

NEW LIST OF BROADCASTING STATIONS

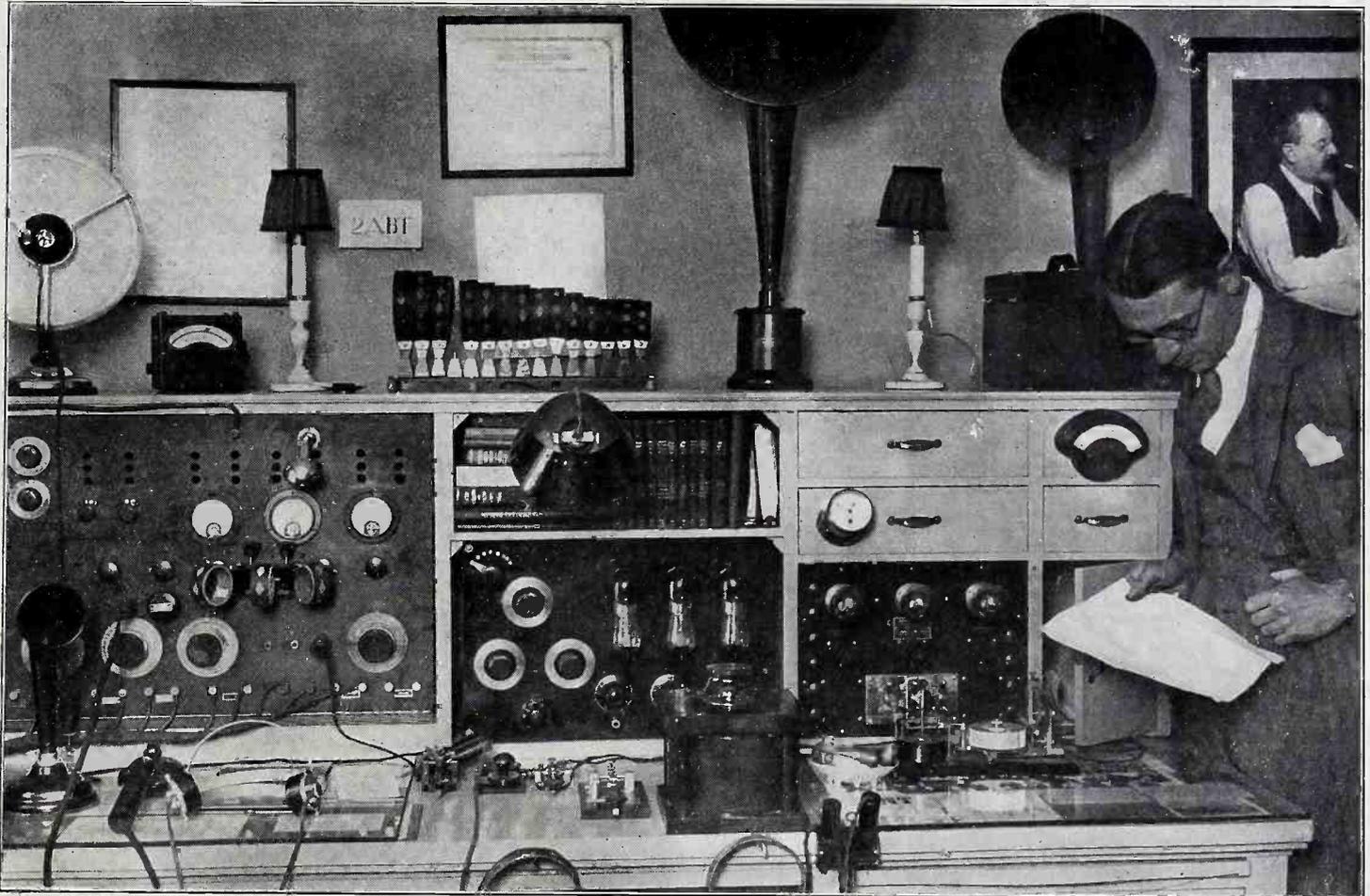
RADIO WORLD

Title Reg. U. S. Pat. Off.

ILLUSTRATED

EVERY WEEK

A COMPLETE AND ELABORATE AMATEUR STATION IS 2ABT



(C. Kadel & Herbert)

George Freisinger, of New York City, is the owner and operator of this splendidly equipped amateur station. As will be noted, the apparatus is mounted on a specially made desk and its arrangement is compact and convenient. The complete equipment is said to have cost \$5,000. The station is described on another page of this issue.

How To Make a Super Amplifier (See Inside)

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. 11. Whole No. 63

June 9, 1923

15c. per copy, \$6.00 a year

How to Build a Battery Charger for Use with 110 Volts A. C.

By *Stuart A. Hendrick 2BJG*

ALMOST every one who owns a storage battery wished, at some time or other, that he had a means of charging it just where it stands instead of lugging it off to a battery charging station every time it runs down.

There are numerous charging outfits on the market.

The electrolytic or chemical rectifier is very unhandy, unclean and cannot be relied upon to do a good job. It will, in all probability, do more harm than good to your battery. The magnetic type of rectifier is noisy and cannot be relied upon as much as a Tungar, which will be described in this article and, in my opinion, by far the best to use with 110 volts A. C. It is noiseless and is the only one that can be absolutely depended upon to do the charging because it has no moving parts to get out of order and no chemicals to evaporate and give off fumes.

The prices of these rectifiers range from \$15 to \$30 and quite a part of this sum may be saved by building the rectifier yourself. While some persons have not the patience or facilities for building apparatus of this type others manage to do these things and any one who undertakes to build one of these Tungar rectifiers will find, when he has finished, that he has not only saved considerable money but has a piece of apparatus that is about the handiest thing possible to say nothing of the knowledge gained while obtaining the parts and building the rectifier.

The Tungar works essentially upon the same principle as the vacuum tube in your receiver, but the bulb is especially built to stand the heavy current that must be passed through it.

The rectifier consists of a transformer which supplies a low voltage for lighting the filament of the special Tungar bulb.

The transformer also supplies a higher voltage which is rectified through the bulb and used to charge the storage battery. The transformer will work only when connected to a source of alternating current at a potential of 105 to 115 volts.

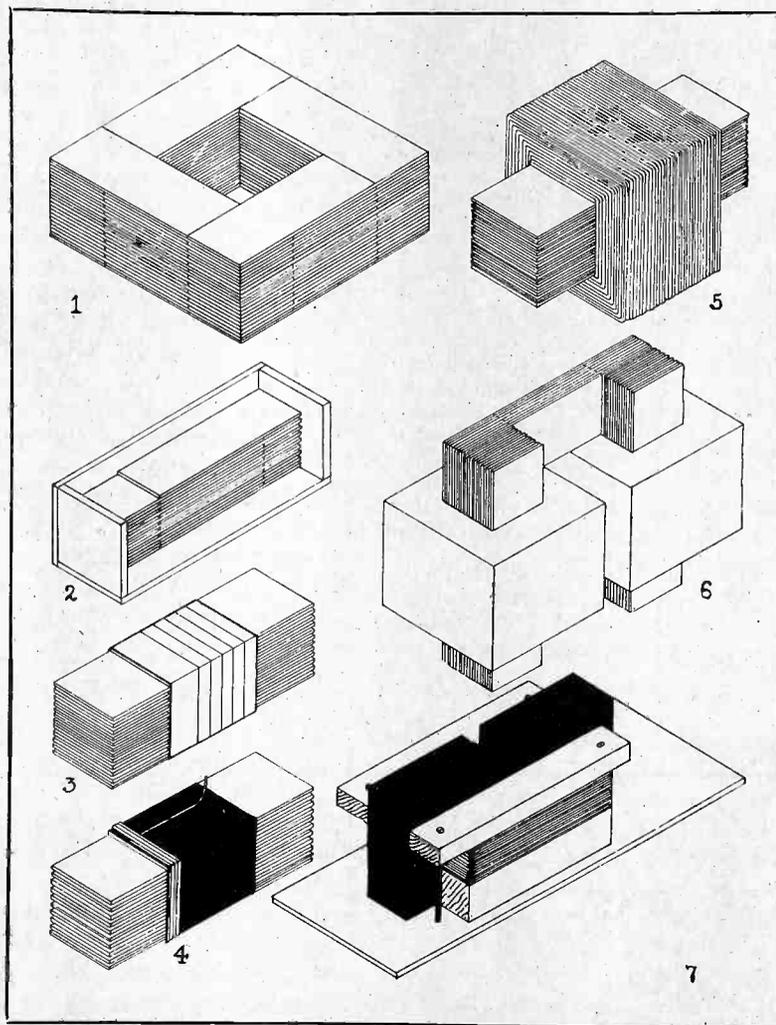
There are two sizes of this type of rectifier—the two ampere and the six ampere.

The two ampere size is suitable for charging small batteries of from 10 to 40 ampere hours capacity. This size will be just the one for those who do not discharge their batteries very often and are in no hurry to get them charged again as they will have to leave the battery in charge for quite a few hours in order to get the job done.

The bulb used in this outfit is known as a Tungar or Rectigon bulb and can be obtained from almost any dealer in radio supplies at a cost of \$4 for the two ampere bulb.

Obtain one of these bulbs and also get a porcelain base socket to fit it. The socket should be such that when it is fastened to a baseboard the bulb will be in

(Continued on next page)



Figs. 1-7. Progressive steps in making the double-wound transformer for use with the battery charger. Each step in the construction is fully explained in the accompanying article.

Shipped Direct from Factory

| | |
|-----------------------|--------|
| 7 x 10 Radio Cabinets | \$2.90 |
| 7 x 20 Radio Cabinets | 4.75 |
| 7 x 18 Radio Cabinets | 3.85 |
| 7 x 24 Radio Cabinets | 5.25 |

20 Cents for Insurance
Post Office or Express Money Order with Orders.

John W. Luhn Wood Products Co.
Stark and Branch Streets Cincinnati, Ohio

MAILED ON APPROVAL

PRICE 30¢

322 9TH ST. BROOKLYN, N.Y.

Cockaday Circuit

The newest and most startling development in radio

Exceedingly Selective. Simple to Operate. Highly Sensitive. Verified C.W. Range of 1200 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 Variable Rheostat (Cutler-Hammer) | 1.30 |
| 1 Panel (Genuine Bakelite), 7 x 18 | 2.50 |
| 1 Grid Condenser, Mica Dubilier .00025 | .55 |
| 1 Switch Lever, 7 Points, 2 Stops | .31 |
| 8 Binding Posts | .40 |
| 1 Grid Leak (Cartridge Type) and Bakelite Holder | .80 |
| 2 Dials, 3 Inch | .50 |

Total \$12.71

One Stage Amplifying Unit to This Set, Additional \$5.00

Two Stages, Additional \$11.00

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 | \$3.95 |
| DeForest DV6A. Wonderful as an amplifying tube | 6.00 |
| 22 1/2 Volt "B" Battery | 6.80 |
| Matheriel Baldwin Type C, Double Phones | 4.50 |
| Matheriel Baldwin Type C, Single Phones | 4.50 |
| Grades (Superior) Phones | 5.95 |
| 48 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

When Your Set Goes on Strike

SOMETIMES your set for no reason at all just lays down on you and goes out of commission, or stations that pounded in last night are weak and faint tonight. What do you generally do? Go through your set with a fine comb or sit and test out carefully?

What you should do is this: Look at your antenna thoroughly and inspect your ground and lead in. It may be that your antenna has become grounded or that your ground lead is broken or loose. Look at your B battery. They sometimes take a sudden drop in voltage and hence your tubes are not working right. Inspect your tubes. Once in a while the lead nipples on the lugs corrode and form a high resistance path for the current which is equivalent to a bad connection. Examine your phone cords. There may be a break in the tinsel and you need a new cord. In order to test them, turn on your tubes, put on your phones and carefully "feel" the cord, an inch at a time, bending it back and forth. If there is no sudden increase in the strength of the signals the cords are O. K. Never test phones with a battery. Examine all your flexible connections, such as the pig-tail connections on your condensers and couplers.

If all these things seem to be right, carefully inspect the set looking for corroded connections or crossed leads. It stands to reason that if the set worked all right the night before, and no one touched it during the day, that it did not walk around and break itself and that there is only some minor trouble, which can usually be found outside of the cabinet. There is no use to get all worked up and go fishing around inside the cabinet and do more damage than originally caused your trouble.

Germans Radio to Moving Trains

GERMANY recently had a demonstration of wireless telephonic communication between a moving train and ordinary receiving and transmitting stations, according to Consul Richardson at Berlin. Messages were exchanged between the president and officials of the government in Berlin and other officials on a train moving at 30 miles an hour, half-way between Berlin and Hamburg, by means of the "Huth" system. This system is a combination of wireless and wire transmission. The sending apparatus was installed in a compartment on the train and the antenna rigged over the tops of two cars. The line telegraph wires along the track are said to have picked up the messages and transmitted them to Berlin where the line was connected with a receiving set.

Build a Radio Receiver That Your Friends Will Admire

FOR a surprisingly small sum you can now build a real receiver that is surpassed by none in either efficiency or artistic appearance. In a beautifully designed cabinet are a series of instruments that co-ordinate to give an ease of control, long distance reception and elimination of interference which will win the instant approval of the most discriminating. The old reliable regenerative hook-up is used with a wave length range of 150-3000 meters. A complete set of blueprints has been prepared showing the construction of this receiver in detail. The plans include a distortionless two-step amplifier that matches the receiver in both beauty and efficiency. A bill of material numbered to correspond with the blue prints and wiring diagram eliminates any chance of error and enables anyone without knowledge of radio or mechanics to build this set. Price \$2.00 postpaid.

EMORY RADIO COMPANY
Dept. A-1 Emory, Virginia

REBUILT RADIO TUBES SAVE YOU MONEY GUARANTEED EQUAL TO NEW

UV200, \$2.75—UV201A..... \$3.75
UV201, \$3.00—WD11-12..... \$3.75

\$3.50 SPECIAL \$3.50

Regular Price, \$5.00

NEW 1.5 VOLT TUBES

Send \$3.50, your burned out 1.5 volt tube (any make), and this adv. for

AN ABSOLUTELY NEW TUBE DETECTOR AND AMPLIFIER

TYPE S—FITS STANDARD SOCKET
TYPE II—FITS WD-11 SOCKET

Radio Tube Service Co.

41 W. 32d Street New York, N. Y.



Pruden Reliable for Good Results Radio Specialist

Dealers write today for our interesting proposition.

FREDERICK H. PRUDEN, Inc.
993 Bergen Ave., Jersey City, N. J.

A REAL PORTABLE SET

Size 9 3/4 x 7 3/4. Weighs about 6 pounds, including batteries, phones, tube, etc. Complete, \$22.50. Capable Range 1,000 miles. New \$6.50 1 1/2-V. Det. & Amp. Tube, \$5.95.

PAULA RADIO COMPANY
233 WEST 34TH STREET NEW YORK CITY

DID YOU GET THE VACATION NUMBER OF RADIO WORLD, OUT LAST WEEK?

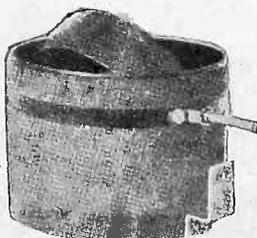
It had page after page of interesting and practical ideas and hook-up for people who are going camping, canoeing, yachting, or just vacationing up in the mountains. You really can't afford to be without it, if you intend leaving the city behind this summer and want to take your radio with you. Dated June 2. Mailed for 15c. Radio World, 1493 Broadway, New York City

DO YOU WANT RADIO FREQUENCY MAXIMUM DISTANCE ON ONE TUBE?

LOOK THESE OVER

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

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



Only one hook-up will do this. Only one tube is necessary if this Coast Coupler is used.

Coast Coupler and diagram mailed within the United States upon receipt of Five Dollars.

Satisfaction or Money Back Guarantee.

Make All Remittances Payable to

COAST COUPLER COMPANY

321 WEST SEVENTH ST.

LONG BEACH, CALIFORNIA

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. 11. Whole No. 63

June 9, 1923

15c. per copy, \$6.00 a year

How to Build a Battery Charger for Use with 110 Volts A. C.

By *Stuart A. Hendrick 2BJG*

ALMOST every one who owns a storage battery wished, at some time or other, that he had a means of charging it just where it stands instead of lugging it off to a battery charging station every time it runs down.

There are numerous charging outfits on the market.

The electrolytic or chemical rectifier is very unhandy, unclean and cannot be relied upon to do a good job. It will, in all probability, do more harm than good to your battery. The magnetic type of rectifier is noisy and cannot be relied upon as much as a Tungar, which will be described in this article and, in my opinion, by far the best to use with 110 volts A. C. It is noiseless and is the only one that can be absolutely depended upon to do the charging because it has no moving parts to get out of order and no chemicals to evaporate and give off fumes.

The prices of these rectifiers range from \$15 to \$30 and quite a part of this sum may be saved by building the rectifier yourself. While some persons have not the patience or facilities for building apparatus of this type others manage to do these things and any one who undertakes to build one of these Tungar rectifiers will find, when he has finished, that he has not

only saved considerable money but has a piece of apparatus that is about the handiest thing possible to say nothing of the knowledge gained while obtaining the parts and building the rectifier.

The Tungar works essentially upon the same principle as the vacuum tube in your receiver, but the bulb is especially built to stand the heavy current that must be passed through it.

The rectifier consists of a transformer which supplies a low voltage for lighting the filament of the special Tungar bulb.

The transformer also supplies a higher voltage which is rectified through the bulb and used to charge the storage battery. The transformer will work only when connected to a source of alternating current at a potential of 105 to 115 volts.

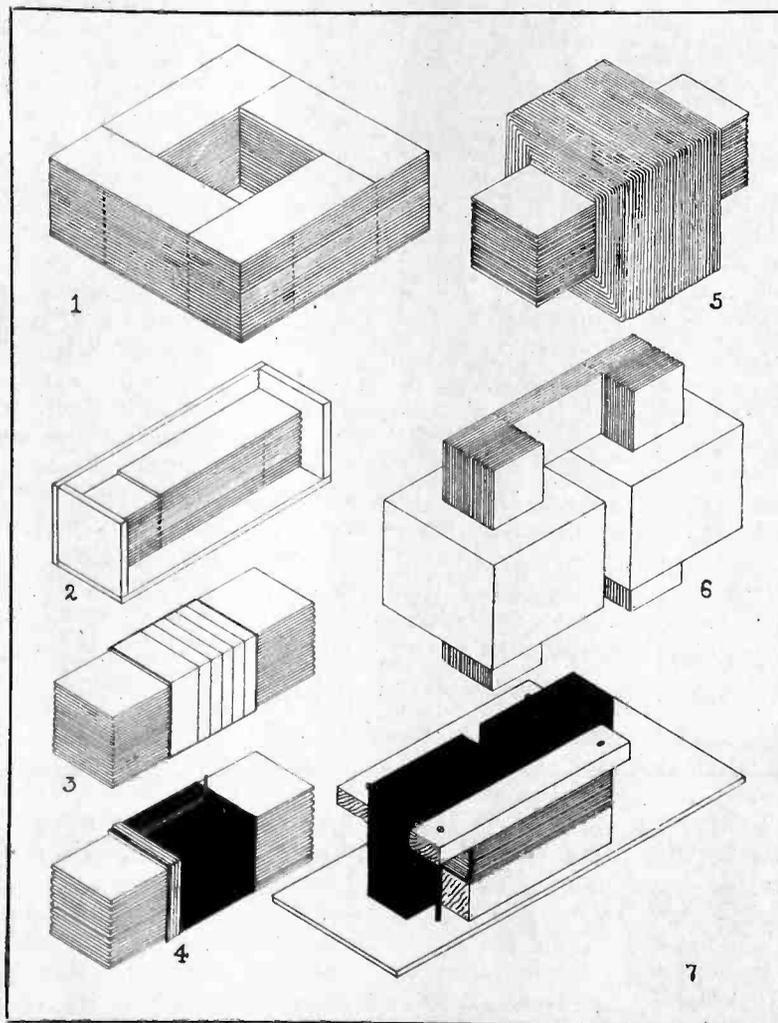
There are two sizes of this type of rectifier—the two ampere and the six ampere.

The two ampere size is suitable for charging small batteries of from 10 to 40 ampere hours capacity. This size will be just the one for those who do not discharge their batteries very often and are in no hurry to get them charged again as they will have to leave the battery in charge for quite a few hours in order to get the job done.

The bulb used in this outfit is known as a Tungar or Rectigon bulb and can be obtained from almost any dealer in radio supplies at a cost of \$4 for the two ampere bulb.

Obtain one of these bulbs and also get a porcelain base socket to fit it. The socket should be such that when it is fastened to a baseboard the bulb will be in

(Continued on next page)



Figs. 1-7. Progressive steps in making the double-wound transformer for use with the battery charger. Each step in the construction is fully explained in the accompanying article.

(Concluded from preceding page)

an upright position, otherwise the filament will sag when it is heated up and will not operate as it should nor last as long as it ought if used properly. Do not, by any chance, put this bulb in a lighting socket, just because it happens to fit, as it will burn out the bulb and probably blow the house fuses.

The next thing needed is a step-down transformer having a two volt secondary capable of delivering 10 amperes and a 15 volt secondary capable of giving two amperes. The two volt secondary is used for lighting the filament of the rectifier tube while the 15 volt winding furnishes the alternating current to be rectified by the tube and to be used for charging the battery.

As very few will have a transformer on hand to meet these requirements, one will have to be constructed according to the following data:

With any transformer the core is the first consideration and when making a transformer, for amateur use, the only dimensions of importance are the height of the strips or laminations when piled up, as well as the width of them; in other words, the cross-section of the core. The length of the legs or sides depends on the size of the coils to be wound upon them, so they should be made long enough to leave plenty of room for the windings to fit in.

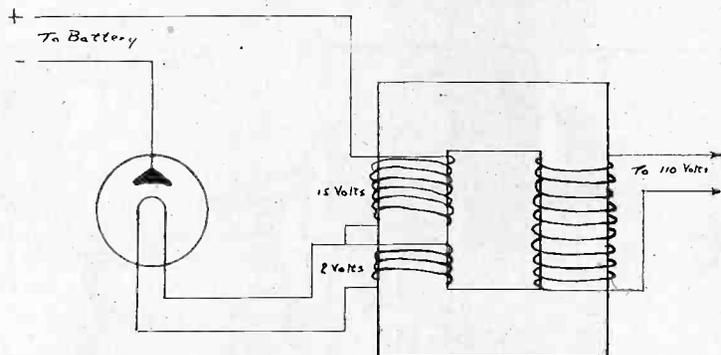


Fig. 8. The way in which to connect the transformer up after making it. Watch your connections on the filament. If the wrong winding is connected you will burn out your tube.

The core used in this outfit was made of strips of silicon steel or transformer iron $1\frac{1}{4}$ inches wide and piled up to a height of one inch. The sizes were five inches long, which left enough room for the coils.

The core may be obtained from any company that manufactures transformers, for two or three dollars at the most. However, quite a few of you may desire to make the core yourselves.

If silicon steel cannot be obtained, ordinary black stovepipe iron may be used and should be about .016 inches in thickness (about 60 thicknesses to the inch).

If this ordinary iron is used in making the core, the cross-section will have to be increased until it is twice as large as that used with the silicon steel because of the lower permeability of the black iron. This will make the core $1\frac{1}{4}$ inches by two inches instead of $1\frac{1}{4}$ inches by one inch. The length of the sides will remain the same in either case, that is, five inches wide by five inches long. Any tinsmith will cut it into strips of the proper width for a nominal sum or you may do this yourself if you have a pair of tinsnips and a little patience.

After enough of the pieces have been cut up to the proper size, $1\frac{1}{4}$ inches by $3\frac{3}{4}$ inches, they should be piled up as shown in Fig. 1 in order to find out if the corners fit together all right. The next thing to do is to make a wooden frame as shown in Fig. 2 so that the legs upon which the coils are to be wound may be piled up evenly and clamped. As each piece of iron

is laid in place it should be given a good coat of shellac. When all of the pieces for one leg have been shellaced and piled up, a piece of wood is put on top of them and clamped down until the whole thing is thoroughly dry after which, when it is taken out of the frame, it will be found to be a solid piece with the shellac holding it together. It should then be taped up as shown in Fig. 3. Two legs should be made up in this manner and when they have been finished the coils should be wound upon them as shown in Figs. 4 and 5. The end of the wire should be fastened as shown in Fig. 4 in order that the winding shall be held securely in place. Plenty of shellac should be applied while winding the coils and when they are finished they should be given an additional coat and placed in a hot oven and thoroughly baked until dry.

The primary coil, or the one that is connected to 110 volts alternating current, is wound upon one of the legs and consists of 605 turns of No. 20 double cotton wire. This winding should be put on evenly and shellaced as shown in Fig. 5. The two secondaries are wound upon the other leg after it has two or three layers of tape on it. The 15 volt winding is put on first and should consist of 85 turns of No. 18 d.c.c. wire. The filament winding is made up of 11 turns of 14 d.c.c. wire wound on top of the 15 volt secondary.

When these two legs have been wound, shellaced and baked they should be stood on end and the pieces that are to make up the sides should be inserted one at a time until the side is built up as shown in Fig. 6, after which the whole thing should be turned over and the other side put in place in the same manner. The transformer should be given another coat of shellac and place in a box or clamped in a frame of wood or iron to keep the laminations of the core from humming while it is in service. One way of mounting is shown in Fig. 7. The bulb should, in all cases, be exposed to the air so as to keep it cool because it develops quite a bit of heat while in use.

The method of wiring up the outfit is shown in Fig. 8. The wire marked negative goes from the anode of the tube to the negative side of the battery.

The operation of the outfit is as follows: The two volt winding keeps the filament incandescent while the fifteen volt winding supplies the alternating current of which only one-half passes through the bulb which acts as a valve, thereby supplying a pulsating direct current which is suitable for battery charging.

A blue glow will be seen directly above the filament when the rectifier is connected to the battery and is working properly. If the blue glow fails to appear, the end of the fifteen volt winding should be connected to the other side of the filament instead of the side it happens to be on. If then the blue glow fails to appear, the filament should be lighted more brightly by adding a turn or two to the filament winding or by adding more turns to the 15 volt winding to get a higher voltage.

This little rectifier consumes about 50 watts—filament 20 watts, copper and iron losses 20 watts and the charging current takes about 10 or 12 watts. Although the efficiency is not very high the cost of charging is considerably lower than the cost of having the battery charged at a battery station. A six volt 60 ampere hour battery will only cost about 12 to 15 cents to charge, including depreciation of the bulb. With careful handling a bulb will last two or three years. The rectifier may be used with any six volt battery.

With the foregoing data any one ought to be able to construct this rectifier which certainly will be a most useful piece of apparatus.

An Interesting Amateur Station Is 5ZA, Roswell, New Mexico

AN amateur owned and operated station well known in this country and which has the distinction of having been heard in England, Switzerland, Hawaii, Panama, and Porto Rico on an input of only 400 watts is that of Louis Falconi. The station is listed under the call 5ZA and is located at Roswell, New Mexico.

The station, both receiver and transmitter, were made by the owner who describes his apparatus as follows: The transmitter is a combination phone, CW and ICW set with a maximum output of 200 watts for CW and 100 watts when phone is being used. Two five watt speech amplifiers are employed when the set is used as a phone transmitter. Referring to the illustration, the transmitter is located on the right hand side of the table. At the top of the panel is located a thermo-couple radiation meter reading from 0-10. Directly under the meter is the opening for the four tubes. These tubes are mounted directly back of the opening on strips of rubber to prevent all vibration or microphonic noises when the set is in operation. The

D.C.) which is generated from 110 volts A. C. The small panel at the right of the transmitter contains the wave length control and on the panel is a variable inductance and a condenser in series with the antenna. Either of these may be shorted if necessary. The switchboard for the motor-generator control and filament transformers is located directly under this panel, and all connections are made as simple as possible.

The receiving unit is a combination long and short wave set, embodying several unique and original features. It can be used as either a double or single circuit. As the double circuit it uses the regular variometers and couplers. For each circuit there is a separate detector and each can be used with either two steps of audio- or two steps of radio-frequency amplification. In the single circuit set is used a bank wound coupler allowing reception up to 3,000 meters. This can be loaded with honeycomb coils and reception up to 20,000 meters is then possible. The top dial is for the coupling control and under it are the controls for the variable condenser, plate variometer, potentiometers,

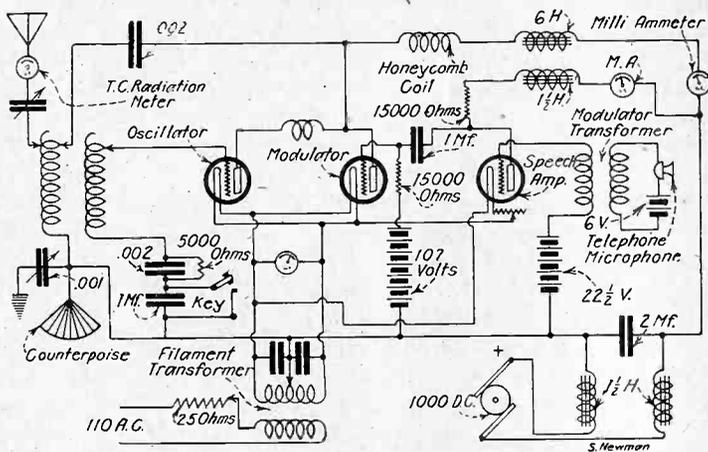


Fig. 1. Circuit diagram of the extremely efficient transmitter used at 5ZA and described in the accompanying article.

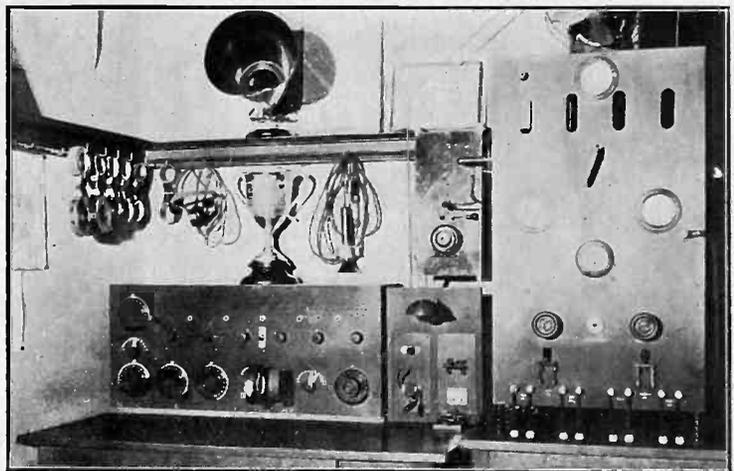


Fig. 2. Transmitter (right) and receiver (left) of Station 5ZA.

switch handle under the openings controls a multiple switch for changing the circuits from CW to phone. This is quite a difficult task when it is considered that all the circuits have to be changed as there are speech amplifiers in the phone circuit. The meter at the right center of the panel is for indicating the total plate input on all tubes, while that opposite it is for indicating the plate input on the speech amplifiers. The remaining meter is for indicating the filament current. An anti-capacity switch throws this meter from the power tubes to the speech amplifiers, the power tubes operating best at 10 volts and the speech amplifiers taking 7.5 volts. This switch is located in the center of the panel. The jack at the lower center controls the filaments of the speech amplifiers as well as allowing the microphone circuit to be switched on or off at will. When the microphone jack is plugged in, the filaments of the speech amplifying circuit are automatically switched on. The two handles on either side of this jack control the rheostats one for the primary of the filament transformer and the other the filament of the speech amplifying tubes themselves for fine regulation. As the amplifying tubes use less current than the power tubes, it is necessary to have a separate rheostat for them alone. Two double pole switches control the plate circuit current (1,000 volts

(two are used—one for control of the plate voltage and one as a stabilizer when the radio frequency amplifiers are in use). The honeycomb coils are used to load the single circuit set. There are six rheostats used, one for each tube (two detectors—one for each circuit). Filament control jacks are used throughout.

In the center of the panel is an anti-capacity switch which throws all the circuits from long wave single circuit to short wave regenerative double circuit. This change involves a transfer of radio-frequency detector and audio-frequency circuits as well as the antenna and ground connections. Capacity effects are nil in this receiver as the entire receiver is screened and grounded. A very valuable feature of the receiver is that in transmitting, by throwing the circuits to the long wave circuit side and tuning to a harmonic of the transmitted wave, a check may be had on the character of the tone and of the transmission.

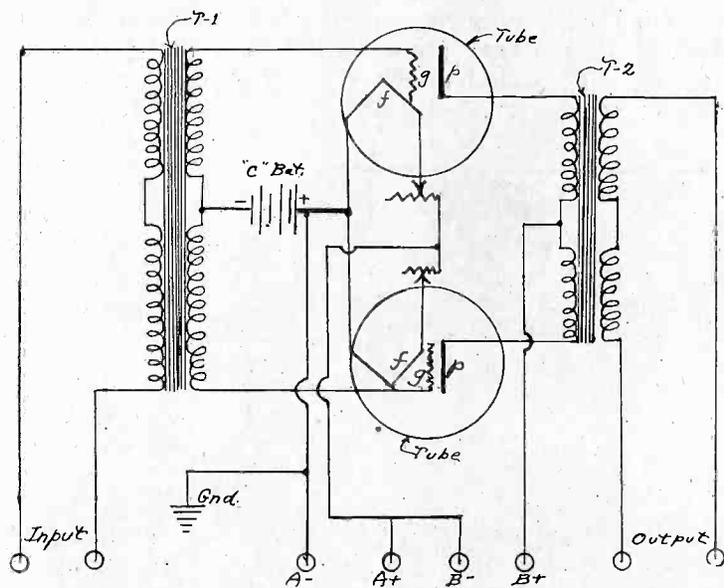
Using this receiver amateurs in every district are heard nightly. Using the long wave single circuit UFT, POZ, NPO are heard constantly and broadcasters all over the United States, Canada and Cuba are heard.

A point of interest to amateurs is the Hoover cup, awarded during the contest in 1921, shown in the background of the illustration. This station took second place in 1922.

How to Make a Super Amplifier

By C. White, Consulting Engineer

WITH the coming of the warm weather many new radio troubles present themselves for our solution. The increase in the amount of atmospheric and the decrease in radio transmission efficiency makes it very necessary to resort to various types of amplification to get the same amount of volume that we have been accustomed to get in the winter months. The popularity of the many styles of loud speakers again emphasizes the fact that we are not going to cover our ears with phones all the time. Who can conveniently conceive a dance with phone receivers on our ears? Still this summer the popularity of radio music for dances in summer camps and hotels is certainly sure to come and means must be taken to see that ample amplification is available in order greatly to augment the weakened signals.



Schematic diagram for the construction of a power amplifier using two transformers of the push-pull type. This will give exceptionally loud amplification with little distortion.

It is a well-known fact that two stages of ordinary audio-frequency is generally looked upon as the reasonable limit to take that type of amplification. The reason that this point has been so fixed by custom is owing to the fact that when more than two stages have been employed all sorts of distortion is encountered. In fact, with some transformers a third stage of audio-frequency so distorts the music and voice that the reception is rendered wholly useless. The solution to the problem is the employment of push-pull amplification instead of the ordinary type of amplification for the second or third stages. It has been found that one stage of straight amplification and then one stage of push-pull type as explained in this article will render wonderful results in quality and volume. It is a well-known technical fact that the push-pull system of tube amplification will render more volume and quality than an equal number of tubes placed or connected in the ordinary method of transformer amplification. Then, again, the development of the new C-301A and UV-201A tubes has made it possible to design push-pull amplifiers that work satisfactorily without the use of power tubes. This is a great item for the summer vacationist who would find it rather inconvenient to lug around storage batteries and the large supply of "B" batteries such tubes required to work efficiently.

With these new tubes dry cells can be used for filament lighting and if the amateur so desires he can use a smaller storage battery than he would need if large power tubes had been used. In addition he will find that two small 45-volt "B" batteries will last him many months more than the summer season. This style of amplifier can be used with or without one or more stages of straight amplification by means of the ordinary transformers.

The general schematic connections are clearly shown in the illustration herewith. Two push-pull types of transformers are used. A "C" or grid bias battery of 4.5 volts is recommended when UV-201A tubes with 90 volts plate potential are employed in the circuit. A separate rheostat is furnished for each tube in order to make it possible to adjust the two tubes to the same operating point on their characteristics. The method of adjustment is to remove one tube from the amplifier and adjust the remaining one for maximum volume. Then replace the other and remove the first tube, and repeat the operation until the same amount of volume is heard. The adjustment is effected by the control of the filament rheostats to each tube. After these adjustments have been made both tubes can be placed in the sockets and the amplifier is ready for operation. These rheostat settings should not be changed and the amount of volume should be varied either by turning down the detector or a previous tube in another stage of amplification. Of course, if the volume continues to remain too high for all occasions then another adjustment can be made, but for just momentary changes in volume it is better to accomplish the same as previously explained.

Now comes the "where to buy" situation. The tubes, rheostats, sockets, and batteries are indeed quite easy to procure, but the purchase of the desirable transformers for push-pull work cannot so easily be manipulated. After you look around a little, I shall be very glad to assist any one in finding a place where the transformers can be accurately made to order at a most reasonable cost, about \$12.50 for the pair. If you should desire to write me concerning this, address me in care of RADIO WORLD, enclosing a self-addressed envelope with your letter, and I will see that your letter is forwarded to the right party. I wish fully to emphasize the fact that this is by no means a marketing scheme, because if you are able to get what you want in your home town it is much better in many ways that you patronize your favorite dealer. Let me again emphasize the fact that this complete outfit can be readily built for less than \$50, and the cost for an amplifier working on the same principle would cost many times that figure. When you first use this type of amplification you will be more than surprised at the amount of volume without distortion that can readily be obtained from two tubes. It is indeed a great pity that many amplifiers built upon this type are not in more common use. It is often the case that the distortion that we are so wont to blame on the loud speaker in reality originates in the amplifier. Please note the fact that with this style of circuit the direct current plate potential supply does not in any way pass through the loud speaker windings. This fact not only means less distortion, but also means that the loud speaker winding is fully insulated from high voltage and burn-outs resulting from short circuiting the same through the coils.

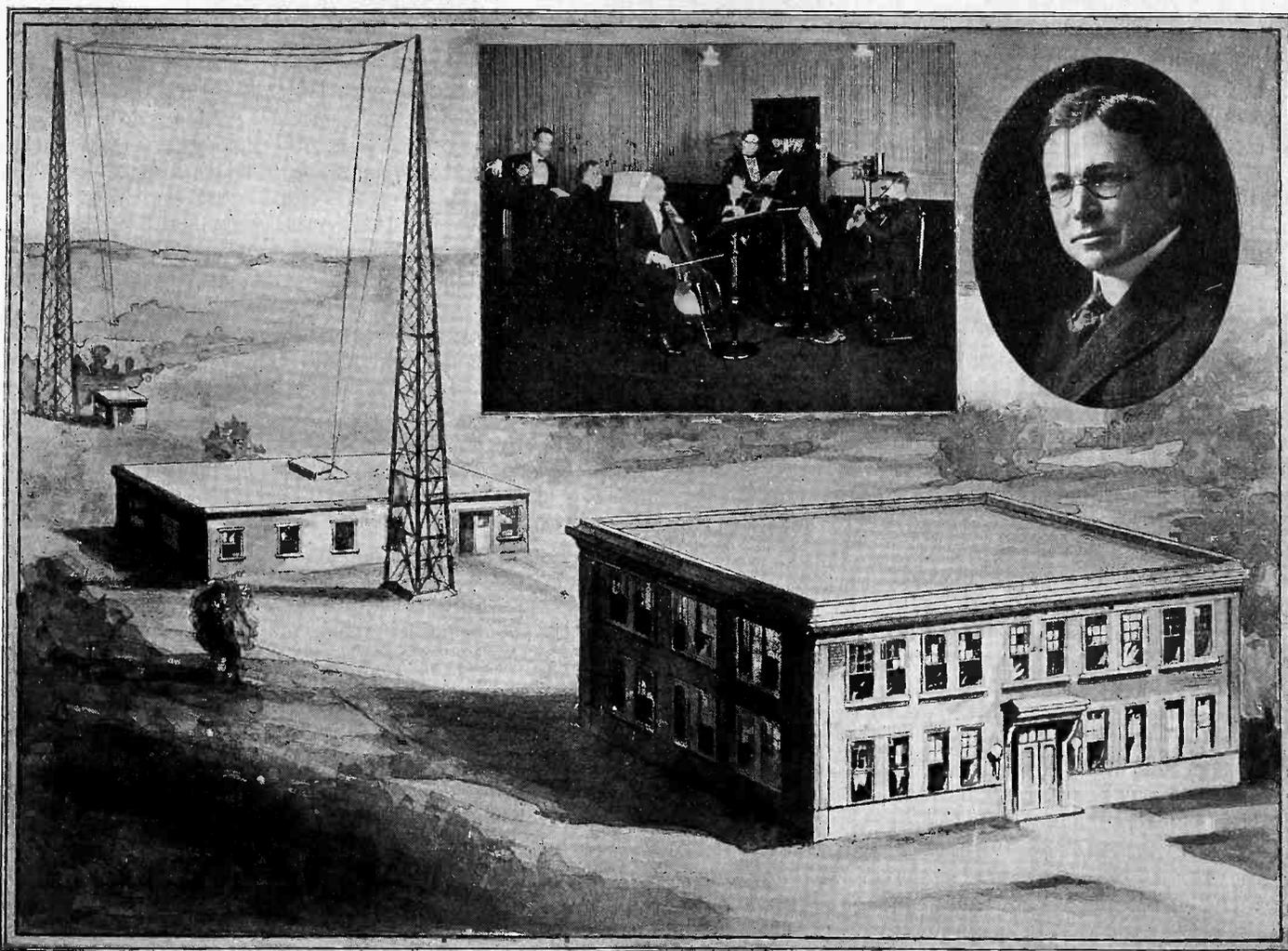
A New Pacific Coast Broadcasting Station

By C. H. Huntley

FAITH in the permanence of radio broadcasting is demonstrated by the announcement of the General Electric Company that the first plant to be constructed exclusively for popular broadcasting will be erected in Oakland, California, to house the large Pacific Coast station of that company.

Work will be started this month on a two-story studio building, the antenna towers and the power house. Workmen are already assembling the radio equipment. It is expected that the new station will be on the air within six months.

and quarters for motor-generator sets and storage batteries. There will be two studios on the second floor, the main studio large enough to accommodate large bodies of musicians such as a band or symphony orchestra, and a smaller studio from which solo numbers and addresses may be broadcast. The use of two studios will make possible continuous broadcasting. Research is now being carried on to determine the reverberating qualities of the ideal studio in order that the proper amount of dampening may be secured in the Oakland studio to assure maximum musical quality. The radio control room will be on the second floor.



Wash drawing of new Pacific Coast Radio Broadcast Station of the General Electric Company to be built at Oakland, California, showing studio and office building, power station and antenna. Insert in center shows how the studio will look and to the right is a portrait of Martin P. Rice, Director of Broadcasting of the General Electric Company.

Martin P. Rice, director of broadcasting for the General Electric Company, will direct the operating policy of the station and Dr. Thomas Addison, manager of the company's interests on the Pacific Coast for the past thirty years, will have supervision of the plant.

The station will be located on East 14th Street, Oakland, adjacent to the new General Electric Company factory building. The site was selected after a thorough inspection of available properties in San Francisco and vicinity. The Oakland plot was chosen because of its technical advantages, the availability of musical talent, and the proximity of the site to San Francisco, the great commercial center of the Pacific Coast.

The plans provide for a two-story brick structure. On the first floor will be the office of the studio manager, a general correspondence room, a reception room for artists

One thousand feet back of the studio building will be the power house and antenna system. The antenna will be multiple-tuned and strung between two steel towers, each 150 feet high and placed 260 feet apart. Beneath the antenna proper will be the counterpoise consisting of a network of wires, fourteen feet above the ground, covering an area of 150 to 300 feet. In addition to the power house, which will be one story high, 71 by 32 feet, there will be a small building for the tuning apparatus and the end of the multiple-tuned antenna.

The transmitting set will be similar to that which is now heard almost nightly from WGY, Schenectady, N. Y., and the many developments which have brought this station a reputation for exceptional transmission quality will be part of the Pacific Coast station equipment. The apparatus is

(Continued on page 14)

The Interdepartment Radio Advisory Committee Organized for the Government

THIS committee had its origin in the First National Radio Conference called by Secretary of Commerce Herbert Hoover which met from February 27 to April 19, 1922. In connection with the assigning of wave length bands for government radio broadcasting it became apparent that there would have to be agreement among the government departments as to the use and distribution of the wave lengths in the government bands. A certain amount of broadcasting was being done by several departments, with little or no co-ordination. An extensive daily program of broadcasting market and crop reports was being transmitted for the Department of Agriculture by seven continuous-wave stations of the Post Office Department. This development was begun in December, 1920. Weather reports and hydrographic news have been broadcast from 30 radio telegraph stations of the Navy Department since 1905. Broadcasting was being done in an experimental way by some other government stations.

On April 24, 1922, Secretary Hoover invited each of the ten Departments of the Government to name a representative on a permanent committee to co-ordinate the radio broadcasting of the Government. As the Chief Co-ordinator, Bureau of the Budget, had also drawn up a plan for a co-ordinating radio committee, a representative of the Chief Co-ordinator was added. Subsequently representatives of the Shipping Board and the Interstate Commerce Commission were added. Thus the committee now includes representation from every part of the government that has any substantial interest in radio.

In the beginning the committee dealt only with broadcasting. Various problems arose which indicated the desirability of extending the scope of the Committee to include a wider field than radio broadcasting. On December 15, 1922, the committee voted to recommend to the Secretary of Commerce that he take action to extend the scope of the committee to include all matters of government radio communication. This was done by the Secretary of Commerce with the concurrence of all the other departments. The scope of the committee's activities was stated by the Secretary of Commerce in his letter of January 5, 1923, to the other departments, to be "with the approval and participation of the interested departments, to cover matters pertaining to radio communication in general. The functions of the committee are to remain purely advisory. . . . to all the participating departments in matters coming under its cognizance."

The chairman of the committee is Acting Secretary S. B. Davis of the Department of Commerce, who serves as the representative of that department on the committee. The committee membership also includes representatives of the following departments and independent establishments: Department of Agriculture, Bureau of the Budget, Office of Chief Co-ordinator; Department of the Interior, Interstate Commerce Commission, Department of Justice, Department of Labor, Navy Department, Post Office Department, U. S. Shipping Board Emergency Fleet Corporation, State Department, Treasury Department, War Department.

The committee has the following standing subcommittees: Subcommittee on Material for Broadcasting, Subcommittee on Operating Procedure, Subcommittee on Technical Problems, Subcommittee on Mobile Radio, Subcommittee on Government Radio Policy and Legislation.

The committee began in 1922 an experimental system of "primary" broadcasting stations for the transmission of official government news by continuous-wave (code) telegraphy, this news being available to approve privately owned broadcasting stations for re-broadcast by radio telephone. Use has been made solely of previously existing stations. Seven Post Office Department (Air Mail) stations were used at the outset and have been replaced by the following navy stations, working on frequencies between 50 and 65 kilocycles (between 6,000 and 4,600 meters); Arlington, Va., Great Lakes, Ill., New Orleans (Algiers), La., San Francisco, Cal. These primary stations accomplish the same purpose as leased wires in supplying material to the radio telephone broadcasting stations.

There is one government radio telephone broadcasting station, that at Arlington, Va. Its frequency, under the new assignments, is 690 kilocycles (435 meters). It broadcasts lectures, market news and miscellaneous information, supplied by the Departments of Agriculture, Commerce, Interior, Labor, and Treasury, and also music by government bands. The schedule includes eighteen 15-minute periods of radio telephonic broadcasting daily.

The character of material, schedules, and procedure for both primary and radio telephone broadcasting are approved by the Interdepartment Committee. About 100 privately owned broadcasting stations are supplied with material from several Departments and authorized to broadcast it by radio telephone.

It is impossible to state the cost of broadcasting by government departments because such operations have been conducted in connection with the other regular radio work of the departments. The figures given here represent simply an apportionment of cost or additional cost to the departments concerned. The cost of conducting the broadcasting by government stations during the past year included \$13,800 for equipment at navy stations (including installation, alterations, power and renewals). There was no equipment charge against broadcasting by the Post Office Department stations; the operation cost at the Post Office Department stations was approximately three cents per word. The average cost of the broadcasting from all seven Post Office stations for one day on a fifteen-hour basis was \$53.93. This was 19% of the total cost of operating the Air Mail stations and amounted to \$16,826 per year. The committee has no estimate of the operation cost of the broadcasting from navy stations, nor of the cost of preparing the material in the departments furnishing the material.

The committee has carefully considered the classification of material for broadcasting. The committee has adopted the principle that radio broadcasting should not be used where wire telegraphy or telephony or printed publication would be as satisfactory.

One of the chief functions of the committee is co-ordinating the services and equipment of the radio stations operated by the several departments. The committee has made a complete survey of the equipment and service of all these stations and has assigned new frequencies (wave lengths) to them to accord with the recommendations of the Second National Radio Conference. The committee's work is bringing about more uniformity in types of equipment used.

The several departments feel that the committee has been a satisfactory clearing-house for government

(Continued on next page)

Simple and Easily Made Neutrodyne Condensers

By J. E. Anderson

EVER since Prof. Hazeltine introduced his neutrodyne receiver there has been a demand for small variable condensers that may be used in the construction of such receivers. None of the ordinary vernier condensers on the market has a capacity sufficiently small to meet the demand, as their minimum capacity is approximately what the maximum should be for neutroding the ordinary amplifier. The capacity required is of the order of one micromicrofarad.

Two wires placed near each other without touching form a condenser of very small capacity. If they are at right angles to each other the capacity is minimum and if they are parallel it is maximum. The capacity may either be varied by turning one with respect to the other or by varying the distance between them. It may also be varied by varying the length of the parallel portion. One of the simplest variable condensers of the parallel wire type is obtained by twisting two insulated wires together. The capacity is increased or decreased by twisting or untwisting

of the stationary plates and the moving vane is $\frac{1}{2}$ inch and the effective length when fully engaged is 1 inch, the capacity as measured between the points E and F is approximately 3.6 micromicrofarads for a separation between the plates of $\frac{1}{64}$ inch. It will be noticed that there are really two condensers in series and the total capacity is one-half that obtained by calculating one side. A condenser of this type has no sliding contacts and the dielectric is air. Furthermore it will not easily short-circuit, as if one side touches the other will probably be farther away.

In Fig. 2 is shown a condenser that requires a little more work to build but that will present a much neater appearance when completed. Two brass bars AB are securely fastened to an insulating base BB, preferably hard rubber, and are drilled and tapped to admit a couple of ordinary switch points P. One of these is fixed in a convenient position and the other is made movable by turning the knob K. If switch points with quarter inch heads are used, the capacity of the condenser when the plates are separated

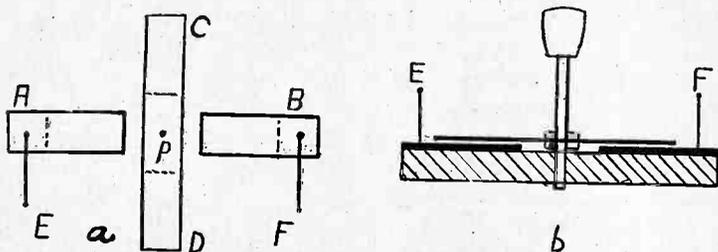


Fig. 1. Diagrams showing how a simple variable neutrodyne condenser can be made. Full instructions are given in the accompanying text.

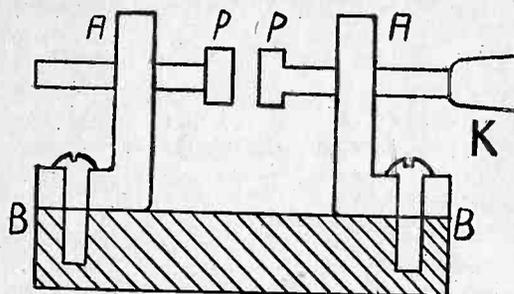


Fig. 2. Another type of neutrodyne condenser which can be constructed by the amateur desiring extremely small capacities.

ing the wires. The insulation of this wire should not be too thick or it would be required to twist too much wire together to obtain sufficient capacity. Enameled or silk covered wire is suitable. The capacity of such a condenser may be calculated, but the formula is too complicated for easy application and the right amount is found much more readily by trial. A pair of No. 20 double silk covered wires would have a capacity of about one-tenth micromicrofarad per inch.

Another condenser that may be easily constructed is shown in Fig. 1. A and B are metal plates or pieces of foil securely fastened to a base of insulating material. CD is a movable metal plate or vane capable of turning about the pivot P. The plan for the condenser set for minimum capacity is shown in a and a section of it when set for maximum capacity is shown in b. If the effective width

rated .005 inch is approximately two micromicrofarads. If a greater maximum capacity than this is required, small metal disks of the proper diameter may be soldered to the switch points. But these disks must be perfectly flat and must be mounted concentrically with the screw and at right angle to its axis. The drilling of the bars AB and the mounting of the switch points on these supports must be done very accurately to prevent wobbling of the plates. It is best to give the plates a coat of shellac or some other insulating covering to prevent short circuit when the plates are close together.

A condenser of this type is capable of extremely fine variation in capacity. Its capacity is comparatively large when the plates are close and its rate of change with turning the screw is rapid. When the plates are far apart the capacity is almost negligible.

(Concluded from preceding page)

radio matters. While the experimental broadcasting system has operated fairly satisfactorily to date, the experience which has been had with it should be used as a basis of a rational plan for a government broadcasting system. The question is, of course, intimately related with the existing and prospective privately owned broadcasting stations throughout the country. If radio is to become of maximum benefit to the people, the government must continue to study the question of properly organized radio broadcasting and other services. There are constant occasions for curtailments or

extensions of the government's radio plant, and the committee's effort is to co-ordinate these needs and fulfill them with maximum economy.

The committee has functioned successfully as a body advisory to the Secretary of Commerce and to the other departments. There have been no disagreements for which a solution has not been found. The committee has been the means of bringing together the diverse needs and interests of the several departments, and has attained a recognized standing in the government administration of radio matters. It should, eventually, be able to establish an efficiency acceptable to taxpayers.

Broadcasters Now Number 592

By Carl H. Butman

WASHINGTON, D. C.—Radio broadcasting stations total 592, according to the latest Department of Commerce survey. Of this number 113 are Class A stations, 36 highpowered Class B stations*, One—KDKA—designated as a broadcasting development station and the balance, 442, Class C operating on 360 meters.

Many old stations grouped temporarily as Class C and directed to operate only on 360 meters, have been reclassified as A stations and assigned special district waves. There remain 442 in this class either awaiting new wave lengths or satisfied to continue on 360 meters. New stations, however, are still coming in, about 30 being added in the last thirty days while 20 dropped out.

During the past week, four new A stations were licensed; one each in Pennsylvania and South Dakota, and two in Colorado. Fourteen C stations were transferred from Class C during the week ending May 26th.

*Note—See list of B stations in RADIO WORLD for May 14.

Four New Class A Stations Licensed

| Call | Station | Frequency Kcys. | Wave Length Meters | Power Watts |
|------|---|--------------------|--------------------------|----------------|
| WBBD | Barbey Battery Service, Reading, Pennsylvania | 1,280 | 224 | 50 |
| KFKH | Denver Park Amusement Co., Lakeside, Colo. | 1,330 | 226 | 10 |
| KFIJ | Thorean, Sidney I., Platte, S. D. | 1,270 | 236 | 5 |
| KFJD | Weld County Printing & Pub. Co., Greeley, Colo. | 1,270 | 236 | 100 |

Fourteen Stations Transferred from Class C to Class A

| Call | Station | Frequency Kcys. | Wave Length Meters | Power Watts |
|------|---|--------------------|--------------------------|----------------|
| KDZF | Automobile Club of Southern California, Los Angeles, Cal. | 1,080 | 278 | 500 |
| WAAF | Chicago Daily Drovers Journal, Chicago, Ill. | 1,050 | 286 | 200 |
| KFZ | Doerr Mitchell Elect. Co., Spokane, Washington | 1,060 | 283 | 5 |
| WAAK | Gimbel Bros., Milwaukee, Wis. | 1,070 | 280 | 100 |
| WLAX | Greencastle Community Broadcasting Station, Greencastle, Ind. | 1,300 | 231 | 5 |
| WLAZ | Hutton & Jones Elect. Co., Warren, Ohio | 1,210 | 248 | 10 |
| WIAK | Journal Stockman Co., Omaha, Neb. | 1,080 | 278 | 200 |

| Call | Station | Frequency Kcys. | Wave Length Meters | Power Watts |
|------|---|--------------------|--------------------------|----------------|
| WEAG | Nichols Hiline Bassett Lab., Edgewood, R. I. | 1,300 | 231 | 10 |
| WIAD | Ocean City Yacht Club, Ocean City, New Jersey | 1,180 | 254 | 10 |
| WMH | Precision Equipment Co., Cincinnati, Ohio | 1,210 | 248 | 10 |
| WQAS | Prince Walter Co., Lowell, Mass. | 1,130 | 266 | 100 |
| WHAQ | Semmes Motor Co., Washington, District of Columbia | 1,240 | 242 | 10 |
| WMAP | Utility Battery Service, Inc., Easton, Pennsylvania | 1,220 | 246 | 50 |
| WQAD | Whiteall Electric Co., Waterbury, Connecticut | 1,240 | 242 | 50 |

Broadcasters Deleted During May

The following 20 stations were deleted from the lists of active broadcasting stations by the Department of Commerce during May:

Class A

- KFGM—Abilene Daily Reporter, Abilene, Texas.
- KFHC—University of Oklahoma, Norman, Okla.

Class C—360 Meters

- KYI—Bakersfield Californian, Bakersfield, Cal.
- KFGE—Buchanan Stevens Co., Mt. Vernon, Wash.
- WVAJ—Columbus Radio Club, Columbus, Ohio.
- WAAJ—Eastern Radio Institute, Boston, Mass.
- WEAT—Fogarty, J. J., Tampa, Fla.
- KFV—Foster-Bradbury Radio Store, Yakima, Wash.
- KDZH—Fresno Evening Herald, Fresno, Calif.
- WDAC—Illinois Watch Co., Springfield, Ill.
- WFAU—Lewis, Edwin C., Inc., Boston, Mass.
- KDN—Meyberg, Leo J., Co., San Francisco, Calif.
- KYJ—Meyberg, Leo J., Co., Los Angeles, Calif.
- WGAH—New Haven Electric Co., New Haven, Conn.
- WHAR—Paramount Radio & Electric Co., Atlantic City, N. J.
- WPAW—Radio Installation Co., Wilmington, Del.
- KQY—Stubbs Electric Co., Portland, Oregon.
- KFAZ—Weatherill, C. H., Reedley, Calif.
- WJZ—Westinghouse Elec. & Mfg. Co., Newark, N. J. (Transferred to "Broadcast Central," New York City.)
- WPM—Williams, Thomas J., Washington, D. C.

U. S. S. "Wyoming" Equipped For Duplex Radio Communication

HIGHLY gratifying results have been secured with a new model high-power tube transmitter installed on the battleship "Wyoming," and used in regular traffic. "In fact," states a Naval report, "some results were unexpected, such as ability to receive on the same vessel during full power operation of this tube rating about 5 KW." Numerous broadcasting stations transmitting on 400 meters were tuned-in in the auxiliary radio room, while the big transmitter, installed in the main radio room, was supplying 36 amperes to the main antenna on a wave length of 507 meters. The receiving set in the auxiliary room was equipped with an amplifier consisting of three stages of radio-frequency and two stages of audio-frequency. "This condition allows duplex com-

munication, which has actually been put in practice on the Wyoming and will be further developed on the 'Colorado' and 'West Virginia,'" the report states.

The arrangement of the radio rooms on these two battleships will differ from present naval practice. Receiving will be done in the main receiving room forward and transmission will be carried on aft from the main transmitting room.

In Naval Aviation Squadrons new tube sets are also replacing spark sets. Five new aerial spotting sets have passed satisfactory tests and are en route to the Air Squadrons of the Battle Fleet, where they will replace SE 1345 sets now in use. Spark sets will be used only at Pensacola for training Naval radio personnel.

Swat the Birdies! How to Minimize Re-Radiation

By Anderson James

THE rapid increase of "birdies" that swarm the ether is becoming a menace to successful radio reception. You can hear their chirps and tweets from every housetop. They light on your antenna and proceed to gargle their throats in the very midst of an operatic selection. They caw and groan and growl and squawk and sputter. And there is no way of scaring them off their perch. At such times there is a strong temptation to the average listener to desert the legitimate vocabulary and indulge in bootleg words. A remedy for the nuisance has been suggested by momentarily converting your receiving set into a transmitter and directing these words to the offender-in-chief. But chances are that he would be out of tune and would miss the message entirely, and the only effect would be to increase the suffering of the innocent bystander. Before you proceed to exact satisfaction be sure that you are not one of the offending birdie breeders. Remember that your neighbor's antenna is not a scarecrow, but it will attract the birdies you let loose as rapidly as your own. They will perch upon it and squirt their unmelodious gamuts into the listener's ears until he tears the phones off his head and condemns the whole radio game.

Let us declare an open season on the birdies. Swat them unmercifully. A little co-operation among the neighborhood birdie victims, and some radio detective work on their part, will readily locate the persistent birdie breeder. He should then be warned that his set is disturbing the neighborhood and, if he persists, his name should be posted or published for maintaining a public nuisance.

There is only one way in which this trouble may be completely eliminated and that is to prevent the receiving set from oscillating. But it is practically impossible to prevent a regenerative circuit from oscillating while tuning in if it is to work anywhere near its maximum efficiency; and the general use of non-regenerative sets can hardly be expected. It therefore remains to minimize re-radiation as much as possible. There are many ways of doing this.

One of the simplest is to detune the antenna circuit by three or more kilocycles from the frequency of the signal desired and depend on the selectivity of the secondary tuned circuit for signal strength. Since the antenna is not tuned to the incoming signals, local oscillations of about the same frequency cannot take place in it with any great intensity, and when they do take place the beat frequency will be too high to cause much interference.

Another method is to reduce the coupling between the primary and the secondary and between the primary and the tickler. There is no advantage in increasing the coupling beyond a certain point except where broadness of tuning is the object. In Fig. 1 is shown a curve representing the amount of energy transferred from the primary to the secondary when both are tuned to the same frequency. It is noticed that the current in the secondary at first increases very rapidly with an increase in the coupling but finally reaches a maximum point. Beyond this the current actually decreases and it is of no advantage to increase the coupling any further. The tickler coil should be so placed with respect to the antenna that the coupling is minimum and yet retain the desired coupling be-

tween the grid and plate circuits. The tickler may be wound on the same form as the secondary and the amount of regeneration varied by means of a series condenser, a variable resistance, or an inductive coupling elsewhere in the circuit. Then the coupling between the antenna and the secondary may be reduced without increasing the amount of re-radiation, as the coupling between the tickler and the antenna is also reduced. Either the primary or the secondary may be on the stator, but it will simplify wiring to put the antenna on the rotor and vary its inductance by means of a loading coil.

Re-radiation may be reduced by introducing the feedback energy by means of a coil in series with the secondary tuned circuit as is exemplified in Fig. 2, and placing them so that their axes are at right angles. This method may also be used in a single circuit tuner, whereas the preceding two were only applicable to double circuits. However, the single circuit is usually the chief offender in producing "birdies" and should be avoided wherever possible. Advantage may be taken,

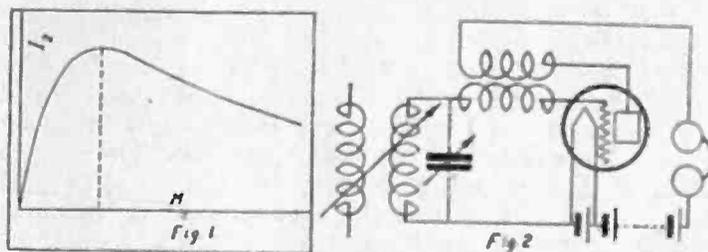


Diagram showing one method of decreasing re-radiation in a set.

however, of the greater range of the single circuit by using it as a non-regenerative amplifier followed by a regenerative detector or radio-frequency amplifier. This two tube circuit may be neutrodyned for better results.

The best non-regenerative circuit is undoubtedly a neutrodyne with tuned coupling between stages. If the neutrodyning has been properly done there is no back coupling from one stage to the preceding, and consequently there is no tendency to oscillate even when the successive stages are in exact resonance with the incoming signal and with each other. Therefore a regenerative detector may be used in connection with such circuit without danger of transferring sufficient energy to the antenna to cause appreciable interference with neighboring receivers. When, for economic and other reasons, it is not desired to use a multi-tube set, the best circuit is one of the simpler reflexes.

The chief source of birdies is the single circuit tuner in the hands of a DX-er with his mind in other states and his regard for the innocent bystander replaced by vanity. He sets his receiver into vigorous oscillation and then picks up the distant stations by the zero beat method. He squirts around the carrier from the remote station until he succeeds in identifying its call letters and off he goes to another carrier and repeats the performance. This he keeps up until Honolulu signs off for the night, and the result of his catch is a jumble of capital letters which he proudly labels "My Result of a Half Hour DX-ing with the New Squirt and Squawk Receiver."

No Need for Clicks, Roars, Shrieks and the Awful Scream of Interference

By Arthur S. Gordon

WOW! Listen to her squeal! No concert to-night with QRM full blast next door! Can't seem to find a quiet wave length anywhere. Wonder what makes all that racket? Doesn't sound like any one kind of hubbub, but like the 57 varieties of din one on top of the other. It's getting worse and worse!"

Such is the plaint of the radio amateur whose receiver is catching and amplifying every sound in the universe excepting the ones it should.

What is there to do? Lots of things. Noises in a receiving set are there because of some fault in the adjustment of one or more of the various instruments. The discord can be cleared out easily and intelligently by an amateur who knows the separate causes, and it is the purpose of this article to describe those causes and to offer simple remedies which will reduce their disturbances to a minimum.

There are two general classifications of noises in radio receivers, outside and inside. Outside annoyances are those over which the amateur has no immediate control, such as the re-radiation of a neighboring set, atmospheric, and interference between two nearby broadcasting stations. These noises may be described as hoots, screams, crackles, roars, and discords. Inside noises, on the other hand, are those which originate within the cabinet of the radio receiver. They can be eliminated, provided, of course, that the set is properly designed and wired and the vacuum tube or tubes are not defective. It very often happens that a tube will be imperfectly made and thus have peculiar jangles all its own. Inside noises range anywhere from a series of widely separated clicks to high, shrill notes, with howls, hisses, rasps and wheezes thrown in for variety. When the outside and inside combinations get together, they produce the intensified and irritating effect known as "hash."

The tumult of sounds peculiar to a single tube set are increased in volume but scarcely in variety by one or two stages of amplification, with the possible addition of an amplifier howl. Taking up the inside noises one by one, the most disturbing and yet the easiest annoyance of which to rid oneself is the "howl" a receiver sets up whenever the operator moves his hands to or from the tuning dials. This effect is known as "body capacity." It is sometimes so great as to prevent a receiver from working. Of it one radio enthusiast writes:

"Body capacity was so bad in my set that at times I had to stand in a certain position and in no other. If I moved a fraction of an inch in any direction the set would howl and I would not be far from howling myself. The cord was very sensitive and if I moved my hands toward it or touched the headset the signals were gone. Touching the dials with anything less than a ten-foot pole was out of the question."

This statement may sound like the first few lines of a patent medicine advertisement, but it is true, every word of it. The radio amateur who wrote it found that his trouble was in placing the headphones on the negative side of the "B" battery. He changed over, placed the phones between the "B" battery and the tickler coil, and has ever since lived in peace with himself and his neighbors.

There are other ways of getting rid of troublesome body capacity. Having the aerial lead go to the rotor

of the variable condenser, for example, instead of to the stator, takes away some of the annoyance, but by far the best way is to shield the entire back of the panel, making sure that the metal or foil used for shielding is not only grounded but that it does not touch any of the instruments.

Discontented grid-leak complaints come next. The grid-leak—properly adjusted—is a blessing, but improperly adjusted, it is just the opposite. It may be either over or under adjusted. The noises it is father to range from a slow steady click heard all around the tuning dials to a high, shrill scream heard only at certain points. These noises, to say the least, interfere with the operation of the set. They are caused by the "make and break" of the tube oscillations as they are alternately passed and choked by an *insufficient* value of grid-leak.

The slow clicks mean that the leak resistance is too high. It should be cut down, therefore, until the high, shrill note is reached. At this point, the proper resistance has almost been reached. Cut it down just a trifle more, and the shrill note will enter the inaudible stage. Be careful here. If the resistance goes the least shade below the proper value, no noises will be heard, it is true, but no signals will either, although there will be plenty of spark signals and carrier wave whistles to egg you on.

You probably will notice, when you have the grid-leak adjusted very close to its ideal value, that a certain position of your tickler coil will produce a low harsh hum, something like that of a hoarse fog-horn. Stop here. This is about the practical limit of amateur adjustment. If you want to search for signals in that area, lower the filament current, step down the "B" battery, and this hum will disappear.

For convenience, it is best to have a variable grid-leak condenser, which can almost in a moment be adjusted to the "silent value" demanded by the particular requirements of your own tube.

Harsh, sandy or grinding noises in the phones, resembling mild atmospheric, are due either to tight coupling or defective batteries, A or B singly, or both at once. A hiss or roar is due to excessive regeneration. Amateurs continue to discover that far better results are obtained with a minimum of filament current than with a maximum. A loud metallic vibration, noticed particularly with the WD-11 tube when the table or the cabinet is tapped, is merely a physical demonstration. It is due to the too rigid mounting of the tube socket. Place it on soft rubber or felt and this objectionable noise will disappear.

A pretty medley of discord comes from a receiver that is not properly wired. A loud and persistent hum that refuses to be tuned out indicates either a wrong or broken connection. If you hear this hum the very first time you listen in, ten chances to one you have made a mistake in wiring. If you hear it after the set has performed satisfactorily for some time, look for a broken connection.

Sometimes when you are enjoying a 360-meter concert to the utmost, in butts a 200-meter amateur crazy-bent for election. Due to his nearness, he slops over his assigned wave length and ruins your concert. He can be shunted out by a rejector circuit such as often has been described in RADIO WORLD. This is simply

(Continued on next page)

Radio and the Woman By Crystal D. Tector

MORE family trouble laid at the door of radio—and probably inefficient domestic management. The daily papers record that the lure of radio crop reports, lectures, popular songs and bedtime stories is given as the cause for marital disaster in a petition by a Queensboro woman. She charges that the attractions of the wireless waves kept her husband up “far into the night, listening to the music and messages.” And when he finally came to bed he kept her awake the rest of the night arguing about new sets and wiring problems, she asserts. Again I ask—why not two sets of head phones and joint conjugal enjoyment.

* * *

Friend Husband and I went to the movies the other evening. As a part of the program they had a very instructive film which showed, in picture form, the way in which a radio wave is generated, modulated, propagated, received, rectified and amplified. It was a very interesting film and it was explained in a thorough and easily understandable manner, by means of cartoons with moving lines showing each change in current or wave. After seeing it, F. H. remarked, “Holy Moses, who in the world would think that that can all happen within a pace of time less than a second!”

* * *

I think that this particular idea of visualizing popular scientific facts is excellent and should be exploited more. Just think of the many ways in which it could be done. Automobiles and electricity, and oh, so many other things that are a continual mystery to the lay mind could be explained. I once heard a professor lecture and he told the class that the best way to impress a thing indelibly was to show it to a person and let him photograph it on his mind. Well, there were a lot of wise people that went out of that little movie that evening with at least a faint idea of what happens when they are listening to a radio concert. I know I went home impressed with the immensity of it all and the complete mastery of the theory that the engineers

at the research laboratories must have.

* * *

F. H. came home the other night loaded down with some boxes and bundles and funny looking parcels. He took them into the garage and locked the door. I, of course, was all questions and curiosity but it availed me not. He was as informative as a clam with a bad case of lockjaw. After supper he sneaked off and locked himself in the garage and wouldn't even let me take the car out. I had no intentions of going out, but merely wanted to satisfy my curiosity. He stayed out in the smelly old place until about 11 o'clock and then, locking the door very carefully, put the key in his pocket and went to bed. The next morning when he had gone to business I went inside the garage and found—whatever do you think? A radio set *in our car*. Well, I had been teasing him to take our vacation traveling around the country this summer and so, thoughtful boy, he had started to get everything ready, even to buying a loop set for the car. Won't we have fun?



(C. International Newsreel Photo.)

Miss Phyllis Blackman, of Ridgewood, Long Island, who claims to have built her own receiver and made many long distance records with it. The receiver is a three circuit tuner of the conventional type.

(Concluded from preceding page)

a single circuit tuner consisting of a coil of wire and a variable condenser, which is run from the aerial to the ground apart from the bulk of the receiver. When the rejector circuit is tuned to 200 meters, all signals coming in on that wave length will go immediately to the ground.

The gurgling, rough, distorted music you sometimes hear is largely due to re-radiation from nearby sets. For this there are several cures. These do not include a law, as in England, against receivers which oscillate excessively, but they do contain a caution directed to those operators, who, because of inexperience or thoughtlessness, allow their two or three tube sets to transmit annoying howls while they are hunting for a station. This method of tuning is known as the “beat-note method,” and has been found to still persist in its disturbing qualities at distances up to 25 miles.

One cure for re-radiation (others are the use of non-radiating tubes or circuits) is in a new conception of tuning. There is no need to have your tubes oscillating while hunting for a station. While you are doing so, annoying whistles running up and down the scale are crossing and re-crossing the concert program of your nearest neighbors. Why not adopt and urge others to adopt a milder method of tuning?

Adjust the filament control to a point which by prac-

tice you know to be satisfactory. That is to say, adjust it to that low point it invariably falls to in the end. Now move the tuning dials slowly. Instead of a shrill carrier whistle, or a sharp squeak, you will be surprised to hear music or a voice coming in without any of the preliminary warnings or noises so commonly associated with tuning in a station. If your filament current is slightly insufficient, you will hear a hollow or breathing sound, with a slight increase in the regenerative stir in your headphones. A slight turn of the rheostat will remedy matters in a case of this kind. You will become accustomed to this method of tuning and not only will you prefer it to the more violent beat-note method, but you will be conferring a favor upon your neighbors—to say nothing of the wear and tear you will save on your tubes.

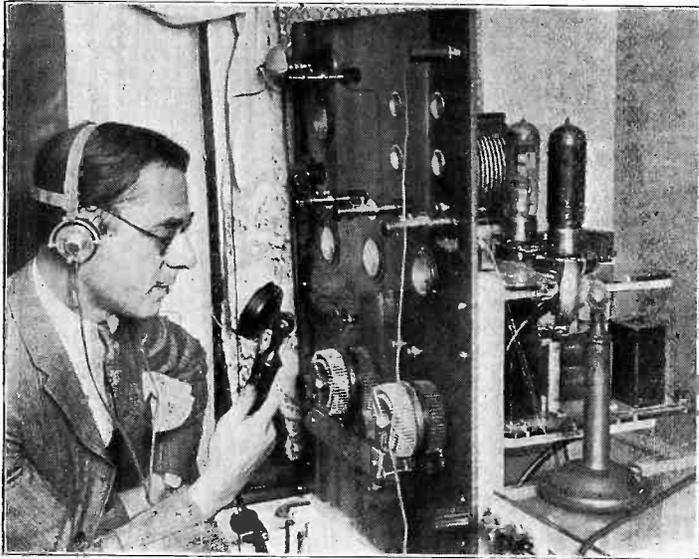
By a complete understanding of what makes the noises in our set, we are enabled to increase its efficiency. The more sensitive a receiver is, the more it seems to be affected by the noise producing defects. Many amateurs decrease the filament current, or step down the “B” battery to cut out the howling and other annoyances. This is obviously not the thing to do. It neither remedies the causes of howling nor does it get the most out of a tube which is more than anxious, under proper control, to do its best—and do it silently if you operate it properly.

New York Amateur Owns \$5,000 Station

By Earl Chatham

AN amateur station that lays claim and rightly so to being one of the finest equipped and most beautiful stations in the country, is Radio Station 2ABT, owned and operated by George Freisinger, a prominent New York amateur. From the standpoint of usefulness and workmanship, the station is the acme of perfection. From the standpoint of looks it is a beauty.

Referring to the illustration on the front cover, the extremely neat and efficient layout of the station can be seen. On the extreme left hand side of the table is the combined transmitter and receiving panel. On this is mounted the combined transmitter and the honeycomb coil receiver. The transmitter, which is a specially built machine, uses the Heising-Colpitts system of modulation and transmission. With this transmitter Cuban stations have been worked con-



(C. Kadel & Herbert)

100 Watt C. W. Transmitter at Station 2ABT. A complete view of the station is shown on the front cover of this issue.

sistently. The transmitter is a 20 watt set, using two five watt oscillators, two five watt modulators, and one five watt speech amplifier. The amplifying transformers of the receiving system are also incorporated in the speech amplifying circuits, making three tubes in all as speech amplifiers. This is done through a special system of jacks which cut in on the receiving

circuit, shortening the inductances and other apparatus and connecting up the amplifying circuits into the transmitting circuit. Either phone or CW can be used with this set and a distance of 1,800 miles has been consistently covered.

Next to this cabinet, and in the smaller panel, is the Reinartz tuner with two steps of audio-frequency amplification. With either of these two sets the power amplifier can be used and horns are located through the entire house. By a system of jacks and plugs any one or a number of them can be plugged in at will.

For straight C. W. a 100 watt set is used, as shown in the smaller illustration on this page. Although constructed primarily for CW or buzzer modulation, it can be used with fair success as a phone set. The two 50 watt tubes are shown in the illustration, directly next to the tuning inductance.

The current for the operation of both of the sets is derived from a 1,000 volt generator of the airplane type. They are specially mounted and located in a noise proof cabinet in the main table of the set.

Every one of the units of this station were put to the most rigorous test before being combined in the final set which is shown, and then a special table was made to incorporate the different units.

Radiograms

Chas. R. C. Ham informs RADIO WORLD that a radio club has just been formed in Hong Kong, China.

* * *

Frank H. Shevit, income tax expert, will broadcast a series of short talks on the federal income tax from Station WJZ every Friday evening. Questions submitted by mail will be answered by radio.

* * *

British North Borneo has hundreds of thousands of acres suitable for the growing of rubber, according to Sir William Rycroft, Governor of that territory, who is visiting Manila, P. I. He said the Japanese have large concessions at Tawao, on the east coast of Borneo, where they have 20,000 acres planted to rubber.

* * *

Electric railways in the United States will spend the enormous sum of \$240,000,000 for new equipment and plant facilities during 1923, according to a survey of expansion programs just announced by the Illinois Commission on Public Utilities. These proposed expenditures are about 60 per cent greater than those in 1922.

(Concluded from page 7)

now being manufactured in the Schenectady works of the General Electric Company and tested at WGY.

The Pacific coast station will be operated at 1,000 watts, but the equipment will be designed in excess of that power for purposes of conducting tests. In operating high-powered equipment below normal rating in broadcasting, tubes and rectifiers are not subject to occasional overloads, and, as a result, superior quality and greater reliability of transmission are obtained.

Six motor-generator sets will be placed in the power house and these will supply filament and plate current for the oscillator, modulator and kenetron rectifier tubes.

Every part of the equipment in the power house and in the control room will be in duplicate, assuring uninterrupted service. If one outfit or part of an outfit breaks down during the operation period another part will be ready to be brought into the circuit.

There will be six tubes in the kenetron rectifier assembly, one metal plate oscillator tube and one metal plate modulator tube. The control room in the studio building will have three stages of speech amplification made up of two 5-watt tubes and four 50-watt tubes. A fourth stage of speech amplification will be installed in the power house.

By means of what is known as "remote control" the facilities of a radio broadcasting station may now be brought to banquet hall, theatre or church and the audience, heretofore limited to the seating capacity of hall or church, is multiplied many times. The church is connected to the transmitting equipment by telephone lines and control of broadcast material is maintained in the church by operators.

The Pacific Coast station of the General Electric Company will utilize "remote control" to broadcast church services and musical entertainments from San Francisco and Oakland. The Pacific Telegraph & Telephone Company has offered to provide land wire connection.

Elementary Instruction for the New Army of Radio Beginners

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

By Lynn Brooks

RE-RADIATION: This term, when applied to a receiver, means the circuit's ability to radiate a wave of its own origin. In regenerative or oscillating circuits, this wave changes in length with every change in the receiver, and it is due to this ability of a receiver that causes interference and "birdies" in other receivers. By correct design and placing of capacity and inductance this bug-bear of regenerative receivers can be eliminated, or a circuit may be attached or placed in relation to the tuning element of the receiver which will absorb the radiated wave and render the receiver incapable of putting the energy into the antenna.

* * *

INSULATION: In all circuits carrying electricity some material must be used to prevent the electricity flowing in the line from leaking away, or finding a shorter path to its eventual destination by using another conductor. In order to accomplish this, insulation is used, which is any material that will not conduct electricity. The most common form of insulating material is rubber, both hard and soft. In its hard state it is used as panel, tubes and rod, and also as dials and different parts such as stators, rotors, etc. In its soft state it is used as tubing to cover wires. Bakelite and various other synthetic compositions are also used for the same purpose. Wood when dry is an insulator, even though a poor one, and while sometimes used for panels, it is not to be recommended.

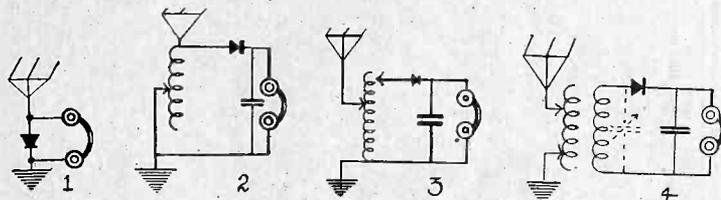
* * *

COUPLING: In a receiving circuit there are two methods of coupling commonly used to transfer the signals from the antenna circuit to the detector circuit. The simplest and easiest method is to use conductive coupling. In conductive coupling the antenna and detector circuits are joined by means of wire, the tuning being accomplished by varying the inductance and capacity in the circuit, and therefore changing the frequency to which the circuit will respond. This method of coupling is used in all the single circuit sets. In these circuits the advantage is simplicity in both construction and tuning, as generally the circuit is tuned by either one or two controls, either of which controls capacity, or inductance. In the second method, called inductive coupling, the antenna and detector or rectifying circuits are separate, the link between the two being the closeness or looseness of coupling used. In close coupling the secondary inductance is placed in such a manner that the windings are close together, and the electro-magnetic coupling is at its highest point. When this is the case, the signals in the detector circuit will be strong but the tuning will be broad, because of the fact that the electrostatic coupling is close. As the tuning is loosened, the coupling between the two cir-

cuits decreases and greater selectivity is obtainable. The advantage of using this type of tuning in a circuit is obvious, as the secondary circuit can be tuned independent of the primary circuit, and if there is more than one station transmitting at the same time, the one desired can be obtained with the least amount of interference from the second.

* * *

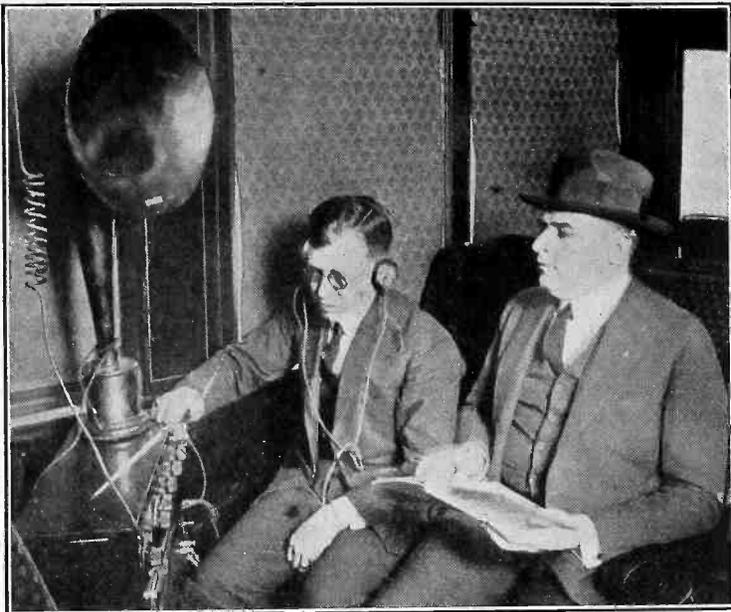
CIRCUIT: A combination of instruments connected in such a manner that they will either transmit an electro-magnetic wave or be capable of receiving or making audible to human ears the electro-magnetic waves of a transmitter. Receiving circuits are divided into various classes, depending upon the complexity of each one. The simplest receiving circuit possible consists of simply an antenna, detector, phones and ground as shown in Fig. 1. This is an untuned circuit and of the simplest form. No tuning can be done with this circuit and reception will only be possible on waves of the same length and period as that of its antenna. The simplest tuned circuit is that shown in Fig. 2. It consists of a single slide tuner, detector, fixed condenser, phones, antenna and ground. This is more selective than the preceding circuit. It can be tuned by moving the slider up or down the inductance and incorporating more or less wire in the circuit and therefore changing the wave length, or frequency, to which the circuit will respond. Fig 3 shows a two



Figs. 1-4. Diagrams illustrating simple crystal circuits, from the untuned to the inductively coupled set.

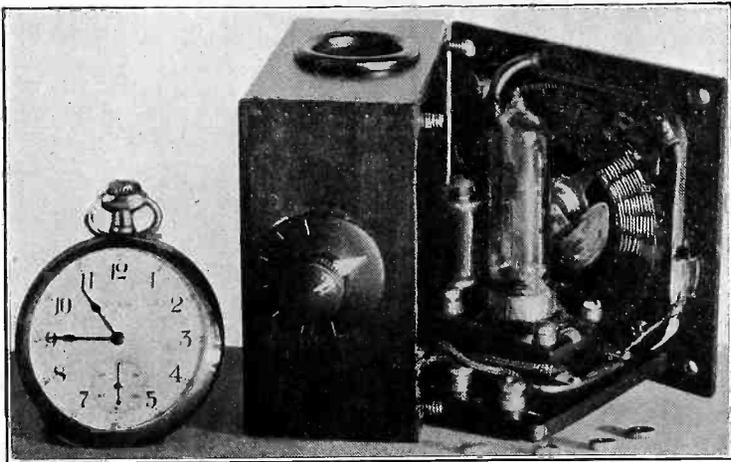
slide tuner circuit, incorporating the same apparatus as the preceding, with the exception of utilizing a two slide tuner instead of the single slide tuner. With this it is possible to tune the antenna circuit and at the same time tune the detector circuit. This circuit can be made even more selective by the addition of a variable condenser as shown in the dotted line. In direct line with these are the inductively coupled circuits. The simplest circuit of this type consists of a variocoupler, or loose coupler, crystal detector, phones, phone condenser, antenna and ground. There is no direct connection between circuit A and circuit B. Circuit A is the antenna tuning circuit and consists of the antenna, lead in, primary and ground. The secondary circuit is the secondary of the coupler, the detector, phones and condenser.

These circuits can be made more selective by the addition of condensers as shown in dotted lines in the drawings. In the coupled circuit the action is as follows: The antenna intercepts the transmitted wave and by means of the lead-in carries it to the primary of the circuit. This primary is tuned to the desired wave length and the current flowing in the first circuit induces a like current in the second circuit. This current being alternating (flowing first one way and then reversing) would not be heard in the phones, as the phones do not respond to the rapid alternations. The detector which is a uni-lateral conductor (allowing current to flow in one direction only) rectifies it and the current flows through the phones as a direct current, making the signals audible. Other circuits will be shown and explained in future issues of RADIO WORLD.



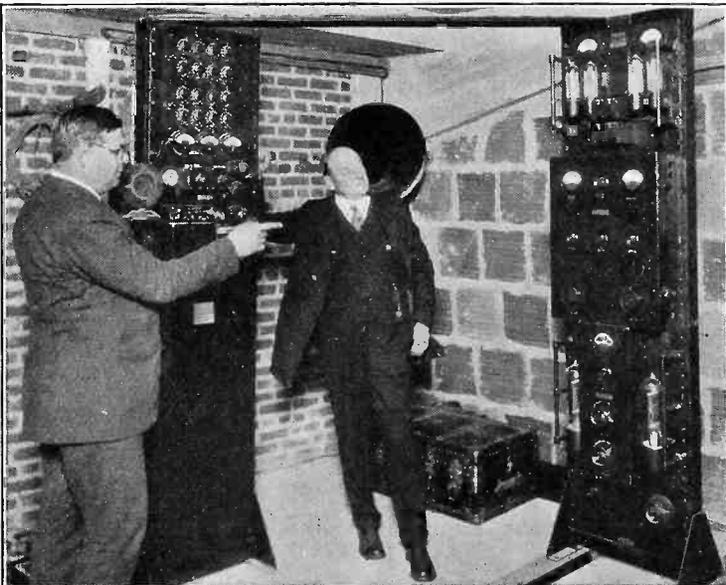
(C. Photographs)

If you intend to travel, particularly between Cincinnati and Louisville, you may be assured that your trip will not be monotonous, no matter how travel hardened a traveling salesman you are. They have installed in the day coach, for the convenience of the passengers, a special receiver using radio-frequency, detector and power amplification, in conjunction with the Western Electric loud speaker, making it possible to hear broadcast programs above the noise of the train.



(C. International Newsreel)

Who says they don't come that small? Here is a set so little that it compares favorably in size with an ordinary Elgin watch. The set was constructed by Roslyn Russel, a Niagara Falls amateur. On account of the small space necessary a home-made spider web inductance was used. The tickler, being stationary, was wound inside of it and a special variable condenser was used. It has a range of 200 to 600 meters, and has copied stations over a radius of more than 900 miles.



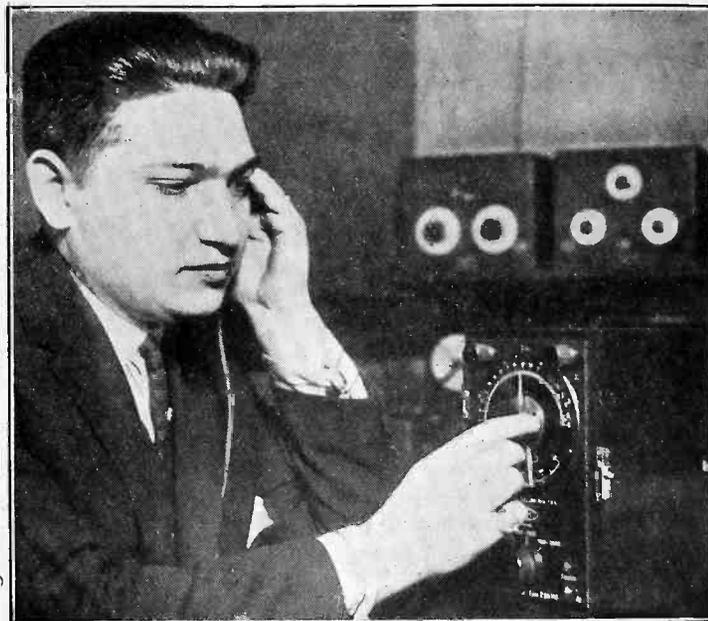
(C. Photonews, N. Y.)

Joe Humphries, boxing bout announcer, inspecting the Western Electric voice amplifier which was used to amplify the announcements and broadcast at the Milk Fund bouts held at the Yankee Stadium, New York City. The amplifier was installed under the grandstand and special care was taken to mount it in such a place that the noise from the crowds would not disturb it.

The Camera Men Here Are the La

Captions by Rob

Your Wave Lengths A

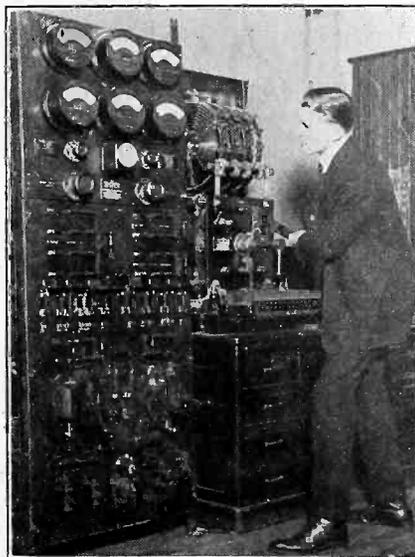


(C. Photonews, N. Y.)

Radio frequency meter used in the office of the Chief Radio Inspector, Second District, for measuring the impressed frequency of the transmitter of a distant station.

FEW people realize the constant activity on the part of the radio division of the United States Department of Commerce to keep an accurate check on the wave lengths of the various stations in the several districts. Every day in the year and every hour of the day there is some one in an official capacity checking up on the wave lengths of the various stations transmitting.

This is especially important since the allocation of the new wave lengths for the broadcasting stations. Down at the Custom House in New York City sits a man with a pair of receivers on his head and a high power receiver in front of him. In conjunction with this receiver there is an up-to-date heterodyne wave meter. This meter is of the most



(C. Photonews, N. Y.)

The apparatus in the Y. M. C. A. Radio School, New York City, and one of the students learning how to adjust it. It is a regulation Navy spark 5-KW type.



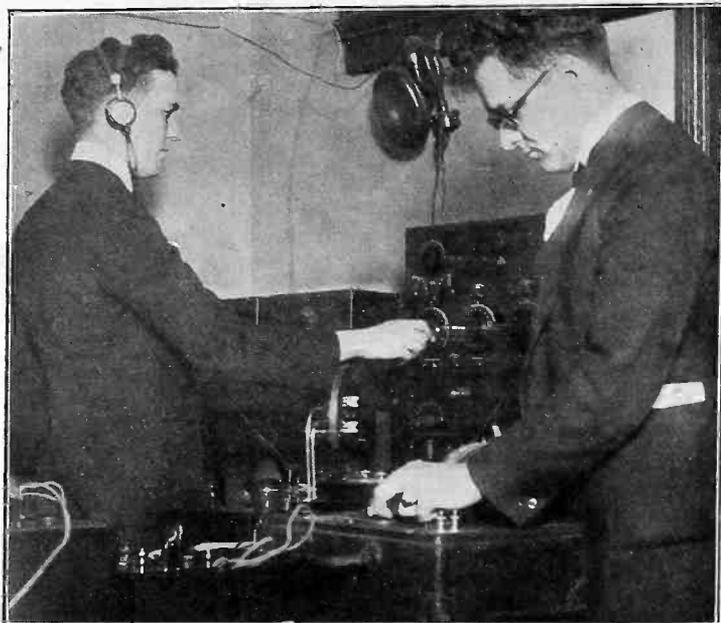
(C. Kadel and Herbert)

Princess Golitzine, a prominent listener in after an arduous day furnished her with her most

Keep At It Nobly— Latest Radio Pictures

by L. Dougherty

Are Constantly Checked



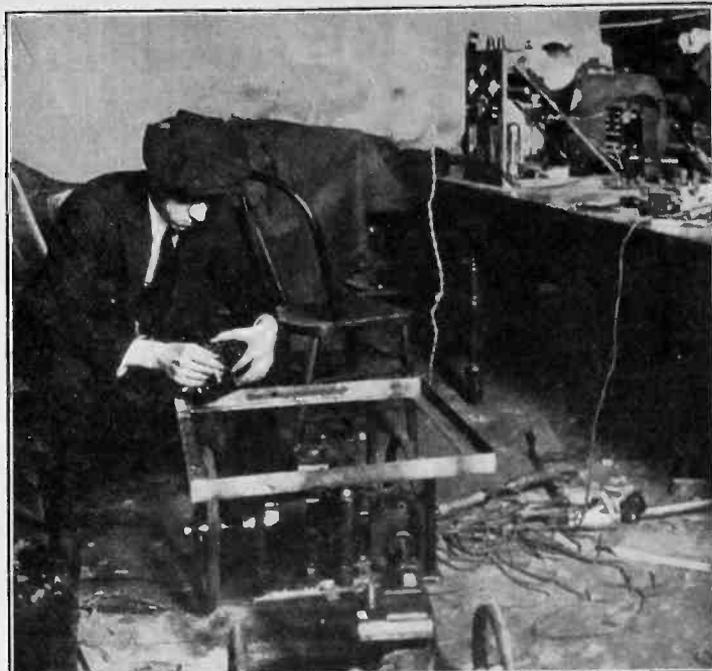
(C. Photonews)

Arthur Batcheller, supervisor of radio at the U. S. Custom House, New York City, calibrating the wave meter by the zero beat method from the standard wave sent out by the Bureau of Standards, Washington, D. C.

accurate type and can record to a fraction just what the frequency of any wave is. As the wave length depends upon the frequency of the emanated wave, it is easy immediately to check up any station.

Besides the men at the Custom House each one of the inspector's staff has a radio set at his home, and they have certain nights when they must be "on duty" in their own homes, checking up the waves and telling any station that is off just what the trouble is.

It is only by the constant activity of this group of men that the commercial and amateur transmission can be kept up to the high standard of accuracy that now prevails.



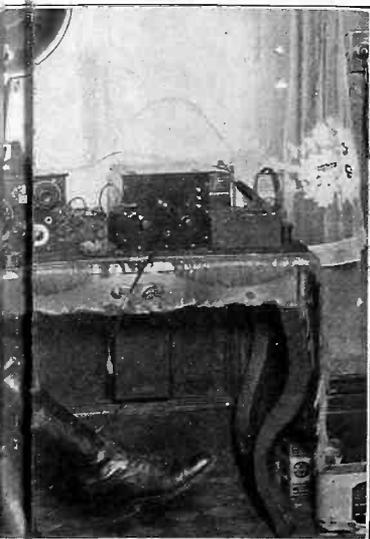
(C. International Newsreel Photo)

Mark Swanson, a Minneapolis inventor, perfecting his radio controlled automobile. The machine, which is a model of one of the popular types of cars, is entirely controlled in its movements by different length waves.



(C. Photonews, N. Y.)

Officials of the Radio Corporation of America at the recent dedication ceremonies of "Broadcast Central," Aeolian Hall, New York City. Left to right, they are Owen D. Young, Chairman of the Board of the R. C. A.; General H. G. Harbord, President of the Corporation; and Dr. Alfred N. Goldsmith, Director of Research of the Corporation.



spowoman and an ardent radio fan, riding. She says that radio has enjoyable form of pastime during her e nutes.

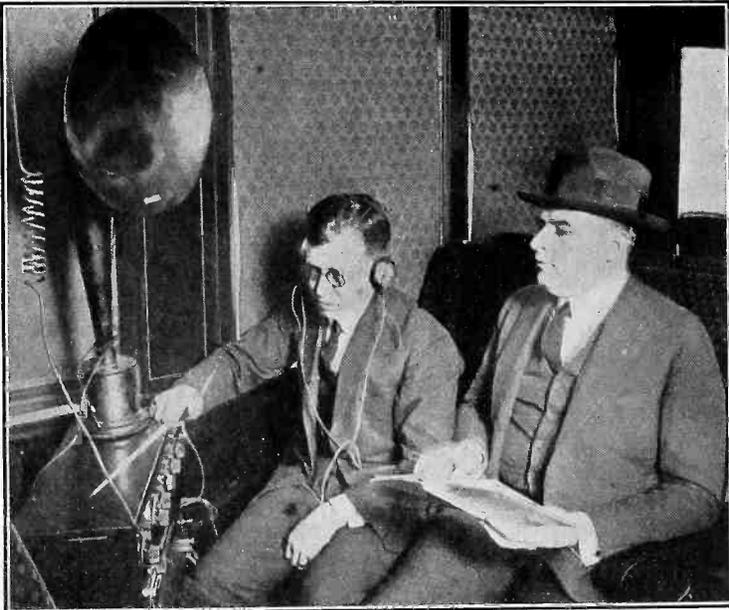


Neatness is one of the factors in the construction of a receiver which promotes highest efficiency. You fans who like to build your sets take a look at the construction of Harold Slater's and get some ideas for your next one.



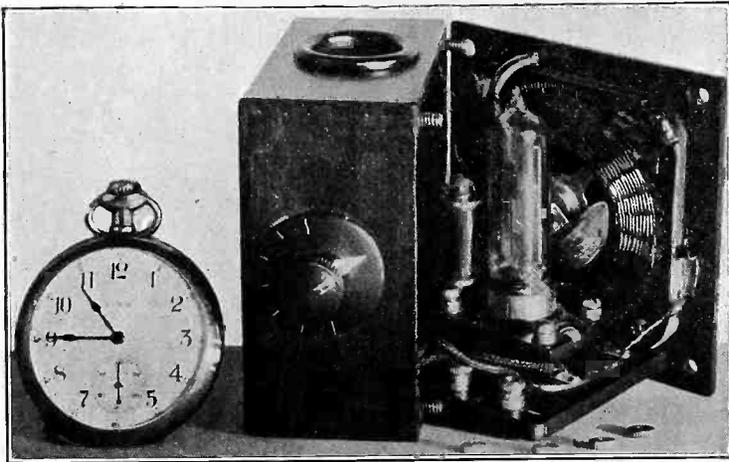
(C. Kadel and Herbert)

A radio set has been installed in Mayor Hylan's reception room at City Hall, New York. It will be a welcome diversion for callers who dally twiddle their fingers and kick their heels against the expensive furniture. The set, which was presented by the Radio Corporation, is the Radiola Grand, one of the popular sets made by that Company.



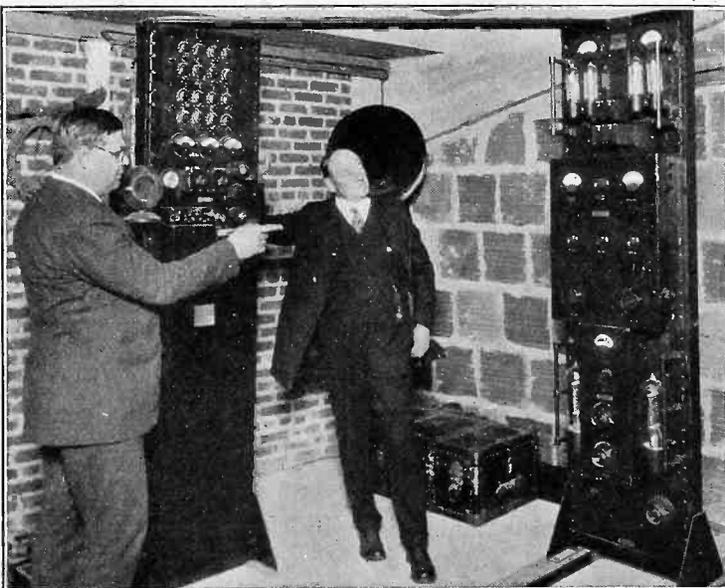
(C. Photograms)

If you intend to travel, particularly between Cincinnati and Louisville, you may be assured that your trip will not be monotonous, no matter how travel hardened a traveling salesman you are. They have installed in the day coach, for the convenience of the passengers, a special receiver using radio-frequency, detector and power amplification, in conjunction with the Western Electric loud speaker, making it possible to hear broadcast programs above the noise of the train.



(C. International Newsreel)

Who says they don't come that small? Here is a set so little that it compares favorably in size with an ordinary Elgin watch. The set was constructed by Roslyn Russel, a Niagara Falls amateur. On account of the small space necessary a home-made spider web inductance was used. The tickler, being stationary, was wound inside of it and a special variable condenser was used. It has a range of 200 to 600 meters, and has copied stations over a radius of more than 900 miles.



(C. Photonews, N. Y.)

Joe Humphries, boxing bout announcer, inspecting the Western Electric voice amplifier which was used to amplify the announcements and broadcast at the Milk Fund bouts held at the Yankee Stadium, New York City. The amplifier was installed under the grandstand and special care was taken to mount it in such a place that the noise from the crowds would not disturb it.

The Camera Men Here Are the Lat

Captions by Rob

Your Wave Lengths A

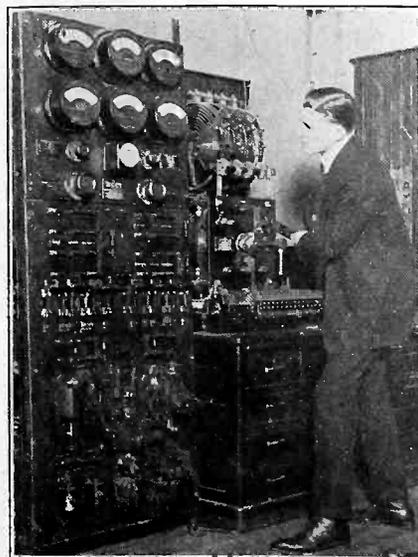


(C. Photonews, N. Y.)

Radio frequency meter used in the office of the Chief Radio Inspector, Second District, for measuring the impressed frequency of the transmitter of a distant station.

FEW people realize the constant activity on the part of the radio division of the United States Department of Commerce to keep an accurate check on the wave lengths of the various stations in the several districts. Every day in the year and every hour of the day there is some one in an official capacity checking up on the wave lengths of the various stations transmitting.

This is especially important since the allocation of the new wave lengths for the broadcasting stations. Down at the Custom House in New York City sits a man with a pair of receivers on his head and a high power receiver in front of him. In conjunction with this receiver there is an up-to-date heterodyne wave meter. This meter is of the most



(C. Photonews, N. Y.)

The apparatus in the Y. M. C. A. Radio School, New York City, and one of the students learning how to adjust it. It is a regulation Navy spark 5-KW type.



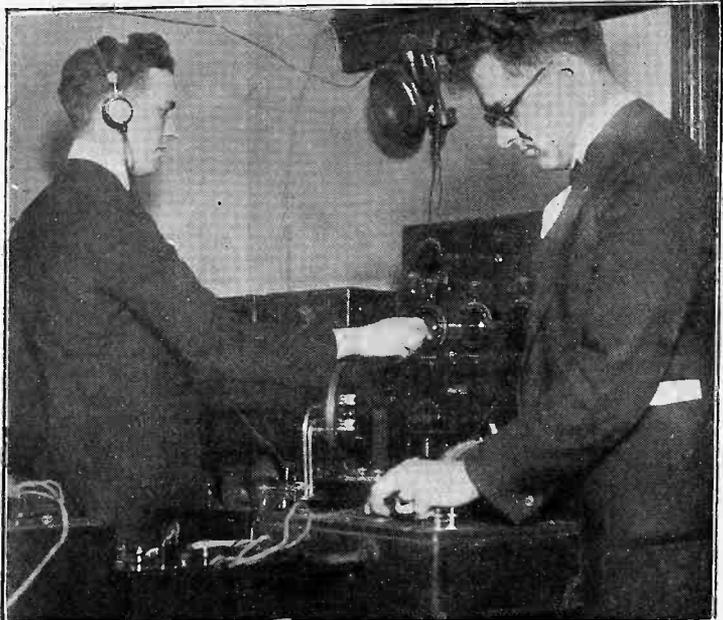
(C. Kadel and Herbert)

Princess Golitzine, a prominent listener in after an arduous day furnished her with her most

Keep At It Nobly— Best Radio Pictures

L. Dougherty

Be Constantly Checked

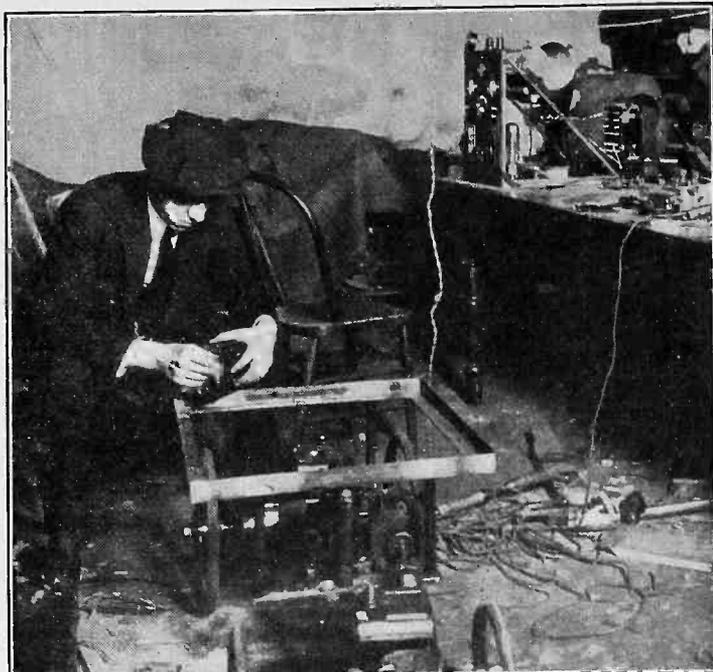


(C. Photonews)
Arthur Batcheller, supervisor of radio at the U. S. Custom House, New York City, calibrating the wave meter by the zero beat method from the standard wave sent out by the Bureau of Standards, Washington, D. C.

accurate type and can record to a fraction just what the frequency of any wave is. As the wave length depends upon the frequency of the emanated wave, it is easy immediately to check up any station.

Besides the men at the Custom House each one of the inspector's staff has a radio set at his home, and they have certain nights when they must be "on duty" in their own homes, checking up the waves and telling any station that is off just what the trouble is.

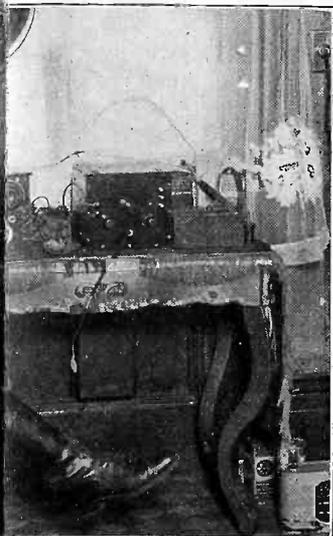
It is only by the constant activity of this group of men that the commercial and amateur transmission can be kept up to the high standard of accuracy that now prevails.



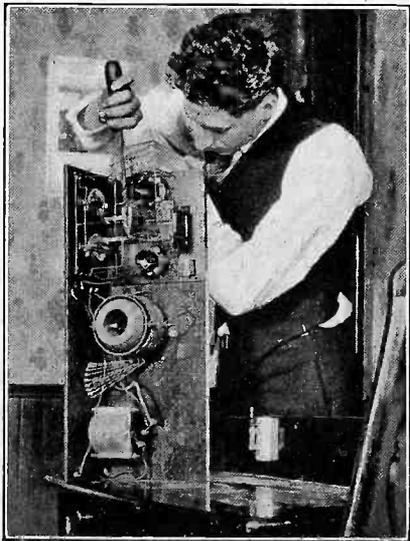
(C. International Newsreel Photo)
Mark Swanson, a Minneapolis inventor, perfecting his radio controlled automobile. The machine, which is a model of one of the popular types of cars, is entirely controlled in its movements by different length waves.



(C. Photonews, N. Y.)
Officials of the Radio Corporation of America at the recent dedication ceremonies of "Broadcast Central," Aeolian Hall, New York City. Left to right, they are Owen D. Young, Chairman of the Board of the R. C. A.; General H. G. Harbord, President of the Corporation; and Dr. Alfred N. Goldsmith, Director of Research of the Corporation.



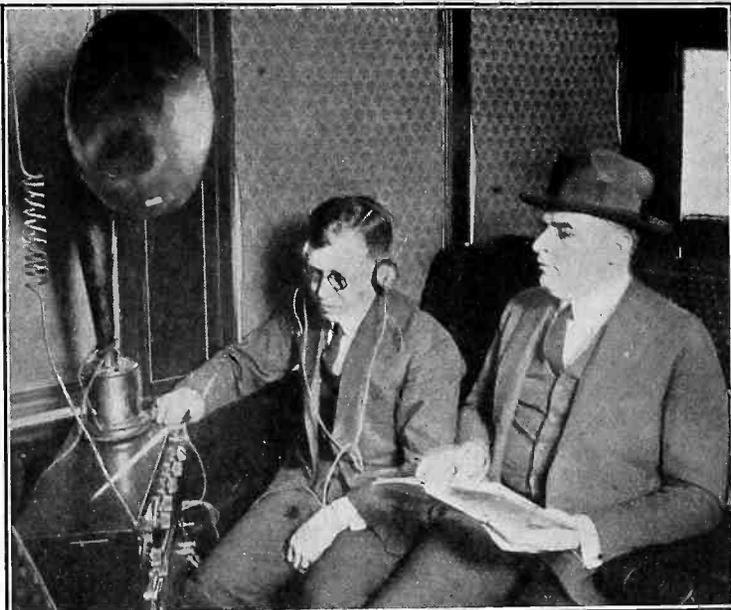
...woman and an ardent radio fan, ...riding. She says that radio has ...ble form of pastime during her ...utes.



Neatness is one of the factors in the construction of a receiver which promotes highest efficiency. You fans who like to build your sets take a look at the construction of Harold Slater's and get some ideas for your next one.

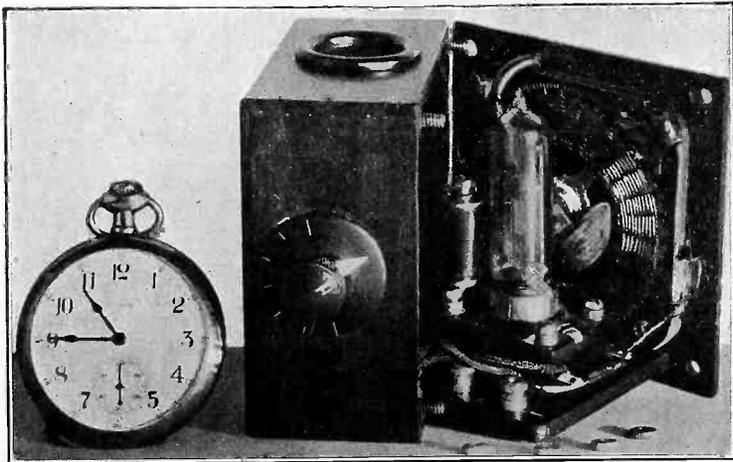


(C. Kadel and Herbert)
A radio set has been installed in Mayor Hylan's reception room at City Hall, New York. It will be a welcome diversion for callers who daily twiddle their fingers and kick their heels against the expensive furniture. The set, which was presented by the Radio Corporation, is the Radiola Grand, one of the popular sets made by that Company.



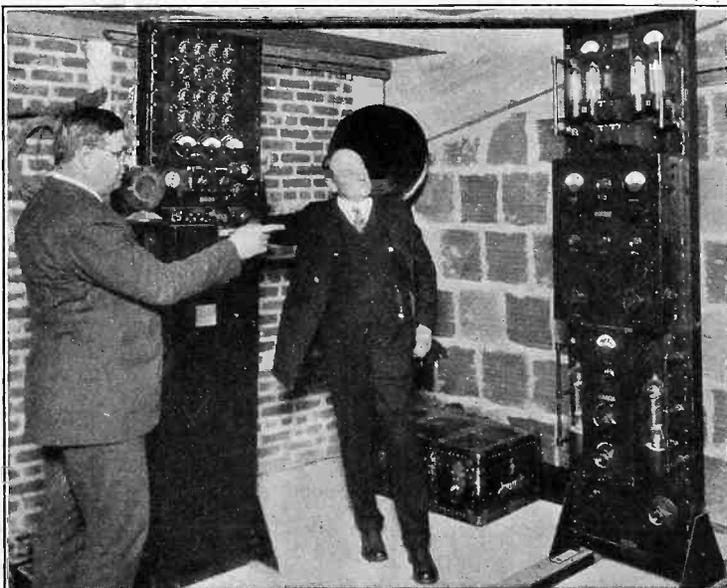
(C. Photographs)

If you intend to travel, particularly between Cincinnati and Louisville, you may be assured that your trip will not be monotonous, no matter how travel hardened a traveling salesman you are. They have installed in the day coach, for the convenience of the passengers, a special receiver using radio-frequency, detector and power amplification, in conjunction with the Western Electric loud speaker, making it possible to hear broadcast programs above the noise of the train.



(C. International Newsreel)

Who says they don't come that small? Here is a set so little that it compares favorably in size with an ordinary Elgin watch. The set was constructed by Roslyn Russel, a Niagara Falls amateur. On account of the small space necessary a home-made spider web inductance was used. The tickler, being stationary, was wound inside of it and a special variable condenser was used. It has a range of 200 to 600 meters, and has copied stations over a radius of more than 900 miles.



(C. Photonews, N. Y.)

Joe Humphries, boxing bout announcer, inspecting the Western Electric voice amplifier which was used to amplify the announcements and broadcast at the Milk Fund bouts held at the Yankee Stadium, New York City. The amplifier was installed under the grandstand and special care was taken to mount it in such a place that the noise from the crowds would not disturb it.

The Camera Men Here Are the La

Captions by Ro

Your Wave Lengths A

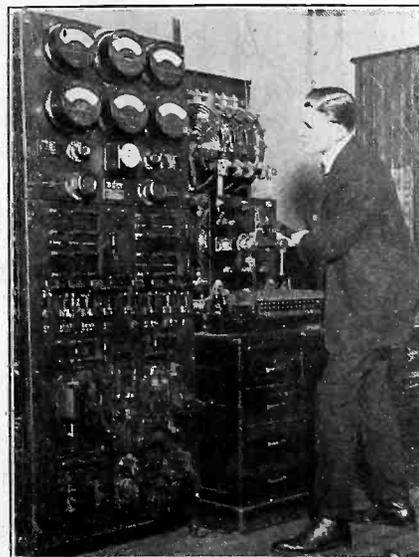


(C. Photonews, N. Y.)

Radio frequency meter used in the office of the Chief Radio Inspector, Second District, for measuring the impressed frequency of the transmitter of a distant station.

FEW people realize the constant activity on the part of the radio division of the United States Department of Commerce to keep an accurate check on the wave lengths of the various stations in the several districts. Every day in the year and every hour of the day there is some one in an official capacity checking up on the wave lengths of the various stations transmitting.

This is especially important since the allocation of the new wave lengths for the broadcasting stations. Down at the Custom House in New York City sits a man with a pair of receivers on his head and a high power receiver in front of him. In conjunction with this receiver there is an up-to-date heterodyne wave meter. This meter is of the most



(C. Photonews, N. Y.)

The apparatus in the Y. M. C. A. Radio School, New York City, and one of the students learning how to adjust it. It is a regulation Navy spark 5-KW type.



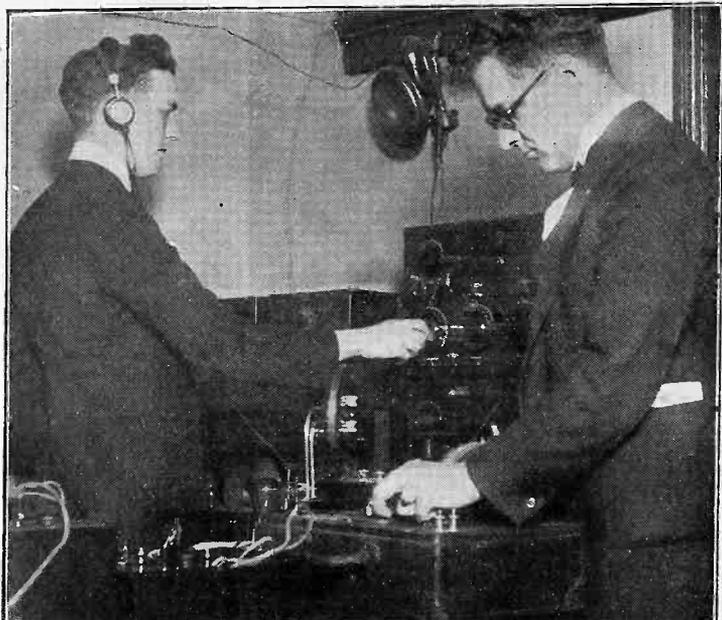
(C. Kadel and Herbert)

Princess Goltzine, a prominent listener in after an arduous furnished her with her most

Keep At It Nobly— Best Radio Pictures

L. Dougherty

Are Constantly Checked



(C. Photonews)

Arthur Batcheller, supervisor of radio at the U. S. Custom House, New York City, calibrating the wave meter by the zero beat method from the standard wave sent out by the Bureau of Standards, Washington, D. C.

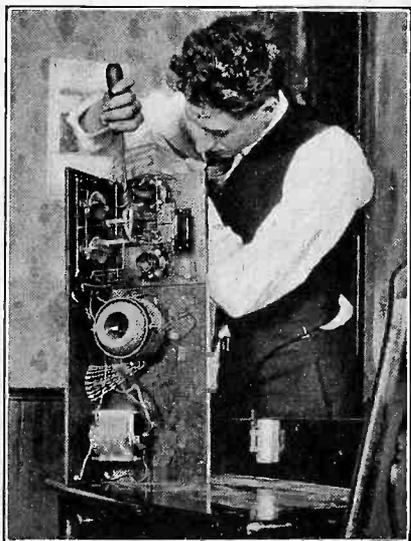
accurate type and can record to a fraction just what the frequency of any wave is. As the wave length depends upon the frequency of the emanated wave, it is easy immediately to check up any station.

Besides the men at the Custom House each one of the inspector's staff has a radio set at his home, and they have certain nights when they must be "on duty" in their own homes, checking up the waves and telling any station that is off just what the trouble is.

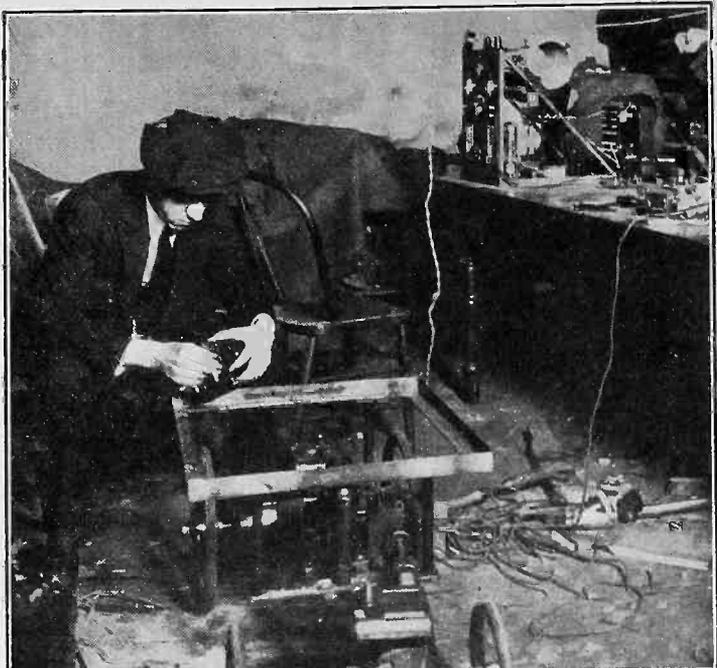
It is only by the constant activity of this group of men that the commercial and amateur transmission can be kept up to the high standard of accuracy that now prevails.



swoman and an ardent radio fan, riding. She says that radio has able form of pastime during her nutes.



Neatness is one of the factors in the construction of a receiver which promotes highest efficiency. You fans who like to build your sets take a look at the construction of Harold Slater's and get some ideas for your next one.



(C. International Newsreel Photo)

Mark Swanson, a Minneapolis inventor, perfecting his radio controlled automobile. The machine, which is a model of one of the popular types of cars, is entirely controlled in its movements by different length waves.



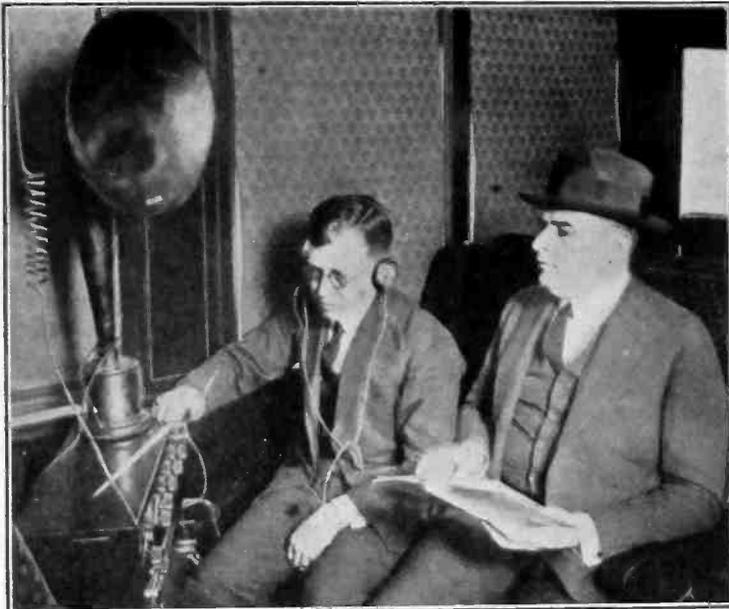
(C. Photonews, N. Y.)

Officials of the Radio Corporation of America at the recent dedication ceremonies of "Broadcast Central," Aeolian Hall, New York City. Left to right, they are Owen D. Young, Chairman of the Board of the R. C. A.; General H. G. Harbord, President of the Corporation; and Dr. Alfred N. Goldsmith, Director of Research of the Corporation.



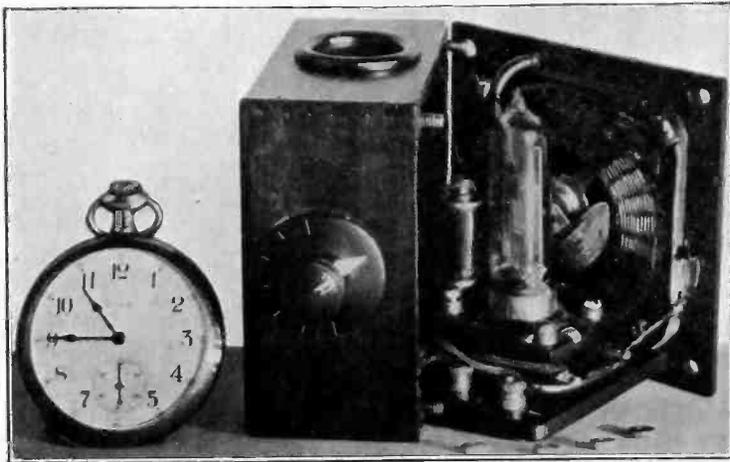
(C. Kadel and Herbert)

A radio set has been installed in Mayor Hylan's reception room at City Hall, New York. It will be a welcome diversion for callers who daily twiddle their fingers and kick their heels against the expensive furniture. The set, which was presented by the Radio Corporation, is the Radiola Grand, one of the popular sets made by that Company.



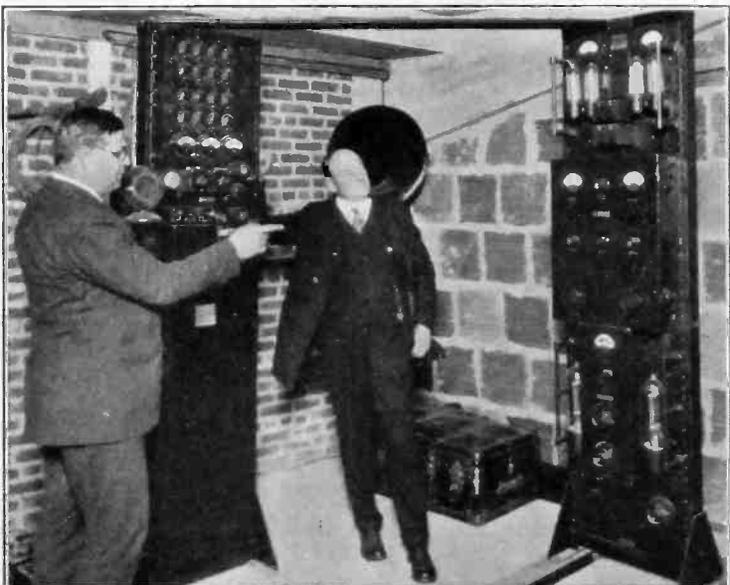
(C. Photographs)

If you intend to travel, particularly between Cincinnati and Louisville, you may be assured that your trip will not be monotonous, no matter how travel hardened a traveling salesman you are. They have installed in the day coach, for the convenience of the passengers, a special receiver using radio-frequency, detector and power amplification, in conjunction with the Western Electric loud speaker, making it possible to hear broadcast programs above the noise of the train.



(C. International Newsreel)

Who says they don't come that small? Here is a set so little that it compares favorably in size with an ordinary Elgin watch. The set was constructed by Roslyn Russel, a Niagara Falls amateur. On account of the small space necessary a home-made spider web inductance was used. The tickler, being stationary, was wound inside of it and a special variable condenser was used. It has a range of 200 to 600 meters, and has copied stations over a radius of more than 900 miles.



(C. Photonews, N. Y.)

Joe Humphries, boxing bout announcer, inspecting the Western Electric voice amplifier which was used to amplify the announcements and broadcast at the Milk Fund bouts held at the Yankee Stadium, New York City. The amplifier was installed under the grandstand and special care was taken to mount it in such a place that the noise from the crowds would not disturb it.

The Camera Men

Here Are the La

Captions by Rob

Your Wave Lengths A

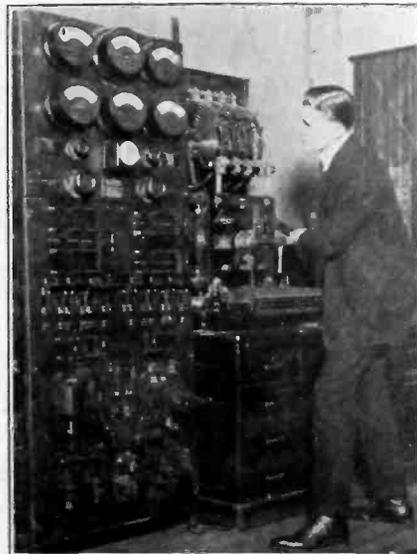


(C. Photonews, N. Y.)

Radio frequency meter used in the office of the Chief Radio Inspector, Second District, for measuring the impressed frequency of the transmitter of a distant station.

FEW people realize the constant activity on the part of the radio division of the United States Department of Commerce to keep an accurate check on the wave lengths of the various stations in the several districts. Every day in the year and every hour of the day there is some one in an official capacity checking up on the wave lengths of the various stations transmitting.

This is especially important since the allocation of the new wave lengths for the broadcasting stations. Down at the Custom House in New York City sits a man with a pair of receivers on his head and a high power receiver in front of him. In conjunction with this receiver there is an up-to-date heterodyne wave meter. This meter is of the most



(C. Photonews, N. Y.)

The apparatus in the Y. M. C. A. Radio School, New York City, and one of the students learning how to adjust it. It is a regulation Navy spark 5-KW type.



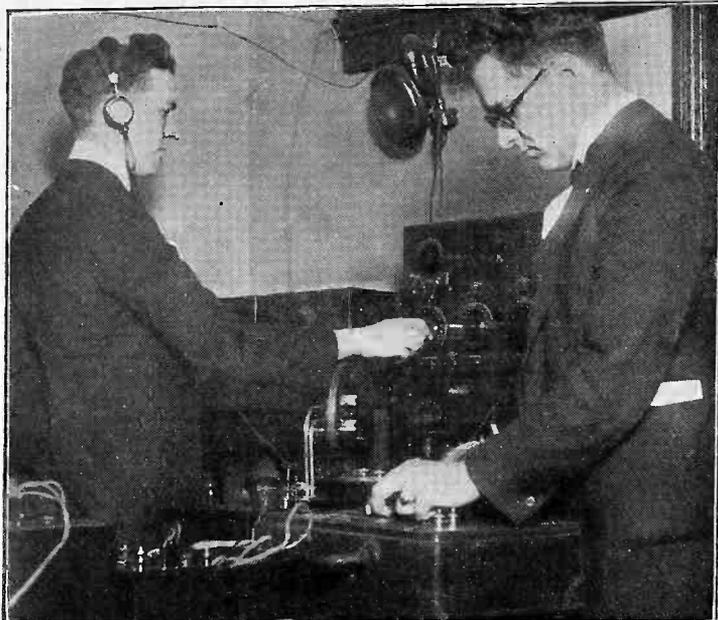
(C. Kadel and Herbert)

Princess Golitzine, a prominent listener in after an arduous day furnished her with her most

Keep At It Nobly— Best Radio Pictures

L. Dougherty

Are Constantly Checked



(C. Photonews)

Arthur Batcheller, supervisor of radio at the U. S. Custom House, New York City, calibrating the wave meter by the zero beat method from the standard wave sent out by the Bureau of Standards, Washington, D. C.

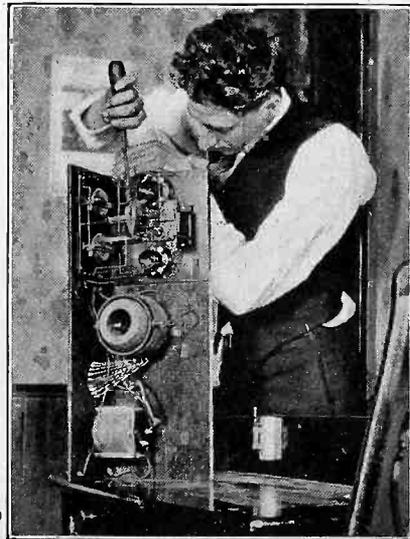
accurate type and can record to a fraction just what the frequency of any wave is. As the wave length depends upon the frequency of the emanated wave, it is easy immediately to check up any station.

Besides the men at the Custom House each one of the inspector's staff has a radio set at his home, and they have certain nights when they must be "on duty" in their own homes, checking up the waves and telling any station that is off just what the trouble is.

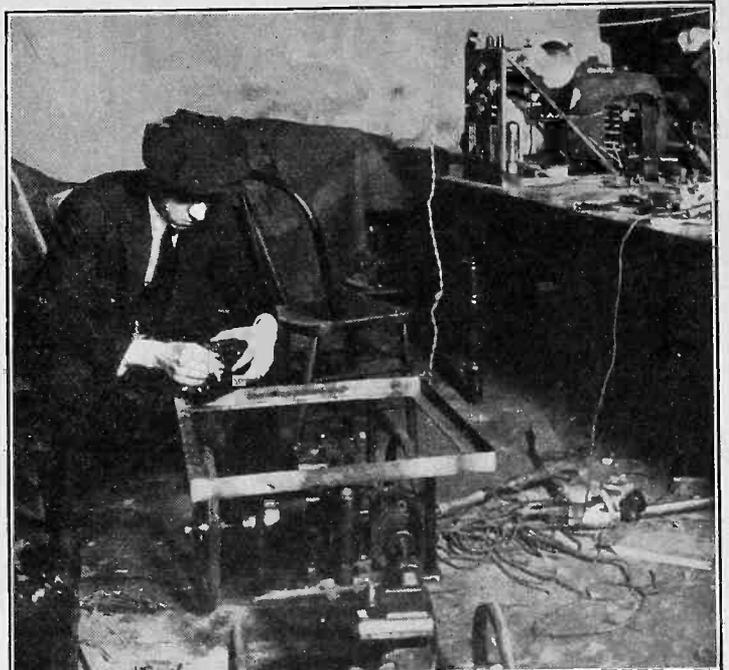
It is only by the constant activity of this group of men that the commercial and amateur transmission can be kept up to the high standard of accuracy that now prevails.



Woman and an ardent radio fan, riding. She says that radio has able form of pastime during her nites.



Neatness is one of the factors in the construction of a receiver which promotes highest efficiency. You fans who like to build your sets take a look at the construction of Harold Slater's and get some ideas for your next one.



(C. International Newsreel Photo)

Mark Swanson, a Minneapolis inventor, perfecting his radio controlled automobile. The machine, which is a model of one of the popular types of cars, is entirely controlled in its movements by different length waves.



(C. Photonews, N. Y.)

Officials of the Radio Corporation of America at the recent dedication ceremonies of "Broadcast Central," Aeolian Hall, New York City. Left to right, they are Owen D. Young, Chairman of the Board of the R. C. A.; General H. G. Harboard, President of the Corporation; and Dr. Alfred N. Goldsmith, Director of Research of the Corporation.



(C. Kadel and Herbert)

A radio set has been installed in Mayor Hylan's reception room at City Hall, New York. It will be a welcome diversion for callers who daily twiddle their fingers and kick their heels against the expensive furniture. The set, which was presented by the Radio Corporation, is the Radiola Grand, one of the popular sets made by that Company.

Latest Official List of Broadcasting Stations in the United States

FOLLOWING is the first installment of an official list of commercial broadcasting stations in the United States as issued by the Department of Commerce. The list will be continued in next week's RADIO WORLD.

As new allocations of wave lengths to stations now operating on 360 meters are made by the Department of Commerce, the changes will be published by RADIO WORLD.

Readers who save these installments will have a complete list of broadcasters with their station calls, location, frequency, wave lengths and power.

| Call | Station | Frequency Kcys. | Wave Length Meters | Power Watts |
|------|--|--------------------|--------------------------|----------------|
| KFAV | Abbott Kinney Co., Venice, Cal.... | 833 | 363 | 5 |
| WEAK | Abercrombie, Julius B., St. Joseph, Missouri | 833 | 360 | 100 |
| KFDA | Adler's Music Store, Baker, Ore.. | 833 | 360 | 5 |
| WTAW | Agricultural & Mechanical College of Texas, College Station, Tex. | 833 | 360 | 100 |
| WMAV | Alabama Polytechnic Institute, Au- burn, Ala..... | 1,200 | 250 | 250 |
| WSY | Alabama Power Co., Birmingham, Alabama | 833 | 360 | 500 |
| WCAR | Alamo Radio Elect. Co., San An- tonio, Texas..... | 833 | 360 | 150 |
| WGAW | Albright, Ernest C., Altoona, Pa.. | 833 | 360 | 20 |
| KZM | Allen, Preston D., Oakland, Cal.... | 833 | 360 | 100 |
| KGO | Altadena Radio Lab., Altadena, Cal. | 833 | 360 | 50 |
| WRAU | Amarillo Daily News, Amarillo, Texas | 833 | 360 | 20 |
| WJAB | American Radio Co., Lincoln, Neb. | 833 | 360 | 250 |
| WGI | American Radio & Research Corp., Medford Hillside, Mass..... | 833 | 360 | 500 |
| KFEZ | American Society of Mechanical Engineers, St. Louis, Mo..... | 833 | 360 | 500 |
| WEAF | American Telephone & Telegraph Co., New York, N. Y..... | 610 | 492 | 500 |
| WIAU | American Trust & Savings Bank, Le Mars, Iowa..... | 833 | 360 | 15 |
| WPAA | Anderson & Webster Elect. Co., Wahoo, Nebraska..... | 833 | 360 | 150 |
| WQAJ | Ann Arbor Times News, Ann Arbor, Michigan | 833 | 360 | 100 |
| KFI | Anthony, Earl C., Inc., Los Angeles, California | 640 | 469 | 500 |
| WRAV | Antioch College, Yellow Springs, O. | 833 | 360 | 200 |
| WOAG | Apollo Theatre, Belvidere, Ill..... | 833 | 360 | 20 |
| WQAK | Appel-Higley Elect. Co., Dubuque, Iowa | 833 | 360 | 50 |
| KQP | Apple City Radio Club, Hood River, Ore. | 833 | 360 | 10 |
| WFAT | Argus-Leader, Sioux Falls, S. D.. | 833 | 360 | 50 |
| KFGL | Arlington Garage, Arlington, Ore.. | 1,280 | 234 | 5 |
| WABG | Arnold Edwards Piano Co., Jack- sonville, Fla..... | 1,210 | 248 | 10 |
| WMAD | Atchison County Mail, Rockport, Missouri | 833 | 360 | 50 |
| WGM | Atlanta Constitution, Atlanta, Ga... | 700 | 429 | 500 |
| WSB | Atlanta Journal Co., Atlanta, Ga... | 700 | 429 | 500 |
| WDAJ | Atlanta & West Point R. R. Co., College Park, Ga..... | 833 | 360 | 500 |
| WPAM | Auerbach & Guettel, Topeka, Kan.. | 833 | 360 | 5 |
| KFEX | Augsburg Seminary, Minneapolis, Minn. | 1,150 | 261 | 100 |
| KFER | Auto Electric Service Co., Ft. Dodge, Iowa..... | 1,300 | 231 | 10 |
| KDZF | Automobile Club of Southern Cali- fornia, Los Angeles, Calif..... | 1,080 | 278 | 500 |
| WDAO | Automotive Electric Co., Dallas, Texas | 833 | 360 | 50 |
| WHAE | Automotive Electric Service Co., Sioux City, Iowa..... | 833 | 360 | 20 |
| KFBC | Azbill, W. K., San Diego, Calif..... | 833 | 360 | 20 |
| WOAS | Bailey's Radio Shop, Middletown, Connecticut | 833 | 360 | 50 |
| WEAR | Baltimore American & News Pub. Co., Baltimore, Md..... | 833 | 360 | 50 |
| WOR | Bamberger, L., & Co., Newark, N. J. | 740 | 405 | 500 |
| WPAY | Bangor Radio Laboratory, Bangor, Maine | 833 | 360 | 20 |
| WBBD | Barbey Battery Service, Reading, Pennsylvania | 1,280 | 224 | 50 |
| KFFZ | Al. G. Barnes Amusement Co., Dallas, Texas..... | 1,330 | 226 | 20 |
| WQAA | Beale, Horace A., Jr., Parkesburg, Pennsylvania | 833 | 360 | 500 |
| WAAL | Beamish Elect. Co., Minneapolis, Minnesota | 833 | 360 | 100 |
| WMAM | Beaumont Radio Equipment Co., Beaumont, Texas..... | 833 | 360 | 100 |
| KDZR | Bellingham Publishing Co., Belling- ham, Wash..... | 1,150 | 261 | 50 |
| KFIF | Benson Tech. Student Body, Port- land, Ore..... | 833 | 360 | 200 |
| WEB | Benwood Company, Inc., The, St. Louis, Mo..... | 833 | 360 | 500 |
| KRE | Berkeley Gazette, Berkeley, Cal... | 833 | 360 | 50 |
| KJS | Bible Institute, Los Angeles, Cal... | 833 | 360 | 750 |
| WRAN | Black Hawk Electrical Co., Water- loo, Iowa..... | 1,310 | 229 | 20 |
| KFHB | P. L. Boardwell, Hood River, Ore. | 1,070 | 280 | 10 |
| WKAY | Brenan College, Gainesville, Ga.... | 833 | 360 | 20 |
| WMAN | Broad Street Baptist Church, Co- lumbus, Ohio | 833 | 360 | 10 |
| WQAH | Brock-Anderson Elect. Eng. Co., Lexington, Ky..... | 1,180 | 254 | 10 |
| KNN | Bullock's, Los Angeles, Calif..... | 833 | 360 | 100 |
| KFDR | Bullock's Hardware & Sporting Goods, York, Neb..... | 833 | 360 | 10 |
| KFEY | Bunker Hill & Sullivan Mining & Const. Co., Kellog, Idaho..... | 833 | 360 | 10 |
| WIAS | Burlington Hawk Eye-Home Elect. Co., Burlington, Iowa..... | 833 | 360 | 150 |
| WDZ | Bush, James L., Tuscola, Ill..... | 1,080 | 278 | 10 |
| KFBB | Buttrely & Co., F. A., Havre, Mont. | 833 | 360 | 50 |
| WQAO | Calvary Baptist Church, New York | 833 | 360 | 100 |
| WJAQ | Capper Publications, Topeka, Kan. | 833 | 360 | 50 |
| KFDF | Casper Community Radio Corp., Casper, Wyo. | 833 | 360 | 100 |
| WQAW | Catholic University of America, Washington, D. C..... | 833 | 360 | 5 |
| KFHF | Central Christian Church, Shreve- port, La..... | 1,130 | 266 | 150 |
| WDAD | Central Kansas Radio Supply, Lindsborg, Kansas..... | 833 | 360 | 10 |
| WPE | Central Radio Co., Inc., Indepen- dence, Mo. | 833 | 360 | 200 |
| WLAS | Central Radio Supply Co., Hutchin- son, Kan..... | 833 | 360 | 25 |
| WNAQ | Charleston Radio Elect. Co., Charleston, S. C..... | 833 | 360 | 20 |
| KFGP | Cheney Radio Co., Cheney, Kan.... | 1,310 | 229 | 10 |
| WAAF | Chicago Daily Drivers Journal, Chicago, Ill..... | 1,050 | 286 | 200 |
| WMAQ | Chicago Daily News, Chicago, Ill.. | 670 | 448 | 500 |
| WJAZ | Chicago Radio Laboratory, Chicago | 670 | 448 | 600 |
| KFGD | Chickasha Radio & Elect. Co., Chickasha, Okla..... | 1,210 | 248 | 20 |
| KFBS | Chronicle News, Gas & Electric Supply Co., Trinidad, Colorado | 833 | 360 | 150 |
| WIAQ | Chronicle Publishing Co., Marion Indiana | 833 | 360 | 10 |
| WDM | Church of the Covenant, Washing- ton, D. C..... | 833 | 360 | 100 |
| WIZ | Cino Radio Mfg. Co., The, Cincin- nati, Ohio..... | 833 | 360 | 260 |
| KUS | City Dye Works & Laundry Co., Los Angeles, Cal..... | 833 | 360 | 100 |
| WBU | City of Chicago, Chicago, Ill..... | 833 | 360 | 500 |
| WRR | City of Dallas, Police & Fire Signal Dept., Dallas, Texas..... | 833 | 360 | 20 |
| KFAQ | City of San Jose, San Jose, Calif.. | 833 | 360 | 250 |
| KFEB | City of Taft, Taft, Calif..... | 833 | 360 | 50 |
| WCN | Clark University, Worcester, Mass. | 833 | 360 | 600 |
| WSAC | Clemson Agricultural College, Clemson College, S. C..... | 833 | 360 | 500 |

| Call | Station | Frequency Kcys. | Wave Length Meters | Power Watts | Call | Station | Frequency Kcys. | Wave Length Meters | Power Watts |
|------|--|--------------------|--------------------------|----------------|------|---|--------------------|--------------------------|----------------|
| KUY | Coast Radio Co., El Monte, Calif. | 833 | 360 | 50 | KFCH | Electric Service Station, Billings, Mont. | 833 | 360 | 10 |
| WHAC | Cole Bros. Elect. Co., Waterloo, Ia. | 833 | 360 | 50 | KYQ | Electric Shop, Honolulu, T. H. | 833 | 360 | 40 |
| WQAL | Cole County Tel. & Tel. Co., Mat- toon, Ill. | 833 | 360 | 25 | KFAN | Electric Shop, Moscow, Idaho. | 833 | 360 | 50 |
| WOAK | Collins' Hardware Co., Frankfort, Kentucky | 833 | 360 | 20 | WLAV | Electric Shop, Inc., Pensacola, Fla. | 833 | 360 | 100 |
| KFCK | Colorado Springs Radio Co., Colo- rado Springs, Colorado. | 833 | 360 | 10 | WPI | Electric Supply Co., Clearfield, Pa. | 833 | 360 | 20 |
| KFHA | Colorado State Normal School, Gunnison, Col. | 833 | 360 | 50 | WFAH | Electric Supply Co., Port Arthur, Texas | 833 | 360 | 10 |
| WMC | Commercial Publishing Co., Mem- phis, Tenn. | 600 | 500 | 500 | KDEI | Electric Supply Co., Wenatchee, Wash. | 833 | 360 | 50 |
| WAAH | Commonwealth Electric Co., Inc., St. Paul, Minn. | 833 | 360 | 500 | KFGZ | Emmanuel Missionary College, Berrien Springs, Mich. | 1,120 | 268 | 10 |
| WCAZ | Compton, Robert E., & Carthage College, Carthage, Ill. | 833 | 360 | 100 | KSL | Emporium, The, San Francisco, Cal. | 833 | 360 | 50 |
| WPAU | Concordia College, Moorhead, Minn. | 833 | 360 | 20 | WCAH | Entrekin Electric Co., Columbus, Ohio | 1,050 | 286 | 100 |
| WIL | Continental Electric Supply Co., Washington, D. C. | 833 | 360 | 10 | WTAS | Erbstein, Charles E., Elgin, Ill. | 1,090 | 275 | 500 |
| WIAH | Continental Radio Mfg. Co., New- ton, Iowa | 833 | 360 | 10 | WRAV | Erner & Hopkins Co., The Columbus, Ohio | 833 | 360 | 250 |
| WEAI | Cornell University, Ithaca, N. Y. | 1,050 | 286 | 500 | WOAJ | Erwins Electrical Co., Parsons, Kan. | 833 | 360 | 15 |
| WEY | Cosradio Company, The, Wichita, Kansas | 833 | 360 | 100 | WWJ | Evening News Ass'n, Detroit News, Detroit, Mich. | 580 | 517 | 500 |
| WHAS | Courier Journal & Louisville Times, Louisville, Ky. | 750 | 400 | 500 | KUO | Examiner Printing Co., The, San Francisco, Cal. | 833 | 360 | 500 |
| WHK | Cox, Warren R., Cleveland, Ohio. | 833 | 360 | 100 | WEAA | Fallain & Lathrop, Flint, Mich. | 833 | 360 | 100 |
| KFCQ | Crary Hardware Co., Boone, Iowa. | 1,330 | 226 | 20 | KFHJ | Fallen Co., Santa Barbara, Cal. | 833 | 360 | 100 |
| WLW | Crosley Manufacturing Co., Cin- cinnati, Ohio | 833 | 360 | 500 & 200 | WRP | Federal Institute of Radio Telegraphy, Camden, N. J. | 833 | 360 | 100 |
| KFDO | Cutting, H. E., Bozeman, Mont. | 1,210 | 248 | 10 | WDAY | Fargo Radio Service Co., Fargo, N. D. | 1,230 | 244 | 50 |
| WLAG | Cutting & Washington Radio Corp., Minneapolis, Minn. | 720 | 417 | 500 | WGR | Federal Tel. & Tel. Co., Buffalo, N. Y. | 833 | 360 | 300 |
| KDZG | Cyrus Pierce & Co., San Francisco, Cal. | 833 | 360 | 250 | WCE | Findley Electric Co., Inc., Minne- apolis, Minn. | 833 | 360 | 250 |
| WWB | Daily News Printing Co., The, Canton, Ohio | 833 | 360 | 20 | KFFP | First Baptist Church, Moberly, Mo. | 1,090 | 275 | 50 |
| WCAG | Daily States Pub. Co., New Orleans, La. | 833 | 360 | 100 | KFDX | First Baptist Church, Shreveport, La. | 833 | 360 | 200 |
| WNAX | Dakota Radio Apparatus Co., Yank- ton, S. D. | 1,230 | 244 | 100 | WDAX | First National Bank, Centerville, Ia. | 833 | 360 | 100 |
| WCAK | Daniel, Alfred P., Houston, Texas. | 833 | 360 | 50 | KFGX | First Presbyterian Church, Orange, Texas | 1,200 | 250 | 500 |
| WFAA | Dallas News & Dallas Journal, Dallas, Texas | 630 | 476 | 500 | KFBG | First Presbyterian Church, Tacoma, Wash. | 833 | 360 | 50 |
| WEAX | Daly, T. J. M. (Argenta), Little Rock, Ark. | 833 | 360 | 20 | KTW | First Presbyterian Church, Seattle, Wash. | 833 | 360 | 250 |
| WEAU | Davidson Bros. Co., Sioux City, Ia. | 833 | 360 | 20 | WKAP | Flint, Dutee Wilcox, Cranston, R. I. | 833 | 360 | 200 |
| WBAH | Dayton Co., The, Minneapolis, Minn. | 833 | 360 | 500 | WDAL | Florida Times-Union, Jacksonville, Fla. | 833 | 360 | 500 |
| WIAF | De Cortin, Gustav A., New Orleans, La. | 833 | 360 | 100 | KFCP | Flygare, Ralph W., Ogden, Utah. | 833 | 360 | 25 |
| WJX | De Forest Radio Tel. & Tel. Co., New York City | 833 | 360 | 500 | WWI | Ford Motor Co., Dearborn, Mich. | 1,100 | 273 | 50 |
| KFKH | Denver Park Amusement Co., Lakeside, Colo. | 1,330 | 226 | 10 | WPA | Fort Worth Record, Fort Worth Texas | 833 | 360 | 100 |
| KZN | Desert News, The, Salt Lake City, Utah | 833 | 360 | 500 | WIAJ | Fox River Valley Radio Supply Co., Neenah, Wis. | 1,340 | 224 | 100 |
| WCX | Detroit Free Press, Detroit, Mich. | 580 | 517 | 500 | WSAL | Franklin Electrical Co., Brookville, Ind. | 1,220 | 246 | 20 |
| KOP | Detroit Police Dept., Detroit, Mich. | 1,050 | 286 | 500 | WOAD | Friday Battery & Elect. Co., Sigourney, Ia. | 833 | 360 | 50 |
| WCAV | Dice Electric Co., J. C., Little Rock, Ark. | 833 | 360 | 100 | WABC | Fulwider - Grimes Battery Co., Anderson, Ind. | 1,310 | 229 | 10 |
| KFHI | Dixon, Charles V., Wichita, Kan. | 1,340 | 224 | 20 | WIAC | Galveston Tribune, Galveston, Texas | 833 | 360 | 100 |
| KFZ | Doerr-Mitchell Elect. Co., Spokane, Wash. | 1,060 | 283 | 5 | WGAJ | Gass, W. H., Shenandoah, Ia. | 833 | 360 | 20 |
| WPAC | Donaldson Radio Co., Okmulgee, Okla. | 833 | 360 | 200 | WQAY | Gaston Music & Furniture Co., Hastings, Neb. | 833 | 360 | 20 |
| KFAT | Donohue, Dr. S. T., Eugene, Ore. | 833 | 360 | 100 | WGY | General Electric Co., Schenectady, N. Y. | 790 | 380 | 1,000 |
| WPAJ | Doolittle Radio Corp., New Haven, Conn. | 833 | 360 | 30 | WPAQ | General Sales & Engr. Co., Frost- burg, Md. | 833 | 360 | 10 |
| WRK | Doron Brothers Electric Co., Hamil- ton, Ohio | 833 | 360 | 100 | WMAH | General Supply Co., Lincoln, Neb. | 1,180 | 254 | 15 |
| KQV | Doubleday-Hill Electric Co., Pitts- burgh, Pa. | 833 | 360 | 250 | WAAS | Georgia Radio Co., Inc., Decatur, Ga. | 833 | 360 | 20 |
| WMU | Doubleday-Hill Electric Co., Wash- ington, D. C. | 1,150 | 261 | 100 | KFDV | Gilbrech & Stinson, Fayetteville, Ark. | 833 | 360 | 100 |
| WMAJ | Drovers Telegram Co., Kansas City, Mo. | 1,090 | 275 | 250 | WAAK | Gimbel Bros., Milwaukee, Wis. | 1,070 | 280 | 100 |
| WCAU | Durham & Co., Philadelphia, Pa. | 1,050 | 286 | 100 | WIP | Gimbel Bros., Philadelphia, Pa. | 590 | 509 | 500 |
| KFFE | Eastern Oregon Radio Co., Pendle- ton, Ore. | 833 | 360 | 100 | WQAC | Gish, E. B., Amarillo, Texas. | 833 | 360 | 100 |
| WRAK | Economy Light Co., Escanaba, Mich. | 833 | 360 | 200 | KFGY | Gjelhaug's Radio Shop, Baudette, Minn. | 1,340 | 224 | 20 |
| KNX | Electric Lighting Supply Co., Los Angeles, Cal. | 833 | 360 | 250 | KDZX | Glad Tidings Tabernacle, San Fran- cisco, Cal. | 833 | 360 | 50 |
| WQAM | Electrical Equipment Co., Miami, Fla. | 833 | 360 | 250 | KJQ | Gould, C. O., Stockton, Cal. | 833 | 360 | 5 |
| | | | | | KFFV | Graceland College, Lamoni, Ia. | 833 | 360 | 250 |
| | | | | | WKAL | Gray & Gray, Orange, Texas. | 833 | 360 | 20 |
| | | | | | KNT | Grays Harbor Radio Co., Aberdeen, Wash. | 1,140 | 263 | 250 |
| | | | | | KFEJ | Greason, Guy, Tacoma, Wash. | 833 | 360 | 10 |

(To be continued next week)

New DX Night Owl Records That Count

Two Lists to Make You Work

From D. Smith, 601 Russell Ave., Geneseo, Ill.

I HAVE been reading your paper a long time and am very much interested in the DX Nite Owl page. Here is my record on a crystal set using conventional hook-up: WOC, KYW, WDAF, WHB, WGY, KDKA, WJZ, WWJ, WCX, WLAG, WAAP, WAAF, KSD, WBAP, WFAA, WGM, WSB, WMC, WHAS, WLW, WOR, WCAE, WOS, WDAP, WJAN, 25 stations.

With Giblin-Remler coils and one tube hook-up I received the following list of stations: WSB, WDAP, WFAA, WLAG, WOC, KYW, WOS, KDKA, KSD, WLK, WHB, WIAK, WOAI, WDAJ, WIAS, WKY, WGM, WDAF, KHJ, WFAT, WAAE, WHAS, WBAP, WJZ, WWJ, WPA, WAAL, WBL, WJAP, WJAN, WIAO, WGY, WCX, WKN, WMAB, WBZ, WCAE, WOH, KFBS, WAAC, KFAF, WMAH, WGAY, KOP, WCM, WAAH, WFAP, WMAT, WBAQ, WOR, WEAF, WEAL, WMH, WHAZ, WAAN, WPAD, WNAD, KLZ, WLAL, WHAM, WNAJ, 9XAC, WMC, WRAM, WIAR, WCAS, WNAV, WAAP, WCAZ, IXAE, WOQ, WOAN, WBT, WHAA, WHA, WCK, WMAK, WGF, WNAB, WJAM, WFAJ, WSY, WWI, WHB, WEAO, WKAA, WDAW, WVAS, WCAF, 9BDY, WPAC, KFBL, WIAA, WJAX, WAAW, WIAL, WHAH, WTAT, WTAU, WGR, WBAV, WWAD, WWT, WOAX, WBAS, WWD, WJAB, WHK, WIP, WDAO, WGV, KYY, KFBU, KXD, KFI, KWH, KDYS, KDZH, KGW, PWX, CJCG, CFCA, CKCK, CFCN, a total of 125.

The One Tubes Have It

From J. Shaw, 207 Jefferson Ave., Charlotte, N. C.

I HAVE been an interested reader of the RADIO WORLD for some time and thought I would send you my DX records from the "Queen City of the South." I am using a hook-up with two variometers, one 23-plate variable condenser, one detector bulb. I have heard the following stations: KDKA, WWJ, WKAS, WGM, WOH, WOE, WIZ, WSB, KSD, WHK, KDPM, WEAF, WOC, WGY, WJZ, WOR, WJAX, WDAS, WLW, WHB, WEY, WXY, WJAK, WHAK, WKAA, WMAQ, WFAA, WQAA, WLAC, WLK, WBAC, WBZ, WHAZ, WBAP, WDAP, WHAB, WDAF, WHAS, WHAF, WCX, WAAP, WIK, WEAT, WRT, WEAE, PWX, WKAN, WEAL, WJB, WEAO, WKAG, WSY, WEAS, WIP, WMC, WLC, VBG, KYW, WMC, WAAX, WAAK, KLZ, KFBV, WOO, WOS, WHA, KYY, WFS, WNAP, WOAI.

Some More CR9 Records

From Herbert Jones, 170 Beach 81st St., Rockaway Beach, N. Y.

YOUR publication of the letter of M. Davidson, Jr., Laurence, L. I., prompts me writing this to thank you for putting me in touch with another Grebe C. R. 9 owner, and if you will I wish you would publish my list of DX to date. I purchased my set March 7 and received all my stations up to the first of April. The past week the static has prevented any DX work for me. I have an aerial only 22 ft. high. I would also like to hear from other Grebe owners.

Station "Frank H. Jones," Lunicu, Cuba; WFAA, WBAP, WOAW, WHB, WDAF, WLAG, WOS, WMC, WOC, KSD, WDAL, WSB, WGM, WDAJ, KYW, WMAQ, WDAP, 9XU, 9KP, WWAY, WHAS, WLW, WPAL, WWJ, WCX, WCAE,

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.

KDKA, WBAZ, WHAM, NAA, 8AWP, WNAC, WLAK, WGI, WGY, WBL, WHAZ, 2XAP, WIP, WOO, WFI, WDAR, WRW, and 12 "locals." Total. 56.

* * *

Stations to the Right of Them Volleyed and Thundered

From Jack Price, 305 Tattnell St., Savannah, Ga.

I HAVE been a constant reader of your valuable magazine for nine months and must say it is "up to the minute" on all the new dope. I have gained much enjoyment as well as useful experience in testing various circuits taken from your pages. Have logged 78 broadcasting stations in 28 States, one in Cuba and Porto Rico and north to CFCA, Toronto, Canada, and west to KHJ, Los Angeles, which I deem good results on one stage of audio with only "thirty-six foot" antenna. Have also heard KDKA, WEAF, WWJ, WDAP and WBAP, Fort Worth, Texas, on crystal alone. Wish some O. M. would send me hook-up for straight key, C. W. using sufficient power to work eight hundred miles. Would be glad to hear from fellow DXers, and gladly QSL.

* * *

Not So Worse—I'll Say

From E. L. Kennedy, Purcell, Okla.

I AM greatly interested in your DX Nite Owl section of the RADIO WORLD, so I thought I would submit my record made with a honeycomb coil tuner and two stages of audio-frequency amplification. I have heard about one hundred stations, but am only sending those over a distance of one thousand miles.

KHJ, KWH, KFI, KOG, KFCL, Los Angeles, 1,225 miles.

KPO, KUO, San Francisco, 1,450 miles.

KDYS, Great Falls, Mont., 1,175 miles.

PWX, Havana, Cuba, 1,350 miles.

WKAQ, San Juan, Porto Rico, 2,250 miles.

WGY, WRM, Schenectady, New York, 1,400 miles.

CFCA, Toronto, Can., 1,175 miles.

CHCF, Winnipeg, Can., 1,060 miles.

CKCK, Regina, Can., 1,160 miles.

WMAC, Cazenovia, N. Y., 1,350 miles.

* * *

A Rare Old Bird Is Right

From E. A. Guilbault, New Orleans, La.

I AM a constant reader of RADIO WORLD and have a stack of them with all the interesting news and sketches in them. I have been experimenting with wireless for a number of years and find that RADIO WORLD has the best reading matter as well as hook-ups of any radio magazine that is published. The DX Nite Owl is sure an interesting old bird. I am somewhat a Nite Bird myself, but since I've got my new set to working and joined the DX Nite Owls, I've been saving money by staying in more and getting good results out of my set. The cir-

cuit I am using is regenerative. My aerial is 4 wires 70 ft. long and 52 ft. above the ground; the lead-in is 40 ft. and I am using but one WD-11 tube. Here is my record from March 5 to March 10: WSB, Atlanta, Ga.; KFI, Los Angeles, Calif.; KYW, Chicago, Ill.; PWX, Havana, Cuba; WMC, Memphis, Tenn.; WBAP, Ft. Worth, Tex.; WKY, Oklahoma City, Okla.; WOC, Davenport, Iowa; WWJ, Detroit, Mich.; WGM, Atlanta, Ga.; KSD, St. Louis, Mo.; WHB, Sweeney School, Kansas City, Mo.; WOAI, San Antonio, Tex.; WAAB, Wichita, Kans.; WDAC, Chicago, Ill.; WLAG, Minneapolis, Minn.; WOR, Newark, N. J.; WXY, Birmingham, Ala.; WOS, Jefferson City, Mo.; WDAJ, College Park, Ga.; WDAF, Kansas City, Mo.; WCAY, Milwaukee, Wis. I think for a one bulb set this is a fairly good record within five days. I am stationed at 4533 Iberville St., New Orleans, La.

* * *

Crystals Aren't So Worse for DX After All

From C. Dunlap, Kinmundy, Ill.

I AM a reader of your weekly and think it is the most up to date radio journal I have seen.

I am sending you a list of stations I have heard with a set consisting of a home-made two-slide tuner galena detector and a pair of 2000 ohm Manhattan receivers:

| Call letters | Location | Distance |
|--------------|---------------------|----------|
| KSD | St. Louis, Mo. | 60 |
| WMC | Memphis, Tenn. | 275 |
| WHAZ | Troy, N. Y. | 850 |
| WSB | Atlanta, Ga. | 425 |
| WPA | Fort Worth, Tex. | 650 |
| WRR | Dallas, Tex. | 625 |
| WLW | Cincinnati, Ohio | 225 |
| WWJ | Detroit, Mich. | 400 |
| WOS | Jefferson City, Mo. | 200 |

3,780

* * *

Here's Your Chance—Owls

From Walter R. Scott, 285 Montague Place, So. Orange, N. J.

I AM sending a list of the most important DX stations I have received, hoping it will interest the "DX Nite Owls."

PWX, WBAP, WHB, WOC, WDAF, CFCA, KYW, KDKA, NAA, WBT, WBZ, WFL, WOO, WIP, WDAR, WGR, WGI, WHK, WLW, WMC, WMB, WSB, WGM, WWJ, WBAX, WBAZ, WCAE, WDAP, WEAS, WHAM, WHAS, WJAX, WMAF, WNAC, WNAL, WHAZ, WGY, WMAK, WLAK, WCX.

My set is a WD-11 tube, variocoupler, variometer and variable condenser. I will send my hook-up to any one who desires it provided a stamped envelop is sent for its return.

* * *

Records from Whaletown

From Benjamin Smith, 57 Prospect Street, New Bedford, Mass.

WHAT I received on a single U. V. 200 tube with a hook-up of the consolidated plan. I made my own variocoupler of No. 22 D. C. C. wire:

WCAS, WDAU, WDAY, WDY, WEAF, WEAN, WFI, WGA, WGI, WGR, WGY, WHAF, WKY, WHAM, WHAT, WHAS, WHAZ, WIAP, WJAR, WJAX, WJAZ, WJC, WJD, WJZ, WLK, WLW, WMAC, WOC, WOO, WOZ, WOAQ, WWI, WWJ, WWT, WWZ, WOAP, NAF, PWX, KYW, WAAF, WLD, WJAP, CFCA.

"When you come right down to it a profitable business is principally dependent upon two things—a salable article of quality, and advertising."—William Wrigley, Jr.

Radio Merchandising

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

Telephone Bryant 4706

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:

- Joseph Spolarich, 210 Ruby St., Joliet, Ill. (Radio supplies.)
 J. W. Austin, 121 Warren St., Lexington, Ky. (Radio service.)
 Broadway Radio Shop, F. Paradise, 77 Broadway, Astoria, L. I., N. Y. (Retailer.)
 H. C. Keich, 715 Waupoosee St., Morris, Ill.
 C. A. Hilton, Jr., Box 140, Valatie, N. Y.
 H. & H. Radio Supply Co., 5409 Indiana Ave., Chicago, Ill. (In market for 300 cardboard or fiber forms for spiderweb coils.)
 L. H. Weaver, 1500 Hayes St., Birmingham, Ala.
 Grover C. Zink, 226 North Centre St., Cumberland, Md.
 George S. Crösin, 5225 Greenway Ave., West Philadelphia, Pa.
 Joseph E. Doughton, Guilford College, N. C.
 J. M. Fiscus, 522 Clinton St., Steubenville, Ohio.
 R. R. Eckart, 1106 Parkview Ave., Dallas, Texas. (Wants two 500-ohm Ward Leonard resistance units.)
 O. A. Gilles, Mechanicsville, N. Y. (Free lance radio salesman.)
 J. F. Fairman, 229 West 58th St., New York City.
 Edgar A. Davis, 29 Belknap St., Dover, N. H. (Makes and sells sets.)
 Samuel Wald, 501 Marcy Ave., Brooklyn, N. Y.
 I. H. Flood, Chelsea-on-the-Hudson, N. Y. (Wireless supplies.)
 Harold A. Symons, 7323 Gratiot Ave., Detroit, Mich.
 J. Severon Hartman & Son, 1309 Constance St., Los Angeles, Calif. (Will sell any reliable radio line.)
 Chas. A. Hines, 133 Rowland Ave., Eagle Rock City, Calif.
 L. L. Turner, 406 North Mangum Street, Durham, N. C.
 H. B. Clark, 4130 Ashland Avenue, St. Louis, Mo. Radio 9DVP. (Interested in both transmitting and receiving apparatus.)
 Edw. R. Sheehan, 314 Helmer Street., Kewanee, Ill. (Interested in Reinartz and Armstrong.)
 Robert Kiggins, 508 East Euclid Street, Delphos, Ohio.
 E. G. Barnes, General Delivery, Mt. Vernon, Ohio. (Builder and retailer.)
 W. K. Buckley, P. O. Box 89, Salem, Mass.
 Wm. Bivins, Eminence, N. Y.
 W. E. McCan, 3741 Sixteenth Avenue, South, Minneapolis, Minn.
 Darwin S. York, 424 Clay Avenue, Scranton, Pa.
 Harold Schegel, 524 Second Street, Ann Arbor, Mich. (Builds radio sets.)
 Stanley Delmar, 231 Allegheny Avenue, Fairmont, W. Va.
 F. C. Hendershot, Spencer, Indiana.
 Francis J. B. Leonard, 750 North State Street, Chicago, Ill.
 E. S. Akin, 1520 South State Street, Syracuse, N. Y. (Wants catalogues of high class radio sets.)
 Chas. R. C. Ham, care Wilson & Co., P. O. Box 615, Hongkong, China.
 Economy Radio Supply Co., 1506 Lexington Avenue, New York City.
 Joseph Schwartz, 3409 Beniteau Avenue, Detroit, Mich.
 Lee Grubb, R. D. No. 1, Millerstown, Perry County, Pa.
 I. N. Mitchell, 680 Fifth Avenue, New York City.
 The Duluth News Tribune, Radio Editor, Duluth, Minn.
 Lester O. Burton, Maple Shade, N. J. (Distributor. Has demand for portable sets.)
 William J. Vandercar, 63 Howard Street, Cohoes, N. Y. (Will soon stock parts and supplies.)

The first of these names were printed in Radio World dated April 21, and have continued in each issue since. Any copy 15c. Any 7 copies for \$1.00. Radio World, 1493 Broadway, N. Y.

"Elements of Radio Communication"

"Elements of Radio Communication." A book for the engineer, amateur, student and layman, by Ellery W. Stone, 445 pp. 145 diagrams, 39 plates. D. Van Nostrand Company, New York. Price, \$2.50 net.

This is a second edition of Lieut. Stone's book revised and enlarged. Much new material and recent data on radio-frequency generators, air-craft radio, vacuum tubes and radio-telephone broadcasting are included in this edition. The book seems to be well adapted for classroom work as well as self instruction for radio amateurs and, in fact, any one interested in the art.

New York Radio Show Planned for September

PLANS are being formulated by the American Radio Exposition Company to hold another radio show in New York City. The last week in September has been mentioned as the opening date, but a definite announcement is expected in the near future. It is probable that the show will be held in either the Sixty-ninth Regiment Armory or the Seventy-first Regiment Armory. All inquiries should be addressed to J. C. Johnson, American Radio Exposition Company, 120 Broadway, New York City.

Radio Department Buyer and Manager Wanted

EDITOR RADIO WORLD: We have an opening in one of our large Radio Departments in the East for a buyer and manager. We want primarily a merchant and one who can promote sales. If you have some one in mind that you think is especially good and who has been running a successful Radio Department, we would like very much to get in touch with him.

Yours very truly,
 RETAIL RESEARCH ASSOCIATION.
 225 Fifth Ave., New York City.

Coming Events

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

PACIFIC COAST ELECTRICAL ASSOCIATION, San Francisco, Calif., June 19-22, 1923; S. H. Taylor, secretary, 527 Rialto Building, San Francisco, Calif.

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

Farmers Need Radio Sets

MR. E. S. AKIN, president of the New York Draft Horse Club, of Syracuse, N. Y., is a radio enthusiast and a valued reader of RADIO WORLD. He expresses the opinion that, if properly demonstrated, radio outfits could be sold more generally to farmers in central New York.

A New Federal Transformer

The Research Division of the Federal Telephone & Telegraph Company, Buffalo, N. Y., has during the last year made several interesting discoveries in its work on the theory of and means for the faithful reproduction of music. The results of successive trials have proven beyond doubt that what the ear of the observer needs for complete satisfaction in music is the presence of the lower tones of the orchestra. Its lack leaves a distinct feeling of dissatisfaction and insufficiency in the music while its presence gives a completeness and satisfaction that constitutes the difference between good music and what the radio listener has been forced in the past to accept.

While the problem of the loss of the lower tones is as serious in the transmitting equipment as in the receiving equipment, the fact that one transmitter serves many thousands of listeners has justified the great investment necessary for the construction of special faithfully reproducing microphone and voice amplifying equipment. But the problem of designing equally good equipment for the radio listener has been attended by the same difficulties and with the added limitation that the selling price of such equipment must be well within the reach of the radio listener.

The methods for the elimination of these many difficulties lie in the careful design of the amplifying transformer. The matter is one that requires the greatest possible care in choice of proportions, nature of the materials involved, and their more careful fabrication and assembly.

The No. 65 Federal transformer has been designed to eliminate the objections that have so limited reproduction in the past. Its design and construction is such that the notes of the bass viol, the kettle drum, the piano bass are carried through the system with a completeness and faithfulness that is amazing.

It is of such construction that each note that enters it is passed on to the vacuum tube with exactly the same fidelity and without a suggestion of any added tones, whether dissonant or not. And, when used with UV-201, WD-12, UV-199, or any of the other commonly available tubes the degree by which this exceptionally satisfactory amplification exceeds that which has yet been available with any A. F. transformer is said to be almost unbelievable.

New Radio and Electric Firms

Electronic Corp. of America, Philadelphia, \$600,000. (Corporation Guarantee & Trust Co.)

Economy Radio Supply Co., dealers in radio sets and parts; 1506 Lexington Ave., New York City. H. Hirschfield and others.

Fall Kill Radio & Electrical Corp., Poughkeepsie, N. Y., \$50,000; J. A. Purcell, J. B. Grubb, W. A. Cronk. (Attorney, T. Purcell, Poughkeepsie.)

Nolte Mfg. Co., 61 Gautier Ave., Jersey City, N. J., to manufacture Reinartz coils, Rhason Radio Corp., New York City, \$50,000; R. J. and C. R. Heitman, H. A. Datter. (Attorneys, Halbert & Quist, 1293 Myrtle Ave., Brooklyn.)

Windham Valley Electric Co. has increased its capital from \$25,000 to \$75,000.

Answers to Readers of Radio World

Will the three tube reflex circuit using the Grimes inverse duplex principle give as good results as a set employing three stages of radio-frequency, crystal detector and two stages of audio-frequency?

Can the R. C. A. Radio 1714 and Audio 714 be used in this circuit?

Which is the better tube for use in the circuit, the U. V. 199 or the 201A?

How can I make small neutrodyne condensers?—F. W. Logren, Box 649, Virginia, Minn.

You will get louder signals in the set employing three stages of radio, detector and two of audio. With the reflex you will obtain signals equal to two stages radio, detector and two of audio. The advantage of this circuit is the saving in tubes and in current. You can employ the transformers you mention. Either of these tubes will function properly, but you will obtain slightly more volume by using the 201. See article by J. E. Anderson in this issue on neutrodyne condensers.

I have been experimenting with the Reinartz tuner hook-up and have had good results but with one exception. I cannot get many amateur stations. I have been told that my antenna is too long for this. It is 310 feet long, fastened to a tree at one end and the gable of the house at the other. Should I cut it down? This is about the only place that I can conveniently place it.—Arthur Greben, Liberty, New York.

The antenna you mention is entirely too long for reception of amateur signals. One hundred or 150 feet at the most is plenty for all waves that you wish to receive. You will get better results and sharper tuning with a small antenna. You can run your wire out for 100 feet, fasten your insulator, and support the rest of it on rope. That will serve the purpose.

I have a crystal set comprising a loose coupler, variable condenser, fixed condenser, phones and Turney Crystalor detector. Can I use any of this apparatus in the construction of a single tube set? What will be my range using one of the WD-11 tubes and the apparatus mentioned? Would putting a one stage amplifier on my present set increase the distance over which I can receive? How far can the average crystal set be relied upon to receive with an outside antenna and the best apparatus obtainable?—Alfred Wagannor, Utica, Utica, N. Y.

You can use the loose coupler, variable condenser, fixed condenser and phones in the set you intend making for the WD-11. It is impossible to state the range of any receiver. The only method you can pursue is to construct the receiver and try it out for yourself. It would not increase your range to add an amplifier, as an amplifier will not boost anything that is not audible in the detector circuit alone. It would make louder the signals that you now receive. The average crystal set is good for 50 to 75 miles on telephone and 100 to 150 miles on spark work at the best average times. Freak reception has been covered over longer distances, but the consistent range of crystals is not large.

Enclosed please find a diagram of a circuit described in RADIO WORLD for Jan. 27, 1923. Would it be possible to put radio-frequency on this circuit? If it is possible, what apparatus is necessary?—Gerald R. Duncan, Fayette, Iowa.

It is not possible to put radio-frequency

amplification on this circuit without destroying the basic principle of its operation.

In RADIO WORLD for Feb. 24 you describe the Flewelling circuit. Will a WD-11 be suitable for this circuit? What voltage is necessary on the plate?—W. C. S. Holden, Valdosta, Ga.

You can use this tube in the Flewelling circuit. The plate voltage should be 45-60 for volume, although 22½ will work, but with poor success.

Where can I obtain the neutrodons and neutroformers necessary for the Hazletine neutrodyne circuit? What tubes should be used with this circuit, and what is the type of radio transformer used?—John C. Kerr, 160 Broad St., Providence, R. I.

You can obtain the apparatus you desire from Freed-Eiseman Corporation, 255 Fourth Ave., New York City. For best results the U. V. 201A should be used with this circuit. No radio frequency transformers are used with this circuit, the neutrodons taking their place.

What is the best type of transformer to use in connection with adding two stages of audio-frequency to the set described by Ortherus Gordon in RADIO WORLD for Jan. 20. I have R. C. U. V. 712, but have been told that they will not work in this circuit. Would a phone condenser bridged across the phone terminals improve this circuit to any extent? What capacity should it be?—A. M. Wiggins, Box 463, Jacksonville, Fla.

The transformers you mention are perfectly o. k. for use with this circuit and whoever has been telling you differently is wrong. You can use such a condenser. It would not improve your reception to any great extent, but would make the signals clearer to some extent. It should be .001.

How many turns of No. 22 D.C.C. wire will be necessary to wind on a tube 4 inches in diameter and 4 inches high to enable me to receive broadcasters? There is to be ¼-inch left for rotor mounting. What ratio transformer is desirable for the first stage of audio-frequency using WD-11 tubes? What for the second stage?—Alfred R. Golze, 1715 Corcoran St., N.W., Washington, D. C.

Thirty-five turns on each side of the division will be sufficient for all your needs. This will make the winding about 1½ inches on each side of the ball and will allow sufficient for each end. A transformer of 9-1 is preferable for the first stage and one of 4-1 for the second.

Will I be able to work the Cockaday four circuit tuner set published in RADIO WORLD for May 12 on WD-11 tubes? Must the sizes of the windings be strictly adhered to?—F. M. McCormack, 158 Webster Ave., Providence, R. I.

The circuit mentioned will work on WD-11 tubes but you will not get the volume that you would get out of the 201 or 201A tubes. The small change in the size of tubes you mention should not make any great difference.

Will the Cockaday circuit get all the new stations operating on the new wave lengths? Does the information on the construction of the coils have to be strictly adhered to? What should the ratio of the transformers

specified be?—Jos. Spolarich, 210 Ruby Street, Joliet, Ill.

The coils specified will allow you to get all the new stations with the aid of an antenna about 100 ft. in length. It is best to follow the instructions exactly. The first transformer specified (Amertran) is 9-1 and the second 3-1. This, with the proper B battery voltage, will allow operation on a loud speaker.

Is it possible to obtain peep hole milliameters with a range of .0 to 1? Will such an instrument placed in the plate circuit of a regenerative set have any effect on the working of same? Will it allow the condition of the B battery to be told?—E. L. Thomson, Maranville, Tex.

Milliameters are not made for peep hole mounting. The small size is 2½ inches in diameter and can be obtained at or through any electrical store. Such an instrument placed in the plate circuit will have no effect on the working of the set. It will allow you to tell the condition of your battery to a certain degree, but not as authentically as a voltmeter, as the amount of amperage in such a battery is extremely small at best.

Enclosed please find the circuit described by Mr. Stoup in RADIO WORLD for May 12. How should variable condenser C1 be connected in circuit to prevent capacity effects? Do arrows on rheostats and potentiometers mean movable arms? Would a dry cell be strong enough to operate the tube? Should plus of B battery go to plus of socket? In sketch, the plus of A battery also goes there. What is the capacity of C3 and C4? Does ground of secondary circuit that goes from the plus of the A circuit have to be a separate circuit from the primary ground?—J. H. Curtis, 1314 W. Front St., Plainfield, N. J.

The rotor of the condenser should connect to the side of the secondary going to the grounded side of the filament circuit. The arrows signify the movable contact arms. A dry cell will operate this circuit if a WD-11 is used. The plus of the B battery always goes to the plate (marked P on socket). You evidently have your connections mixed. There are two filament connections on a tube socket, marked FF or F+ and F— or — and +. The plate and grid are marked P and G. Do not get these mixed up simply because the plus of the B battery goes to the plate. Do not make the mistake of connecting the B battery in such a manner that it will cross the filament leads, or you will burn out your tube. The best method to pursue in preventing this is to place an ordinary electric light bulb of either 60 or 75 watts in the B battery leads to act as a ballast lamp. If by chance there is a direct circuit, the bulb will take care of excess current and will prevent you from burning out your filament.

Where can I obtain a complete hook-up for the WD-11 receiver published in RADIO WORLD for March 3, on page 9, by C. White?

What voltage is the best for the B battery circuit in this hookup?—Henry W. Schwab, 201 Buell Street, Muscatine, Ia.

The entire hook-up was shown on the page you mention. We do not supply blue prints of circuits. 22½ volts on the plate will be enough for all WD-11 tubes when used as detectors.

Build Your Own HAZELTINE NEUTRODYNE with FREED - EISEMANN

Licensed Essential Parts



Complete wiring diagram, instructions, etc. sent in special container with patented essential parts. Three NEUTROFORMER COILS mounted on variable condensers, and DOUBLE NEUTRODON (as illustrated), sent for \$21.50. Ask your dealer to show you these parts, as well as complete assembled five-tube Neutrodyne Set in mahogany cabinet, Model NR-5, \$150.

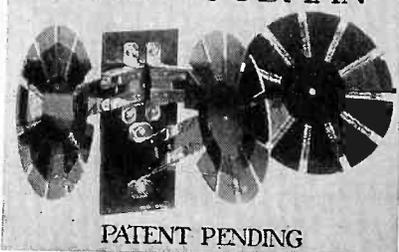
Or send 25c for Neutrodyne Constructor which shows "How to Make the Neutrodyne"

FREED-EISEMANN RADIO CORPORATION

253 Fourth Avenue New York

Licensed by I. R. M. Inc. Under Hazeltine Patents

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.

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 OATWHISKER

14-Karat Gold Multiple contact. 25c

Supersensitive

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

Cockaday Circuit TUNER COILS

Complete as per specifications.

No. 18 Wire Used—D Coil Bankwound. Price, \$2.75

Hook-up, directions and material list furnished free with each set of coils.

MAIL ORDERS FILLED

Dealers, Communicate

Eastern Radio Mfg. Co.

22 Warren Street, New York, N. Y.

Baseball Writers Protest Broadcasting Baseball Plays

THE Baseball Writers' Association of America is opposed to the radio broadcasting of baseball results from major league parks throughout the country, it became known last week when the association wired Commissioner Landis and Presidents Heydler and Johnson, of the National and American Leagues, protesting against alleged granting of permission to a radio corporation to provide facilities for this purpose.

The telegram, signed by Frederick G. Lieb, of New York, president of the association, and Joseph M. McCready, of Philadelphia, secretary, is as follows:

"Understand permission has been granted to a wireless corporation to broadcast results of games at Polo Grounds and other parks throughout the country, giving detailed results play by play. If this is permitted, it will kill circulation of afternoon papers and in the end will result in curtailment of baseball publicity.

"The Baseball Writers' Association is strongly opposed to allowing any wireless connection with the baseball parks which would allow broadcasting stations to give details while a game is in progress."

Farmers Benefit by WOC's Broadcasting Schedules

That the daily broadcasting schedules given by Station WOC, owned and operated by the Palmer School of Chiropractic, at Davenport, Iowa, are of special benefit to the farmers is becoming more evident continually.

Farmers who have not already installed receiving sets visit their neighbors who have this wonderful new means of communication with the daily activities and see what benefits are to be derived.

The inspiration behind the Palmer School of Chiropractic has always been that of public service, and this institution has ample opportunity to carry out this idea of service through its radio programs. Located as it is in the middle west, and the center of a large farming population, it has been mindful of the fact that a large percentage of its potential audience is made up of farming folk and has endeavored to make its schedules of interest to them in particular.

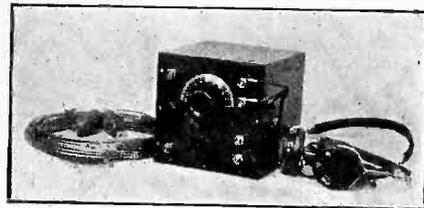
Blue Law Silences Radio Loud Speakers

MANY years ago, the Elizabeth, N. J., Board of Works passed an ordinance prohibiting peddlers and others from making noises on the streets. This ordinance was invoked last week to stop the use of large phonograph horns in front of stores of radio dealers. Chief of Police Mulcahy says the use of these horns violates the ordinance as a "nuisance." The dealers argue that the ordinance was passed before radio was thought of, but the Chief was obdurate and said the use of horns to distribute radio messages will have to end. The dealers indicated they will fight the police ruling.

Performing Artists Now Want Broadcasting Royalties

IT is now rumored that the performing artists will demand revenues from the broadcasting stations for giving other types of entertainment than music. Payment to singers and dance orchestras is said to be among the possibilities.

The Radio (Trade Mark) 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)

YOU SAVE 50% OF THE USUAL COST

WORLD BATTERIES FOR RADIO



| | |
|-----------|---------|
| 6 Volt | \$10.00 |
| 60 Amps. | |
| 6 Volt | 12.50 |
| 80 Amps. | |
| 6 Volt | 14.50 |
| 100 Amps. | |
| 6 Volt | 16.00 |
| 120 Amps. | |

A Better Battery Cannot Be Built

The best of material—careful construction by skilled mechanics—makes a battery that will give a long life of hard service.

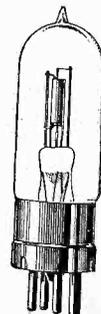
A written two (2) year guarantee. You take no chances with a World Battery—it is the most satisfactory battery you can get and you save 50%.

Mail Your Order Today

We ship C. O. D. subject to inspection, or will allow 5% discount for cash with order. All orders shipped same day as received.

WORLD BATTERY CO.
Dept. 17, 1219 So. Wabash Ave.
Chicago, Ill.

GUARANTEED 2 YEARS



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.



SOMETHING NEW

A real LOUD TALKING DETECTOR made of B-Metal, 100% superior to any crystal. Puts new life into your RADIO set. Guaranteed for ONE YEAR, CHEAPEST in the long run. If your dealer is unable to supply it, we will.

B-Metal Refining Co.
3134 Trumbull Ave.
Detroit, Mich.

WOULD YOU LIKE TO RECEIVE RADIO ADVERTISING MATTER?

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.

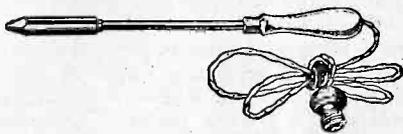
ADDRESS SERVICE EDITOR, RADIO WORLD,

1493 BROADWAY,

NEW YORK CITY

Greenhuts

Value, Quality and Service
71 West Broadway
 NEW YORK CITY



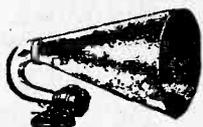
A Complete Electric Soldering Iron Ready for Use. Will Operate on Either A. C. or D. C. Ideal for Radio Work.

\$2.25



Phones

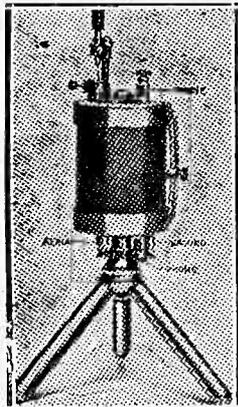
Nerco \$2.50
 Work Rite 2.95
 Brandes 4.95



Loud Speakers

Murdock \$3.25
 King Amplitone... 3.25
 Small Woodhorn. 2.95

Gem Crystal Receiving Set. Simple, Clear, Efficient and Beautiful.



Set Only
\$3.25

Complete with Antenna Outfit and \$5 Pair of Phones
\$6.95

PLENTY OF WD 11-12 UV 199 - 200 - 201 - 201A, etc., Tubes in Stock Now at Cut Prices.

| | |
|--------------------------|-------------------------|
| Audio Trans. \$2.25 | 7x18 Panels \$.75 |
| Radio Trans. 1.95 | VT Sockets25 |
| Aerial Wire35 | Cockaday Coil... 1.75 |
| 17 P. Ver. Cond. 2.50 | Phone Plug 45 |
| 23 P. Ver. Cond. 2.75 | Light. Arrest.75 |
| 43 P. Ver. Cond. 3.00 | Rubber Ear Cap. .75 |
| 3 1/2" Dials20 | 22 1/2 V. Bat.75 |
| Rheostats28 | Homecharger 12.95 |
| Variometers 1.50 | Thord. Trans. 2.50 |
| Bradleystats 1.35 | D.C. Charger 9.95 |
| WD 11 Sockets... .20 | R.C.A. 712 Trans 5.10 |

All Other Nationally Advertised Radio Apparatus in Stock and Sold at the Lowest price in the Country on a "Money Back Guarantee Basis."

Features of the Program at WGY Next Week

RADIO listeners tuned to WGY, the Schenectady broadcasting station of the General Electric Company, Sunday evening, June 10, will have an opportunity to take part in the opening service of the 127th Commencement of Union College. On that evening Dr. Charles Alexander Richmond, president of the college, will deliver the baccalaureate at the First Presbyterian Church. Several Schenectady clergymen will take part in the service.

A feature of the week of June 10 at WGY will be a program by the Monday Musical Club of Albany, N. Y., under the direction of Mrs. Ralph G. Winslow, Monday, June 11.

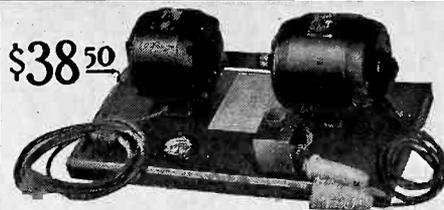
Frederick J. Clinnick, cornetist, will be featured on the program for Tuesday, June 12. A Flag Day address will be delivered by the Rev. William E. Compton, Thursday night, June 14.

"Clarence," a comedy by Booth Tarkington, will be presented by the WGY Players Friday night, June 15, with Edward H. Smith as Clarence. At the late concert, Friday night, an all Irish program will be presented.

Broadcast Designations—Not Official!

Now that what is known in newspaper offices as the "silly season" is approaching, it is but natural that radio should come in for its share of nonsense. The first attempt to reach RADIO WORLD is the following list of well known broadcasting stations:

- WOR—"Waves of Romance."
- WJZ—"With Jazzy Zip."
- WJY—"With Just Youthfulness."
- WHN—"We Hinder Not."
- WEAF—"We Exploit All Favorites."
- WHAZ—"We Handle All Zones."
- WGY—"We Grow Younger."
- WOC—"We Oversee Crops."
- WHAM—"We Handle All Matters."
- WSB—"We Slay Bollweevils."
- WDAP—"We Do Atlantic-Pacific."
- PWX—"Please Wire Xchange."
- WAAM—"We Are Active Merchants."



\$38.50

RECHARGE YOUR OWN BATTERIES

WHY pay good money out constantly for recharging batteries when the Ohio Motor Generator will do it quickly at a slight expense. This inexpensive home charging outfit keeps your Radio in service all the time and pays for itself—by charging your neighbors' batteries. It is noiseless, gives no trouble, and will even recharge totally exhausted batteries quickly. The set is made up of the celebrated Ohio A C motor and D C generator wound for 6-10 volts. The motor and generator have ball bearings and are of the highest grade construction. It has none of the troubles common to cheap charging sets and will last a lifetime. It will charge quickly any three cell automobile or Radio "A" battery. Furnished complete on a substantial base with ammeter and field rheostat to adjust the charging rate from one to twenty amperes. The motor is for 60 cycle, 110 volt service and is complete with ten foot cord and attachment plug ready for instant connection and operation. Full instructions provided.

Motor and generator can be specially wound to charge six cell batteries or other unusual conditions. Price \$38.50 f. o. b. Cleveland. Ship by Express C. O. D., weight sixty pounds. Send your order today and stop paying good money for recharging. Your money back quick if not satisfactory. NOTE:—If your service is other than 60 cycle, 110 volt, ask for special price. THE OHIO ELEC. & CONTROLLER CO. CLEVELAND OHIO

WD 11 Hook-up Positively Free of Body Capacity

- also giving selectivity, sensitivity, and record distance, GIVEN FREE with purchase of any article listed:
- WD 11 Tubes \$6.50
 - WD 12 Tubes 6.50
 - UV 201A 6.50
 - UV 199 6.50
 - 23 Plate Condenser 1.75
 - 43 Plate Condenser 2.50
 - 3 Plate Condensers 1.25
 - Radio 180 Degree Vario Coupler 4.00
 - Approved Lightning Arresters 2.00
 - Freshman Grid Leak and Condenser90
 - Murdock Phones 3.50

Shipped postpaid on receipt of money order.

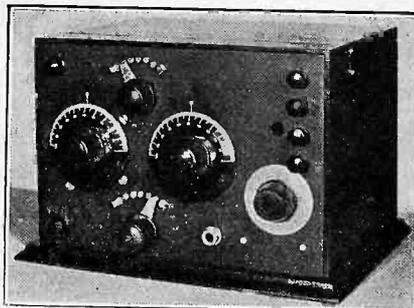
C. W. KAUTZ

Box No. 362 LANCASTER, PA.

DEXAPHONE

1000 MILES ON ONE TUBE

\$11.50
 without cabinet



\$15.50
 Complete

Immediate Delivery
 Fully wired,
 ready for use.

Beautiful solid mahogany cabinet, 7 x 10 x 7, panel grained and engraved. Bakelite dials. Standard parts used throughout.

Immediate Delivery
 Fully wired,
 ready for use.

Hundreds of satisfied customers are giving us wonderful testimonials as to the marvelous sensitivity and selectivity of the DEXAPHONE.

MOGUL ELECTRIC COMPANY 236 FULTON STREET NEW YORK CITY

FILL OUT AND MAIL NOW SUBSCRIPTION BLANK

RADIO WORLD

RADIO WORLD

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 Postage.

1493 Broadway, New York City

RADIO BROADCASTING MAP

FOR the benefit of those interested in Radio and those who are becoming interested, Band 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, ownership, etc., of each. The Band 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
 1403 BROADWAY NEW YORK CITY



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 Mt'g's. Adapted for the **COCKADAY** circuit, \$2.88

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

Sunbeam Detector.....\$45.00
 Sunbeam 1 Step Amplifier.....75.00
 Sunbeam 2 Step Amplifier.....125.00
 (Complete with Tubes, "B" Battery, "A" Battery, Phones, Aerial, etc.)

Sunbeam Detector and 1 Step.....\$12.00
 Sunbeam Detector and 2 Step.....18.00
 Also 2 Step Unit.....14.50
 Assembled Jacks, Sockets, Transformers, etc., ready in one piece for mounting. Most compact unit available.

SUNBEAM ELECTRIC CO.
 71 THIRD AVENUE NEW YORK

Directive Radio Transmission on a Wave Length of 10 Meters

UNDER this title the Bureau of Standards has issued Scientific Paper No. 469 by Francis W. Dunmore, Associate Physicist, and Francis H. Engel, Assistant Physicist, of the Bureau. An abstract of the paper follows:

Interference between different radio transmitting stations can be reduced by the use of markedly directional antennae for transmitting and receiving and by the use of short wave lengths not at present employed. For broadcasting, such as the transmission of market reports or music, directional antennae are not suitable for transmitting, but can be used for reception. For point-to-point communication—that is, from one transmitting station to one receiving station—directional antennae can advantageously be employed for both transmission and reception. Radio communication has so far been

carried on, with few exceptions, on wave lengths of not less than 200 m. The use of much shorter waves, such as 10 meters, with the accompanying reduction of interference, has not been adopted to any extent. Experiments recently made by Marconi and others have shown them to be practicable.

This paper describes a series of experiments in radiotelegraph and radiotelephone transmission on a wave length of 10 m. using at the transmitting station a reflector consisting of short, vertical wires arranged as elements of a parabolic cylinder. The system described, therefore, employs two means of reducing interference. In the work described in this paper a 50-watt electron-tube generating set was employed. The capacity between the elements of the tube, together with the grid and plate coupling coils, formed the generating circuit. Waves were radiated from the generating set by two short, vertical, multiple-wire conductors, one placed above and one below the generating set. A coupling coil was connected between the two vertical conductors, and the generating set thus coupled to the system. The generating set with the vertical conductors was suspended in the focal axis of the parabolic cylinder. Each wire of the reflector was tuned separately to 10 m. by adjusting its length. With all adjustments of the reflector correctly made, good directional transmission was obtained. At least 75 per cent of the radiated power was confined to an angle of 40°.

Studies were made of the effect of removing the wires near the center of the reflector, of removing alternate wires in all parts of the reflector, of detuning the wires, and of varying the aperture of the reflector. For studying the radiation characteristics of the system, a single-turn loop-receiving antenna was used with a small condenser, thermocouple, and micro-ammeter. Measurements of received current were made with this receiving apparatus while the transmitting reflector was rotated. Radiation characteristics for various adjustments of the reflector are shown by means of polar curves.

The paper gives the constructional details of the apparatus employed, so that any person interested can duplicate the apparatus used and the results obtained, and can continue in this line of investigation.

French Radicals Attack Broadcasting

The radical newspaper *L'Ere Nouvelle* published last week a violent attack on radio broadcasting on the ground that it is undemocratic. The New York *Sun* correspondent at Paris cabled his paper the following quotation from the attack:

"It is possibly the hardest blow ever struck at democracy. Wireless telephony contains nothing equitable. By the fashion in which it is organized it institutes a despotism. Speech becomes a monopoly in law and in fact. The people become a mute whose ears are filled with what the authorities decide to give them.

"Two kinds of things will be given this mute. First, unimportant facts and items of news. Then will come tendentious news designed to provoke simultaneously everywhere the passions of the crowd by official discourses and Government hints or indications useful to the economic and financial powers associated with the Government.

"Directly or under cover of limited liability companies the Government and reaction will be able to say to millions of listeners just what they want them to hear and there will be no contradiction."

OPEN EVENINGS UNTIL 9 SATURDAY UNTIL 11

The
ATLANTIC & PACIFIC
 CME OF PERFECTION
RADIO CO.

131 WEST 37TH STREET, NEW YORK CITY

Something Really New!

The Ideal Set for Travel, Home or Camp

The set that has taken New York by surprise. Its *loudness* is equal in volume to One Stage of Amplification on a good set. There is only *One Control*. Extreme simplicity is attained by the use of one dial. A *selectivity* which will tune in and out of local and distant stations when the traffic is heavy. In *distance* it has surpassed the best regenerative sets. A 200 to 1,250 meter range makes it possible to neatly handle the *new wave lengths*.

All this is enclosed in a trim cabinet 2" x 6" x 8". Think of that for convenience! It only *weighs 2 lbs.* when *packed* ready to mail.

By organizing our production on a large basis we have been able to use the best materials and still sell this Wonder Set at only

\$12.50

Special discounts to dealers.
 Attach Money Orders to Mail Orders. Postage Must Accompany Mail Orders.

SPECIAL VACATION SUBSCRIPTION OFFER (FOR NEW SUBSCRIBERS ONLY)

In order to materially increase our subscription list we are offering for a limited time a special subscription of eight issues of **Radio World** for \$1.00. You may begin your subscription now, or have us start sending the first issue on this subscription offer when you go out of town.

CUT OUT THIS TODAY SO THAT YOU WILL NOT FORGET ABOUT IT

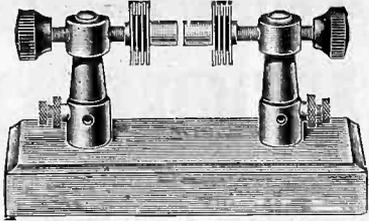
Radio World's Special Summer Subscription Offer

Radio World, 1493 Broadway,
 New York City

Enclosed find \$1.00, for which send me Radio World for eight issues, beginning with your number dated.....

SUBSCRIPTION RATES
 Single Copy.....\$.15
 One Year (52 numbers).....6.00
 Six Months.....3.00
 Three Months.....1.50
 Add \$1.00 a year for foreign postage.
 50 cents extra yearly to Canada.

Name.....
 Address.....
 City and State.....



STATIONARY SPARK GAP

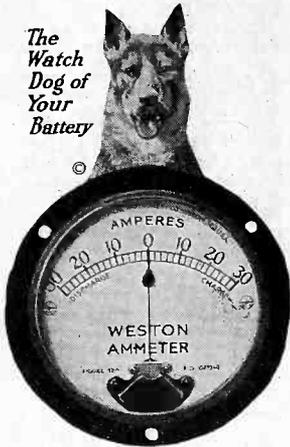
This Spark Gap is suitable for all stations up to 1/4 K. W. capacity. List \$2.40.
Our Price \$1.00

AMRAD 1/4 K. W. SPARK TRANSFORMER \$4.00

GALENA CRYSTAL DETECTORS

They are absolutely free from distortion. Music received is exceptionally good. List \$2.50.
Our Price \$1.00

The Watch Dog of Your Battery



FOR CW FANS

Complete line of Eldredge, Jewell, General Radio, Roller-Smith, Hoyt, Weston, and Sterling Voltmeters, A C and D. C. Ammeters and Hot Wire Ammeters.

American Radio Stores

235 Fulton Street, New York City
All orders must include postage, and all checks must be certified.

PATENTS

promptly procured. Trade Marks designed & registered. FREE INVENTION RECORDING BLANK. Phone Vanderbilt 7213



Something New in Batteries

Exceptionally good proposition. Assigning Territory Rapidly.

JOBBERs and DISTRIBUTORS

Write or Wire **SIBBENEL**

25 Mt. Eden Ave. New York

THE COMO

DUPLEX TRANSFORMERS

Something really new in Audio Amplification. (See article, this issue, by C. White, on "A Super Amplifier.") We guarantee more volume and infinitely better quality than is possible with any other transformer on the market.

Sold only in matched pairs

PRICE \$12.50 PER PAIR

Send for descriptive literature

Como Apparatus Company

168 DARTMOUTH STREET BOSTON, MASS.

Old WJZ's Senior Operator Becomes Chief at WBZ

WITH the closing down of old WJZ in Newark, N. J., came the passing of many familiar radio personalities. OHN is one of them. In real life he calls himself Harry E. Hiller. As the letters indicate, he was the senior operator attached to the Newark staff. And now, after the shutting down of the famous old station, he is going to WBZ, the Westinghouse Station in Springfield, Mass. He will become its chief operator, and will bring with him some of the fame which belongs to old WJZ.

The story of OHN is the story of WJZ. Hiller is a seasoned radio man, and an old hand at the game. He started his radio activities in 1912 presumably stringing a flimsy antenna on the paternal roof, as many youths of the period were wont to do. He secured a government license and after successfully passing the examination, was assigned a transmitting call 2IH.

It was then that he decided to pursue radio as a career and during 1918, he became an instructor at the Y. M. C. A. radio school in New York City. Later he joined the International Radio Telegraph and Telephone Company, who were making radio aeroplane material for the U. S. Government. After learning the essentials of radio manufacturing, Hiller decided to get some real operating experience.

He achieved a life long dream by shipping as a radio operator and liked it so well that he stuck to the sea till 1920.

It was in 1920 that he joined the Westinghouse Electric and Manufacturing Company in Newark, N. J., but the real radio work did not begin until he was attached to the radio staff in 1921, when preliminary experiments were begun between Newark and East Pittsburg.

OHN's first broadcasting experience occurred on the 4th of July, 1921. This was a memorable day also for boxing fans, as well as radio fans, as on that date the Dempsey-Carpentier fight was broadcast.

Bishop Says Radio Cuts Down Church Attendance

BISHOP WILSON R. STEARLY, of Newark, N. J., is quoted as saying:

"The widespread use in private houses of wireless apparatus lays a fresh responsibility upon the clergy and laity in regard to services of the church. It is debatable whether the broadcasting of sermons of popular preachers and of entire church services will act as a stimulant or a deterrent to church-going.

"Why go to your parish church when you can sit at ease in your parlor and hear the heavenly music of a capable choir and be charmed by the fervid eloquence of a magnetic preacher?

"There seems to have entered into our crowded and throbbing life another ally of those forces which make more difficult the assembling of the faithful for praise and prayer. The habit of church-going has a hard time in the face of Sunday excursions, movies, sacred concerts, automobiling and broadcasting.

"Now it becomes necessary for the clergy to make the church more attractive than the world's entertainments, to discover to men the possibilities within it for strength and refreshment, and the gifts of grace in its bestowing, more precious than earthly things."

RADIO TUBES REPAIRED

"Guaranteed Equal to New"

FOUR DAY SERVICE

6 V. Detectors, \$2.50; Amplifiers, \$2.75

5 Watt Power Tubes, \$4.00

Refilled Tubes Always in Stock

Our repaired tubes speak for themselves

Radio Tube Laboratories, Inc.

776 Broad Street Newark, N. J., U. S. A.

Summer Static Overcome

"Good-bye Aerial"



ANTENELLA

No aerial or antenna needed

All outside wiring, aerial, lightning arresters, switches and other inconveniences so inductive to static are eliminated.

Merely plug Antenella in any light socket and you can enjoy all Radio pleasures in any room in your home, apartment or hotel. No current assumed.

New Improved

ANTENELLA

NOW ONLY

\$1.25

formerly \$2.00

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

JUNE SPECIALS

| | List Price | Special Price |
|--|------------|---------------|
| Code Practice Sets (key, buzzer and switches mounted on attractive base) | | \$1.75 |
| Three Coil Honeycomb Mounting | \$4.50 | \$3.25 |
| Honeycomb Coils (Mounted) 50-75 Turns | 1.60 | .98 |
| STANDARD VARIABLE CONDENSERS: | | |
| 21 plate, with vernier, knob and dial | \$5.00 | \$3.75 |
| 41 plate, with vernier, knob and dial | 6.00 | 4.20 |
| Standard Variometers 150-750 meters | 5.50 | 3.75 |
| Standard Varlocouplers, 180° variation | 5.00 | 3.50 |
| Standard Hydrometer | .75 | .55 |
| Standard Rheostats | 1.00 | .60 |
| Antenna Equipment (complete in box) | 7.50 | 4.95 |

"BETTER GOODS—BETTER SERVICE"

DEALERS: Write for special proposition.

C. W. THOMPSON COMPANY

MATTOON, ILLINOIS

SPECIAL TEN-DAY OFFER

Genuine Western Electric

V.T. 2 Tubes

Only \$6.25

MANY OTHER BARGAINS—LIST FREE

Globe RADIO Shop

115 W. 23d STREET N. Y. CITY

SHORT-CUT ANTENNA

Replaces loops, aerials, electric light plugs, etc. Brings clearer signals and truer tone.

POSTPAID \$5.00

SHORT-CUT RADIO CORP.

243 West 54th St. N. Y. City

Make Your Set Portable

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).

RADIO MANUFACTURERS—South America is the coming field. Have your catalogs, booklets and bulletins translated into Spanish by a specialist. Submit English originals for estimate. TECHNICAL, Box 126, Trinity Station, New York City.

RECHARGE dry cell batteries. Cost, 5c. Instructions, 15c. J. Brent, 3 Stueben St., Bridgeport, Conn.

ATTENTION! Is your set equipped with that new discovery, The Desert Cactus Cat Whisker? The Whisker that brings in the long distance. If not, order today—Set of two for 25 cents and get details on that new (Mars) long range crystal receiver—Address, Mars, Box 822, Needles, Calif.

MAGNAVOX TYPE R3. Latest nationally advertised models, in original sealed factory cartons. List \$35. Special introductory offer \$25. Radio Central, Dept. W, Abilene, Kansas.

\$133 WESTINGHOUSE AERIOLA SR. with two stage amplifier complete with tubes and Brandes head set. \$98. \$125 Amrad No. 3500 four-tube receiver for \$98. The Radio Shop, Virginia, Minn.

TUBE RADIO SETS, \$21.50 up. Parts sold at reasonable prices. Price list free. State whether interested in sets, part. McLean, 8103 Maryland Avenue, Cleveland, Ohio.

SAXOPHONE, brass Alto, made by Buffet, Paris, with leather case cost hundred dollars new, both in good condition, WILL TRADE for complete WD-11 or WD12 three-tube receiving set or parts for same. Give names and value of parts. C. Dillman, No. 246, Webb City, Okla.

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

BROADCASTING OUTFIT using five fifty watt tubes to be sacrificed. Everything complete. Make us an offer. Park City Radio Company, Bowling Green, Ky.

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.

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.

WANTED—Omnigraph in good working condition. Box 435, Hardin, Montana.

You Need It!

Have you seen the book-up with complete panel layout in full size and all construction details in RADIO WORLD No. 43, dated Jan. 20? This book-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..

Cram's Radio Broadcasting Map

of the
UNITED STATES AND CANADA

Scales 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 STAND-
ARD BROADCASTING STATIONS
WITH COMPLETE INDEX OF STATIONS
35c (POSTPAID)

THE COLUMBIA PRINT
1493 BROADWAY, NEW YORK CITY

VENTRILOQUISM taught almost anyone at home. Small cost. Send 2c. stamp today for particulars and proof. Geo. W. Smith, Room M-643, 125 N. Jefferson Ave., Peoria, Ill.

CHEAPEST TO BUILD—Easiest to tune. Get particulars Rokay Single Control Hook-up. Describe your set. Rokay Electric Company, Ingomar, Ohio.

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.

FOR SALE—Radio Receiver, Navy type, cost \$595. Good condition. Dealers invited to call and see. Also 8 genuine "Vario-perm" guaranteed .001 variable condensers. Columbia Print, 1493 Broadway, Room 326, New York City.

HYPNOTISM—Controls self and others. Wants gratified. Ten easy methods, \$1.10. "MIND-READING" (any distance)—Wonderful, \$1.10. SCIENCE INSTITUTE, RW 1014 Belmont, Chicago.

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.

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.

FREE CATALOGUE. Ebonite panels, 7x12, 50c.; 23 plate variable condensers, \$1.25; American No. 200 Tubes, \$3.00; Amplifying, \$3.75; W. D. 12 Peanut, \$5.75; Sockets, 25c. Stewart's Radio Supply Co., 3124 Cherokee St., St. Louis, Mo.

THREE NEW 50 WATT TUBES. Never used. \$20 each. W. N. A. B., Bowling Green, Ky.

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

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 equaling tube equipment. Simple to install in any crystal detector. Price only twenty-five cents coin. "PT" CRYSTAL CONTACT COMPANY, Box 1641, BOSTON.

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.

SUPER-SIMPLICITY CIRCUIT—1,000 to 1,500 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.

Build your sets with quality parts and get sure results. Radio Parts Co., Box 56, Dunellen, N. J.

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

CRAM'S RADIO BROADCASTING MAP of the UNITED STATES AND 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, 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.

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

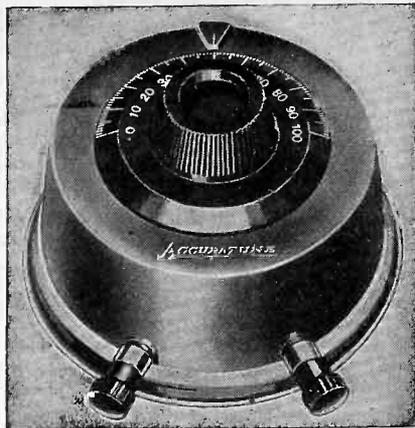
THE COLUMBIA PRINT, 1493 B'way, New York City

CORRESPONDENTS WANTED BY RADIO WORLD ALL OVER THE UNITED STATES AND CANADA

Send us your name and address and say that you want to become our correspondent. We will show you how you can represent RADIO WORLD in your locality and at the same time make money for yourself. We would particularly like to hear from those who are handling the "Saturday Evening Post."

Address Correspondent Editor, Radio World, 1493 Broadway, 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.

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., Breems 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 Building.
San Francisco—Stevens & Baumann, Inc., Holbrook Building.

SUBSCRIPTION RATES

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

Receipt by new subscribers of the first copy of RADIO WORLD mailed to them after sending in their order, is automatic acknowledgment of their subscription order.

ADVERTISING RATES

One page: One time—\$150.00.
Half, Quarter, Third and Two-thirds pages at proportionate rates.

One inch, one time—\$5.00. Per agate line \$0.40.

On four consecutive issues, 10% discount.
On thirteen consecutive issues, 15% discount.
Cover and preferred-position rates made known on application.

Terms: 30 days net. 2% 10 days.

CLASSIFIED ADVERTISEMENTS

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

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

IMPORTANT NOTICE

While every possible care is taken to state correctly matters of fact and opinion in technical and general writings covering the radio field, and every line printed is gone over with a scrupulous regard for the facts, the publisher disclaims any responsibility for statements regarding questions of patents, priority of claims, or other matters that 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.

VACATION PORTABLE SET

CONTAINS EVERYTHING INSIDE, WORKS ANYWHERE WITHOUT AERIAL
Editorially described by the Radio Globe on Saturday, April 28 (2nd page)
Wave band from 200 to 600 meters. Extremely selective. Will cost you about \$16, including nice typewriter cabinet.
You can make yours in an evening. Get my complete set of instructions, patterns, list of parts, etc. Price \$1
Apply to the originator CHARLES A. PEZET
46 W. 65th, N. Y. City. (Discount to Dealers)

W.T.501 DETECTOR TUBE

For tube sets, use our special Adapter, 75c extra. To convert crystal sets into tube sets, use special socket, 40c extra.
Radio Research Guild
40 Clinton Street
Newark, N. J.

SEND US YOUR DEAD TUBES—

WE REPAIR



Radiotron, UV-200, UV-201...\$2.75
Cunningham, C-300, C-301...\$2.75
WD-11...\$3.50

Mail orders solicited and Promptly Attended To.

We Put New Life in Them

GEO. H. PORELL CO., Inc.
The Vacuum Tube Hospital
SOMERVILLE (44), MASS.

HOOK-UP AND CIRCUIT HOUNDS

Did you miss it? Do you want it? If you do, you can get it by writing in to Radio World for any one of these back numbers, as per dates:

| | |
|---|----------|
| Reinartz circuit for 2 tubes..... | Jan. 13 |
| Good 2 tube WD-11 Circuit for DX..... | Jan. 27 |
| Satterlee Circuit..... | Feb. 3 |
| G. W. May's Wonder Circuit..... | Feb. 17 |
| Power Amplifier Circuit..... | Feb. 24 |
| Reflex Circuits..... | Feb. 24 |
| Flewelling Super Circuit..... | Feb. 24 |
| Multi-tube Reflex Circuits..... | March 3 |
| One tube Superregenerative..... | March 3 |
| Lewis Three Tube Circuit..... | March 10 |
| Regenerative Radio Frequency circuit for 5 tubes..... | March 24 |
| Hazeltine Neutrodyne Receiver..... | March 31 |
| 2VK's Transmitter circuit..... | April 21 |
| Compact Universal Receiver..... | April 28 |
| Stockburg Pup receiver..... | May 5 |
| Cockaday receiver..... | May 12 |
| Improved Grimes Circuit, A. D. Turnbull's Long Distance Circuit, Combined Receiver and Transmitter, Improved 1 tube Reinartz..... | May 19 |

Any number for 15c. Any 7 numbers for \$1.00. All 14 numbers for \$2.00. Or start subscription with any number. Radio World, 1493 Broadway, New York City.

GUARANTEED REPAIRS

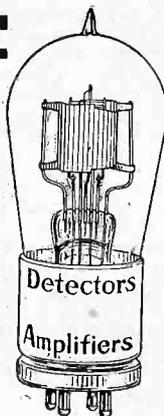
Broken and Burned Out
VACUUM TUBES

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.



Physician Summoned by Radio

THE steamship "West Cahous," lying at anchor in Baltimore harbor, about nine miles from the city, needed medical help at about 3 a. m. recently and needed it quickly, reports the U. S. Public Health Service. A member of the crew had fallen into the hold and had hurt himself seriously. So the captain of the ship sent a wireless broadcast asking help.

The call was picked up, not in Baltimore, nine miles away, but at Cape May, N. J., about 100 miles due east of Baltimore. As Cape May was separated from the "West Cahous" by parts of New Jersey and Delaware and by the eastern shore of Maryland, not to mention Delaware and Chesapeake bays, no direct help from it was possible.

But the operator was on the job. Promptly he consulted the long distance list in the Baltimore telephone directory and called up the residence of the Public Health Service surgeon in charge of the Marine Hospital in Baltimore—100 miles to the west. The surgeon, roused from sleep to receive the message, asked him to radio certain emergency treatment to the "West Cahous" and to direct the captain to send a boat to a certain pier in Baltimore, where he would find a surgeon waiting to go out to the ship with him. And so, in the middle of the night, in less than an hour, a wireless-controlled sea-going ambulance carrying a Public Health Service officer, reached the side of the injured sailor and brought him later to the hospital.

ENJOY YOUR VACATION with a Radio Set built from THE

RADIO CONSTRUCTOR

Vol. 1, No. 3

Clearly described and easy to make with the aid of FULL SIZE PANEL LAY-OUTS

Price 50c

S. NEWMAN & COMPANY
74 DEY STREET NEW YORK CITY

FADA VARIO-COUPLER

\$4.75



Use the FADA Vario-coupler and solve the secret of pulling in long distance signals.
FADA Handbook only a dime
F. A. D. ANDREA, INC.
1381 W. Jerome Ave., N. Y. C.

FADA RADIO EQUIPMENT

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 disclosing your idea, free on request. Write today.

RICHARD B. OWEN, Patent Lawyer
32 Owen Building, Washington, D. C.
2278-P Woolworth Bldg., New York City

Here's Your Radio Library!

Useful Technical Articles Published in 1922 Issues of RADIO WORLD

See prices at end of this page

APRIL 1.

A 500-Mile Radiophone Employing a 5-Watt Tube, by Frank A. Hahnel.
"Tell Me, Please, How Will This Set Receive?" by E. L. Bragdon.
Short Cuts in Receiver-Circuit Design, by O. C. Roos.
Making a Short-Wave Regenerator, by Fred. Chas. Ehlert.

APRIL 8.

Do You Know Your Receiving Equipment, by James D. Gordon.
Why a Crystal Is Called a Rectifier, by Walter Emmett.
Is Radiotelephony Dependable? by O. C. Roos.
Mounting Crystals in Your Detector, by E. L. Bragdon.
Storage Batteries for Radio, by Fred. Chas. Ehlert.

APRIL 15.

First Principles of Electricity as Applied to Radio, by John P. Miles.
Your Storage Battery, by E. L. Bragdon.
What Makes Radio Possible, by Edward Linwood.
Ground Connection as Vital as Antenna, by Fred. Chas. Ehlert.

APRIL 22.

Valuable Pointers on Aerial Construction, by Edward Linwood.
What is Meant by Tuning, by E. L. Bragdon.
Radio-Frequency Amplification and Regeneration, by Frank Armstrong.
Honey-Comb Coils and Condensers, by Edward Linwood.
Charging the Storage Battery, by E. L. Bragdon.
How to Construct the Variocoupler, by Frederick J. Rumford.

MAY 6.

The Advantages of Radio Frequency, by Harold S. Potter.
How to Construct, Protect and Operate a Storage Battery, by George W. May.
The Beginner's Catechism, by Edward Linwood.
Tuning and What is Meant by It, by Fred. Chas. Ehlert.
New Frequency Amplifier Brings Faintest Waves in Strong, by G. W. May.

MAY 13.

My Practical V. T. Detector and Two-Stage Amplifier, by Frederick J. Rumford.
The Principles of Radiotelegraphy, by Walter J. Howell.
The Reason for the Loop Aerial, by George W. May.
Tuning and What is Meant by It, by E. L. Bragdon.
The Beginner's Catechism, by Edward Linwood.

MAY 27.

The Beginner's Catechism, by Edward Linwood.
How to Make Your Own Condenser, by George W. May.
Tuning as Applied to Telegraphy, by Walter J. Howell.
Why the Condenser Doesn't Condense, by E. L. Bragdon.
Making Signals Louder with Two-Stage Amplifier, by George W. May.

JUNE 3.

The Cost of a Single-Circuit Receiver, by Howell W. Miller.
The Beginner's Catechism, by Edward Linwood.
How to Compute and Build a Fixed Condenser, by E. L. Bragdon.
Design for an Amateur's Receiving Set, by C. White.
Simple Method of Recharging a Storage Battery, by John Grayson.

JUNE 10.

Radio Receiver for Short Waves, by George W. May.
How to Filter Atmospheric Conditions, by C. White.
The Messenger Boys of Broadcasting, by E. L. Bragdon.
Are You a Member of the N. O. D. C.? by E. L. Bragdon.
The Beginner's Catechism, by Edward Linwood.
How to Construct One- and Two-Slide Tuning Coils, by George W. May.

JUNE 17.

The Vacuum Bulb's Start in Life, by C. White.
How to Select the Right Set, by E. L. Bragdon.
The Beginner's Catechism, by Edward Linwood.
Test of Inductance Coils, by Fred. Chas. Ehlert.
Short Waves from a Simple Receiver, by Stanley Bryant.

JULY 1.

Novel Unit-Detector and Amplifier, by Frederick J. Rumford.

Why You Must Use a Condenser, by C. J. Williams.
How Wave Lengths Travel, by Fred. Chas. Ehlert.
Radio World's Revised Dictionary, by Fred. Chas. Ehlert.
The Beginner's Catechism, by Edward Linwood.
Use of the Vacuum Tube Detector, by George W. May.

JULY 8.

Radio's Place in the Phenomena of Nature, by E. L. Bragdon.
The Function of the Loose Coupler, by Charles H. Plath.
Armstrong's Superregenerative Amplifier Fully Explained, by John Kent.
Operating a Transatlantic Station, by Fred. Chas. Ehlert.
The Beginner's Catechism, by Edward Linwood.
Reducing Strays and Static, by Fred. Chas. Ehlert.

JULY 15.

Assembling a Detector and Two-Stage Amplifier, by H. S. Stanford.
Combined Radio and Audio Frequency Amplification, by C. White.
The Beginner's Catechism, by Edward Linwood.
Locating Your Aerial, by Harold Day.
Facts for Beginners, by Fred. Chas. Ehlert.

JULY 22.

When Your "Movies" Come by Radio, by Stanley Bryant.
Underlying Principles of the Vacuum Tube, by George W. May.
Practical V-T Detector Panel, by Frederick J. Rumford.
Revised Radio Dictionary, by Fred. Chas. Ehlert.
The Beginner's Catechism, by Edward Linwood.
Importance of Aerials to Radiation, by C. White.

JULY 29.

The Vacuum Tube as a Transmitter, by Charles H. Plath.
My 20-Kilowatt Tube and its Uses, by Irving Langmuir.
Importance of the Capacity Switch, by E. L. Bragdon.
The Truth about Lamp-Socket Aerials, by Harold R. Hart.

AUGUST 5.

How to Construct and Operate the Armstrong Superregenerative Circuit, by John Kent.
Using Radio Frequency to Extend Range, by George W. May.
Things Every Radio Fan Must Know, by E. E. Hawley.
Revised Radio Dictionary, by Fred. Charles Ehlert.

AUGUST 12.

The Work of the Audio-frequency Transformer, by George W. May.
Practical Measurements of Capacity and Inductance, by W. A. Dickson.
Experimenting with Armstrong Circuit Produces Unusual Hook-up, by Dr. O. S. Kelly.
How to Secure Perfect Regeneration, by Fred. Chas. Ehlert.

AUGUST 19.

How to Build a Portable Field Buzzer, by De Witt H. Thompson.
Using Two Tubes for Receiving, by C. White.
The Storage Battery as an Important Factor in Radio Reception, by Donald Van Wyck.
The Use of Capacity in a Circuit, by George W. May.
The Beginner's Catechism, by Edward Linwood.

AUGUST 26.

How to Build a Spider-Web Receiver, by Frederick J. Rumford.
My Detector and One-Step Amplifier, by Fred. Chas. Ehlert.
The Beginner's Catechism, by Edward Linwood.
Hints for Fans, by C. F. Rye.

SEPTEMBER 2.

Generating C-W for Transmission, by C. White.
Wonders of Radio-Frequency Amplification, by H. S. Potter.
How to Connect the Electric-Light Socket Aerial, by John Kent.
Practical Circuits for Regenerating Loud Signals, by O. S. Kelly.

SEPTEMBER 9.

Radio Ideas for the Amateur to Test Out by Carl Masson.
How to Make a Practical Wave-Meter, by Frederick J. Rumford.
How to make a Honey-Comb Coil with a Two-Stage Amplifier, by Fred. Chas. Ehlert.
Perfect Short-Wave Radio-Frequency Amplification, by George W. May.

SEPTEMBER 16.

How to Make a Two-Tube Superregenerator, by Frederick J. Rumford.

Methods of Amplifying Radio Signals, by B. Brabury.
Voice Distortion in Vacuum-Tube Receivers, by W. A. Dickson.
Charging a Battery—from a French Radiologist's Point of View, by Marius Thouvaia.
Working Diagrams for Beginners.

SEPTEMBER 23, 1922

New V T Hook-up Worth Testing Out, by P. F. Metzler.
New Method for Lighting Filaments, by C. White.
Why the Radio Compass Is the Fighting Element of Science, by Ortherus Gordon.
Complete Table of Symbols Used in Radio Reception, by Fred. Chas. Ehlert.
The Radio Primer, by Edward Linwood.
Complete Method for Building an Electron-Tube Detector Unit, by Experts of the United States Bureau of Standards.

SEPTEMBER 30, 1922

Increasing the Wave Lengths of a Receiving Set, by George W. May.
The Importance of the Variometer to a Receiving Set, by Donald Van Wyck.
Successful Stunts of an Amateur Radiologist, by C. F. Rye.
Employing Jacks with a Two-Stage Amplifying Receiver, by Fred. Chas. Ehlert.

OCTOBER 7.

Superheterodyne Receiver as Applied to the Armstrong Superregenerative Circuit, by Charles R. Leutz.
Constructing a Radio-Frequency Regenerator, by C. White.
Why the Open Antenna Is Best for the Radio Listener, by C. D. Wagoner.
Broadcasting Stations of United States and Canada.
The Radio Primer for the Beginner, by Lynn Brooks.

OCTOBER 14.

Neat Home-Made Tube Socket, by Gordon S. Arthur.
Vessels Now Guided Through Fog by New System of Radiotelegraphy, by Ortherus Gordon.
What Makes the Receiver Work, by Donald Van Dyck.
Using the Variocoupler in a Short-Wave Receiver, by George W. May.
Regenerative V-T Receiver for Short Waves, by Fred. Chas. Ehlert.

OCTOBER 28.

A simple Super-regenerative Receiver, by Harold S. Potter.
Vacuum Type of Arrester Safe, by Fred. Chas. Ehlert.
How to Make Your Aerial Function, by Horace Beers.
How to Avoid Interference When a 360 Meter and a 400 Meter Station Are Operating Simultaneously, by C. W. Horn.

NOVEMBER 4.

Receiver for Amplifying Weak Signals, by Horace Beers.
How to Learn the Code, by Ortherus Gordon.
Detectors—and How They Work, by Donald Van Wyck.

NOVEMBER 18.

Radio Devices You Should Understand, by John Kent.
The Counterpoise, by Frederick J. Rumford.
Changing Inductance and Capacity, by Fred. Chas. Ehlert.
The Importance of Understanding and Testing Radio Apparatus, by C. White.
Operating a Three-Unit Honeycomb Regenerative Receiver, by John Kent.

DECEMBER 2, 1922

Sharp Tuning to Help Eliminate Interference, by A. O. Curtis.
Getting the Results Out of Your Receiver, by C. H. Plath.
Some of the Things That Are Sorely Needed in Radio, by C. White.
Broadcasting Church Services, by Peter Gray.
My Hookup and How It Works, by J. A. Merklein, R. E.

DECEMBER 9, 1922

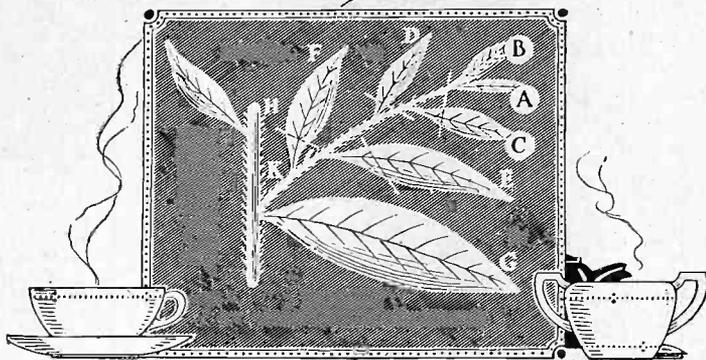
Why Radio Frequency Amplifies Signals, by Donald Van Wyck.
Capacitively Coupled Receivers, by A. O. Curtis.
Efficient Crystal Set, by C. H. Plath.
How to Prepare Hard Rubber Sheeting for Your Panels, by W. S. Standiford.

DECEMBER 16, 1922

How to Put a Vernier on Your Condensers, by Ortherus Gordon.
A New Three Slide Regenerative Tuner Hook-Up, by R. L. Dougherty.
Factors That Affect the Range of Transmitters, by B. R. Cummings.
New List of Broadcasters Recently Licensed.

Any single copy of Radio World, beginning with No. 1, mailed on receipt of 15 cents postpaid. Any seven issues for \$1.00. The above 32 numbers sent for \$4.50. Or send \$6.00 for 1 year (52 numbers) and have your subscription start with any number. Radio World, 1400 Broadway, New York.

The A.B.C. of Good Tea



THIS diagram shows clearly one reason for the superior flavor, strength and aroma of RIDGWAYS TEA.

The plucking season commences in the early Spring and continues right into the Autumn. At the commencement of the season, the plant sends forth its first tiny shoots. In order to get the very choicest pickings, only those leaves marked "A," "B" and "C" are gathered for Ridgways. These tender, young tip-leaves give to Ridgways Tea that rare quality of flavor

which distinguishes the famous Ridgway blends. The leaves marked "D," "E," "F" and "G" are coarser and less flavory and therefore are never used by Ridgways.

This carefully guarded Ridgway quality also assures more cups to the pound. When you buy Ridgways Tea you not only get the best tea, but actually more of it than is possible from inferior tea. As an example of rare good tea we suggest that you order Ridgways (GOLD LABEL), the *Genuine Orange Pekoe*.

Be Sure to Insist Upon
Ridgways Genuine Orange Pekoe Tea

A GENEROUS SAMPLE
WILL BE SENT ON REQUEST

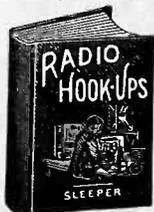
Address: Ridgway Tea Co., Dept. A., 60 Warren St., New York

INDIA-CEYLON
Ridgways Tea

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

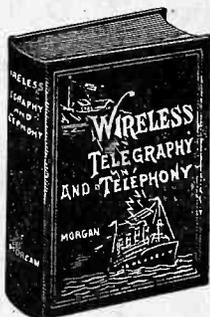
A book that gives you not only clear diagrams for all kinds of telephone and telegraph receiving and transmitting sets, but simple descriptions of each circuit shown and spaces for notes of results obtained.

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

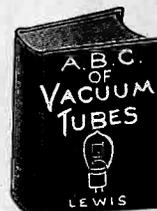
The man who wants to feel the real thrill of accomplishment, and who is not satisfied in the merely making use of what others have done for him, builds his own radio apparatus. Radio men can follow the data in "Radio Phone and Telegraph Receivers" with full confidence, because each piece of apparatus 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