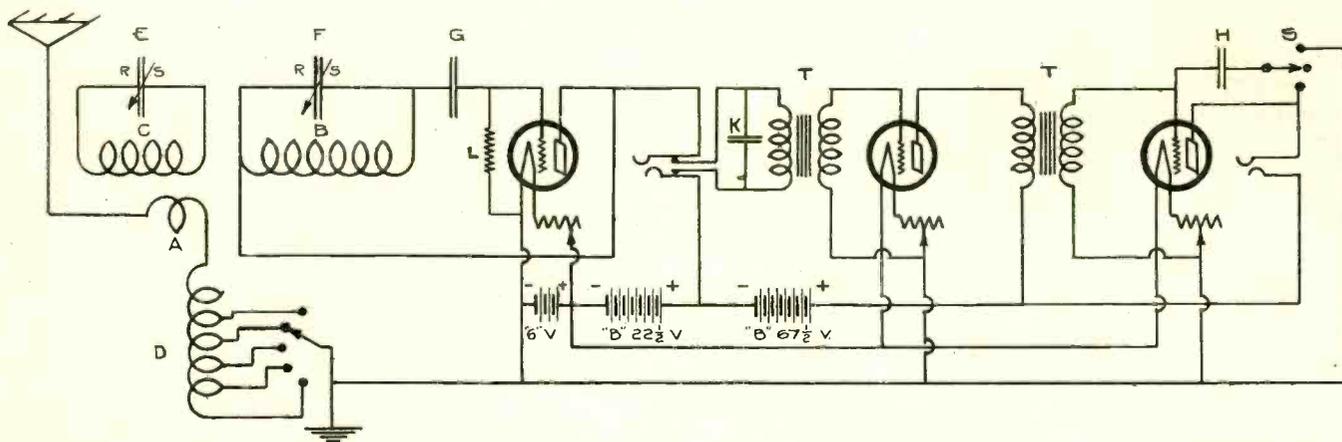
In order to increase this amplification tubes were connected in such a manner that the output or plate circuit of one tube supplied the input or grid circuit of the next, increasing the signals at each step. Previously it was not known that even better results could be had with one tube when properly connected. It was only necessary for some

the coils so that the reinforcing energy supplied to the grid could be controlled. There is a point in this action at which the tube will start to generate oscillations itself, and it is at this point that the signals are the loudest.

It is evident that regenerative control depends upon the control of the negative resistance. When it is too great the tube will oscillate, and when too small regeneration becomes weak. At the point approaching oscillation the signals are strongest.

It will be noticed in the diagram herewith that the secondary circuit is not the usual regenerative circuit. It is what is known as the ultra-audion circuit, with the grid and plate of the tube connected to each end of the secondary coil. This type of circuit is extremely critical and oscillates easily. The antenna system is of the semi-a-periodic type, which requires no condenser. It is coupled to the secondary circuit by means of a single turn, as shown at A. Adjacent to the secondary coil the coil C is placed, with a condenser connected in parallel with it. This is what is known as the fourth circuit. Its function is as follows:

When the coil A receives an impulse due to an incoming signal a comparatively high E. M. F. is induced in Coil B as the transformation ratio is very high, and therefore the grid is strongly impressed. On account of this high ratio



Constants used in the Cockaday Circuit: A, single turn around coil C; B, 65 turns on 3/4-inch Tube No. 18 s.s.c. wire; C, 34 turns on same tube 1/16 inch from coil B; D, 43 turns double bank wound tapped at 3, 7, 13, 21, 31 and end (set at right angles to B & C); E and F, .0005 variable vernier condenser; G, .00025 fixed condenser; H, .001 fixed condenser; K, .0005 fixed condenser; I 1 megohm grid leak; T1 Amertran transformer (audio); T2 General Radio transformer (audio); S, 3-point switch.

one to find out how these connections were to be made. This was accomplished, simply and effectively, by Edwin H. Armstrong.

The incoming signals are extremely weak, and the voltages on the grid are likewise feeble, but the currents flowing in the plate circuit are enormous in comparison.

Armstrong placed a coil in close inductive relation to the secondary coil and provided means of varying their relation to each other. This coil was connected in series with the plate circuit, through which the current from the "B" battery had to pass before reaching the plate. A magnetic field is set up in this coil, which field varies precisely with the grid voltages, and, as the two coils are coupled together, this varying field induces varying voltages in the secondary coil. The result is that feeble incoming signals are reinforced, with a corresponding increase in the plate current.

The effect of regeneration in a receiving circuit is to increase the negative resistance of the plate circuit, which is the equivalent of decreasing the effective resistance; so the only limiting factor is the capacity of the tube itself.

Due to this it is necessary to adjust the amount of feed back from the plate to the grid by adjusting the relation of

even the weakest signals manifest themselves in the secondary circuit, and this accounts for the long-distance reception this circuit is capable of. The plate current resulting from this weak signal is therefore correspondingly large. This method, if used in a plain ultra-audion hookup, would be very unsatisfactory, as any signal would be sufficient to cause it to spill over or to oscillate. It is therefore necessary to provide a means of controlling the regenerative action, and this is accomplished by means of the fourth circuit. The coil C is within the magnetic field of the grid coil B, and when condenser E is varied the reactance between this circuit and the grid circuit is varied. It will be seen that, if the tube circuit is in an oscillating condition, there will be a point in the fourth circuit, or what is known as the stabilizer circuit, at which it will absorb energy from the grid coil B. This is equivalent to inserting resistance in the grid circuit, and, as before mentioned, the grid circuit resistance, positive and negative, determines its point of oscillation. It is evident that if this circuit is in an oscillating condition the stabilizer can be adjusted to absorb enough energy from the grid circuit to just stop it from oscillating where signals will be heard strongest.

How to Construct and Tune a One Bulb Regenerative Set for Long Distance Work

(Continued from page 1)

Don't expect to get good results on distant stations unless you tune very, very carefully.

A great percentage of the efficiency of your outfit is in the tuning, and if you will learn the purpose of each instrument in your set you will get the most out of it. A combination of a good set with good tuning is what brings you the distant stations.

A single steel copper coated wire makes a very good receiving aerial and should be about 150 feet long, including the lead in; however, 175 or 200 feet will work satisfactorily with this set. The L top aerial, which receives slightly better from the lead in end should be pointed toward the distant stations you wish to receive.

Run your aerial at right angles to power lines, if possible, to avoid inductance. Also keep the aerial at least four feet away from tin roofs, spouting, etc.

Insulate your aerial perfectly with good insulators and solder any splices in case it should be necessary to splice two wires together. A tube insulator such as is used in house-wiring makes a good insulator through which to bring your lead in wire through the window frame or through a board the width of the window sash installed either above the upper sash or below the lower sash.

The higher your aerial the stronger the signal strength; also the stronger the static. However, make your aerial high and you can lower it in summer if you wish. We are using an aerial forty-five feet high at one end, fifty-feet at the other and 150 feet long, including the lead in.

Keep your aerial drawn up tight, for as the wind swings it the capacity is changed and will cause howling on the very fine tuning which is necessary for distant stations.

The material you will need for this set consists of 150 to 200 feet of No. 14 copper or copper-plated solid or stranded aerial wire, enough No. 14 or larger copper or copper-plated wire for your ground. The length of the ground wire will depend on the distance your set is located from where it is necessary for you to connect to the ground and should be as short as possible.

Two antenna insulators, one tube insulator, one standard variocoupler for tuning the primary with the units; ten taps and contact points for each tap; also two switches for the contacts in case you intend to install the set in a cabinet. If you are not going to assemble the set in a cabinet you need not purchase the two switches or contact points, but instead use two small clips, similar to storage battery clips, one soldered to the aerial wire and the other soldered to the ground wire.

In case you have a good variocoupler which is not of the units-tens type you can use it very nicely by the addition of a vernier .0005 variable condenser installed in the aerial or ground circuit. This condenser will allow you to tune your primary or aerial circuit between the taps on the coupler. You will also require:

- 1 Vernier .0005 condenser for tuning the secondary circuit. (Panel mounting type.)
- 1 Standard variometer, moulded bakelite preferred, for tuning the plate circuit.
- 1 Standard detector tube.
- 1 Standard detector tube socket.
- 1 Variable grid leak.
- 1 .00025 fixed grid condenser.
- 1 Vernier rheostat (for panel mounting).
- 1 Board.
- 1 Potentiometer, 200 or 300 ohms for panel mounting type connection across "A" battery.
- 1 .001 fixed condenser.

- 1 .002 fixed condenser.
- 1 Pair good 2,000 ohm phones.
- 1 22½ volt "B" battery.
- 1 80 ampere hour storage battery or at least 100 ampere hour capacity if you intend hooking to an amplifier now or at a later date.
- 15 Feet No. 18 tinned or copper wire for connections.
- 2 Phone binding posts.
- 1 Piece of bakelite or hard rubber 3/16 x 6 x 8 inches.
- 1 Piece of bakelite or hard rubber 3/16 x 1 x 3 inches for mounting phone binding posts.

Follow the directions already outlined for installing the aerial. You should have a pulley on one end so that you will be able to lower the aerial if necessary; also, it will be much easier to keep the aerial tight to prevent swinging. Keep in mind that the aerial receives better from the direction to which your lead in is attached. Your ground wire should be at least No. 14 gauge and should be made as short as possible from your instruments to the nearest water pipe at a point nearest where the water pipe enters the ground. After cleaning the water pipe thoroughly with a file, the ground wire should be wrapped on for about a dozen turns then well soldered to the water pipe. If you do not have a water pipe on which to make a ground connection a gas pipe will do, but as a rule does not make as good a ground connection.

The instruments should be installed on a board one-half inch thick by six inches wide. Everything should be perfectly insulated with all connections made as short as possible, particularly the connection between the grid leak and the grid. All the instruments should be connected as outlined in the diagram and checked over thoroughly to be sure they are right. The plate variometer next to the plate terminal of the vacuum tube, then one side of the phones should be connected to the other side of the variometer, then comes the "B" battery. The rheostat should be connected in the negative side of the filament circuit, etc. The vernier rheostat, potentiometer, variable condenser and .001 fixed condenser are mounted on a piece of bakelite or hard rubber 3/16 x 6 x 8 inches. The variable condenser, rheostat and potentiometer are of the panel mounting type. The bakelite panel should then be attached to the board in an upright position.

The red or colored cord from your phones should be attached to the terminal going to the plus side of the "B" battery, and in case your cords are both the same color you can try attaching them to your phone posts first one way and then the other, leaving them the way in which they bring in the signals loudest. This is important in order to get in the distant stations and give long life to your phones, for if the "B" battery current goes through your phones in the wrong direction it has a tendency to demagnetize the telephone magnets as well as decrease the signal strength.

If you will look over the construction of your units-tens variocoupler you will notice that by proper manipulation of the aerial and ground clips you can cut in one turn of wire at a time from the bottom of the primary to the top with the exception of a few turns in the center of the primary. The primary circuit consists of the aerial, primary, variocoupler and ground connection. The tuning to the wave length you wish to receive is all taken care of by the primary or the variocoupler. The secondary circuit consists of the secondary of the variocoupler, L2; the variable condenser, C1; the grid leak, grid leak condenser and connections. This secondary circuit should be tuned to resonance with the primary. The variometer, L3, in the plate circuit, is for tuning the plate circuit to resonance with the secondary circuit in order to make the set regenerate. The fixed condenser C4 is for the purpose of by-passing the radio frequency currents around the phones and also "B" battery. The radio-frequency current is not required in the phones, as only the pulsating direct current is used to operate the phones; therefore, by shunting this con-

(Continued on next page)

Valuable Advantages of Instruction by Radio in Public Schools

By *William L. Ettinger*

Superintendent of Schools of New York City

THE experiment in teaching a class by radio, recently carried on at the Haaren High School, New York City, through the courtesy of WJZ and the Radio Corporation of America, was an unqualified success. While I do not believe that this method of instruction will ever do away with the services of the classroom teacher, yet I am convinced that a new field in education has been opened by this experiment, which has wonderful possibilities.

In a large city system it is often necessary to get official notices to schools in a very short space of time. In New York City, where there are over 500 elementary schools, 32 high schools, and numerous special schools, it is obvious that the mere mechanical work involved in sending out such a notice requires the time of a considerable number of people. With a broadcasting station at educational headquarters and receiving sets in all the schools the problem would have a simple and instantaneous solution. All large cities in the country have conditions similar to those in New York City.

Directors of special branches, special teachers and supervisors could give demonstration lessons directly to groups of teachers or classes, with a great saving of the time now wasted because teachers are obliged to travel long distances in order to attend a conference at some central place.

Famous men frequently visit the city, and they are sometimes willing to address school assemblies, but only one or two schools are fortunate enough to hear them. Radio communication would make it possible for all the school assemblies in the city to hear such a speaker if he were stationed at school headquarters. When one considers that schools all over the country may listen in at the same time, the possibilities for hearing great speakers seem to be almost unlimited.

In rural school communities the chances for radio instruction are much greater than in cities. No longer need the rural school be isolated or entirely dependent upon the services of a few poorly trained teachers. The country school-house can now be put in touch with the best instruction in the world by simply installing a radio set.

A suggestion may not be out of place here. Many schools having receiving sets are unable to get much that is worth while during the hours of the day that classes are in session. Could not a movement be inaugurated for having broadcasting stations send out educational programs suited for school instruction during these hours? A movement of this kind would be of great benefit to schools already possessing radio sets and would also be an inspiration to other schools to purchase them.

(Concluded from preceding page)

denser around the phones and "B" battery you cut out a considerable amount of resistance for the radio-frequency current which travels through the plate circuit. The fixed condenser, C3, which connects the movable contact on the potentiometer and the plus lead of the storage battery circuit, is used for the same purpose as condenser C4. The ground connection from the plus lead of the storage battery is used to cut out induction.

In tuning for distant stations it is well to first tune in a nearby station on, say, a 400 meter wave length to the exact tune with your primary and secondary circuits, first turning on your rheostat to the point where you hear a hissing in the phones and having the movable contact on the potentiometer set about one-fourth the distance from the plus lead connection of the storage battery and with the vernier plate on the variable condenser about half-way in between the fixed plates of the condenser. This setting of the vernier condenser will allow you to get a fine adjustment by its use after you have already tuned in with the regular condenser dial. You should tap on the 18 volt tap of the "B" battery provided it is reasonably new, otherwise you may tap on for more voltage. The proper tap can be determined by experimenting.

The plate variometer should then be adjusted until the loudest signals are heard in the telephones without distortion. The rheostat should now be turned back and left at the point where you get the signals in loudest with the least amount of noise or hissing and the potentiometer should be changed to the point where you get the signals in loudest without hissing.

Turn on the rheostat a little stronger or until you hear the hissing again and then go after a much more distant station which you know to be on a 400 meter wave length. Change the secondary condenser or the plate variometer or a combination of both, or possibly changing the primary connection one or two turns either way until by careful manipulation you get in the distant station loud,

then adjust the vernier rheostat again until the broadcasting is loudest with the least amount of hissing or noise; after which you should stabilize the circuit further by use of the potentiometer. You will notice as you adjust the variometer for a distant station you will first get a squeal, which is the carrier wave, and as you turn the dial slightly the frequency of the carrier wave will become less and less until you reach a point where you cannot hear it and as you turn the dial still further you again hear the carrier wave, the frequency increasing as you turn the dial. The dead or zero point of this squeal is called the "zero beat," and is the best possible adjustment for the reception of music, for then you will have maximum volume and no distortion. You should now change the variable grid leak to the point where you get the loudest signals without distortion, then leave it there, as this is the proper setting for all stations for the detector bulb which you are using. If you should later install another detector bulb you may have to again adjust the grid leak. About one-half megohm is correct for the radiotron or Cunningham detector tubes.

By first tuning in a local or nearby station you get roughly the proper adjustment of your circuits. Then by tuning in a more distant station you get still finer adjustment on the circuits for 400 meter wave length. Now if you have tuned in a distant station very carefully you can possibly get a much more distant station or stations by careful adjustment of the plate variometer only. If not successful in this change the secondary tune slightly by use of the variable condenser; then with the variometer, go after the "zero beats" of the carrier waves you may hear.

The three circuit tuner provides the best method of receiving what you want to hear and eliminating what you do not wish to hear. However, you have to pay for the extra distance over which you will be able to receive and for the eliminating of interference, by some very careful tuning. If you do not tune very carefully you can very easily run through some of the very distant stations without hearing them at all.

WEAF, The Last Word in Broadcasting Studios

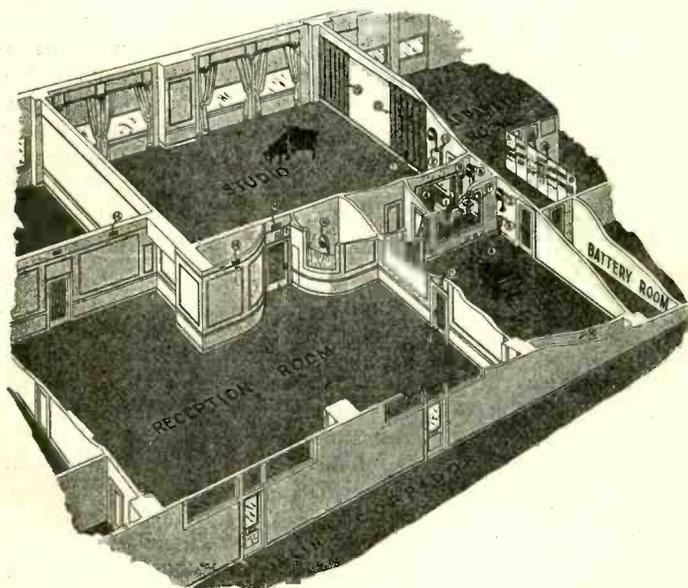
By Edgar H. Felix

COMPRISING the latest developments in studio acoustics, arrangement and technical improvements WEAF's new studio and remote control facilities in the Telephone and Telegraph Building at 195 Broadway, New York City, are the latest in broadcasting.

Minute attention to detail is responsible for much of the improvement in acoustic properties. The parquet floors are laid in pitch and are insulated from the walls of the studio. False walls are used between the studios and the hall to introduce a dead air space, making them practically impervious to sounds in the hall.

The draperies on the walls are so hung that they can be adjusted to give the correct degree of deadening. Heavy brass bands require more deadening than a quartette or a pianist. A speaking voice requires the least deadening for good transmission.

The paramount feature of the new studio installation



Isometric view of the new broadcasting layout of Station WEAF.

is the use of two studios, a small one for singers, speakers and small groups of instruments and a second large studio for bands, large choruses and orchestras.

The use of two studios will improve the running off of programs because it will obviate much of the delay to which the radio audience is subjected when single studios are used.

The accompanying illustration shows the arrangement of the new studios. The announcer's microphone (1) is located in a sound-proof booth having double plate glass windows and giving clear vision to both studios. Special walls render the booth impervious to outside interference. The loud speakers (2) and (3) in the studios repeat the announcer's introduction of the artists and also enables him to give directions regarding the placing of instruments and singers while the studio is idle. Switches on the announcer's panel (4) enable him to switch in his own microphone or those in the large and small studios (5, 6 and 7). There are two microphones in each studio, one regular and one emergency. The announcer's loud speaker (8) enables him to hear the performance as it is heard by his large unseen audience so that he gives his directions from the listener's point of view instead of a studio one. The signal lights (9 and 10) indicate by colored lights, whether the studio is on the air, the carrier wave is being sent out, the microphones are switched in or studio director or announcer are wanted on the telephone. Each door of the studios has a red signal light (11) which indicates that the particular studio is broadcasting at that time. If any one disregards this signal and opens the door when transmission is taking place, the loud speakers are automatically disconnected. As a further precaution the doors (12) are equipped with special knobs which can be opened only by one that is familiar with them. A loud speaker (13) concealed in a closet reproduce the entertainment for anyone in the reception room. A ventilation system (14) keeps the studios cool and well ventilated under all conditions. Adjustable deadening curtains (15) are readily adapted to suit the form of program being transmitted. A double wall with dead air space (16) prevents radiation of hall and elevator noises from the main corridor to the studio. The announcer who is the king of the whole situation is in direct communication with the engineers through line telephone (17). The equipment panel (18) is mounted with all necessary apparatus for controlling the microphone amplifiers and input currents to the special cables connecting the studio with the station as well as the station to outside points. Special equipment for equalizing lines to correct attenuation as well as instruments for measuring the gain of any amplifier or group of amplifiers are provided. Behind the panels is a large loud speaker (19) which provides the monitoring engineers with either the studio output or with the output of a loop receiver.

Radio Traffic in Italy Rapidly Increasing

The volume of radio traffic in Italy has increased at a surprising rate during the past four years, Trade Commissioner Osborne at Rome reports. In 1919, Italian statistics show only 50,000 words were transmitted, but it is now estimated that in 1923 this will

increase to seven million words. This month a new station at Coltano, Italy, will be opened for commercial traffic and direct communication between New York and Rome will probably be established. Today this traffic is handled via Berlin, Paris or London.

Coming! New List of Broadcasters!

While the Department of Commerce has assigned wave lengths for each of the broadcasting zones established by the recent Second National Radio Conference, individual assignments of station wave lengths have

not been announced. They are being arranged as rapidly as possible and as soon as finished **A COMPLETE, UP-TO-DATE LIST OF BROADCASTERS** will be published by **RADIO WORLD**.

The allocation of wave lengths for ten new Class A stations appears in this issue of **RADIO WORLD**.

New Jersey Radio Manufacturers Move for Stability in the Industry

IT is an apparent fact that New Jersey is an important center of the radio manufacturing industry. During the past few years many of the largest and best equipped radio manufacturers have located in and around Newark, the big city of New Jersey.

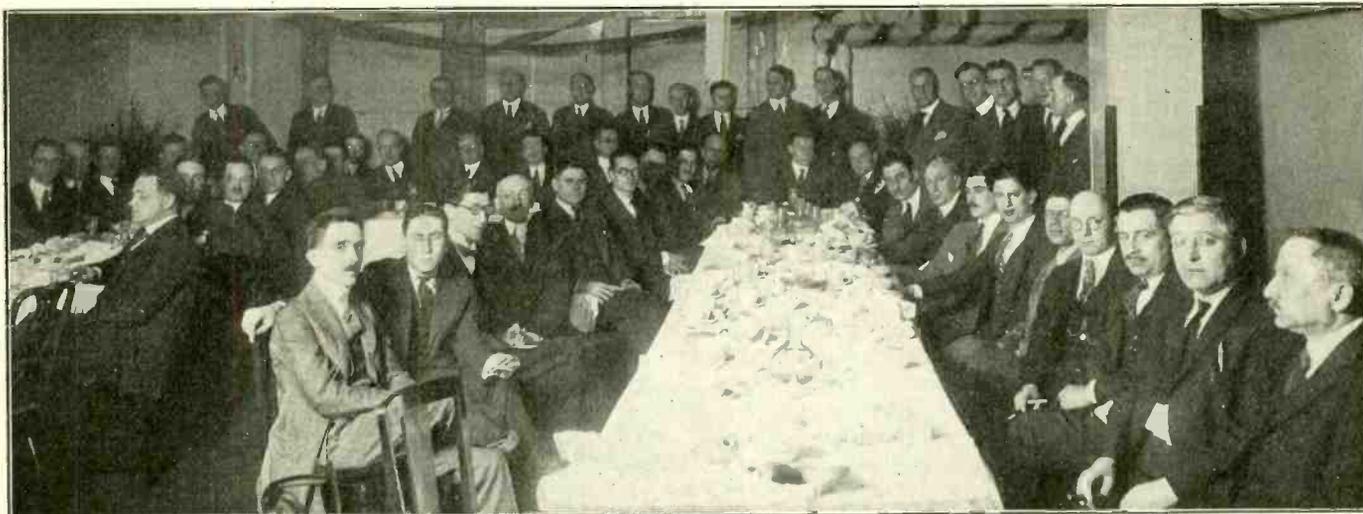
Because of the tremendous growth of this industry during the period of the boom, and the consequent failure of many manufacturers when the market became flooded with inferior goods due to turning out quantity production rather than quality, it was thought a good plan to organize for the protection of the trade.

To stabilize the industry, keep it on a firm business basis and protect the reputable manufacturers, the Radio Manufacturers' Association of New Jersey was organized on April 5, 1923, with 31 reputable manufacturers as charter members.

The officers elected and who will serve until the end of the year are: W. S. Lefebvre, Sheltone Mfg. Co., president; J. A. Harvey, Harvey Mfg. Co., vice-president; Ross Amos, Fibre Products Co., treasurer; H. L. Denburg, Royal Electrical Laboratories, secretary.

The charter membership of this organization includes the most active and reputable firms engaged in the business of manufacturing radio parts and sets, and is as follows:

City; H. C. Gawer, R. C. A., New York City; W. S. Lefebvre, Sheltone Co., Newark, N. J.; John A. Harvey, Harvey Mfg. Co., Newark, N. J.; W. E. Harkness, A. T. & T. Co., New York; George F. McClelland, A. T. & T. Co., New York; William R. Brogh, W. B. L. Radio Co., Newark, N. J.; Otto Herschkowitz, Ajax Radio Corp., Newark, N. J.; Jack Larson, W. B. L. Radio Co., Newark, N. J.; A. R. Mortan, Clapp-Eastham "Radak," 395 Broadway, New York City; W. H. Frasse, Daven Radio Co., Newark, N. J.; P. W. Golden, A. B. Cole, Inc., Newark, N. J.; T. F. W. Meyer, Mydar Radio Co., Newark, N. J.; L. E. Gehman, L. E. Gehman & Co., Newark, N. J.; G. A. Thomson, Diamond Elec. Spec. Corp., Newark, N. J.; F. M. Rosenfeld, Diamond Elec. Spec. Corp., Newark, N. J.; Harvey Mansfield, Radio Broadcast, Garden City, N. Y.; Arthur H. Lynch, Radio Broadcast, Garden City, N. Y.; F. M. Artley, Artley Products, Inc., Jersey City, N. J.; R. E. Perrin, Artley Products, Inc., Jersey City, N. J.; Mortimer Salzman, Wholesale Radio Equip. Co., Newark, N. J.; D. McCormack, Radio Supplies, Newark, N. J.; W. B. Curtiss, Curtiss Radio Sales Co., Newark, N. J.; H. R. Rose, Shamrock Mfg. Co., Newark, N. J.; D. W. May, D. W. May, Inc., "W. B. S.," Newark, N. J.; F. Russell, Shamrock Mfg. Co., Newark, N. J.; D. Wald, Wald Electric Co., New York City; Charles A. Gould, Gould Storage Battery Co., New York City; O. H. Caldwell, Electrical Merchandising, New York City; H. L. Denburg, Royal Electrical Laboratory, Newark, N. J.; A. Rubin, Henry Hyman Co., 476 Broadway, New York City; B. Muldoon, Henry Hyman Co., 476 Broadway, New York City; E. Anglin, Henry Hyman Co., 476 Broadway, New York City; L. A. Nixon, The Radio Dealer, New York City; M. P. McNeely, The Radio Dealer, New York City; D. S. Walker, Harvey Wire Co., Newark, N. J.; James P. Black,



Representatives of the radio industry at the dinner of the Radio Manufacturers' Association of New Jersey, Newark, N. J.

A. B. Cole Co., Newark; Adams Morgan Co., Upper Montclair; Ajax Elec. Spec. Co., Newark; Daven Radio Co., Newark; Davis Radio Co., Keyport; Diamond Spec. Co., Newark; Duranoid Co., Newark; Eagle Radio Corp., Newark; Essex Spec. Co., Berkley Heights; Fibre Products Co., Newark; Lloyd Gehman, East Orange; Harvey Mfg. Co., Newark; Mack Moulding Co., Little Falls; Metro Elec. Co., Newark; Multiple Elec. Prod. Co., Newark; Mydar Co., Newark; Murad Laboratories, Asbury Park; Newark Spinning & Stamping Co., Newark; Radio Detector Co., Newark; Royal Electrical Laboratories, Newark; Shamrock Mfg. Co., Newark; Shaw Insulator Co., Irvington; Sheltone Mfg. Co., Newark; Standard Crystal Co., Newark; Standard Metal Co., Newark; Standard Radio & Equipment Co., Newark; Thresher Radio & Mach. Co., Newark; Union Radio Co., Newark; United Specialties Co., Newark; W. B. L. Radio Co., Newark; Woodside Mfg. Co., Newark.

As reported in RADIO WORLD last week, a combined business meeting and dinner was staged by the Radio Manufacturers' Association of New Jersey and the Radio Trade Association at the St. Francis Hotel, Newark, on the evening of April 26. In the accompanying illustration is portrayed the attendance at the dinner which included the following gentlemen:

C. B. Cooper, Crosley Mfg. Co., 1803 Tribune Bldg., New York

Harvey Wire Co., Newark, N. J.; Ralph Coen, The R. C. Mills-The R. C. Outlet, New York City; Harry S. Welker, The Wireless Age, New York City; Victor Hamerslag, Newark Ledger, Newark, N. J.; A. O. Karsten, Royal Electrical Laboratory, Newark, N. J.; H. E. Bennett, Radio Dealer, New York City; Edward Reese, Standard Crystal Co., Newark, N. J.; Edward L. Becker, Crocker-Wheeler Co., Ampere, N. J.; Stanley C. Bryant, L. S. Brach Mfg. Co., Newark, N. J.; J. Maurice Casper, Radio Dealer, New York City; H. Barron, Rooker & Barron Mfg. Co., Newark, N. J.; George Ollendorf, National Light & Elec. Co., Newark, N. J.; F. C. Manning, United Spec. Co., Inc., Newark, N. J.; A. M. Joralemon, National Carbon Co., Long Island, N. Y.; W. R. Lawrence, Standard Metal Mfg. Co., Newark, N. J.; Ross Amos, Fiber Products Co., Newark, N. J.; Arnold D. Friedman, RADIO WORLD, New York City.

Newsdealers Will Deliver Radio World to Your Home

If you have daily, weekly or monthly publications delivered to your home, you can also instruct your dealer to deliver RADIO WORLD with your other papers.

A Remarkably Good Selective Receiver

By C. White, Consulting Engineer

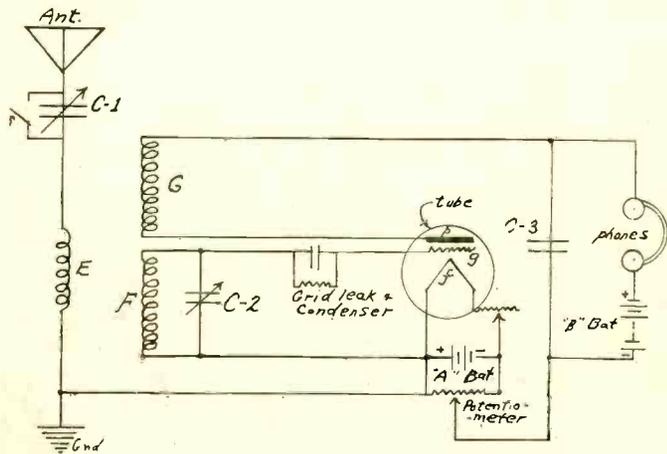
THE results that can now be obtained with a well-made single circuit regenerative tuner are really nothing short of remarkable. But the users of such outfits in some cities and certain localities are experiencing quite a bit of trouble with interference. It is, indeed, sad that the single circuit tuner has not the selectivity of the more complex types, for without doubt it has good volume. Then again, a single circuit tuner will pick up more interference from your neighbor's set than a coupled circuit tuner. Aside from the fact that a single circuit is simple to operate one of the most potent reasons for its popularity is its economy. The triple circuit tuner with its two variometers and a variocoupler to start with costs more than the best type of single circuit affair. Yet if the ambitious radio fan will take his time and patience he can actually build a triple circuit tuner for the same

desirable to procure a mica condenser and a good grid leak in order to insure quiet operation.

Owing to the fact that there are so many different types of detector tubes upon the market it is of the strictest importance to see that the filament rheostat has a resistance large enough to give ample room for gradual and steady filament control. Do not try to operate a UV-199 tube with a six ohm resistance for a rheostat and expect to get very wonderful results. As a good rule of thumb it is well to remember that the resistance of a rheostat should be about the voltage rating of the tube divided by the rated filament current of the tube. For an example, the new UV201-A radiotrons have a filament rating of .25 amperes at five volts. Dividing five by .25 we get 20 ohms as an approximate resistance for the filament rheostat. Remember that the figure is only approximate but it is obvious from the little calculation that a six ohm rheostat will not do the trick in the right way. A potentiometer of 250 or 300 ohms is employed to smooth out the regenerative adjustment thus adding increased stability to the tuning in of distant and weak stations.

As I previously have stated the trick to the economy of this particular three circuit receiver is the construction of the tuning element E, F, and G. The coil E is wound with No. 22 D.C. magnet wire on a good molded bakelite or formica roter. It should have about 40 to 50 turns. The coil F is stationary and is wound on a four-inch bakelite or formica tube. It should have about fifty turns with No. 22 D.C.C. wire. This coil should be wound with the wire spaced apart. This is best accomplished by winding the wire with a piece of cord between each turn of wire and the next, shellacing the finished coil and removing the cord when dry. This arrangement spreads the coil and decreases disturbed capacity, the foe of selectivity. It would be well to wind the coil E in a similar manner if there is enough room on the rotor form. The coil G is wound on the same type of rotor form as the coil E with No. 22 D.C. C. magnet wire likewise, but has only 30 to 35 turns.

The assembly of the complete tuning unit should be as follows: The secondary or coil F is the stationary form, coils E and G are attached to each end respectively of the tube upon which W is wound. In other words the unit looks just like a standard variocoupler which has two rotors, one at each end of the stator tube, instead of one at one end only. Care should be taken in the mechanical construction to see that the two rotors do not touch when moved. The tube should not only be long enough to prevent this, but also for ample fastening of the rotor shafts on to the tube at each end. The coupling between the secondary and the primary can be adjusted separately from the tickler coupling. If the primary were made the stator then the secondary would be movable, and when the secondary and primary coupling would be changed the tickler coupling would be altered in the same amount approximately.



Connections for the tuner and hook-up of Mr. White's selective receiver.

cost as a good single circuit. The secret of the whole thing is the construction of the tuner elements. Instead of using the standard types of variocouplers and variometers, a special combined inductance unit is employed. The coupler will embrace all the wavelengths employed in broadcasting without the use of switch-points. Of course, if more latitude is desired the primary can be loaded by means of honeycomb coils.

In the illustration herewith is shown the connections of the tuner. The primary circuit can either be tuned or untuned depending upon the type of signal and the amount of selectivity desired. A tuned primary will give greater selectivity. The secondary is likewise tuned, still further increasing the selectivity of the tuner. Although tuning the secondary by means of a condenser instead of a variometer is not as desirable, yet owing to the quiet operation of the former and the saving of time in adjusting for operation, I certainly think that the sacrifice is justifiable. The ordinary three circuit tuner is too selective for the average novice to operate with ease, while a single circuit removes this trouble but adds the one of poor tuning. This receiver lies between the ordinary single circuit and the standard triple circuit in sharpness of tuning. The constants of the circuit are as follows: The condenser C-1 is a 23 plate air variable, C-2 is an 11 or 13 plate air variable, and C-3 is a .002 mfd. mica condenser used as a bypass. The size of grid leak and condenser will depend solely upon the tube used, but, as a general rule a .00025 mfd. condenser with a two megohm leak will suffice for most cases. It is very

DO YOU WORK IN A RADIO FACTORY?

If so, it would pay you to represent **RADIO WORLD**. Get subscriptions and earn a generous commission for doing so. Everybody connected with your concern, from the boss down to your fellow employees, should read **RADIO WORLD** every week.

Address Subscription Manager, Radio World, 1493 Broadway, N. Y. C.

"This Is Station WGY Schenectady" —Its Powerful Equipment

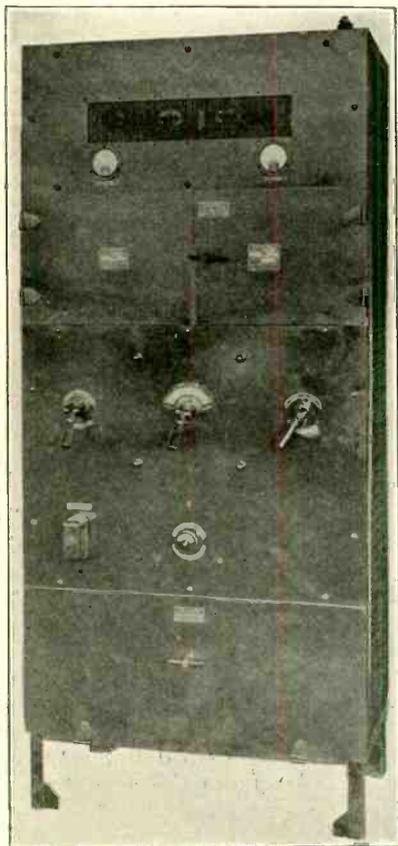
By Robert L. Dougherty

TO many broadcast listeners, station WGY, General Electric Company, Schenectady, N. Y., does not need any introduction. It will be of interest to readers of RADIO WORLD, however, to know that this powerful station has practically covered the entire Western Hemisphere. Its western record is Hawaii, a distance of over 5,000 miles direct air-line, and its eastern record is Paris, France, a distance of 3,225 miles. Its southern record is Peru, a distance of 3,230 miles.

The apparatus in this marvelous broadcasting station, since its installation 12 months ago, has been constantly changed to eliminate all objectionable features in an effort to make it one of the most powerful in the land.

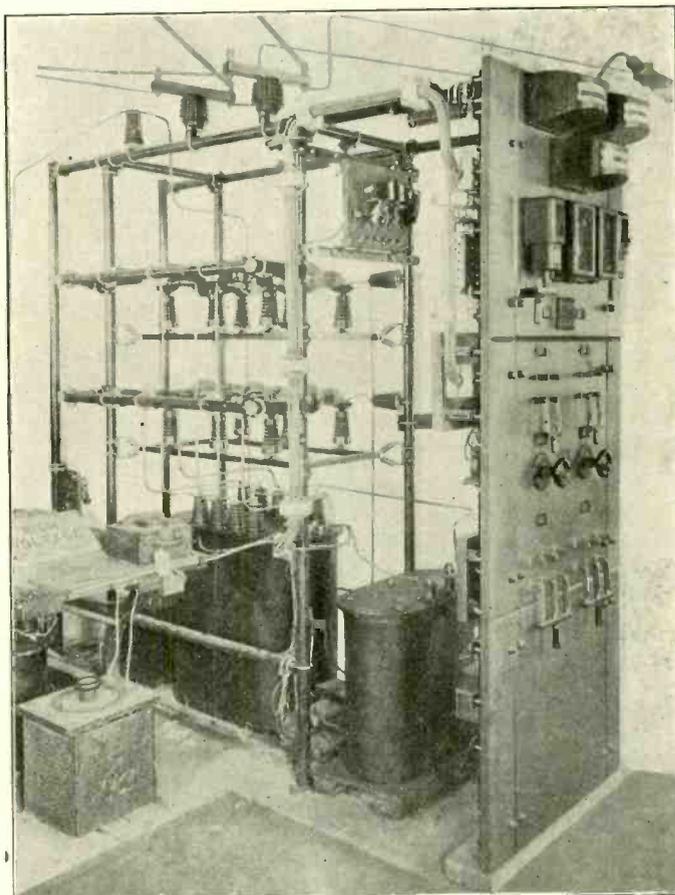
ing of time signals. In order successfully to accomplish this, WGY uses the apparatus shown in Fig. 4. This consists of a special trap circuit, shown on the extreme left hand, a tuning unit next to it, and a special set of amplifiers, with a power amplifier, at the end to boost the current, which is then transmitted directly into the set by means of a loud speaker.

In order to broadcast services from the different churches and institutions, it is of course necessary to have separate control at the place where the service or program takes place. This instrument is shown in Fig. 3. With this apparatus the man located at the transmitting end is enabled to control perfectly the program as to modulation and loudness before it is sent over the land lines to be further amplified and



(C. Photonews, N. Y.)

Fig. 1—1-KW transmitter panel, such as used at WGY, Schenectady, N. Y.



(C. Photonews, N. Y.)

Fig. 2—Kenotron assembly panel, used to supply 12,000 volts D.C. to the plates of the tubes.

Fig. 1 shows the 1-kw transmitter control panel as now used by this station. With this panel either CW, ICW or telephone may be used at the will of the operator. It employs four 250-watt radiotron tubes—two as oscillators and two as modulators—with two 50-watt radiotrons as speech amplifiers. The current for this panel is supplied from a three-unit motor-generator. It is a double-current self-excited generator and a high-voltage direct-current generator, driven by a single phase direct current motor, supplied from a 110-volt line.

This station is particularly successful in the relay-

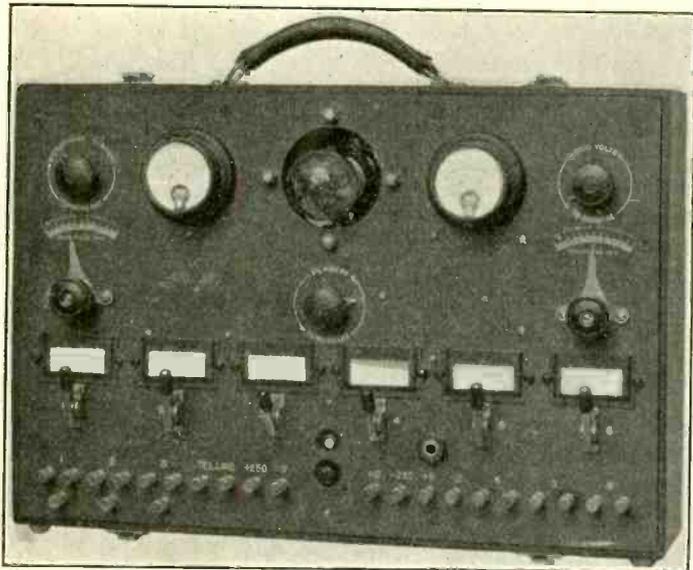
then broadcast, by means of the regular station equipment. By this method finer adjustment is possible and the man at the transmitter of the station does not need to bother with anything else but the fact that the amplifiers, and broadcasting transmitter are functioning satisfactorily. Such equipment as this is getting to be quite common in the cases where the actual performers are located at a great distance from the studio, and it is by the use of such apparatus as shown that perfect modulation and transmission can be obtained, with the least amount of trouble and the conditions

(Continued on next page)

(Concluded from preceding page)

along the line changed, to suit the nature of the performance.

When this station is operating on full power, 12,000 volts must be supplied to the plates of the tubes. This is done by the kenotron rectifier shown in Fig. 2. In the rectifier the delta-connected primary is supplied from a three-phase 220-volt generator. The high tension windings of the transformers are connected to form two Ys, 180 degrees out of phase. Each Y, with its rectifying tubes (kenotrons), is thereby a half-

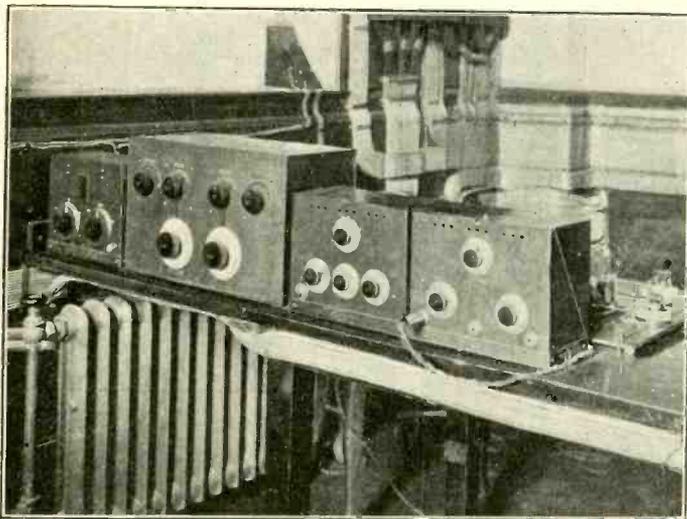


(C. Photonews, N. Y.)

Fig. 3. Church control system panel. Used where a program is to be broadcast from a distant point and no amplifying system is present.

wave rectifier. There are six kenotrons used in this set, the holders for which are directly back of the board. This rectifier will allow 12,000 volts to be supplied to the plate current, but with a ripple effect of less than one-tenth of one per cent.

The oscillator and modulator assembly is illustrated in Figure 5, and utilizes a tank circuit loosely coupled

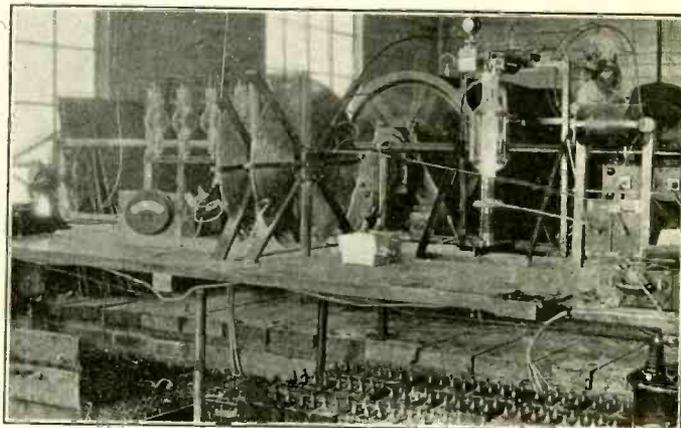


(C. Photonews, N. Y.)

Fig. 4. Time signal transmitter and amplifier used to retransmit time signals from the Naval Observatory, Washington, D. C.

to the antenna in such a manner that the frequency is determined by the constants of this tank, or dummy circuit. The oscillator uses one tube (UV-208) which is operated at reduced output. It is shown in the right center of the illustration. The modulating system employs five tubes (UV-206) and the plate method of modulation is employed.

People listening to a broadcast program do not realize the extreme care and accuracy that must be used in order to furnish them with a well worked out and transmitted program. Before the station opens, the staff is all on hand, and all clocks are checked to the second, as the studio where the actual performers sing or talk is located at a distance from the control and transmitting room and no mistakes as to time can be allowed. Before the actual operation of the station, the power men throw the complete assembly of operating apparatus to a dummy antenna and carefully check all readings. Then the apparatus is switched on the antenna, and a signal from the power house (located at distance of 3,000 feet from the operating room) tells the operators that everything is in readiness from an operating standpoint. When the program is started, the men at the power house listen in and tell the operators and the man in charge of the studio whether the modulation and signals are perfect; if not, they are immediately corrected. For every different kind of program a different type of microphone



(C. Photonews, N. Y.)

Fig. 5. Modulating and oscillating equipment. One oscillator and five modulating tubes are used. The oscillator is shown in the right center of the illustration and the modulators are directly to the left of the tuning system.

must be used and also the modulator system rechecked. This is done to conform with the amount of power necessary as it requires more power to transmit a vocal solo properly than it does to transmit a band or dance orchestra. Checking is constantly going on, and listeners at a distance cannot realize the activity that is necessary to transmit a program that they will receive perfectly.

WGY was the first station successfully to use the pallophotophone in the re-transmission of talks by famous persons. The first test on this marvellous device was heard and recorded in London, England, and Paris, while the person who delivered the address was many thousand miles from the actual transmitter.

Important Notice About Change of Address

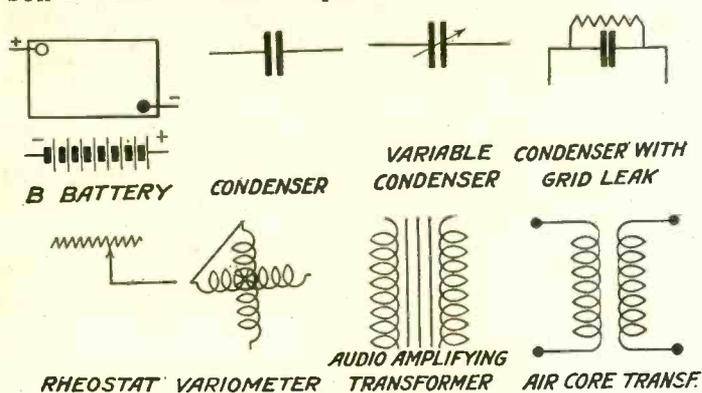
Owing to the increase in circulation of RADIO WORLD and the fact that we have to go to press earlier, it is necessary that all changes in subscribers' addresses should reach us two weeks before date of publication. If you are going away, or contemplate changing address in the near future, please send in your change at once.—Subscription Dept., RADIO WORLD, 1493 Broadway, N. Y. C.

Elementary Instruction for the New Army of Radio Beginners

Constantly Used Terms Explained
in Plain Language for the
New Radio Enthusiast

By Lynn Brooks

RHEOSTAT: An instrument used to reduce the amount of current flowing in a circuit. It is found in numerous forms, but the type with which we are concerned is that which varies the filament current. Generally it consists of a number of turns of german silver or other high resistance wire wound on a former which is circular or semi-circular in shape. Contact and variance of the resistance are made by means of a slider which passes over the wire. The rheostat sometimes takes the shape of a pile of carbon discs which are either compressed or released by means of a screw arrangement. When they are tightly compressed the resistance is very low and increases as the screw is released, reaching its maximum resistance when the carbon discs are as loose as possible.



Symbols used in drawings of radio apparatus to indicate the various parts.

VOLT: The measure of pressure or electromotive force, in an electrical circuit. Discovered by Count A. Volta, an Italian electrician. When measuring pressure, such as that caused by water flowing in a pipe, we would say that the pressure was so many pounds per square inch of surface. In electricity we measure the pressure in volts. A volt is the force necessary to cause a current of one ampere to flow through a circuit having a resistance of one ohm.

COULOMB: The time measure of "quantity" as related to electrical current. Discovered by C. A. De Coulomb, French scientist. It is the quantity of electricity that will pass a given point in an electrical circuit in one second. To measure coulombs it is necessary to measure the quantity of electricity delivered by a current having a strength of one ampere flowing for one second of time. Thus, a current of one-fifth ampere must flow continuously for five seconds to deliver a coulomb of electricity. A current of 10 amperes flowing through a conductor for one second would thus be 10 coulombs of electricity.

AMPERE: The measure of current flow in an electrical circuit. Discovered by A. M. Ampere, French

scientist. An ampere is the current resulting from overcoming a resistance of one ohm in an electrical circuit under the pressure of one volt. Thus to find the amperage in a circuit it is necessary to divide the voltage by the resistance—the result being the amperage of the circuit.

WATT: The unit of electrical energy or power. It is the product of the voltage and current in a circuit when there is one volt and one ampere in the circuit. A horse-power equals 746 watts.

FORMULAE: For determining the voltage of a circuit use this formula: Voltage = Amperage multiplied by Resistance.

Problem: Known resistance 6 ohms. Known amperage two amperes. Find the Voltage. Amperage X Resistance = Voltage. $2 \times 6 = 12$ volts in the circuit.

For determining the amperage in a circuit use this formula: Amperes = Voltage divided by Resistance. Problem: Known voltage 12. Known Resistance 6 ohms. Find the amperage. Voltage \div Resistance = Amperage. $12 \div 6 = 2$ Amperes in the circuit.

For determining the resistance in a circuit use this formula: Resistance = Voltage divided by Amperes. Problem: Known Voltage 12. Known Amperage 2. Find the resistance. Voltage \div Amperage = Resistance. $12 \div 2 = 6$ Ohms resistance in circuit.

For determining Watts in a circuit: Watts = Volts X Amperes. Problem: Known voltage 12. Known amperage 2. Find the watts. Voltage X Amperage = Watts. $12 \times 2 = 24$ Watts in the circuit.

Radio Produces Piano Music from an Organ

By Jean Franklin

WHILE calling upon a prospective customer recently I saw a little child seated at an old organ and yet the music was that of a piano, which led me to ask questions. The big brother had purchased the old organ from a second-hand dealer for \$5.00 and brought it home. Every one jeered at him and at his purchase, but "the way of the truly radiophan is hard"; so he kept his counsel and packed the old organ to his workshop. Here he removed carefully the scroll woodwork above the stops, set in his bakelite panel, and behind this installed his radio set.

The organ possessed a roll top and when the radio is not in use, he rolls down the top and secures it from dust and dirt. The set did not interfere with the mechanism of the organ in the least and he later had carved an aperture in the bottom beside the pedals, and here he has placed his loud speaker.

For my entertainment the sister, who was an excellent musician, was called in and she accompanied on the organ the voice that was singing via the radio. The happy little family also told me of sending in a request to sing one of their favorite numbers one evening. The request was complied with by the broadcasting station and the daughter accompanied the musicians who were playing so far away and the other children sang the same melody.

As I left the happy household, the little mother explained to me that previous to the advent of radio in their home, one daughter spent her evenings in a dance hall on the other side of town, her sons in a pool hall, and her husband at his store; but now the family hurried through supper and had their friends come in to hear the concerts.

Pictures in Wide Variety Collec

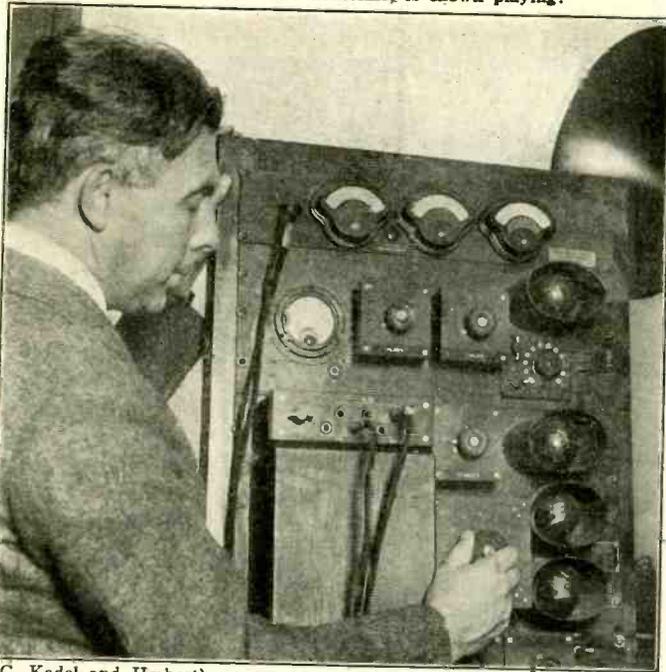
Captions by Ro



(C. Kadel and Herbert)
Thousands of people have enjoyed listening to the organ recitals broadcast from Station WEAF every Sunday, but few have had a chance to see the monster organ. Here is shown the manual of the Skinner organ, which has 3,500 pipes, 44 stops and all horns, chimes, harps and full equipment. It cost over \$50,000.00 to install. William E. Zeuch, noted organist, who has entertained thousands, is shown playing.



(C. Photonews, N. Y.)
Charles Ray letting his "pet houn' dog" listen in. "Whiskers" evidently doesn't think much of the soprano concert being broadcast and is just about to let the world know by a prolonged wail of protest against all soprano singers in general and that one in particular.



(C. Kadel and Herbert)
The speech amplifier control used to modulate the Skinner organ recitals before they are sent over the land wires to the operating room of WEAF. Because of the great volume of sound produced by an organ on the deeper tones it is necessary to regulate the apparatus extremely carefully if perfect reproduction is to be obtained.



(C. Harris and Ewing)
First and exclusive illustration of Surgeon General Hugh S. Cumming, of the United States Public Health Service, in the radio room at Health Headquarters, Washington, D. C. This service is devoted exclusively to broadcasting health lectures on how to cure and prevent disease. The broadcasts are relayed through regular land wires to the Government broadcasting station at Arlington. These health talks are sent out twice a week, and arrangements are being made to increase the service until forty stations, covering the entire United States, are broadcasting them.



(C. Keystone Views)
The boys of Dr. Bernardo's school, London, England, were recently presented with the set illustrated, to enable them to listen in on the Paris and New York broadcast programs. The photo shows Lady Torrington, its donor, listening in on one of the New York programs.



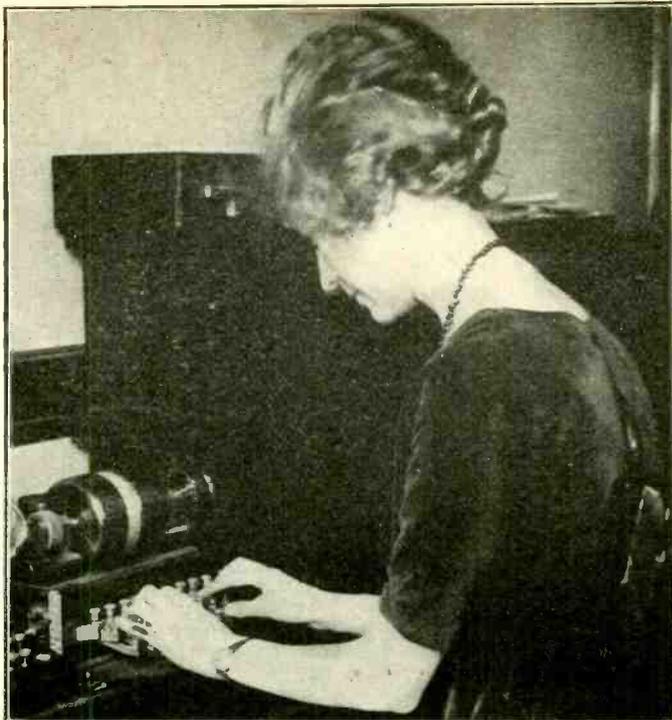
(C. W. T. Meyers)
Powell Crosley, Jr., President of the Crosley Manufacturing Co., Cincinnati, is shown with the new equipment of Station WLW. The transmitter on his right is the new 500-Watt Electric control board. The speech modulator and amplifier is located directly next to the operator, who has ample means of listening in on the program and changing conditions to suit the needs.

ected for Radio World Readers

bert L. Dougherty



(C. Wide World Photos) The proprietor of the "Butchers' Arms," Cross Land, Salford, England, has installed a complete receiver to keep his customers busy and buying. No Oscar, the glasses do not contain root beer, as soft drinks are taboo in that particular atmosphere, even though they do use soft tubes as detectors. Who wants to be proposed for the next election as chief broadcaster and announcer in Great Britain? Now, one at a time—one at a time!



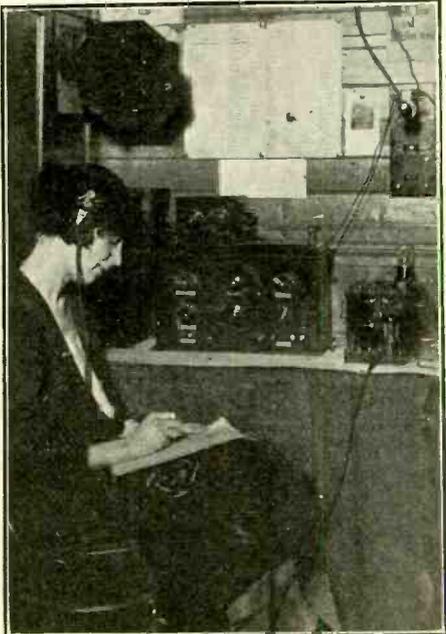
(C. Harris and Ewing) The latest code invention, which is capable of 11,881,376 changes by the mere twist of that little dial on the left-hand side of the machine. It is used by the U. S. Government instead of the bulky lead covered code books which were always such a temptation to the secret agents of other governments.

(C. Photonews)

Douglas Fairbanks shows how Robin Hood, the Merry Outlaw of the Twelfth Century, might—I said might—look if you could persuade him to get close enough to a modern Magnavox while a broadcast program was going on. They must be announcing a funny joke to make a busy man like Doug smile that way. Oh, well, radio does relieve once in a while. Who is it Doug? New York or London?



(C. Wide World Photos) London has really gone radio mad, don't you know. They are now putting receiving sets on the private cars of the elite, so that they won't even miss a word while they are rushing to their offices.



(C. Fotograms, N. Y.) The last word in convenience has at last been made, thanks to radio. You can now reserve your seats in B. F. Keith's Royal Theatre, New York City, via radio. Miss Theresa Mardigan, operator, is always willing and ready to take your order over the air, and she can't talk back and say "sorry," either. Say, fans, notice the little old loose coupler all by its lonely? How well do I remember—?



(C. Kadel and Herbert) "Let them that want to dance themselves into a fit do so," is Mr. Harold Stein's motto. He is out after the "Radio Golf" endurance record for continuous reception. Mr. Stein has covered 30,000 miles in 24 hours' continuous listening in and claims to hold the record. Now, who is going to beat him? Send all records to Harold Stein, 1044 Madison Avenue, New York City.

edicating the
t to the desk
ng the condi-

RADIOGRAMS

WORLD NEWS HAPPENINGS BRIEFLY PHRASED FOR BUSY READERS

Dr. Lee de Forest, the well-known inventor, sailed for Europe last week.

* * *

An electrical cure for pneumonia is being perfected. The patient is shocked out of his congestion. Ordinarily, observes the Minneapolis Journal, he does not get the doctor's bill in time for the necessary shock.

* * *

The Heraldo De Cuba, a Spanish daily newspaper published in Havana, Cuba, will be the first newspaper on the island to own and operate a radio broadcasting station, which it expects to place in service about May 15.

* * *

The first baby born on the Government reservation at the radio station at West Sayville, Long Island—a boy—has been christened Francis Arthur by his parents, Mr. and Mrs. Robert A. Maxwell. The baby was born on Friday, April 13.

* * *

Action on regulation of radio communication is being discussed at the Pan-American Congress in session at Santiago, Cuba. The United States delegation is recommending the early convocation of a Pan-American Radio Conference in Washington.

* * *

In order to give advance information, WGY, the General Electric Company's broadcasting station at Schenectady, N. Y., a general outline of each week's programs will be announced on the preceding Friday at the close of the early evening concert—about 9:30 p. m.

* * *

Radio was employed to divert a patient's attention as an aid to local anaesthesia by surgeons at a New York hospital last week during an operation. The operation was successful and it was admitted that radio might in future become a factor in similar operations.

* * *

Floyd Charles Furlow, president of the Otis Elevator Company, died in New York City last week. He was educated at Georgia Institute of Technology and Worcester Polytechnic Institute. He was an early experimenter with X-rays, and built the first wireless apparatus in the South.

* * *

The results for the Einstein eclipse problem have just been deduced from the photographs secured at Walhal on the northwest coast of Australia on September 21 of last year by the William J. Crocker eclipse expedition from the Lick Observatory, University of California. These results are reported to be in exact accord with the requirements of the Einstein theory of relativity.

* * *

The Eiffel Tower will last another twenty-three years, according to engineers who have been examining its stability in consequence of a report that it was falling down. During the war the

tower paid for itself many times over as a wireless information station controlled by the war department. It continues to be used as a wireless station, and broadcasts an evening concert and news bulletins that may be picked up at many points in Europe and on the Atlantic.

* * *

Earl Morrison, a parole violator, has been returned to the penitentiary at Joliet, Ill., following his capture by Freeport, Ill., police on a "radio tip." Morrison was paroled to a Chicago Heights business man last September. He left there a few days ago, saying he was going to Chicago. A description of Morrison was broadcast by Radio Station WOC, at Davenport, Iowa. A sergeant of the Freeport police station who was listening in copied Morrison's description.

* * *

"The concert was good and its reception perfectly clear and remarkably loud," says Louis M. Royal of Wrangell, Alaska, in a recent note to the operator of KFAE, broadcasting station at the State College of Washington, at Pullman, Wash. And L. L. Kannaly of KAN Ranch, Oracle, Arizona, responds with: "KFAE was appreciated in Arizona last night, and all hands on the KAN wish to thank you." As far east as Peoria, Ill., R. G. Coleman picked up the college with a short-wave regenerator set with two steps of amplification.

* * *

The practical use of radio, the airplane and modern birds-eye photography was strikingly demonstrated one day last week by the Marine forces at their main Atlantic Coast base at Quantico, twenty miles down the Potomac from Washington. Fire in a group of ten former Shipping Board wooden vessels was discovered. Through powerful field glasses, officers at Quantico, gazing down the Potomac, discovered the fire. They sent a marine aviator to investigate. He photographed the burning ship, sent the information by radio to Quantico, on the basis of which assistance was given to combat the fire, and the completed pictures of the fire were delivered in Washington in time to be printed in afternoon newspapers.

* * *

More than half a million people, it was estimated, last week heard the first radio debate on the prohibition question that has been held in this country. The debaters were Wayne B. Wheeler, general counsel of the Anti-Saloon League of America, and Colonel Ransom H. Gillett, general counsel of the Association Against the Prohibition Amendment. The arguments were broadcast from the studio of the American Telephone and Telegraph Company's station WEAJ, where the debate was held. The point furthest away known to have received the discussion was a radio receiving set in Petersburg, Va. More than 150 questions were received by telephone, local and long distance, and hundreds of additional calls could not be handled.

Ten More Class A Stations Licensed

THE Department of Commerce has licensed ten more broadcasting stations to operate under Class "A" on specific waves in their respective districts.

Kansas, Nebraska, Missouri and Louisiana each received two stations, while Oklahoma and Texas got one each. Among the new stations listed below with their wave lengths, calls and power, are a daily paper, a church, two universities, a National Guard unit, and three electrical and radio concerns, showing an unusual distribution.

Although three of the stations received the same wave length, it will be noted that they are all in different districts and states, separated so interference will not be marked.

The ten new Class "A" stations which follow were licensed during the week ending April 28th:

Call	Station	Freq. Kc/s	Wave L'gths. Meters	Power Watts
KFGM	Abilene Daily Reporter, Abilene, Texas.	1290	233	100
KFHF	Central Christian Church, Shreveport, La.	1130	266	150
KFGP	Cheney Radio Co., Cheney, Kansas.	1310	229	10
KFHI	Dixon, Charles V., Wichita, Kansas.	1340	224	20
KFGV	Heibredner Radio Supply Co., Utica, Neb.	1340	224	10
KFGC	Louisiana State University, Baton Rouge, La.	1180	254	100
KFFX	McGraw Co., The, Omaha, Neb.	1080	278	250
KFGJ	National Guard, Missouri 138th Infantry, St. Louis, Mo.	1130	266	100
KFHC	University of Oklahoma, Norman, Okla.	1180	254	20
KFHD	Utz Electric Co., St. Joseph, Mo.	1330	226	10

Answers to Readers of Radio World

Would different rheostats in the Grimes reflex circuit be of any advantage? I am using different makes of tubes and they consume different values of current. Can this circuit be used on an outside aerial with a tuning inductance? Can the R215-A peanut be used in this circuit?—A. D. Turnbull, 57 Union Street, Sydney, N. S., Canada.

You can use rheostats in each tube filament circuit if you wish. The only reason that this was eliminated in the original circuit was that it made the controls simpler and that is what they are striving for. You can use this circuit in a tuned antenna circuit by connecting the secondary of your coupler across the two terminals where you normally connect your loop. You can use the tube you name with this circuit.

Kindly furnish me with a hook-up for using one WD-11 with a loop. I do not want to use any variocouplers or tuners unless it is absolutely necessary, as I intend to put it in a canoe and want to make it as simple as possible. Will the circuit enable me to tune in local stations and distant ones also?—L. Robinson, 535 West 189th St., New York City.

The hook-up you desire is given herewith. It will work on the canoe but its range is necessarily limited and you can not expect

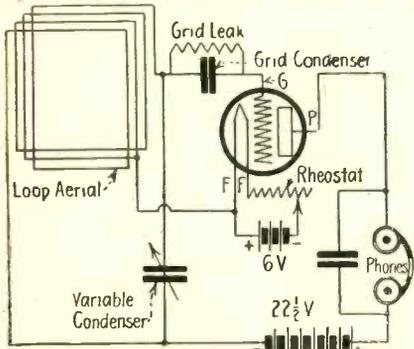


Diagram requested by Mr. L. Robinson. This circuit allows reception on a loop without the use of any inductances. The variable condenser is .0005 mfd.

to do any extensive long distance work with it. For local work it will be perfect. The loop should be about two feet square wound with litz or stranded wire. Ten turns will be about right. Use a clip for the third connection and do your rough tuning with that. You will then be able to incorporate all your apparatus in a box 6x6 inches, with the batteries separate.

Does it make any difference in the reception of signals if the antenna is hung loose, as long as the proper amount of wire is used?

I want to build a set using the peanut tube. What apparatus will I need?—Joseph P. Sims, 3826 Hennison Place, N. W., Washington, D. C.

The manner in which the antenna is erected does affect the reception. Be sure, however, that it will not swing and touch anything like telephone poles, electric wires, high tension lines or tin roofs. It will allow better reception if it is strung tightly.

The apparatus you will need is a tuner, condenser, both A and B batteries, variable condenser, telephone condenser, rheostat, socket, phones, antenna wire, and insulators.

Our local dealer claims that the U. V. 201A cannot be used for radio frequency. I have heard many reports to the contrary, but wish to find out definitely before con-

structing my set. Can they be used with the Acme R2 transformers? Are they good detectors? Are they good amplifiers? I wish to do away with my present set and install a one step radio detector and two stages of audio frequency. What bulbs may I use? I have 201A. My antenna is 70 ft. of wire strung around the picture moulding and with this I can only receive WJZ and other local stations. Does it matter if the power lines for my house are on a level with my antenna? Would this tend to decrease my distance?—Emil Nyldert, 389 George St., New Brunswick, N. J.

You have been misinformed. These tubes will work with radio frequency. They are perfect detectors and amplifiers. They will work in any circuit as either audio-frequency amplifiers, detectors or radio-frequency amplifiers. The transformer you mention is O. K. for use with this tube. You may use the 201A tubes in the circuit you mention. There may be a slight absorption noticed when such an antenna is installed, but if the wire is insulated it should not prevent you from receiving distant stations if your receiver is a tube set. Have it well insulated and do not run it near metal such as beams or posts. Good results have been achieved using a wire strung around the moulding such as you describe.

I have constructed the one tube super-circuit described by W. S. Thompson on page 9 of RADIO WORLD for March 17. I have used the same values specified and hooked it up as shown but cannot get anything but a loud hum like that of a generator. What can my trouble be and how can I remedy it?—F. H. Flood, Chelsea, N. Y.

The fact that you get a loud hum seems to suggest the fact that you have an open connection at some point in your circuit. Go over your wiring very carefully, examining all the connections and testing out the honeycomb coils. It may be that there is a broken connection in the honeycomb and that would cause it. See that your tube is making good connection on all the contacts. Watch the connections on your jacks and examine your variometer to see that there is no open connection in it. Rewire your set, being sure that you follow the diagram exactly. Look at all your fixed condensers and test them for a blown condenser as this might also be the cause. Mount the coils at right angles to one another. Examine the honeycomb mount to see that it is making good connection all around. This hum should not be present if the set is correctly wired and all connections soldered and no open line exists.

In the Anniversary Number of RADIO WORLD you state in connection with the constructional article on a variocoupler, that a bank wound coil will transform this tuner into a multi-wave tuner. Where can I obtain information on this type of winding?—Joseph M. White, 2731 W. Silver Street, Philadelphia, Pa.

If you will refer to RADIO WORLD for March 10, 1923, you will find an article on bank winding and the methods used in making bank wound coils on page 8 in an article by Arthur S. Gordon. It is very comprehensive and the drawings illustrate it clearly.

Kindly give me the diagram of the Reinartz circuit and also some information on the coils.—J. A. Thorne, 37 Riva Ave., Milltown, N. J.

If you will refer to page 23 of RADIO WORLD for January 13, 1923, you will find a

circuit diagram of the receiver you mention, as well as a complete description of how to wind and tap the coils.

Can I use the two High-Mu audion tubes in place of the regulation U. V. 201 tubes in the reflex circuit described by W. S. Thompson? Can any radio-frequency transformer be used with these tubes?—F. H. Ameel, 88 Grand Ave., Mt. Clemons, Mich.

You can use these tubes in this circuit with success. You can also use any radio-frequency transformer, but it is better to use the Meyers as it is constructed for use with those tubes and calculated to the internal characteristics of the Meyers tubes.

Kindly give me a hook-up for the connection of a series-parallel switch in the antenna

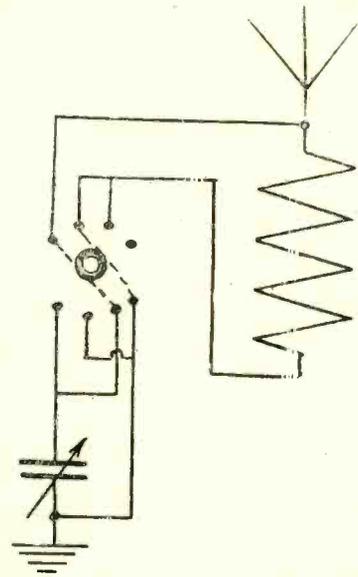


Diagram illustrating the connections on a series-parallel switch in the primary circuit of a receiving set.

circuit of a set.—Adolph Finender, 23 Vine St., Philadelphia, Pa.

The hook-up you desire is given herewith.

Are the French detector and amplifier tubes any better than the 216A, Meyers and VT 1 and 2 in the "super" circuit?—Wade E. Marshall (no address).

We do not compare the relative advantages of apparatus in this column. However, you will make no mistake in using American apparatus.

Enclosed find a drawing of the location of my antenna with reference to high tension lines, two branches of the Long Island railroad and power house. I get a continual hum, like the hum of a generator. Can you suggest any way to eliminate it?—L. E. Lowey, c/o New York Telephone Co., New York City.

From your diagram you seem to be surrounded on three sides by power lines and leads from the power house. We cannot suggest any method outside of using a filter circuit such as described in RADIO WORLD for April 28, 1923, by C. White, or hooking-up a filter circuit such as described in RADIO WORLD for January 20, 1923, page 20, in answer to a question much the same as yours. You are in a very difficult position as regards clear reception, being surrounded in such a manner by power lines.

Some Real DX Records You Can Shoot At

Captain Halsey Reports 59,190 Miles in 12 Hours 30 Minutes

From Captain J. H. Halsey, S. S. "El Cid," Southern Pacific Steamship Lines, Pier 49, N. R., N. Y. C.

NOTING some DX Nite Owls' records in your interesting journal I decided to send mine in. I keep a log of each station, as well as what they are sending; how I received it and the exact place I am at the time, as I change my position every day, running between New York and Galveston, Texas. In all I have logged 164 different stations since January 4, 1923. I am using a variation of the Flewelling circuit, with two steps, but never use second step, as ship's vibration causes distortion and rattling.

The following stations were heard on March 23-24-26 in 3 hours 30 minutes time:

WKAQ, Porto Rico, 1,350 miles; WOR, Bamberger's, 1,250 miles; WGY, Schenectady, 1,350 miles; KDKA, Pittsburgh, 1,050 miles; WEAJ, New York Telephone, 1,264 miles; WDAF, Kansas City Star, 855 miles; WBAP, Fort Worth Star-Telegram, 615 miles; KSD, St. Louis Post-Despatch, 775 miles; WDAO, Dallas, Texas, 580 miles; WHB, Kansas City (Sweeny's Auto School), 855 miles; WBZ, Springfield, Mass., 1,375 miles; WOS, Jefferson City, Mo., 780 miles; WEAY, Iris Theatre, Houston, Texas, 575 miles; WWJ, Detroit News, Detroit, 1,090 miles; WHAS, Louisville, Ky., 760 miles; WSY, Birmingham, Ala., 420 miles; WDAJ, College Park, Ga., 500 miles; WFAA, Dallas, Texas, 580 miles; WPA, Fort Worth Record, 615 miles. Total, 16,429 miles.

(March 24—Off Tortugas, Fla., 4 hours 20 minutes.)

Belge, Honduras, Tropical. Radio Corp., 600 miles; WDAJ, College Park, Ga., 625 miles; WGM, Atlanta Constitution, Atlanta, Ga., 620 miles; WHAB, Galveston, Texas, 700 miles; WJZ, Waldorf-Astoria, New York, 1,250 miles; KSD, St. Louis Post-Despatch, 1,100 miles; WOC, Davenport, Ia., 1,250 miles; WBAP, Fort Worth Star, 1,035 miles; KFI, Los Angeles, Cal., 2,295 miles; WFAA, Dallas, Texas, 1,000 miles; WIP, Philadelphia, Pa., 1,175 miles; KWH, Los Angeles, Cal., 2,295 miles; WSB, Atlanta Journal, Atlanta, Ga., 620 miles; WDAF, Kansas City, Mo., 1,250 miles; telephone conversation between Catalina Island and San Pedro, 2,275 miles; WHB, Kansas City, Mo., 1,250 miles; WEAJ, New York, 1,250 miles; WCAY, Milwaukee, Wis., 1,375 miles; WHA, Madison, Wis., 1,385 miles; WDAL, Jacksonville, Fla., 425 miles. Total, 25,080 miles.

(March 26—200' Southwest of Cape Hatteras, 4 hours 40 minutes.)

WEAF, New York, 625 miles; WOR, Bamberger's, 616 miles; WGY, Schenectady, 760 miles; WBAV, Columbus, Ohio, 575 miles; WHAZ, Troy, N. Y., 760 miles; WDAV, Muskogee, Okla., 1,050 miles; WSY, Birmingham, Ala., 575 miles; WOS, Jefferson City, Mo., 975 miles; WOO, Philadelphia, Pa., 550 miles; WDAA, Nashville, Tenn., 600 miles; WLW, Cincinnati, Ohio, 650 miles; WWX, Washington, D. C., 415 miles; WJAZ, Chicago, Ill., 850 miles; KDKA, Pittsburgh, Pa., 550 miles; WJZ, New York, 625 miles; WGM, Atlanta, Ga., 390 miles; WDAP, Chicago, Ill., 850 miles; WOC, Davenport, Ia., 970 miles; WDAJ, College Park, Ga., 400 miles; WDAF, Kansas City, Mo., 1,075 miles; WDDR, Philadelphia, Pa., 550 miles; WBZ, Springfield, Mass., 710 miles; KSD, St. Louis Post-Despatch, 820 miles; WBAP, Fort Worth Star, 1,250 miles; WSB,

THE editor of RADIO WORLD will be pleased to receive sketches of hook-ups drawn carefully in black ink or heavy pencil from the "DX Nite Owls" who send in records with a view to publishing them.

Send hook-ups of your sets, provided they contain something unusual. Send, also, the names of the various makes of apparatus you are using.

Make your letters brief and informative. Write on one side of the paper only.

The letters and hook-ups will be published in the earliest possible numbers of RADIO WORLD.

Atlanta, Ga., 390 miles. Total, 17,681 miles. Grand Total, 59,190 miles in 12 hours 30 minutes.

My aerial is one single wire between trucks of each mast, about 300 feet long, entirely separate from ship's aerial.

An Old Friend Came Out of His Shell

From J. A. Gillem, Piqua, Ohio.

I HAVE been a reader of RADIO WORLD since your first issue; and, being interested in the DX Nite Owls' page, I thought I would send in my record for three nights.

Station	City	Signals
	February 23, 1923	
WDAF	Kansas City, Mo.	Fair & Clear
WGM }		
WSB }	Atlanta, Ga.	" " "
WBZ }		
ISAB }	Springfield, Mass. (Testing)	" " "
WOR	Newark, N. J. (Transatlantic)	" " "
KYW	Chicago, Ill. (Midnight Show)	" " "
KDKA	East Pittsburgh, Pa.	" " "
KHJ	Los Angeles, Cal. (Road Conditions and Music)	Weak
WGY	Schenectady, N. Y.	Fair & Clear
WMAQ	Chicago, Ill.	" " "
WHB	Kansas City, Mo.	" " "
KSD	St. Louis, Mo.	" " "
WBAP	Fort Worth, Texas	Weak
WHAZ	Troy, N. Y.	Fair
WDAJ	College Park, Ga.	"
WIAO	Milwaukee, Wis.	"
	February 24, 1923	
WHAS	Louisville, Ky.	"
WOC	Davenport, Ia.	"
WMC	Memphis, Tenn.	Loud
	Atlanta, Pittsburgh, Newark and Kansas City	
WLK	Indianapolis, Ind.	Loud
WLW	Cincy, O.	"
WLW	Cincinnati, O.	"
WCAH	Columbus, O.	Fair
WGC	Des Moines, Ia.	"
WDAC	Chicago, Ill.	"
WGV	New Orleans, La. (11:50 p. m. C. T.)	"
WHA	Madison, Wis.	"
WOAL	Webster Grove, Mo. (12:14 p. m. C. T.)	Weak
WPAL	Columbus, O.	Loud
WSY	Birmingham, Ala. (1:10 a. m. C. T.)	"
	February 25, 1923	
WJZ	Newark, N. J.	Loud
WHAS	Louisville, Ky.	"
WWJ	Detroit, Mich.	"
WLW	Cincinnati, O.	"

Using a W. T. No. 501 tube I duplicated eight stations on March 4, and, on March 10, all the above named stations, adding 9XW. I am using a scientific tuner, 23-

plate variable condenser, GA grid condenser and a W-D 11 tube, 45 volts on the plate and 1½ volts filament. The tuner is a home-constructed one; the signals are loud, and I am using one tube. I also have a variocoupler instead of the tuner, single-circuit regenerative. It is mounted on the same panel. Brandes superior phones are used. My aerial is 95 feet long, 25 feet high at free end, and 20 feet at the lead-in.

All 'Board! Chicago and All Points West! 'Board!

From Henry A. Brown, 2768 Delaware Ave., Buffalo, N. Y.

In the March 17th issue of RADIO WORLD my attention was directed to Mr. Gordon's hook-up. It has been my intention to write you regarding my results obtained with this little wonder, but have been waiting till California was heard! (from Buffalo, N. Y.). The nearest approach is Butte, Mont. The directions were copied as to panel, etc., but a separate 3-plate vernier was inserted under the condenser, moving that instrument up slightly. A variable grid leak and condenser (Freshman) was also used to good advantage. Not having a W-D 11 I used a U. V. 200.

The first station in was Kansas City, WHB, good and loud. I must admit that I was skeptical, having tried many hook-ups that were supposed to "fill the room laying the phones on the table" or "blowing hats off." You know what I mean. I wish to add my praise and thanks for your contribution to us poor dubs on the side lines like myself who do not know anything about this game until the other fellow tells us. Attached you will find a list of stations heard—by that I mean, at least one piece clear and not just sign offs—not having a map handy I do not know what mileage this represents but is a good record for 5 evenings' work.

I live one mile from WGR, Fed. Tel. & Tel., and can tune them out at will. One evening Toronto, Davenport, Philadelphia, Newark, Springfield, Mass., and New York City came in. Two pairs of phones are used, and a friend of mine witnessed the above. I can't tell you exactly what he said, but suffice to say it was very expressive.

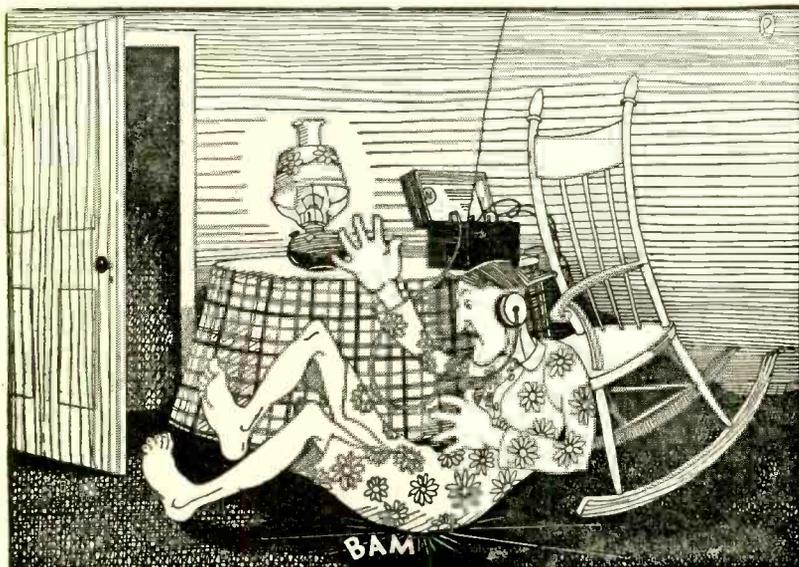
- WGF—Des Moines, Ia.
- WGY—Schenectady, N. Y.
- WHAM—Rochester, N. Y.
- WMAK—Lockport, N. Y.
- WHAZ—Troy, N. Y.
- WEAF—New York City.
- WBZ—Springfield, Mass.
- KDKA—Pittsburgh, Pa.
- WOR—Newark, N. J.
- WJZ—Newark, N. J.
- WHAS—Louisville, Ky.
- WGM—Atlanta, Ga.
- WSB—Atlanta, Ga.
- WDAJ—Atlanta, Ga.
- KYW—Chicago, Ill.
- WDAP—Chicago, Ill.
- WLAG—Minneapolis, Minn.
- WLW—Cincinnati, Ohio.
- Said hello, several times then Winnipeg, Canada.
- CFCA—Toronto.
- WSY—Birmingham, Ala.
- WBT—Charlotte, N. C.
- WHB—Kansas City.
- WDAF—Kansas City.
- WBAP—Fort Worth, Tex.
- WFAA—Dallas, Texas.
- WOAI—San Antonio, Texas.
- WOS—Jefferson City, Mo.
- WIP—Philadelphia, Pa.
- WOO—Philadelphia, Pa.
- WOC—Davenport, Ia.
- WMC—Memphis, Tenn.
- WMAQ—Chicago.

Broadcast Bill's Radiolays

By William E. Douglass

YOU know, the other night I simply couldn't go to sleep an' gosh I tried most every way. I even counted sheep. An' when I passed a thousand they kept jumpin' just the same. Those last three cups of coffee must uv been what wuz to blame. So gently I crept out of bed as quiet as could be n' went down stairs to smoke an' read till maybe two or three, at which time ol' man Morpheus might not be quite so shy. I'd heard of others tryin' it an' 'lowed 'twuz worth a try. I pulled a chair up by the fire but 'fore

wuz sayin' I yells "give us one more encore" an' the boys kept right on playin'. 'Course I don't suppose they heard me but one party did I know an' I soon received a message which wuz not by radio. There wuz Min up on the landin' with her night cap on her head an' her message wuz as follows, "You march right up here to bed." "I'll be with you in a minute, dear. Did I disturb your rest?" I answered her real gentle an' just them frum way out west, I picked up another station which was sendin' out a speech on the



"When I hit it was surprisin'—I had fell out of my chair."

I lit the light thinks I, "Some station's sending even at this time of night." So you might say suitin' action to the word I got my set an' I clamped those rubber earmuffs on to see what I could get. I listened to an orchestra in Dallas for awhile an' say it wuz a dandy playin' music just my style. I could hardly keep my feet still when they played "I'm All Alone" an' that chap that played the saxophone sure got a wicked tone. Well, almost without thinkin' 'fore I knew what I

Famous Men of Russia, an' What They Have Tried to Teach. I'll admit he knew his subject but the next thing that I knew I wuz travelin' in an aeroplane across an ocean blue. As I looked off in the distance I could see a stretch of sand an' I figgered that had ought to make a dandy place to land. All at once I started fallin', droppin' straight down through the air. When I hit it was surprisin' I had fell out of my chair.
(Copyright, 1923, Westinghouse Electric & Manufacturing Company.)

Radio Successfully Penetrates Mine Shaft

AN interesting and highly successful experiment, recently carried out by the members of the Radio and Research Club of the Springfield, Ill., High School, was radio communication between members of the club located in a mine and other members above, at various places around the city.

It has always been a moot question in the minds of radio experts whether successful communication could be carried on between men far below the earth and others at a distance on the surface. The members of the club went down 250 feet with portable apparatus and, under the leadership of A. B. McCall, the faculty adviser of the club, started in to call the world above. The excited listeners at the top of the shaft continued to communicate with them until notice came that another member, located at his home in Springfield, had also heard and answered the signals.

Mine officials from all over the country are interested in the outcome of the experiment because of the fact that it will prove

invaluable in mine rescue work in aiding entrapped miners. Rescue crews will be able to keep in constant touch with one another and the surface through the aid of simple and portable apparatus.

Radio Corporation Orders Employees to Become Naturalized Citizens

GEN. J. G. HARBORD, president of the Radio Corporation of America, New York City, has issued an order that all unnaturalized employees of the company must become American citizens. Of the 1,100 employees it is said that only 76 are aliens and that these are nearly all Canadians.

"It is only reasonable," Gen. Harbord is quoted as saying, "that those who are enjoying the privileges and advantages of inhabitants of this country should assume the responsibilities of citizenship. Our charter requires that all elective officers be American citizens, and we are extending this requirement to include all our organization. Any who do not want to be naturalized are at liberty to leave."

Why Magnavox is the Reproducer Supreme

OFFICIAL tests with the oscillograph prove that the Magnavox electro-dynamic receiver reproduces incoming wave forms with maximum accuracy.

The Magnavox can be used with any receiving set—the better the set, the more Magnavox can do for you.

When you purchase a Magnavox you possess an instrument of the very highest quality and efficiency.



R2 Magnavox Reproducer with 18-inch horn (as illustrated)

This instrument is intended for those who wish the utmost in amplifying power. It requires only .6 of an ampere for the field.

Price, \$60.00

R3 Magnavox Reproducer with 14-inch horn

The ideal instrument for use in homes, offices, amateur stations, etc. Same in principle and construction as Type R2.

Price, \$35.00

Model C Magnavox Power Amplifier

For use with the Magnavox Reproducer and insures getting the largest possible power input.

2-stage, \$55.00
3-stage, \$75.00

Magnavox products can be had of good dealers everywhere.

THE MAGNAVOX CO.

Oakland, California

N. Y. Office: 378 Seventh Ave.

Radio Merchandising

Advertising Rates: Display, \$5.00 an inch, \$100.00 a page. Classified Quick-Action Advertising, 5 cents a word.

Telephone Bryant 4794.

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:

- Wm. Marshall, 100 Randolph Ave., Jersey City, N. J.
 Wesley Gillette, Schuylkill Haven, Penn.
 B. Hennessy, 30 Fifth Ave., New Rochelle, N. Y.
 A. V. B. Evans, 98 Ascan Ave., Forest Hills, Long Island, N. Y.
 Excelsior Book & News Co., Box 232, Aberdeen, Md. (Retailers.)
 Clyde E. Reed, Norfolk, Neb.
 Carl E. Ray, Grass Valley, Ore. (In market for receiving set.)
 Leo Zittman, 1 Stack Place, Brighton Beach, Brooklyn, N. Y.
 Martin V. Smith, Fort Bayard, New Mexico.
 Cecil Gee, 716 Washington Street, Portsmouth, Ohio.
 Homer S. Reece, Rural Route 2, Box 112, Mt. Park, Okla.
 C. A. Storer, 33 Pearl Street, Springfield, Mass.
 P. W. Fitzkee, 2735 East Sixth Street, Tulsa, Okla. (Has trouble getting good parts.)
 A. C. Cavender, 510 South Pine Street, Hope, Ark.
 J. W. McLean, 8103 Maryland Avenue, Cleveland, Ohio. (Wants to become a distributor.)
 L. S. Hillegas-Baird, Business Manager, The Milwaukee Radio Amateurs' Club, 229 Ninth Street, Milwaukee, Wis.
 Chester R. Lytle, Hitchcock, S. D. (Consumer.)
 Leroy Stapleton, Box 69, Saxton, Pa.
 Robert Donaldson, 1010 First Avenue, Seattle, Wash.
 T. J. Tronson, 34 Seventh Avenue, Fond du Lac, Wis.
 W. V. Wood, 347 Ralston Street, Reno, Nev.
 Radio Bug House, George W. Perkins, Thomson, N. Y.
 J. R. Young, 653 Pacific Highway, Cottage Grove, Ore.
 P. E. Lust, 1146 Twelfth Street, Portsmouth, Ohio.
 E. K. Anderson, 916 Greene Avenue, Brooklyn, N. Y.
 T. R. Bailey, 113 North Washington Street, Platteville, Wis.
 A. O. Pearce, P. O. Box 625, Palatka, Fla.
 Righto Radio Co., C. T. Ayres, Manager, 10758 Indiana Avenue, Chicago, Ill. (Wants dealers' prices.)
 Donald H. Race, 89 Boyd Street, Stapleton, N. Y.
 Isaac Gruber, 2025 Arctic Avenue, Atlantic City, N. J. (Is starting a radio salesroom.)
 D. A. Haggin, Stillwater, N. Y.
 Charles A. Smith, 713 Oberlin Avenue, Lorain, Ohio.
 Edward W. Young, 2628A Bermar Street, St. Louis, Mo.
 Fred B. Gleason, Jr., Taft School, Watertown, Conn.
 Frank J. Mapps, 319 Pearl Street, Brooklyn, N. Y.
 T. R. Goldsborough, Assistant Examiner, Division 16 (Radio), U. S. Patent Office, Washington, D. C.
 Webster C. Patterson, 392 South River Street, Wilkes-Barre, Pa.
 Will H. Quinn, 915 Davis Avenue, Pottsville, Pa.
 E. E. Ridings, Blytheville, Ark.
 Francis McCarthy, 514 Center Street, Middleboro, Mass.
 Huron H. Smith, Public Museum, Milwaukee, Wis.
 G. Haskell Blanchard, 111 Manchester Road, Schenectady, N. Y.
 Walter J. Gray, 5145 Terry Avenue, St. Louis, Mo.

Duke of York Gets an American Radio Set

A LETTER recently received from a large manufacturer of radio goods—The Eagle Radio Company, 210 Central Avenue, Newark, N. J.—shows how completely American radio manufacturers have captured the field. The letter states in part: "It might interest the readers of your magazine as a news item to note that the following Associated Press report was received on April 26, the date of the Duke of York's wedding, relative to the Eagle Portable receiver set:

"One of the most unique and most appre-

ciated gifts received by the Duke from the United States is a powerful receiving set built upon a mahogany tea wagon."

It is the belief that this radio receiver was the only one received by the Duke as a wedding present. It was purchased from one of the Eagle company's New York City dealers—Kellogg & Bertine, 631 Madison Avenue.

A High Grade, Low Price Grid Leak

A WELCOME accessory to the field of radio parts, and one that will be duly appreciated by fans who construct their own sets, is a cheap and extremely well made grid leak manufactured by the Airex Company, 237 Centre Street, New York City. In appearance the leak somewhat resembles an overgrown paper condenser, with a small scale and pointer on it. It is constructed of thin fibre, and is extremely reliable over a range of from 0-10 meg. which gives enough latitude for the most finicky builder. It is neatly made, and, as there are no composition parts to chip and break, and is extremely thin, it should meet with a great reception by the fans. It sells for 25 cents, which is a revelation in these days of high prices.

An Efficient Portable Regenerative Receiver

CHARLES A. PEZET, 46 West 65th Street, New York City, has perfected a portable receiving set that actually deserves the name. The dimensions of the case are only 12¼ by 9½ by 4¼ inches, and the total weight is only five pounds.

But its portability is matched by the efficiency of the set. Mr. Pezet has based his circuit on the Armstrong triple circuit, using three Litz wound spiderwebs as tuning inductances for primary, secondary and tickler circuits. The set can be worked either on a WD-11 or UV-199 tube. A special feature of the set is an extra connection, with which it is possible to operate it with a ground alone or an antenna alone. It is claimed by the builder that this set has brought in stations hundreds of miles away and has tuned out local interference that has bothered larger, more bulky sets.

RADIO STOCKS

(Quotations as of May 2, 1923, furnished by Frank T. Stanton & Co., 15 Broad St., New York City, Specialists in Wire-less Securities.)

Stock	Bid	Asked
American Marconi, Stamped...	5*	15*
American Marconi, Unstamped	\$5	\$7½
American Tel. & Tel.	122	122½
Canadian Marconi	2½	3
Dubilier Condenser	11½	11½
English Marconi com.	11	15
English Marconi pfd.	11½	15½
Federal Tel., Cal.	5	5½
General Electric	173	173½
Hennessy Radio Pub. 8% pfd.	9	11
Manhattan Elec. Supply.	55	57
Marconi Int. Marine.	7	9
Mackay Companies com.	112	113
Radio Corporation com.	3½	3½
Radio Corporation pfd.	3½	3½
Spanish Marconi	1	3
Western Union	110	110½
Westinghouse E. & M.	56½	56¾

*Cents per share.

Federal Tel. & Tel. Co.'s Guarantee and What Is Back of It

THE Federal Telephone & Telegraph Company, Buffalo, N. Y., one of the best known and staunchest manufacturers in the telephone and radio industries, recently adopted a guarantee, which is printed on a tag and attached to each of its products. It reads as follows:

"We hereby guarantee Federal Standard Radio Products to be free from all mechanical and electrical defects, and to function properly when installed in accordance with our authorized directions, and we agree to replace, at our expense, any unit or part which may prove defective."

As any guarantee is dependent upon the financial ability of the maker to live up to it, the following statement of the assets and liabilities of the Federal company should be of convincing interest:

BALANCE SHEET, JANUARY 1, 1923.

Assets	
Cash	\$124,259.98
Notes and Accounts Receivable	749,868.96
Real Estate and Inventory.	2,439,442.77
Investments, Stocks and Bonds at par	7,272,433.71
Franchises, Patents, etc.	523,761.35
Prepayments	124,739.07
	\$11,234,505.84

Liabilities

Stock Issued	\$7,282,750.00
Accounts Payable	73,925.98
Notes Payable	2,728,293.37
Accrued Accounts	27,130.39
Funded Debt	391,700.00
Surplus	730,706.10
	\$11,234,505.84

RADIO WORLD congratulates the Federal company on this significant and forward step, which undoubtedly will be followed by others and do much to standardize radio equipment and stabilize merchandising conditions throughout the entire radio industry.

New Radio and Electric Firms

Electrical Home Needs Co., Cleveland, Ohio; L. P. Kearns, R. G. Latom, B. D. Zieve, A. Cline and F. P. Chapin.

Bat-Electric Service Co., 619 State St., Watertown, N. Y.

E. H. Freeman Electric Co. has removed to 10 Prince St., Trenton, N. J.

Electrical Supply & Equipment Co. will occupy a new four-story building at 278 Broadway, Albany, N. Y.

Service Electric Co. has removed to 116 Washington St., Binghamton, N. Y.

Reeservice Shop is the new name of Reeservice Music Shop, 108 Main St., Cambridge City, Ind. Increased radio business is reported.

Southern New York Electrical Supply Corp., 78 State St., Binghamton, N. Y. W. H. Hecox, E. C. Wehle and H. A. Yetter.

Electrical Merchandise, Inc., 225 Glenridge Ave., Montclair, N. J., J. E. Nestor. Federal Radio & Electric Co., wholesale electrical supplies, 41 Park Ave., Paterson, N. J.

Niagara Falls Electric Supply Co., 215 Main St., Niagara Falls, N. Y.; A. W. Paltrovitch.

Northern Electric Construction & Fixture Co., Cleveland, Ohio; capital stock, \$10,000; R. L. Davis, P. S. Graham, G. A. Robinson, G. Carter and F. Sellberg.

Directors of Boys' and Girls' Summer Camps

FOLLOWING is a list of names and addresses of directors of boys' and girls' summer camps, each of whom should be a potential purchaser of radio sets for camp and vacation use. Additions to the list will be published in succeeding issues of RADIO WORLD:

- R. C. Frank, 620 West 122d St., New York.
- G. R. Frank, 192 Parkwood Ave., Columbus, Ohio.
- Louis M. Fleisher, 1218 Walnut St., Philadelphia, Pa.
- Samuel G. Friedman, 1422 North 16th St., Philadelphia, Pa.
- Edward A. Carlson, 118 Coulter Ave., Ardmore, Pa.
- Ralph I. Underhill, Scarsdale, N. Y.
- Harvey C. Went, 1083 Noble Ave., Bridgeport, Conn.
- Irving G. McCall, Hotel McAlpin, New York.
- Jacob M. Ross, 575 West 172d St., New York.
- Ephraim Weinstein, 455 Ft. Washington Ave., New York.
- George A. Kohut, Ph.D., 220 West 87th St., New York.
- Harry J. Kugel, Kohut School for Boys, Harrison, N. Y.
- Edwin V. Spooner, Exeter, N. H.
- Frank E. Poland, 22 Oak Terrace, Malden, Mass.
- W. S. Cowing, 21 Carver Rd., Newton Highlands, Mass.
- Henry Richards, Gardiner, Me.
- Guy W. Chipman, 15 Clark St., Brooklyn, N. Y.
- Mrs. E. D. Baylis, 1021 Ocean Ave., Brooklyn, N. Y.
- Andrew I. Albert, 1728 Crotona Park East, New York.
- A. A. Jameson, 615 Chamber Commerce Bldg., Atlanta, Ga.
- Edward M. Healy, 227 Roseville Ave., Newark, N. J.
- C. E. Allen, 19 Ricker Rd., Newton, Mass.
- A. R. Webster, 1325 Cypress St., Cincinnati, Ohio.
- Joseph I. Gorfinkle, Mount Vernon, N. Y.
- C. E. Allen, 19 Ricker Rd., Newton, Mass.
- Joseph C. Saltman, 1454 Grand Concourse, New York.
- Mr. and Mrs. R. L. Marsans, 519 Second St., Brooklyn, N. Y.
- A. E. Hamilton, Raymond, Me.
- Mrs. F. T. Burdett, 239 Park Ave., East Orange, N. J.
- Miss Mary E. Richardson, 69 Woodmont Ave., Mittineague, Mass.
- Miss Margaret H. Schmidt, 128 Leicester St., Detroit, Mich.
- Miss Edith A. Steere, Packard Rd., Ann Arbor, Mich.
- Miss Edith P. Holt, 39 Fitch Pl. S. E., Grand Rapids, Mich.
- Miss Winifred Schureman, 1780 Lyndale Ave., South Minneapolis, Minn.
- Dr. and Mrs. J. Grant Quinby, Lakeport, N. H.
- Mrs. Blanche Carstens, 523 Washington St., Brookline, Mass.
- Mrs. N. S. Winchester, 31 East Haverhill St., Lawrence, Mass.
- Miss A. R. Hazelton, 14 Billingham St., Somerville, Mass.
- Miss Alice Hazelton, 14 Billingham St., Somerville, Mass.
- Dr. Ann Tomkins Gibson, 6323 Lancaster Ave., Philadelphia, Pa.
- Calvin Sargent, New London, N. H.
- Miss Mary H. MacCracken, Mount Vernon Seminary, Washington, D. C.
- Julia E. Lancaster, Newton Center, Mass.
- Miss Lena Seitlen, 572 Blue Hill Ave., Roxbury, Mass.
- Miss Rachel Rosnosky, 29 Richfield St., Dorchester, Mass.
- Mrs. Morris Klein, 617 West 141st St., New York.
- Mrs. S. Evannah Price, 40 High St., Springfield, Mass.
- George W. Orton, 39 South 10th St., Philadelphia, Pa.
- Ernest P. Roberts, 55 Hanson Pl., Brooklyn, N. Y.
- B. B. Girden, 3805 Review Pl., New York.
- C. Ward Crampton, M.D., 18 East 78th St., New York.
- Wallace Greene Arnold, 81 Jane St., New York.
- Robert Tindale, 31 East 71st St., New York.
- Miss Esther Hamburger, 250 West 103d St., New York.
- Miss Mildred Hamburger, 250 West 103d St., New York.
- Miss Fanny G. Crenshaw, 919 Franklin St., Richmond, Va.
- Mrs. N. B. Adams, 509 West 121st St., New York.
- Mrs. Fannie L. Bernstein, 385 Ft. Washington Ave., New York.
- Jacob Heniger, 230 West End Ave., New York.
- Miss Effie Bendann, Hotel Wolcott, New York.
- Miss Dora Weil, 2020 Eutaw Pl., Baltimore, Md.
- Mrs. C. F. Towne, Woodland Park, Auburndale, Mass.
- Mrs. M. Thorner, 2672 Boulevard, Jersey City, N. J.
- Miss Emily H. Welch, 476 Norwood Ave., Buffalo, N. Y.
- Robert A. Patterson, Kingswood School, Hartford, Conn.
- D. H. Markham, University of Arkansas, Fayetteville, Ark.
- Joy Pratt Markham, Fayetteville, Ark.
- E. C. Offinger, 14708 Shaw Ave., East Cleveland, Ohio.
- Ralph S. Pitts, 130 Grant St., Denver, Colo.

- Tedford Cann, 2259 Loring Place, New York.
- Emil Von Elling, New York University.
- John H. Bruns, 153 E. 86th St., New York.
- Frank T. Essig, 5 West 125th St., New York.
- Miss Blanche Hirsch, 5 West 91st St., New York.
- Miss Clara Altschul, 5 West 91st St., New York.
- Miss Ethel L. Sargent, 58 Glenville Ave., Allston, Mass.
- Miss Harriet M. Balcom, 58 Glenville Ave., Allston, Mass.
- Miss Rose Sommerfeld, 225 East 63d St., New York.
- Mrs. Bella Hirsch, 309 West 86th St., New York.
- Ethel B. Mayall, Princeton, N. J.
- Miss Alice H. Belding, Randolph-Macon Coll., Lynchburg, Va.
- Wm. Gould Vinal, Rhode Island College Education, Providence.
- Miss Beatrice A. Hunt, Holbrook, Mass.
- Mr. and Mrs. I. Spectorsky, 232 West 112th St., New York.
- Mrs. E. A. W. Hamnatt, South Orleans, Mass.
- Samuel Schlosberg, 11 Lathers Pl., New Rochelle, N. Y.
- Albert Loewinthan, 227 Audubon Ave., New York.
- Miss Mary D. Snyder, 362 S. Broadway, Lexington, Ky.
- Miss Sara G. Blanding, 548 Central Ave., Lexington, Ky.
- Mrs. Clara F. Liebman, 409 Edgecombe Ave., New York.
- Dr. Emma G. Wood, Box 416, Maplewood, N. J.

U. S. S. "Guide" Wants a Chief Radio Operator

EDITOR, RADIO WORLD: The U. S. Coast and Geodetic Survey steamer "Guide" is outfitting and assembling a crew at the present time, and we are desirous of enlisting a Chief Radio Operator. The pay of this rating is \$90 per month. The rating is equal to a C. P. O. in the United States Navy, but the man is not an officer. The man must enlist for a period of one year. The ship will probably go to the west coast of the United States in the late summer, and work on that coast thereafter.

We are desirous of getting a man who has had navy experience, preferably a man who was on minesweepers, as this vessel has the minesweeper radio equipment.

If you know of any men who would be interested in this position please refer them to me at the address below, and it will be greatly appreciated.

Respectfully,
K. T. ADAMS,
Executive Officer, U. S. S. "Guide."
West New Brighton, N. Y.

Wireless Expert's Kidnaped Son Sought by Radio

VERNER ALEXANDERSON, the six-year-old son of E. F. W. Alexander-son, chief engineer of the Radio Corporation of America, was kidnapped from his home at Schenectady, N. Y., on April 30.

News of the crime was almost immediately broadcast from Station WGY of the General Electric Company at Schenectady. Since then WJZ, the Westinghouse station at Newark, N. J., has also broadcast news of the child's disappearance. Both stations, as well as several others, have sent out detailed descriptions of the boy, and these have been picked up by many amateurs and police department officials.

Mr. Alexander has offered a reward of \$1,000 for any clue to finding his son, and the city of Schenectady has offered another reward of equal amount.

When he was kidnapped Verner was playing in the yard of his home with his two sisters when a stranger approached. After engaging the children in conversation he offered to get a pair of rabbits for the boy, and sent the sisters for a box in which to put them. When the little girls returned the boy and the strange man had disappeared.

A number of fruitless clues have been followed. The broadcasting has been repeated several times since the kidnapping. The child was found near Theresa, N. Y., on May 3.

Coming Events

ANNUAL HOME AND CITY BEAUTIFUL EXPOSITION, featuring radio exhibits. Atlantic City, N. J., June 16 to September 8, 1923.

CANADIAN ELECTRICAL ASSOCIATION, Montreal, Canada, June 21-23, 1923; Louis Kon, secretary, 65 McGill College Avenue, Montreal, Canada.

NATIONAL ELECTRIC LIGHT ASSOCIATION, New York City, June 4-8, 1923; M. H. Aylesworth, executive manager, 29 West Thirty-ninth Street, New York.

"MANY INQUIRIES—LARGE SALES—CONTINUE THE AD!" SAYS RADIO WORLD ADVERTISER

Frederick H. Pruden, Incorporated
Manufacturers Representatives Electrical and Radio Apparatus
Lerner Building, Journal Square, Jersey City, N. J.

Editor, Radio World:—We are very pleased to inform you that our advertising through your medium has resulted in the largest number of inquiries received from all other advertising mediums.

These inquiries have resulted in a large number of sales. They have come to us through your paper from India, France, Cuba and Canada. No one knows where the next one will come from, perhaps from Japan or China.

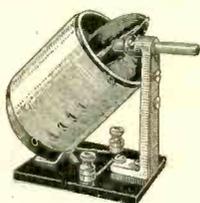
It is our belief that your paper, although a comparatively new one in the radio field, compares favorably, if it does not excel, some of the older publications. It is our intention to continue advertising in every issue.

Yours very truly,

Frederick H. Pruden, Incorporated
(Signed) F. H. PRUDEN, President

April 14, 1923

We Advertise Only the Best Tubes Made
GUAR. 1½ VOLT TUBES
 \$8.50 Detector and Amplifier for dry cells.
 Fits standard socket\$4.75
 5.00 Detector Tubes, guar. 2.75
 6.00 Amplifier Tubes 3.50
 1.50 22½ Volt B Battery75
 To avoid delays check items and total amount.
 Dealers—Write for Attractive Discounts on Above
B. B. RADIO COMPANY
 2202 Marmal Ave., Dept. W.4, Brooklyn, N. Y.
 All Deliveries Made Within Two Days.



SELECTO-Jr.

180° Variocoupler
Built for Results
 Has no solid dielectric
 in Rotor.
 Rotor built of self-supporting pancake coils.
 Lowest possible resistance,
 resulting in increased selectivity.

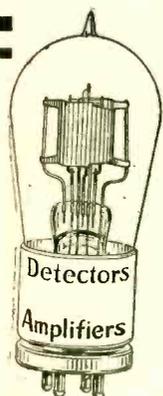
Requires only 2½" width on panel, no more than dial. Range, 200-700 meters.

\$4.00 each, postpaid

Send P. O. or Express Money Order

J. E. TAYLOR

202 N. Calvert St., Baltimore, Md.



GUARANTEED REPAIRS

Broken and Burned Out

VACUUM

TUBES

W.D.-11 not accepted for repair

Your dealer should know, but if he does not, send direct to

HARVARD RADIO LABORATORIES

Boston 9, Mass.

Tubes returned parcel post C. O. D.

We Recommend For Investment

HENNESSY RADIO PUBLICATIONS CORP.

8%
PREFERRED STOCK

(Publishers Radio World)

Complete details sent free upon request

Frank T. Stanton & Co.

Specialists in

Wireless Securities Since 1917.

35 Broad St. New York

Tel. Broad 9519-1576-3841

The Associated Radio Industries of St. Louis

AN association of radio dealers, jobbers, manufacturers and manufacturers agents has been formed in St. Louis, Mo., for the purpose of co-operation and good fellowship. The officers are: President, C. H. Wilson, Manhattan Electric Supply Co.; vice-president, W. E. Fuetterer, Fuetterer Battery Service Co.; Secretary, W. E. Kuhn, Security Radio and Auto Supply Co.; treasurer, R. W. Lawrence, Lawrence Radio Corporation. The directors are: W. Saltmarsh, The McGraw Co.; H. B. Engel, Sobeig-Engel Co.; C. Brunswick, Brunswick Electric Co.

The association has adopted this slogan: "Buy Satisfactory Radio from Dependable Dealers." Members will be supplied with a large card bearing the emblem and slogan to be placed in their stores and will run co-operative advertising in the local newspapers continuously. It is also the intention of the association to take charge of all future radio shows. The cost of membership is \$10 initiation and \$10 yearly dues.

Partial Program of WGY

THE Chamber of Commerce of Watervliet, N. Y., will provide the concert for Thursday night, May 10, broadcast from WGY, the General Electric Company's station at Schenectady, N. Y. The program will include orchestral and vocal quartet selections as well as solos, and Colonel W. I. Westervelt, U. S. Commandant of the Watervliet Arsenal, will talk on "The U. S. Army Gun Plant." A special feature will be a chime selection by Ernest A. Meneely. The chime set to be used is the only one of its kind and was recently turned out by the Meneely Bell Foundry.

During the early concert Friday night, May 11, J. C. Warner will give a talk on the UV-201-A and UV-199 tubes. At 10:30 o'clock Friday night, the WGY Players will present Langdon McCormick's play, "The Storm." The WGY Players will be assisted by Harry Hollingsworth and Nan Crawford, Van Curler Players.

Saturday evening a program of dance music will be broadcast from Cain's Dance Castle.

Why His Set Didn't Receive

HE was a bumptious radio fan. He could pick up St. Louis, Chicago, San Francisco, according to the New York "Sun." He was never tired of telling particularly the meek little man who owned a cheap amateur set what wonderful times he had listening in. "You ought to get a real outfit," was his stock expression.

One night the meek little man knocked on the door of the bumptious one. "I can't seem to pick up the Blank Orchestra," he explained apologetically. "I'm wondering if it's static or something like that."

"Nothing of the kind. It's just your bum outfit. Come on in and we'll pick it up on mine."

But the bumptious one didn't have any better luck than his humbler neighbor. He grew wrath. "This set's no good. I'll get another. I'll throw this one out!"

"Would—would you sell it to me?" asked the meek one timidly.

"Sell it to you! Take it!"

The meek little man departed rejoicing in his good luck.

And now the bumptious one is off radio for life. His outfit was perfectly good; there was no atmospheric disturbance; the Blank Orchestra was on strike that particular night.

Fifty-two issues for \$6.00. Subscription Department, RADIO WORLD, 1493 Broadway, New York City.

Good Bye Aerials! So Long Static!



(Pat. Pending)

Replaces aerials, loops, electric light plugs, etc. Eliminates lightning dangers. Reduces STATIC and other interference. Brings clearer signals and truer tone. Works on all standard vacuum tube sets.

Postpaid, Anywhere, for \$5.00

Satisfaction Guaranteed, or Money Refunded.

Dealers: Write for our proposition.

Short Cut Radio Corp.

243 West 54th St. New York

Makes Your Set Portable

SHELTONE Loud Speaker

With Special Nath. Baldwin Type C Headset

Correct in PRINCIPLE PERFECT RESULTS



When you sit back and enjoy the broadcast program you want perfect reproduction.

The band stand in your town, cathedrals, theatre stage, are all built like Sheltone.

It is built like these to take advantage of the most correct acoustic principles and to reproduce music and speech perfectly. If your dealer cannot supply you order direct.

Loud Speaker, Complete...\$16.00 Postpaid
 Loud Speaker, No Phones...\$4.00 Postpaid
 C. O. D. or Cash with Order.

Dealers, Write for Discounts.

THE SHELTONE CO.

68 HALSEY ST. NEWARK, N. J.

RUSONITE

CRYSTAL RECTIFIER MULTIPoint

(Patent Pending)

A Synthetic CRYSTAL DETECTOR sensitive over its entire surface

Eliminates all detector troubles. Extraordinary clearness and volume. Endorsed by radio experts and press. Sold in sealed packages only. Join the ever-increasing Rusonite fans.

Price, mounted, Sensitiveness 50c guaranteed

RUSONITE CATWHISKER

14-Karat Gold Multiple contact. Super-sensitive 25c

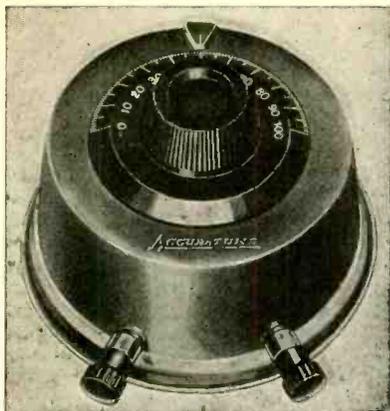
Order from your dealer or direct from us. Rusonite Products Corp., 21 Park Row, N. Y.

PATENTS

promptly prepared. Trade Marks designed & registered. FREE INVENTION RECORDING BLANK Phone Vanderbilt 7313

FREE MANUFACTURERS PATENT CO. INC. 8004 520 FIFTH AVE. NEW YORK

AUXILIARY TUNER



Helps Cut Out Those Interfering Stations

Not a mere wave-trap, but a high-grade tuner which when connected in series with antenna will materially improve the selectivity of the average receiver.

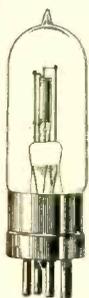
One piece molded Condensite Case.
Send Cash or Money Order.

Regular retail list, \$7.50. Special Introductory Price... **\$5.45** post paid

GUARANTEED TO IMPROVE YOUR SET OR MONEY REFUNDED.

RADIO MULTI-PARTS

897 17th Street Newark, N. J.



WE REPAIR WD-11, \$3.50 AND POSTAGE.

Also other vacuum tubes, excepting VT-1 and VT-2.

Mail orders solicited and promptly attended to.

H. & H. RADIO CO.

514 Clinton Avenue Newark, N. J.

ROBBINS

RADIO DESK

An attractive piece of furniture so constructed and designed to meet all the requirements in making a neat installation of the radio in the home. Its many advantages and moderate cost make it almost indispensable.

For Sale By First Class Furniture and Radio Dealers or Write

ROBBINS WOODWORKING CO.
LIBERTYVILLE, ILLINOIS

You Need It!

Have you seen the hook-up with complete panel layout in full size and all constructional details in RADIO WORLD No. 43, dated Jan. 29?

This hook-up actually goes out and drags the distance in, and lays it at your table.

All that is necessary is to lay the full-page diagram of the panel on your own panel and drill and mark your holes. Simple, isn't it?

If you haven't this copy, send 15 cents to Radio World, 1493 Broadway, New York, N. Y., and copy will be mailed you. Or start your subscription with that number.

RADIO WORLD

TELEPHONE, BRYANT 4796
PUBLISHED EVERY WEDNESDAY (Dated SATURDAY OF SAME WEEK)
FROM PUBLICATION OFFICE,
1493 BROADWAY, NEW YORK, N. Y.
BY HENNESSY RADIO PUBLICATIONS CORPORATION

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

European Representative: The International News Co., Brems Bldgs., Chancery Lane, London, Eng. Paris, France: Brentano's, 37 Avenue de l'Opera.

Managing Editor Stephen L. Coles
Technical Editor Robert L. Dougherty

Field Representatives:
New York—Arnold D. Friedman, W. H. Oke.
Chicago—Stevens & Baumann, Inc., First National Bank Building.
Los Angeles—Stevens & Baumann, Inc., Higgins Bldg.
San Francisco—Stevens & Baumann, Inc., Holbrook Bldg.

SUBSCRIPTION RATES

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

ADVERTISING RATES

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

CLASSIFIED ADVERTISEMENTS

Five cents per word. Minimum, 10 words. Discount of 10% on 4 consecutive issues—15% on thirteen consecutive issues. Cash with order.
Entered as second-class matter, March 28, 1922, at the Post Office at New York, New York, under the act of March 3, 1879.

IMPORTANT NOTICE

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

What Makes an Advertisement Pay?

There is an interesting editorial in the Advertising Club "News" this week telling how the same mail order advertiser had two advertisements prepared by two different copy writers.

Each adv. was of the same size, in the same publication, advertising the same article at the same price, and so "keyed" that an exact record could be kept of the returns from each.

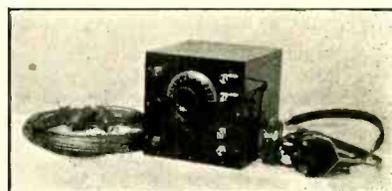
One advertisement brought inquiries at \$1.34 each and produced business amounting to \$742. The other adv. brought inquiries at 18c. each and produced business amounting to \$4,452.

See the letter of Frederick H. Pruden in another column, and note the fine results RADIO WORLD brought him. It will bring any other manufacturer or distributor equally good results—if the advertising copy is equally good.

RADIO WORLD's copy chief has had twenty years' experience. We are in intimate touch with our readers, know their buying problems and interest, receiving as we do hundreds of letters and inquiries from them daily from every part of the country. We are at your service. Address Advertising Copy Chief, RADIO WORLD, 1493 Broadway, New York.

Subscribe for RADIO WORLD, \$6.00 a year, \$3.00 six months, \$1.50 three months.

The Radio Flivver



Smallest and Lightest Dependable Long-Range Receiving Set in the World

Complete with Phones, Tube, Both Batteries, and a 150-foot Braid Antenna.

\$45.00

Dealers, Write.

RADIO PANEL SHOP

JUNCTION CITY, KANSAS
(Western Branch, Payson, Utah)

"The Little Wonder"

FOR BOYS AND GIRLS

CRYSTAL SETS

Unassembled-Net **\$3.50**

Catches distinctly everything broadcasted within 30 miles. We also manufacture the "Little Wonder" assembled set at \$5.00.

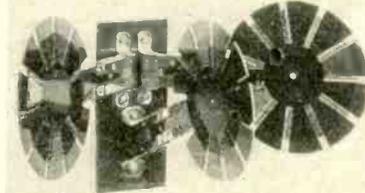
GUARANTEED TESTED CRYSTALS

Galena 15c Radiosite 20c

Write for Free Catalog

It lists all our radio parts and supplies.
Holloway Elec. Supply Co., Inc.
238 Third Ave. New York City

THE GOODMAN



PATENT PENDING

The Niftiest Short Wave Tuner on the Market Only \$6.00 & PP on 1 lb. Send for pamphlet.

L. W. GOODMAN
DREXEL HILL, PA.

The GOODMAN is really a high grade instrument, well and sturdily constructed. The PANEL and FANS are GENUINE BAKELITE—the best material known for the purpose.

W. T. 501 DETECTOR TUBE

For tube sets, or to convert crystal sets into tube sets at small cost. **\$2.00**

Special Socket 40c extra
Special Adaptor 75c extra

RADIO RESEARCH GUILD

40 Clinton St. Newark, N. J.

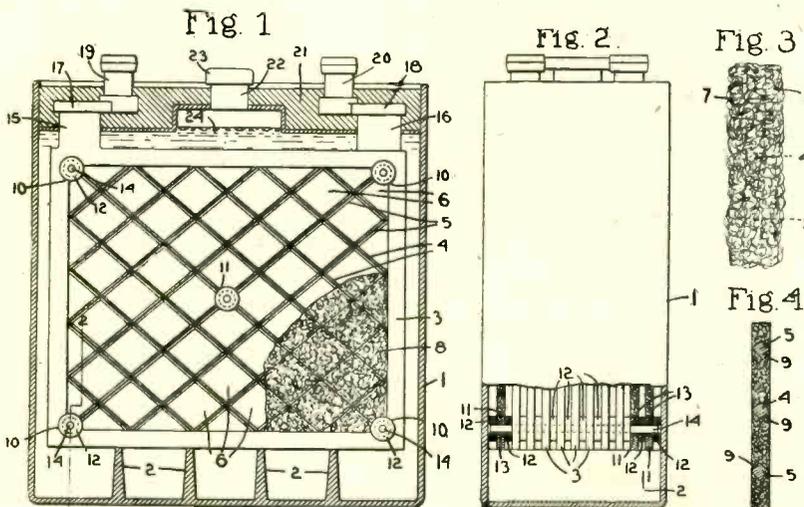
Latest Radio Patents

Storage Battery and Process

No. 1,450,533: Patented April 3, 1923. Patentee: Albert H. Williams, Worcester, Mass.

THIS invention relates to improvements in storage batteries and the process of producing the same and the general object thereof is to provide a storage battery which will have a greater efficiency and a longer life than batteries heretofore constructed and which can be produced at a much less

will be of such a character that the breaking away of the active element during charging and discharging will be substantially eliminated. A further object of the invention is to provide an electric battery of a character which will not require the positioning of separator plates between the positive and negative plates of the battery, whereby the resistance of the usual separator plates to



Albert G. Williams' new method of filling the plates in a storage battery with sponge lead, exposing a greater surface to the electrolyte.

cost, and in a shorter time. More specifically the object of the invention consists in the production of a storage battery comprising plates in which the active material is of greater strength and purity and of increased and uniform porosity which will enable a better circulation of the electrolyte and in which the conductivity of the active element will be increased by the perfect electric contact between the particles of the active material, so that the electrical resistance will be reduced and in which, by reason of the purity and porosity of the active material, substantially no local electric action will take place and polarization during a heavy rate of charge or discharge will be substantially eliminated. A further object of the invention is to produce plates for a storage battery which will not warp or buckle and which

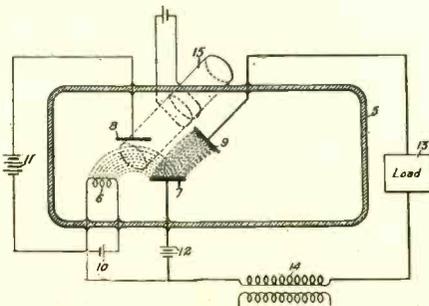
the passage of the electric current through the electrolyte will be eliminated. A further object of the invention is to provide a storage battery in which the negative and the positive plates as initially constructed will be composed of a core or grid having pure sponge lead integrally attached or welded thereto. Another object of the invention consists in treating the plates in such a manner during their production that the necessity for the long period of charging usually required in the production of storage batteries will be rendered unnecessary and a completely charged storage battery produced within the period of less than an hour, whereas in batteries as heretofore produced the construction and charging of the batteries usually requires several days.

Hot-Cathode Tube

No. 1,450,265: Patented April 3, 1923. Patentee: Joseph Slepian, Wilkensburg, Pa.

THIS invention relates to hot-cathode apparatus, such as is used for rectification and in detector-bulb work and it has for its object to provide apparatus of the character designated that shall embody means for providing a strong and effective electron emission. The accompanying drawing is a diagrammatic view of an electron tube, together with associated supply and auxiliary circuits, illustrating one application of the invention. In the construction and operation of electron tubes, it has been usual to employ incandescent filaments as electron sources, these filaments being maintained at incandescence by the passage of heating current there through. The use of a filament of sufficient size and temperature to produce the large electron streams required in certain forms of apparatus engenders a relatively large amount of heat that must be dissipated and, furthermore, the filament is subject to rapid deterioration because of the high temperature at which it must be run, thus limiting

the useful life of the apparatus. A relatively small incandescing filament may be operated at moderate temperatures to produce a small number of electrons and these electrons may be caused to make impact upon an adjacent electrode with high velocity by subjecting



New method of sustaining electronic flow in a vacuum tube.

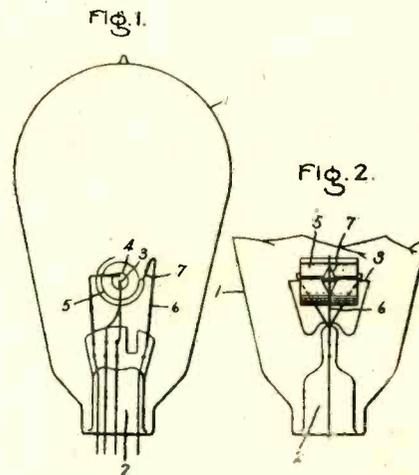
them to the influence of a high-voltage electrostatic field. As a result, there is produced a profuse emission of electrons from the

adjacent electrode by the joint action of reflection and of secondary emission, it being well known that the impact of a high-velocity electron upon another body may set free a large number of low-velocity electrons therefrom. The adjacent electrode, which is thus caused to be the seat of a profuse electron emission, may now be employed as a cathode in an auxiliary circuit, and a relatively large amount of current may be offered passage because of the large number of electrons available. If desired, the above process may be repeated, and the electrons set free from the adjacent electrode be caused to make impact upon still another electrode, setting free a still larger number of electrons therefrom, and this process may be continued indefinitely. A convenient method of manipulating the electron streams, in apparatus of this type, is by means of magnetic fields.

Vacuum Electric Discharge Device

No. 1,450,413: Patented April 3, 1923. Patentees: Herbert W. Edmondson and William T. Munro, Rugby, England.

THIS invention relates to vacuum electric discharge devices of the kind known as valves, rectifiers or the like such as are used in wireless telegraphy and for other purposes in which a heated cathode is employed. The object of the invention is to provide an improved discharge device in which the destructive effects resulting from the heat produced in the anode by the bombardment of the electrons from the cathode are eliminated as far as possible. According to the invention a shield preferably of metal is mounted within the device in such a position as to cut off the heat radiated from the anode during operation of the device. This shield may be of different shape according to the construction of the discharge device,



New constructional idea applied to a vacuum in order to prevent deterioration of elements through heat radiation from filament.

and is separated from the anode so that the vacuous space between it and the latter serves to prevent it from becoming heated to any considerable extent. In applying the invention to a form of valve in which the cathode is located within a cylindrical anode, the whole being mounted on a glass stem within an evacuated bulb, the stem carrying the leading-in conductors for the device, the shield may be in the form of a cylinder of thin sheet metal almost completely, or completely, surrounding the anode or interposed between the anode and stem in any convenient way so as to prevent the stem from being heated by direct radiation from the surface of the anode. As a result the heat radiated from the anode will be prevented from injuriously affecting the seal.

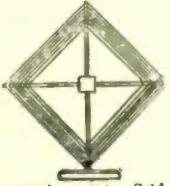
RADIO TUBE SERVICE
 Seventy-five cents allowance on all old licensed tubes (5 volt) in the purchase of new U. V. 200, 201, 201A or C300, C301, C301A, U. V. 202 and C302. One dollar allowed on W.D.-11 and 12.
 Unlimited Quantity—Immediate Delivery
 WE ALSO REPAIR TUBES
 UNCALLED FOR REFILLED TUBES IN STOCK
 Write Today for Circular W-9 on Tubes
Radio Tube Laboratories
 776 Broad St. Newark, N. J., U. S. A.



**Pruden Reliable
 for Good Results
 Radio Specialties**
 Dealers write today for our interesting proposition.
FREDERICK H. PRUDEN, Inc.
 993 Bergen Ave., Jersey City, N. J.



12000-OHM List Price 75c
RESISTANCES IN STOCK
 For the New Super Circuits
RADIO STORES CORPORATION
 DISTRIBUTORS
 220 W. 34th St., N. Y. City Leagers 10110-9219



RITTER \$1
LOOP AERIAL
 A knockdown aerial, including wire; can be assembled in 10 minutes. Endorsed by N. Y. Globe and Mail. Results guaranteed. Ritter loop reduces interference, static and lightning troubles. No outside aerial or ground needed. Sold direct from our factory. By mail 10c. extra.
 We also manufacture the now famous **RITTER GRAND CRYSTAL SET**, price \$3.50
RITTER RADIO CO.
 230 Canal Street New York City

**AN
 ATTRACTIVE
 BINDER
 FOR
 RADIO WORLD**

The publishers of Radio World have at last succeeded in getting a binder that will securely hold a full volume of this publication (26 numbers).

This binder is securely made, is attractive in appearance, and each copy can be added weekly without any difficulty.

This Radio World binder will be furnished to our readers at the reasonable price of

65 cents each
 (Sent parcel post prepaid.)

Address Sub. Department
RADIO WORLD
 1493 BROADWAY NEW YORK

**Radio Telephony
 Rapidly Growing in
 Chile**

IN Santiago, Valparaiso, and several other smaller Chilean cities, interest in radio telephony is growing steadily, and its fuller development only awaits the establishment of a broadcasting station within the country, such as those now in operation on the east coast of South America, says Assistant Trade Commissioner W. E. Embry in a report to the Department of Commerce. It is reported that the broadcasting stations recently erected in Buenos Aires, Montevideo, and Rio de Janeiro have given very satisfactory results, and large numbers of amateur receiving sets have been sold in these countries. This is especially true of the Argentine, where conditions for broadcasting programs are almost ideal, as the land generally is flat and radio transmission carries all over the River Plate district, Uruguay, and into southern Brazil on the north and as far as the Andes on the east. For this reason the sale of radio equipment has met with the greatest success in this country, and it is now estimated that there are approximately 25,000 sets in the Argentine Republic in comparison with approximately 100 less than one year ago.

American radio equipment, up to the present time, has been given preference. This is especially true of Chilean orders, as practically all equipment now in use in Chile is of American origin. Four or five concerns in Santiago deal in this class of goods, and a similar number handle radio apparatus in Valparaiso. Estimates of the number of sets throughout Chile vary between 100 and 500.

The Chile Radio Corporation, a local Chilean concern, with offices on the top floor of the highest office building in Santiago, has a very good amateur broadcasting station with one-kilowatt power, and programs consisting mainly of music are being offered from time to time. Outlying cities within a radius of 300 miles report that the concerts are heard very distinctly under normal weather conditions.

Another smaller broadcasting station has been maintained in Providencia for the past three or four months by a local amateur radio enthusiast, and programs consisting of phonograph records have been broadcast successfully. Providencia is an outlying suburb of Santiago. The broadcasting from this station is carried on by an improvised equipment of 20 watts power.

Numerous native Chileans have shown unusual interest in all matters pertaining to radiotelephony and its development. Amateur sets have been constructed and experiments are continually being made by local amateur enthusiasts. It is not unusual for amateurs in Santiago to receive, or rather intercept, messages sent out from stations in Honolulu, France, Japan, the United States, and other distant places. One of the local amateur stations recently heard very distinct messages from Arlington, District of Columbia.

Non-Sectarian Church to Receive Services by Radio

At Wellesley Hills, Mass., a new church will soon be opened which, instead of broadcasting its services, will receive them from other churches or from broadcasting stations by special arrangement. Roger W. Babson, the noted statistician, is the donor of the church, which will be equipped with a radio-telephone receiving set and loud speaker. Thus the music, sermons, prayers and other features of church ritual will be audible to the congregation. The church will be non-sectarian. On Sundays services will be held for Catholics, Baptists, Congregationalists and Christian Scientists in the order named.

Send 10c for a copy of the **FADA Handbook**—a real aid to your experimental work.
F. A. D. ANDREA, INC.
 1581-W Jerome Ave., New York City

**A NEW LIGHTNING
 ARRESTER**
 THE NEON LIGHTNING ARRESTER
 Best Protective Arrester for Aerials on the Market
 Helps Eliminate Static
 Can also be used as a Rectifier for small currents
 Approved by Underwriters' Laboratory
 N. Y. Tribune Laboratory
Neon Lamp Works
 62 W. 14th St., New York
 \$1.50



CUT RATE PRICES
 A Money-Back Guarantee Goes with Everything We Sell
 Standard Parts at Lowest Prices
SPECIAL—\$12.00 GENUINE \$6.50
 V. T. Z TUBES.....
 10.00 Telefunken Amplifiers with Socket \$5.25
 6.50 A. P. Detector Tubes..... 4.50
 8.00 Westinghouse Z Dry Cell Tube W. D. 11 Socket..... 4.00
 6.00 1½ Volt Dry Cell Tube Standard Socket 4.75
 12.00 Nathaniel Baldwin Type C double 8.75
 Master Baldwin Type C double 8.25
 Baldwin Type C single..... 4.50
 8.00 Brandes Head Sets..... 9.75
 8.00 Federal Head Sets..... 4.95
 7.50 Stromberg-Carlson Head Sets.. 5.75
 10.00 N & K Head Sets..... 6.00
 7.00 U. V. 712 Audio Transformers.. 5.75
 7.00 Federal Transformers 4.75
 5.00 Acme Transformers 3.75
 Rasla Radio Transformers..... 5.00
 De Luxe A. C. Homechargers.. 15.00

COMPLETE STOCK—MANY OTHER BARGAINS—WRITE FOR LIST
 Send Money Order or Certified Check and include Postage.
GLOBE RADIO SHOP
 115 West 23rd Street New York

PATENTS

To the Man with an Idea
 I offer a comprehensive, experienced, efficient service for his prompt, legal protection, and the development of his proposition.
 Send sketch or model and description, for advice as to cost, search through prior United States patents, etc. Preliminary advice gladly furnished without charge.
 My experience and familiarity with various arts frequently enable me to accurately advise clients as to probable patentability before they go to any expense.
 Booklet of valuable information, and form for properly developing your idea, free on request. Write today.
RICHARD B. OWEN, Patent Lawyer
 32 Owen Building, Washington, D. C.
 2276-P Westworth Bldg., New York City

Subscribe for RADIO WORLD, \$6.00 a year, \$3.00 six months, \$1.50 three months.

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

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS

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

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

A WONDERFUL CRYSTAL SET. Can hear all over Philadelphia, and sometimes outside of Philadelphia. Price with phones, \$12.00; without phones, \$6.00. Receiving sets, \$35 to \$200. Guaranteed or money back. Send Money Order or call. Williams Radio, 2339 N. 8th St., Philadelphia, Pa.

PATENTS—SEND DRAWING OR MODEL FOR EXAMINATION AND OPINION. Booklet free. Watson E. Coleman, Patent Lawyer, 624 F Street, Washington, D. C.

ARE YOU IN THE RADIO BUSINESS? If so, drop us a card for price list. If not, let us start you in a good paying business. We furnish everything and have a proposition that meets the needs of 90% of the public. Liberal discounts to agents. Immediate delivery. Write today. THE WILKENDA COMPANY, 500 Fifth Avenue, New York.

BUILDERS AND EXPERIMENTERS. Do you know that the Reflex circuit is one of the most interesting circuits to construct? You can not guess how much fun you are missing if you fail to try out at least one of these circuits. See RADIO WORLD issues of Feb. 24 and March 3. They contain two fine articles by W. S. Thompson, with plenty of new Reflex circuits to experiment with. Don't miss these! 15c a copy. RADIO WORLD, 1493 Broadway, New York City.

GRAM'S RADIO BROADCASTING MAP OF THE UNITED STATES & CANADA. Scale 100 miles to the inch. In two colors, size 34x28. Printed on high-grade map paper, up to-the-minute information, indicating all amateur and standard broadcasting stations, with complete index to stations. 35c postpaid. The Columbia Print, 1493 Broadway, N. Y. C.

TWENTIETH CENTURY BOOK OF RECIPES, FORMULAS AND PROCESSES—Edited by Gardner D. Hiscox. This book of 800 pages is the most complete book of recipes ever published, giving thousands of recipes for the manufacture of valuable articles for every-day use. Hints, helps, practical ideas and secret processes are revealed within its pages. It covers every branch of the useful arts and tells thousands of ways of making money and is just the book everyone should have at his command. The pages are filled with matters of intense interest and immeasurable practical value to the photographer, the perfumer, the painter, the manufacturer of glues, pastes, cements and mucilages, the physician, the druggist, the electrician, the dentist, the engineer, the foundryman, the machinist, the potter, the tanner, the confectioner—the chiropodist, the manufacturer of chemics—novelties and toilet preparations, the dyer, the electroplater, the enameler, the engraver, the glass worker, the gold-beater, the watchmaker, the jeweler, the ink manufacturer, the optician, the farmer, the dairyman, the paper maker, the metal worker, the soap maker and the technologist in general. A book to which you may turn with confidence that you will find what you are looking for. A mine of information up-to-date in every respect. Contains an immense number of formulas that everyone ought to have that are not found in any other work. New edition. 807 octavo pages. Cloth binding. Price, \$4.00. The Columbia Print, 1493 Broadway, New York City.

RADIO FANS AND PROFESSIONALS—How many of you know the correct CODIFICATION of all characters, punctuations and signs (such as %, &, etc.). We dare say that nine out of ten don't know them correctly! Our instructor, who has had 35 years experience, eight years of which were with Uncle Sam as MORSE and RADIO TELEGRAPHER, has just published the first and only CHART known to give fully a true and correct CODIFICATION of ALL characters used in both codes. This CHART is indispensable to all up-to-date beginners and veterans alike. Fifty cents (money order preferred) will bring CHART, also much information extremely interesting to BOYS and GIRLS; because, with this information and a little PEP on your part, you can qualify shortly (as scores of our graduates have done) and secure positions paying \$1,500 to \$3,000 yearly. (See Civil Service Bulletins 215, 357 and 54.) We are registered with the U. S. C. S. Com. at Washington and can help you. AMERICAN TELEGRAPHIC STUDIO, BOX 793, WORCESTER, MASS.

JUST THE SPOT FOR SELLING RADIO EQUIPMENT
102 West 40th Street.

Front office, up one flight, near 6th Avenue corner. Prominent sized room; windows altered to suit. Owner on premises.

CASH FOR OLD GOLD. Platinum, Silver, Diamonds, Liberty Bonds, War, Thrift, Unused Postage Stamps, False Teeth, Magneto Points, Jobs, Any Valuables. Mail in today. Cash sent, return mail. Goods returned in ten days if you're not satisfied. OHIO SMELTING CO., 337 Hippodrome Bldg., Cleveland, Ohio.

50,000 COINS, MEDALS, paper money, antique guns, swords, pistols, Indian relics, stamp collections. Lists free. COLLECTION EXCHANGE, 1536-A Willington St., Philadelphia, Pa.

OLD MONEY WANTED—\$2.00 to \$500.00 EACH paid for hundreds of Old and Odd Coins. Keep all old money. Send 10 cents for New Illustrated Coin Value Book, 4x6. You may have valuable coins. Get posted. We pay CASH. Clarke Coin Company, Ave. 83, Le Roy, N. Y.

IMPROVE YOUR SET by shielding your panel. Experts recommend it. Two square feet sent postpaid for two dimes. RADIO IMPROVEMENT & SALES CO., Room 402, 1658 Broadway, New York City.

WIRING A HOUSE. By Herbert Pratt. Shows a house already built; tells just how to start about wiring it; where to begin; what wire to use; how to run it according to insurance rules; in fact, just the information you need. Directions apply equally to a shop. Sixth edition. COLUMBIA PRINT, 1493 Broadway, N. Y. C. Price, 35 cents.

ELEMENTS OF RADIO TELEPHONY, by Wm. C. Ballard, Jr. A standard book on radio telephony, the work of a recognized authority. Accurate, simple, clear, reliable and strictly up-to-date. For the technical man who wants to post himself on radio and for the radio enthusiast who wants the fundamental principles of radio and their application tersely and entertainingly presented. Price, postpaid, \$1.50. The Columbia Print, 1493 Broadway, New York.

MOTOR BOATS AND BOAT MOTORS—By V. W. Pagé and A. C. Leitch. All who are interested in motor boats will find this latest work a most comprehensive treatise on the design, construction, operation and repair of motor boats and their power plants. It is really two complete books in one cover, as it consists of two parts, each complete in itself. Part one deals with THE HULL AND ITS FITTINGS, part two considers THE POWER PLANT AND ITS AUXILIARIES. A valuable feature of this book is the complete set of dimensioned working drawings detailing the construction of five different types of boats ranging from a 16-foot shallow draft, tunnel stern general utility craft to a 25-foot cabin cruiser. It is a comprehensive work of reference for all interested in motor boating in any of its phases. 372 illustrations. 524 pages. New Edition. Price, \$4.00. THE COLUMBIA PRINT, 1493 Broadway, New York City.

DO YOU WANT TO SAVE MONEY in making your set? Send for the Jan. 27 issue of RADIO WORLD, containing a full-page drawing of how to make filament control rheostats, as well as an easily understandable text, which makes the construction easy. 15c a copy, or start your subscription with this issue. RADIO WORLD, 1493 Broadway, New York.

IF YOU ARE A REGULAR RADIO fan and like to hear the stations in the four corners of the United States come in with a bang, then you will want the Flewelling Circuit. If you do, send 15c for RADIO WORLD, issue of Feb. 24, which contains complete description and directions for the manipulation of the circuit. RADIO WORLD, 1493 Broadway, New York.

EXCHANGE JOLLY, INTERESTING LETTERS through our club. Stamp appreciated. Betty Lee, Inc., 4254 Broadway, New York City

Reinhold Radio Detector. A CHEMICAL DETECTOR. Every spot equally sensitive. Lasts indefinitely. Permanent graphite contact. Ideal for reflex circuits. \$1.50 prepaid. WARREN-DARCY RADIO COMPANY, 1441 Broadway, N. Y.

VACUUM TUBE RESULTS FROM A CRYSTAL SET! A "PT" Ultra-Sensitive Contact will increase the range and audibility of your crystal set. We guarantee this wonderful Contact to be MORE SENSITIVE THAN ANY OTHER CAT-WHISKER MADE; and that IT WILL NOT JAR OUT. WITH A "PT" MYRLE WOOD HEARD 46 PHONE STATIONS, IN A THOUSAND-MILE RADIUS! Others likewise testify that the "PT" has given results equalling tube equipment. Simple to install in any crystal detector. Price only twenty-five cents coin. "PT" CRYSTAL CONTACT COMPANY, Box 1641, BOSTON.

SUPER-SIMPLICITY CIRCUIT—1,000 to 1,900 miles on one tube, one control, 150 to 25,000 meters. No rheostat, storage battery, vario coupler, variometer, 3-coil mounting, variable inductance, taps or radio frequency. Nothing to guess about. Complete hook-up and particulars, \$1.00. No checks. Build your own. Save 50% and get better results. RADIO EXPERIMENTAL LABORATORY, Box 194A, Berkeley, Calif.

MOVIE FILMS—For Professional and Toy Machines. Wonderful complete stories with best Movie Stars. SPECIAL BARGAIN—1,000-foot reels, ONLY \$3.00. Stock up, BOYS, while they last. Monarch Theatre Supply Co., 724 South Wabash Avenue, Dept. 69, Chicago.

BECOME A MILLIONAIRE over night! I'll send you one million Russian roubles for \$2.00. 500,000 for \$1.50; 100,000 for 50c. American Sales Co., Box 1278, San Francisco.

EXCHANGE LETTERS with friends everywhere. Pleasant pastime. Information for stamp. Smith, Box 3125, M. Portland, Ore.

RAND-McNALLY RADIO MAP OF UNITED STATES—Is 28 x 30 inches in size. The locations of broadcasting stations are shown by distinctive symbols. The call letters of each station are given, also the wave lengths of each. The Radio Districts with numbers are shown in red and the Radio Relay Divisions are in blue. Time zones are included. Alphabetical lists of stations and alphabetical lists of call letters are in the margins. Convenient pocket form with cover. Price, 35c. The Columbia Print, 1493 Broadway, New York City.

LATEST Radio Directory (Call Book) and Trouble Finder. A practical handbook and guide. Price, 25 cents. B. E. Brown, Lincoln, Maine.

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

RADIO BROADCASTING MAP

FOR the benefit of those interested in Radio and those who are becoming interested, Rand McNally & Company have prepared a publication containing a wealth of information of greatest value. It shows in the most comprehensive way, the location of the broadcasting stations, gives their classification, the call letters, wave lengths, etc., of each.

The Rand McNally Radio Map of United States is 28x30 inches in size. The locations of broadcasting stations are shown by distinctive symbols. The call letters of each station are given, also the wave lengths of each. The Radio Districts with numbers are shown in red and the Radio Relay Divisions are in blue. Time zones are included. Alphabetical lists of stations and alphabetical lists of call letters are in the margins. Convenient pocket form with cover.

Price 35c Each

THE COLUMBIA PRINT

1493 BROADWAY NEW YORK CITY

**United States Radio Exports
During 1922**

THE total value of radio apparatus exports from the United States in 1922, as compiled by the Department of Commerce, was \$2,897,799; distributed among the various months as follows: January, \$9,274; February, \$283,950; March, \$21,180; April, \$116,221; May, \$186,525; June, \$547,364; July, \$385,861; August, \$188,670; September, \$207,535; October, \$564,803; November, \$223,180; December, \$163,236.

Statistics showing the United States exports of radio apparatus include, of course, material for high-power telegraph stations, several of which are being erected with apparatus shipped during 1922. This accounts for the relatively high percentage exported to Poland, Cuba, Mexico, Japan, Uruguay, and probably, to some extent, Argentina.

Canada ranks with the domestic market on account of the large amount of broadcasting being done and the proximity of its centers of population to stations in the United States. The heavy shipments to Argentina last fall were intended partly for Chile and other neighboring countries, Buenos Aires being used as a distributing point.

It is interesting to note that over 81.5 per cent. of the entire amount exported was shipped to four countries, whose total population (89,141,219) is only a little under 6 per cent. of that of the entire world outside of the United States. The following percentage of the total United States radio apparatus exports in 1922 was taken by the various countries: Canada, 28.2; Argentina, 22.5; Poland and Danzig, 19.8; England, 11; Cuba, 4.1; Mexico, 3; Brazil, 2.6; Japan, 1.4; Uruguay, 1.4; Philippine Island, 1.1; New Zealand, 1, and all other countries, 3.5.

Radio Permeates the Universe

First Yegg—"Say, Bill, I seen a radio in dat house up de block dat we jest passed. Whatcha say we does de monkey up an' freezes onto some of de junk? It brings lotsa jack."

Second Yegg—"Fer de luvva Pete, hang offa dat! Dontcha know dat kinda stuff is wise dan snitchin' candy off'n a bawlin' brat? Dem radio nuts raise all cane when dere wives even dust dem blame tings off. D'ya wanta raise de neighborhood? Dese guys sits up till mornin' t'hear de blame stuff."

First Yegg—"Huh, howdayagetdatway? How d'ya know?"

Second Yegg—"Cause I got one of dem tings meself. Now laugh dat off!"



Perfect Radio **satisfaction** throughout entire Summer with loop or indoor aerial with two stages Radio Frequency, employing our **new** Radio Frequency Transformers at but \$4.00 each. Totally unlike any other. All difficulties eliminated. Regardless of previous disappointments, these Transformers will do what others claim. No extravagant, unsubstantiated claims. Money back guarantee. A few dollars will construct a Set **equal or superior** to any made, and **you** can build it.

- A NEW RECEIVING SET AT \$18.00
- A NEW INDUCTANCE SWITCH AT \$1.50
- A NEW VERNIER CONDENSER AT \$1.00

All described in **new** literature.

"THE LINE OF NO DISAPPOINTMENTS"

NEW YORK COIL COMPANY
338 PEARL STREET NEW YORK CITY, N. Y.

Young Sunday **Greenwich Radio Co.**
185 GREENWICH STREET NEW YORK, N. Y.

TUBES	ONE TUBE SET
VT 2 Western Electric .....\$8.00	Guaranteed to get 700 miles..\$14.95

VARIOMETERS & COUPLERS Eagle Moulded List Price, \$8; Special, **\$4.95**

PATHE LOUD SPEAKERS, Remarkable Value at \$17.50

WOULD YOU LIKE TO RECEIVE RADIO LITERATURE?

Are you in the market for radio goods of any kind, either as a consumer, a distributor or a retailer? If so, send us your name and address on a post card and we will see that your name reaches the right people, so that you will receive pamphlets, circulars, etc., regarding the goods you want.

ADDRESS SERVICE EDITOR, RADIO WORLD, 1493 BROADWAY, NEW YORK CITY

NOW IN PREPARATION

Radio World's Special Vacation Number

Advertisers who want to reach proprietors of summer hotels, summer camps, etc., and owners who contemplate equipping their country homes, yachts, motor boats and automobiles with radio sets can reach them quickly and effectively by using space in **RADIO WORLD'S SPECIAL VACATION NUMBER**.

Our Circulation Department is making special efforts to reach all these potential buyers of your goods, and to see that a copy of **THE VACATION NUMBER** is placed in their hands so that they cannot fail to read the advertising announcements as well as our text pages.

RADIO WORLD'S VACATION NUMBER will be unusually interesting, be profusely illustrated with outdoor radio pictures, full of the snap and go of outdoor life, and its many special articles and illustrations are designed to make readers want the goods offered by our advertisers.

REGULAR RATES WILL BE IN FORCE AS FOLLOWS:

- | | |
|---|---|
| One page: One time—\$150.00. | On four consecutive issues—10% discount. |
| Half, Quarter, Third and Two-thirds pages at proportionate rates. | On thirteen consecutive issues—15% discount. |
| One inch, one time—\$5.00. Per agate line—\$0.40. | 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.

SELL THEM YOUR GOODS!

Wire, write or phone now about special positions.

RADIO WORLD, 1493 BROADWAY, NEW YORK CITY

"As valuable to your radio set as
RADIO is valuable to the world"

is
**ARTHUR PUDLIN'S
VARIABLE HIGH
RESISTANCE LEAK**

Eliminates the hissing and all disagreeable noises.

Enables you to hear all stations within 3000 miles.

Endorsed by Flewelling, Rosenblum and other leading Radio Engineers.

Price with .00025 Mice
Condenser \$1.00
Price without Condens-
er75

We Also Manufacture
The Artmica Condenser
In all capacities. 25c.

Our Products handled by all up to date dealers. If your neighborhood dealer does not carry them, send purchase price and dealer's name to

Arthur Pudlin Engineering Co.
Dept. "D" 1540 Broadway, New York

10c

will bring you immediately our 32-page booklet containing complete diagrams and descriptions of Flewelling, Reinartz, Super-Regenerative and other circuits. Information about tubes, hints on construction of sets and other valuable and instructive data for everyone interested in Radio is included.

Our complete line of standard equipment is also illustrated and described—an up-to-date catalog of the newest in Radio at right prices.

FREMONT RADIO SALES CO.
227-229 Fulton St. NEW YORK CITY

BIG SLASH!

Cash with Order—Parcel Post Prepaid

\$3.00 6-Volt Detector Tube.....\$1.85
3.50 6-Volt Amplifier Tube..... 2.15
5.00 1½-Volt Detector and Amplifier.. 3.75
6.50 1½-Volt Detector and Amplifier.. 4.95
5.00 6-Volt Detector Tube..... 2.99
6.50 6-Volt Amplifier Tube..... 3.95

Complete Parts for Flewelling, Reinartz, Kaufman, Cockaday or "Pup" Cir-
cuits \$10.⁹⁵

PAULA RADIO CO. 233 W. 34th St.
New York City
Wholesale—Retail—Write for Catalogue

Subscribe for RADIO WORLD, \$6.00 a year,
\$3.00 six months, \$1.50 three months.

FILL OUT AND MAIL NOW
SUBSCRIPTION BLANK

RADIO WORLD

RADIO WORLD 1493 Broadway, New York City

Please send me RADIO WORLD for months, for which
please find enclosed \$.....

SUBSCRIPTION RATES:

Single Copy \$.15
Three Months 1.50
Six Months 3.00
One Year, 52 Issues..... 6.00
Add \$1.00 a Year to Foreign
Postage; 50c for Canadian Post-
age.

**500 Attend Milwau-
kee Radio Amateurs'
Club Affair**

BEFORE an audience of 500, many being broadcast listeners, the Milwaukee Radio Amateurs' Club, Inc., recently exhibited the two-reel radio film, "The Wizardry of Wireless." Following the exhibition, A. R. R. L. City Manager I. H. Strassman, 9AHO, and E. T. Howell, Sc. M., technical committee chairman, addressed the gathering on the subject of the relations between the amateurs and the radiophone people. The progress being made in ridding the air of unlicensed stations was reported, and the efforts of the traffic committee to bring about cordial feeling between the two classes was called to the assembly's attention as well as a description given of that committee's work.

"Radio Frequency Amplification System" was the title of a paper presented by E. D. Nunn, ex-9FE, a Milwaukee radio engineer, in which stress was laid on the use of R. F. amplification with two variometer receptors. This lecture is the first of a series being arranged by the new program committee chairman, H. F. Waring, pre-war 9AEX, and president of the society. H. P. S. Day, Sc. B., a telephone engineer, presented the second paper under the title of "Vacuum Tube Characteristics." In non-technical language some of the fundamentals as well as the applications of the thermionic valve were treated in interesting fashion.

Upon his return from San Francisco, Charles S. Polacheck, a former secretary-treasurer, addressed the members under the title of "Some Experiences of a Wayfaring 'Ham' in the West," and told of his meeting with a former speaker at the club, L. E. Grogan, formerly radio engineer to the government of Southern China; also he related his experiences as a guest of the San Francisco Radio Club, Inc., at several of their interesting meetings.

The club's code class for faddists is meeting weekly at 7:15 p. m., Thursdays, in the Public Museum's Trustees' Room, while the society's regular meeting is held at 8:00 p. m. in the same room and on the same evening.

Amateurs to Broadcast News

E. H. SCHNELL, Hartford, Conn., traffic manager of the American Radio Relay League, has authorized the appointment of 125 amateur stations for the distribution of amateur news items by radio. During recent storm emergencies in the upper Mississippi Valley both amateur operators and broadcasting stations supplemented wire service, temporarily out of commission, enabling a number of papers to keep in touch with news centers and correspondents. Whenever such emergency occurs again in any part of the country these amateur stations will be at the service of railroads, newspapers and the public.



**DIETZEN
SUPER
FONES**
Type G
3000 Ohms

List \$7.50
\$3.95
Postpaid

Clear
as a
Bell

SPECIALS

- \$25.00 Aerola, Jr., Crystal Set..... \$7.95
- .50 Large Radio Map35
- 8.00 Dayton Molder Variometer..... 5.45
- 5.00 Sleeper Radio Frequency Trans-
former 2.15
- 5.50 180° Variocoupler, silk wound wire
on Bakelite 2.95
- 1.25 Western Electric Ammeter..... .49
- 6.50 43 Plate Murdock Variable Con-
denser 3.45
- 3.00 Owl Radio Frequency Transformer 1.15
- .75 3 inch Bakelite Dial35
- 3.50 1½ Volt French Peanut Tube with
Socket 2.50

We pay postage on above items

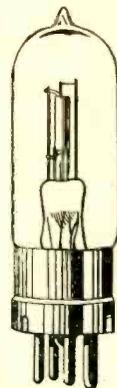
Send 10c. for copy of Radio Review a monthly Magazine, containing live radio news-diagrams and hundreds of Radio Bargains.



RADIO STORES

Dept. E. 3, 191 Fulton Street, N. Y. C.

NEW YORK'S GREATEST RADIO
MAIL ORDER HOUSE



At Last

A Real
1½-Volt Tube
Platinum
Coated Filament,

Clear Bulb,
Standard Base,
Detector, Amplifier

Plate Potential 22½-130,
Amps .225

Absolute \$4.95
Guarantee EACH

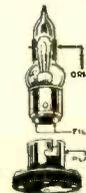
OR TWO FOR \$9.00

MAIL ORDERS FILLED PROMPTLY
Send Cash or Money Order (No Stamps)

TREXO TRADING CO.

200 Broadway, Suite 210, N. Y. City

Guaranteed 1000 Hours' Service



The DELTA is a 3-volt dry cell tube,
using a 22½-volt B Battery.

Can be used as detector in any suc-
cessful circuit.

\$2.50 Each

Composition Delta Socket, 40c each.
Standard Socket Adapter, 75c each.

DELTA MIDGET TUBE CO.

241 Market St. Newark, N. J.

THE ANNIVERSARY NUMBER of Radio World was increased in size and is an exceptional issue. A few copies left at 15c. each, or you may start your subscription with that number. RADIO WORLD, 1493 Broadway, New York.

PERSONAL STATIONERY

SEND ONLY \$1. Be distinctive—have your own stationery. Send cash or money order for 200 sheets, 100 envelopes, postpaid, printed in blue ink with name and address, not over 3 lines (or 50 characters), on good white bond, sheets 6x7. Personal Printing Co., Box 5255T Boston, Mass.
Reference: International Trip Co., Bann

Go to your dealer for a Free demonstration of the **ROYALFONE**



Matched tone, sensitive, Adjustable head band, 5 ft. cord. Equal to any \$8.00 ohm \$8.00 phone. Money back guarantee. If your dealer cannot supply you take advantage of this special offer.

Price \$3.75 C. O. D. or money order

ROYAL ELECT. LAB.

209 MARKET ST. NEWARK, N. J. Salesmen wanted

LOOP AERIAL for \$1.50

The above is knocked down, including Wire, Binding Posts and all Wood parts—sawed to fit. No screws or nails, wire fits in slots.

The Ritter Crystal Set. A well made and efficient receiving set, with crystal. **\$2.50**

Money orders or certified checks accepted. Goods shipped day order is received.

RADIO PARLOR, 2671 Broadway, New York, N. Y.



The Best Combination, Boys!

SUNBEAM

SUNBEAM QUALITY goods to complete the Cockaday Circuit One guaranteed, accurate set of coils consisting of one plain and one Bank-wound coil sent postpaid for \$2.75.

17 plate SUNBEAM QUALITY condenser, heavily nickel-plated, handsome finish, all Bakelite M'ts. Adapted for the COCKADAY circuit. \$2.88

Another hummer. Triple Bank-Wound Coil, Silk Wound. To meet the new Government regulation wave-lengths now being allotted. Furnished with hook-up and instructions. \$3.25

PHONES

- \$12.00 Baldwin, double \$9.80
- 6.00 Baldwin, single 5.25
- 8.00 Brandes 5.75
- 8.00 Federal 4.90
- 6.00 Murdock No. 56 4.25
- 7.00 Auth 4.00
- RADIOSEAVE LOUD SPEAKER UNIT 3.75
- AMPL.-TONE PHONES, 2200 Ohms, TESTED AND GUARANTEED 3.75

- TRANSFORMERS**
- \$7.00 U. V. 712 R. C. \$5.85
 - 7.00 Federal 4.75
 - 5.00 Acme 3.75
 - 5.75 Kardon 3.50

CONDENSERS

- Radio Stores Corp., Bakelite Ends, 23 Plate . . . \$3.75
- A. B. C., 23 Plate 1.60
- Radiant with Gearing Vernier:
- 23 Plate 5.50
- 43 Plate 6.00

MIGNON, FORMICA INSERTS

- Type A, Plain, 14 Plate \$4.50
- Type B, Plain, 26 Plate 5.00
- Type C, Plain, 46 Plate 6.00
- Type A, Vernier, 14 Plate 6.00
- Type B, Vernier, 26 Plate 6.50
- Type C, Vernier, 46 Plate 7.50

SOCKETS V. T.

- Bestone, Solid Bakelite \$0.75
- Eagle, Bakelite60
- Good Bakelite Sockets50
- John Firth50
- Composite Base30

MISCELLANEOUS

- Federal Potentiometer \$1.25
- Klosner Rheostat75
- Filkostat 1.75
- Bradlostat 1.85
- Cutler-Hammer Rheostat85
- Cutler-Hammer Vernier Rheostat 1.25
- JEWELL VOLT METER—zero to 50 volt. 3.00
- Sterling Voltmeter—zero to 50 volt. 2.50
- Cutler-Hammer Battery Switch for panel mounting, Nickel Plated75

DeForest, Eyeready and all Radio apparatus of SUNBEAM QUALITY available at Best Prices. Our Radio mechanics will complete any radio set to your specifications.

SUNBEAM ELECTRIC COMPANY

71 THIRD AVENUE (Between 11th and 12th Streets), NEW YORK

Farm Lighting Plants at Bargain Prices. For Yachts, Motor Boats and Country Homes.



Na-ald Special Socket No. 499



Na-ald De Luxe No. 400

It's the contact that counts

The dual-wipe contact strips of the Na-ald De Luxe socket avoid the trouble experienced with the socket of conventional design. Because of thorough cure and high dielectric properties this socket keeps plate to grid losses at a minimum (of particular importance in Flewelling Circuit or in Radio Frequency).

Price 75 cents

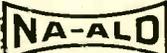
The Na-ald Special Socket No. 499 is a sturdy little socket for the G. E. No. 199 dry-cell tube. It has special slot construction, and is moulded of genuine Bakelite. The heat from soldering connections will not affect these sockets.

Price 50 cents

Booklet with wiring design and instructions for Hazeltine's Neutrodyne circuit, together with other selected circuits, packed with each Na-ald product or sent in exchange for cover taken from any Na-ald carton.

Alden Manufacturing Co.

Dist. L. 52 Willow St. Springfield, Mass.



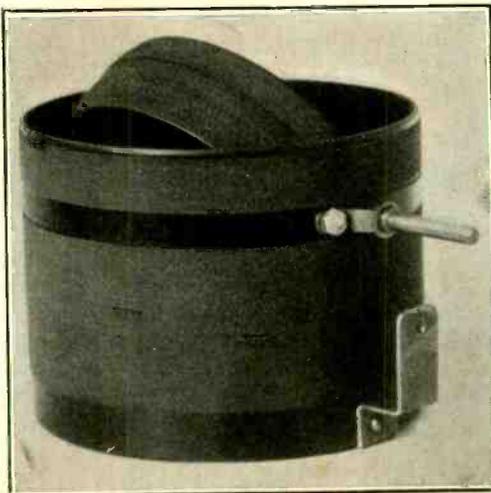
TO GET THAT DISTANT STATION

USE A COAST COUPLER

This coupler is designed along strictly scientific lines, and is the result of eighteen months' experiment. Wound with green silk covered wire on Bakelite tubing. Very selective.

Following are a few of the many DX stations received with this coupler, and detector tube only, at Long Beach, California:

- PWX, Havana, Cuba
- WWJ, Detroit, Mich.
- WSB, Atlanta, Ga.
- WDAP, Chicago, Ill.
- CFCN, Calgary, Can.
- WBAP, Ft. Worth, Texas



Our adaptation of a popular hook-up furnished with coupler. Coupler fully guaranteed when hooked up according to instructions.

Coupler and diagram, sold only under our money back guarantee. Mailed anywhere in the United States upon receipt of \$5.00. Post Office or Express money order.

Make All Remittances Payable to

COAST COUPLER COMPANY

321 WEST SEVENTH ST.

LONG BEACH, CALIFORNIA

IF YOU ARE INTERESTED IN RADIO YOU NEED THESE BOOKS

Radio Books for the Expert and Amateur

Telling How to Operate a Radio Set—How to Build a Set—Principles of Vacuum Tubes and Other Radio Problems



Radio Hook-Ups

By M. B. SLEEPER

A book that gives you not only clear diagrams for all kinds of telephone and telegraph receiving and transmitting sets, but simple descriptions of each circuit shown and spaces for notes of results obtained.

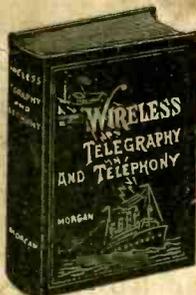
PRICE 75c.

Construction of New Type Transatlantic Receiving Sets

By M. B. SLEEPER

There is a peculiar fascination about receiving radio messages from the high-power stations of England, France, Germany, Russia and Italy, as well as those located in the Pacific Ocean and the Oriental countries. Several types of simple receiving sets for this purpose are described, with detectors and amplifiers to accompany them. Suggestions are also given for operating relays and reproducing the signals on a phonograph. Schedules of operating time for high-powered stations are given. In addition, there is some valuable data on home-made wavemeters for testing and experimenting

PRICE 75c.



Wireless Telegraphy and Telephony Simply Explained

By ALFRED P. MORGAN

One of the most complete and comprehensive treatises on the subject ever published. A study of its pages will enable one to master all the details of the wireless transmission of messages. The author explains in simple language the theory and practice of wireless telegraphy and telephony. 154 pages, 156 engravings

PRICE \$1.50



Design Data for Radio Transmitters and Receivers

By M. B. SLEEPER

The only book that gives tables and data for designing, receiving and transmitting apparatus so that you need no knowledge of mathematics. It's the first book a beginner buys after he has learned the use of his phone receiver.

PRICE 75c.

Construction of Radiophone and Telegraph Receivers for Beginners

By M. B. SLEEPER

The man who wants to feel the real thrill of accomplishment, and who is not satisfied in the merely making use of what others have done for him, builds his own radio apparatus. Radio men can follow the data in "Radio Phone and Telegraph Receivers" with full confidence, because each piece of apparatus described was first made, tested and found efficient before the final design was accepted. Special receivers, both crystal and audion, are shown in detail. Regenerative circuits as well as audio and radio frequency amplifiers are described with clear photos, diagrams, and working drawings prepared especially for the novice and the man who wants to receive the radio telephone broadcast. A special feature is the phonograph type radio set and the loud speaker. Fully illustrated.

PRICE 75c.



The Radio Experimenter's Handbook

By M. B. SLEEPER

Throughout the preparation of this book, one purpose was kept in mind—Answer the Practical Questions of the "Novice," of the "Beginner," and the more advanced "Student." This book will help in the selection or construction of simple apparatus for the transmission and reception of radio telegraph and telephone signals. In the chapters on radio receivers the simplest crystal, the simple audion, and the regenerative types are described in quite some detail. The question of antennas, both for transmitting and receiving, are taken up. A good many helpful suggestions are given which will be of considerable aid to the experimenter. 16 chapters. Fully illustrated.

PRICE \$1.00



The A B C of Vacuum Tubes Used in Radio Reception

By E. H. LEWIS

Assoc. I. R. E., and Radio Instructor

Written particularly for the person who "knows nothing about radio," but who would like to gain an understanding of the elementary principles of operation of vacuum tubes and various circuits in which they are used for the reception of radio-telegraph signals and radio-telephone music and speech. Illustrated.

PRICE \$1.00

How to Make Commercial Type Radio Apparatus

By M. B. SLEEPER

This book describes in detail many commercial types of spark and vacuum tube telephone transmitting and telegraph and phone receiving equipment of all kinds. The experimenter will be able to get a world of ideas for the design and construction of his next piece of radio equipment from the very clear descriptions and the 98 clearly illustrated figures.

PRICE 75c.



Experimental Wireless Stations

By P. E. EDELMAN

Tells how to make apparatus to not only hear all telephoned and telegraphed radio messages, but also how to make simple equipment that works for transmission over reasonable long distances. Then there is a host of new information included. The first and only book to give you all the recent important radio improvements, some of which have never before been published. 392 pages, 167 illustrations.

PRICE \$3.00

Any of These Books Sent Prepaid on Receipt of Price
 The 7 Books for \$9.50, to One or Different Addresses

ADDRESS **THE COLUMBIA PRINT**
 ROOM 326, NO. 1493 BROADWAY, NEW YORK