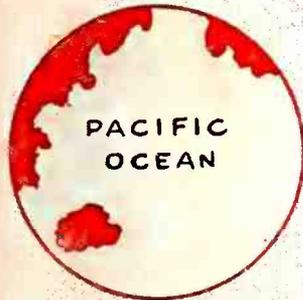


RADIO

AGE



The Magazine of the Hour

VOL. 1.

MAY, 1922.

NUMBER 1

.. IN THIS NUMBER ..

How to Make a Home Radio Set for \$6.

An Official U. S. Government Article For Boys.

**Chicago Boy's Simple Directions for
Making Radiophone at Home.**

Fully and Clearly Illustrated.

Questions and Answers.

They Simplify Your Own Radio Problems.

How to Get a Good Radio Set---Free.



A MAGAZINE FOR A MILLION FANS

For Beginners, Experts, Dealers, Jobbers, Manufacturers

\$2.50 a Year

25c a Copy

Radio Age

PROSPECTUS

UR special field: The Middle West and the West. This includes the "Chicago Territory" which is unquestionably the richest agricultural, commercial, financial and *industrial* region in the world. Radiophones according to late figures published through the Associated Press, are being used in four States as follows: Iowa, 23,000; Missouri, 25,000; Nebraska, 22,000; Kansas, 20,000; Wisconsin, 1,500 stations, increasing at the rate of 5 a day. Cleveland alone has 15,000 amateur and professional radio enthusiasts; St. Louis, 2,200; Dallas, 263; Cincinnati, 500; Indianapolis, 1,000; Milwaukee, 1,000. Schools and colleges in all states are teaching radio, farmers all over the Middle West are installing radio sets; clubs are being organized everywhere.

Chicago—Radio operatives are growing in number so rapidly that their number could only be approximately estimated. Thousands of boys are studying practical radio science in the public schools. Dealers and manufacturers are unable to supply the demand for equipment.

Our special circulation: Boy beginners particularly, and amateurs generally. Radio Age will write Radio so that boys can understand it. There will be technical articles for the advanced students of Radio but the departments for beginners will not be written **OVER THE READERS' HEADS**. Numerous illustrations will aid amateurs in constructing **HOME RADIO SETS**. Getting a printed message across is simply one form of **SALESMANSHIP** and it is a highly specialized line. Radio Age knows its market and knows how to supply it.

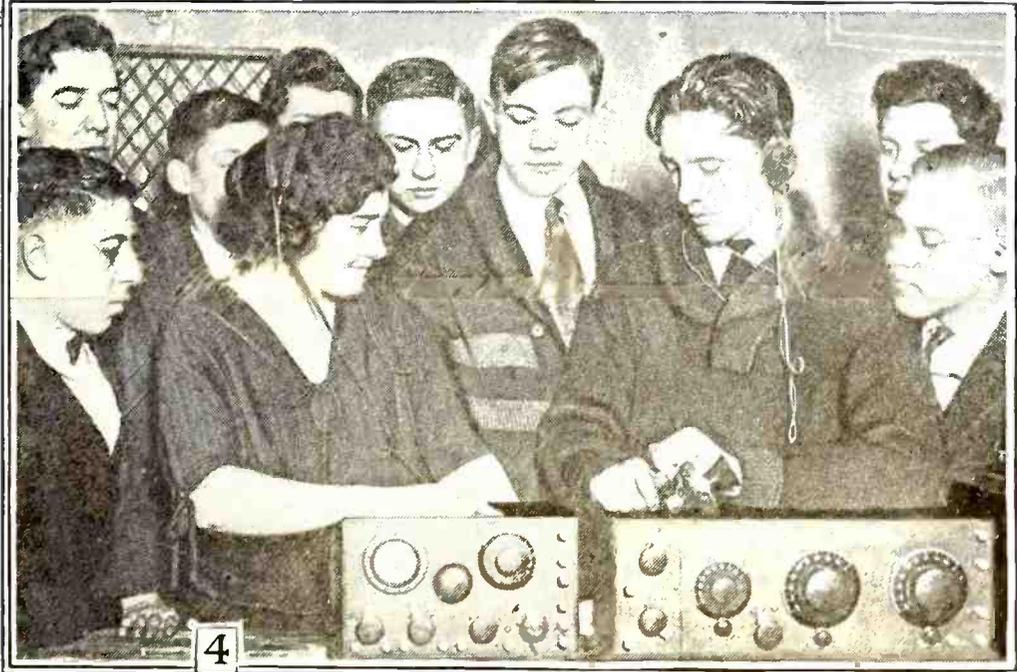
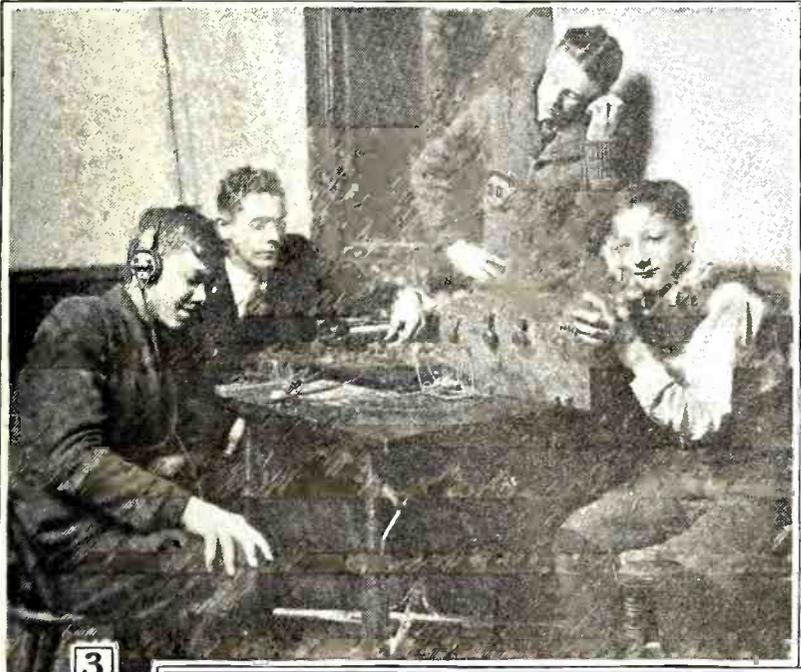
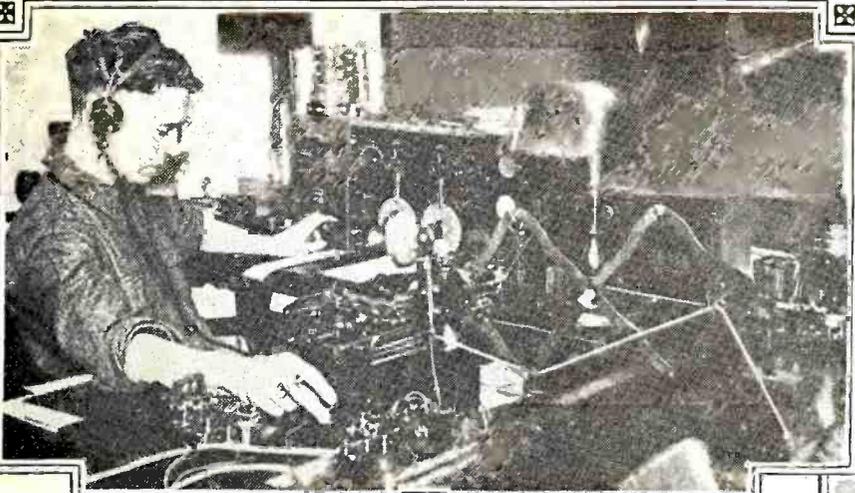
Our special departments: In addition to illustrated articles showing beginners how to launch out into the ether waves there will be original articles written by boys telling what they have done in Radio and how. There will be a Questions And Answers department, carefully handled; Radio Clubs will have attention with liberal use of names of individuals and photographs; there will be a department for Trade News, a Radio Readers' Exchange, for letters of interest from our readers. These features will be supplemented by articles presenting facts about the growth of radio in popularity, about the constantly increasing list of practical uses for radio, about the importance of radio in its relation to society generally. Radio Age will have no narrowed view of its subject.

It is the hour of Radio. We offer—

"The Magazine of the Hour"

Radio Age, The Magazine of the Hour, published on April 8; a monthly magazine, Vol. I, No. 1. Publication office, Garrick Building, 64 W. Randolph St., Chicago, Ill. Subscription price \$2.50 a year. Published by the M. B. Smith Publishing Co. Entry as second class matter applied for at the postoffice at Chicago, Illinois, under the ACT of March 3, 1879.

S.R.W. - 9/18/26
R.R. (credit) 3/29/46



(1.) Sgt. Lawrence W. Bock no longer has "the lonesomest job in the army." He is the operator of the army radio station at Fort McPherson, Ga. The picture shows him enjoying songs by Galli Curci broadcast from Atlanta, Ga. (2.) Edward Herron, Chicago boy, showing one he made himself. Edward is proud of it and has a right to be. (3.) Chicago Boys' Club No. 2, 1725 Orchard St., has a radio class. Left to right, George Hensel, Charles Coleman, Jr., Erwin Alanap and William Pour. (4.) Elizabeth A. Bergner, radio instructor at Lane Technical High School, explaining to her class of boys some of the mysteries of Radio. Photo 2 and 3 by courtesy of

Who's Who In Radio

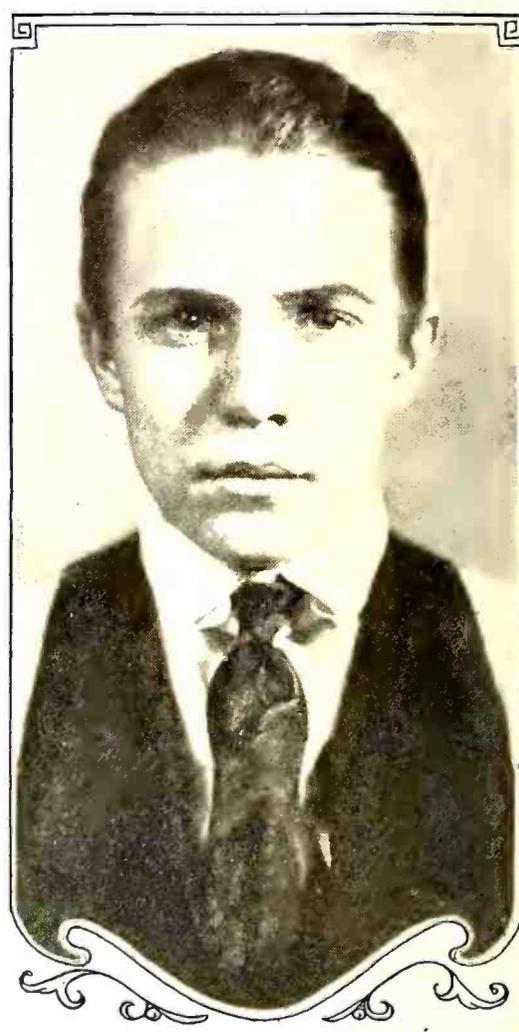


"Paddy" O'Neill

I F WE were to follow a time-honored custom we would devote this page to men who are great and famous. Edison, Fleming, Marconi and De Forest, to be sure. All honor to these celebrities.

But the age of radio is essentially a new era for boys and the boys of today may be Steinmetzes tomorrow.

So our first Who's Who presents "Paddy" O'Neill and Eddie Neilsen. See Eddie's own story beginning on Page 5 and read about Paddy on this page. Send in your favorite boy radio "experts" for our Who's Who page.



Edwin Nielsen



ONE of the most enthusiastic boy radio fans in the Middle West is "Paddy" O'Neill, 11-year-old son of Detective Patrick J. O'Neill, who was killed by Tommy O'Connor, the Chicago gunman.

Little Pat, now the "man of the family," owns a cheap receiving set, which he has rigged himself, driving a pipe into the ground in his back yard to ground the wires. Driving in the pipe took a whole day of the boy's time.

As soon as his set was rigged and in operation, Pat called in all the neigh-

bors to hear the Chicago Opera Company, hearing the same music as though he and his friends were in the front row at the Auditorium Theater—at \$6 a seat.

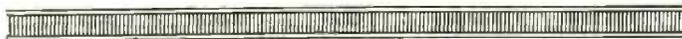
The concerts are now a nightly feature in the O'Neill home. Detective O'Neill was killed when he and six other detectives went to the home of William Foley, O'Connor's brother-in-law, to arrest him for the forfeiture of bonds in a charge of robbery. O'Connor dashed from the house, firing as he

ran. O'Neill fell, dying on the way to the hospital.

Little Pat immediately took command of the family—his mother and three small brothers and sisters—acting for the grief-stricken woman in helping comrades of the slain policeman arrange a fitting funeral.

Through the generosity of Chicago citizens more than \$10,000 was raised for the bereaved family.

Pat also wired their little home, and once tapped the service wires of the—but that's a secret.



RADIO AGE

"The Magazine of the Hour"

M. B. SMITH
PUBLISHER

PUBLISHED MONTHLY GARRICK BLDG CHGO.

FREDERICK SMITH
EDITOR

Great Radio Shows To Come

THE Radio show at the Hotel Pennsylvania in New York set that city radio wild and greatly increased the interest in other shows to be given in the larger cities. Pittsburgh and Boston come first and then Chicago is to have two expositions, one in the Leiter Building, from June 26 to July 1, inclusive, and the other in the Coliseum during the week of October 15 to 21.

How you can send your morning kiss by radio to your wife while speeding over the rails on fast trains, how you can enjoy the great concerts of the country, listen in on vaudeville performances and hear the world news while seated comfortably in your home will be visualized by the displays at the National Radio Exposition to be held in the Leiter Building, Chicago, June 26th to July 1st, inclusive. Radio fans will be enabled to see every type of apparatus in operation at this show, where accessories by the gross will be exhibited and where numerous "stunts" will be put on to be broadcast throughout the middle west. This announcement was made by Milo E. Westbrooke, well known exposition manager, who recently staged the National Shoe Exposition in Chicago and who has put on some of the biggest trade shows in New York and Chicago. Mr. Westbrooke declared the Chicago Radio Exposition would be bigger and better than the one recently held in New York, where thousands upon thousands were turned away every night.

"This probably will be the most comprehensive Radio exposition ever conducted by, for and in the interest of radio fans," said Mr. Westbrooke. "There will be exhibits of every sort of radio apparatus manufactured, including the very latest devices and inventions. All the parts that are used in the construction of sending and receiving instruments will be on display.

"The working of the radiophone will be demonstrated and the people who have listened to concerts given hundreds of miles away and heard the world news transmitted to them while seated comfortably in their homes, will have an opportunity to see the instruments in operation and view the various parts utilized in their construction. The Radio Show in June will be one of

the greatest educational expositions ever held in Chicago or any other city.

"The sudden popularity of radio tele-



The Sweet devotee of Radio carries a set in her hand bag.

phony has resulted in the establishment of more than 600,000 receiving sets in the country, and of these 150,000 are located in the middle west. Throughout the United States 20,000 amateurs are qualified as transmitters, capable of sending and receiving a minimum of fifty characters a minute by transcontinental Morse code. For each Radiophone there is an average audience of five persons, thus making a total of 2,500,000 who are associated with the wonders of wireless."

The October Show

U. J. Herrmann, of the Cort Theater, announces that the "Annual Chicago Radio Show" will be given each year in October because deferring the exhibition to that season will give the manufacturers a chance to catch up with deliveries and will also permit them to complete and perfect many improvements in construction and design.

Mr. Herrmann says:

"Because of the enormous demand most manufacturers of radio equipment are months behind in filling orders. By

October conditions should be greatly improved. The radio shows which have been held in other cities during the last year have been pronounced successes. In New York the public was turned away by the thousands every day during the show in the Pennsylvania hotel and the crowds were so great around the exhibits as to cause actual discomfort.

"The nation-wide, ever-growing interest in radio has amply demonstrated that only the largest exhibition buildings are adequate to properly handle the enormous crowds whose enthusiasm has placed radio shows on the plan with the big national automobile exhibits."

The Pittsburgh Show

Rare harmony from Chicago, musical comedy from Cleveland, trade conditions information from St. Louis, new flashes from New York, government reports from the National Capitol, these are only a few of the many features given via radio at the first Pittsburgh radio exhibition in the William Penn hotel, April 11, 12 and 13. A large receiving set erected by the Westinghouse interests receives and transmits these messages from the air for the benefit of the Pittsburgh fans and the numerous visiting delegations from the neighboring districts and states.

Practically every one of the largest manufacturers of radio equipment and supplies made reservation for the show but as space is limited at the William Penn a few could not be accommodated. Leading local dealers and distributors have extensive displays and their booths are both beautiful and educational. There are on exhibition sets of every one of the leading radio manufacturers as well as a large percentage of the battery and accessory people.

The educational talks and illustrated lectures are held throughout the afternoon and evening of each day of the show, except the opening date when the doors are open at 7 o'clock. These lectures are conducted by men prominent in the industry and are intended to both instruct the fans as to the proper means of assembling their equipment and to educate the uninitiated in to the mysteries of the wireless.

Turn to page Thirteen

Tune Up and Listen In

roadcasting from these Stations is on
360 meters where not otherwise
specified

Midwest Broadcasts

Eighth District

DKA—Westinghouse Electric & Mfg. Co., Pittsburgh, Pa. Daily, except Sunday, music 10:00-10:15 a. m. and 12:30-1:00, 2:00-2:20 and 4:00-4:20 p. m., with special Saturday concert 3:00-4:00 p. m.; bedtime stories, 7:30 p. m.; press, 7:45; special features and vaudeville acts, 8:00 p. m.; music and news, 8:30-9:30; Sunday, church service, 10:45 a. m., 3:00 p. m. and 7:30 p. m.

VBL—The Detroit News, 615 Lafayette Bldg., Detroit, Mich. Daily, except Sunday, 11:30-11:55 a. m., and 3:30-4:00 p. m., phonograph music; 7:00-8:30 p. m., special musical programs by selected artists.

KQV—Doubleday-Hill Electric Co., 719 Liberty Ave., Pittsburgh, Pa. Daily except Saturday and Sunday, music, 4:30-5:00 p. m.; Sunday, 1:00-1:30 p. m. and 4:00 to 5 p. m.; Monday, Wednesday and Friday, 9:30 to 10:30 p. m.

VDZ—Marshall Gerken Co., 27 Ontario Ave., Toledo, Ohio.

VPB—Pittsburgh Gazette-Times, Gazette Square, Pittsburgh, Pa.

WMH—Precision Equipment Co., Cincinnati, Ohio. Monday, Wednesday and Saturday, 8:15-10:00 p. m., music, speeches and news; daily 485 meters; 11:00 a. m. and 4:00 p. m., weather reports.

Ninth District

NOV—R. B. Howell, 1802 Farnum St., Omaha, Neb.

WHA—University of Wisconsin, Madison, Wis. Daily except Sunday, weather reports at 12:35 p. m., Friday at 8:15 p. m.; special music and other dates as announced. Midnight to 1:00 a. m., university news on 410 meters.

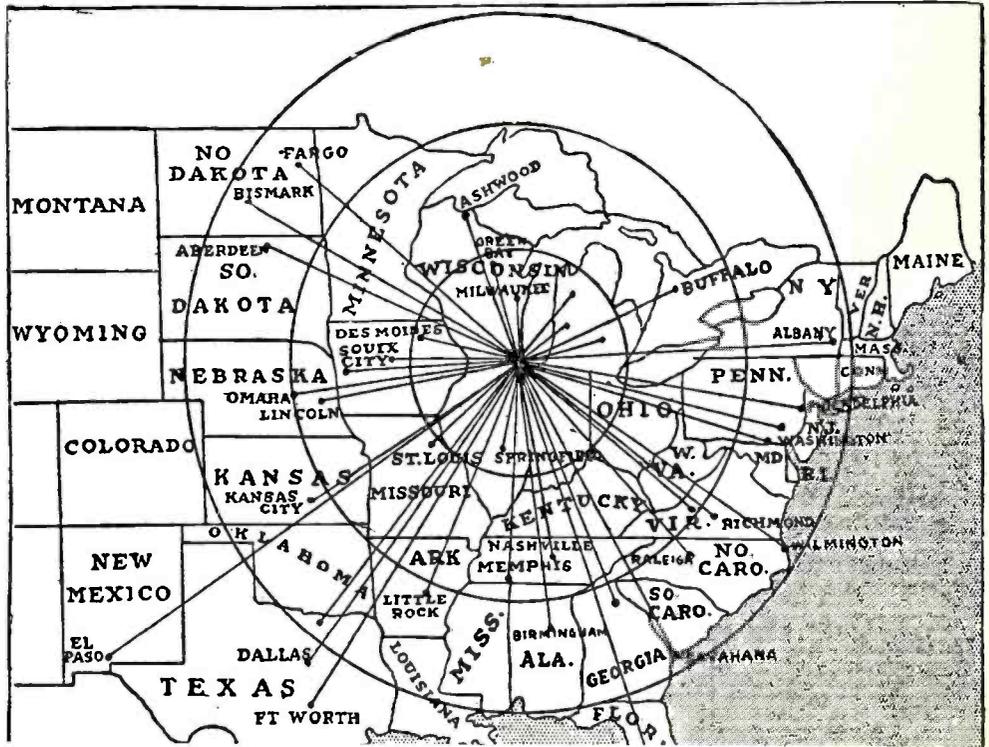
WLB—University of Minnesota, Minneapolis, Minn. 485 meters; daily 12 noon, weather and stock reports; 7:30 p. m., wheat and potato market; 7:45 p. m. Wednesday only, music, 360 meters.

WLK—Hamilton Mfg. Co., 2011 North Alabama St., Indianapolis, Ind., Sunday, 8:00-8:55, religious, vocal and instrumental music; Tuesday, 8:00-8:55 p. m., jazz, vocal and instrumental music; 9:00-10:00 p. m., local theatre numbers and news items; Thursday, 8:00-8:55, special numbers from local singers and orchestras, stories, news and speeches.

KYW—Westinghouse Electric & Mfg. Co., 111 W. Washington St., Chicago, Ill. Daily, except Sunday, 9:30, 10:00, 10:30, 11:30, and 12:00 a. m. and 2:45 p. m., stock and market reports; 2:15, 4:15 and 6:00 p. m., news and market reports; 7:00 p. m., summary of financial report; 7:30 p. m., children's bedtime story; 8:00-9:00 p. m., musical program; 9:00 p. m., news and sports; Sunday, 3:30 p. m., Radio Chapel.

KXAB—Western Radio Co., Kansas City, Mo. Market reports and weather forecast, 11:30 a. m. and 2:30 p. m.; concerts in the evening.

KZAF—Reynolds Radio Co., Denver, Colo. News twice daily and concert Sunday



List of stations broadcasting market or weather reports (485 meters) and music, concerts, lectures, etc. (360 meters), (March 10, 1922).

Owner of station.	Location of Station	Wave lengths.	Call Signal.
Allen, Preston D.	Oakland, Calif.	360	KZM.
American Radio & Research Corp.	Medford Hillside, Mass.	360	WGI.
Atlantic-Pacific Radio Supplies Co.	Oakland, Calif.	360	KZY.
Bamberger, L. & Co.	Newark, N. J.	360	WCR.
Bible Institute of Los Angeles, Inc.	Los Angeles, Calif.	360	KJS.
Church of the Covenant	Washington, D. C.	360	WDM.
City of Chicago	Chicago, Ill.	360	WBW.
Cox, Warren R.	Cleveland, Ohio	360	WHK.
Crosley Mfg. Co.	Cincinnati, Ohio	360	WLW.
DeForest Radio Teleg. & Teleg. Co.	New York, N. Y.	360	WJX.
Detroit News, The	Detroit, Mich.	360, 485	WWJ.
Doubleday-Hill Electric Co.	Pittsburgh, Pa.	360	KQV.
Doron Brothers Electric Co.	Hamilton, Ohio	360	WRK.
Duck Co., Wm. B.	Toledo, Ohio	360	WIU.
Dunn & Co., J. J.	Pasadena, Calif.	360	KLB.
Electric Lighting & Supply Co.	Hollywood, Calif.	360	KGC.
Examiner Printing Co., The	San Francisco, Calif.	360	KUO.
General Electric Co.	Schenectady, N. Y.	360	WGY.
Gilbert Co., A. C.	New Haven, Conn.	360	WCJ.
Gould, C. O.	Stockton, Calif.	360	KJQ.
Hamilton Mfg. Co.	Indianapolis, Ind.	360	WLK.
Hatfield Electric Co.	Indianapolis, Ind.	360	WOH.
Herrold, Chas. D.	San Jose, Calif.	360	KQW.
Hobrecht, J. C.	Sacramento, Calif.	360	KVQ.
Howlett, Thos. F. J.	Philadelphia, Pa.	360	WGL.
Karlowa Radio Co.	Rock Island, Ill.	360, 485	WOC.
Kennedy, Colin B. Co.	Los Altos, Calif.	360	KLP.
Kluge, Arno A.	Los Angeles, Calif.	360	KQL.
Kraft, Vincent I.	Seattle, Wash.	360	KJR.
Lorden, Edwin L.	San Francisco, Calif.	360	KGB.
Marshall-Gerken Co.	Toledo, Ohio	360, 485	WSZ.
Metropolitan Utilities District	Omaha, Neb.	360, 485	WOU.
Meyberg Co., Leo J.	San Francisco, Calif.	360	KDN.
Meyberg Co., Leo J.	Los Angeles, Calif.	360	KYJ.
Missouri State Marketing Bureau	Jefferson City, Mo.	485	WOS.
Montgomery Light & Water Power Co.	Montgomery, Ala.	360, 485	WGH.
Newspaper Printing Co.	Pittsburgh, Pa.	360	WPB.
Northern Radio & Electric Co.	Seattle, Wash.	360	KFC.
Palladium Printing Co.	Richmond, Ind.	360, 485	WOZ.
Pine Bluff Co., The	Pine Bluff, Ark.	360	WOK.
Pomona Fixture & Wiring Co.	Pomona, Calif.	360	KGF.
Portable Wireless Telephone Co.	Stockton, Calif.	360	KWG.
Precision Equipment Co.	Cincinnati, Ohio	360, 485	WMH.
Precision Shop, The	Gridley, Calif.	360	KFU.
Radio Construction & Electric Co.	Washington, D. C.	360	WDW.
Radio Corporation of America	Roselle Park, N. J.	360	WDY.
Radio Shop, The	Sunnyvale, Calif.	360	KJJ.
Radio Telephone Shop, The	San Francisco, Calif.	360	KYY.
Reynolds Radio Co.	Denver, Colo.	360, 485	KIZ.
Rike Kumlir Co., The	Dayton, Ohio	360, 485	WFO.
Rochester Times Union	Rochester, N. Y.	360, 485	WHO.
Seeley, Stuart W.	East Lansing, Mich.	485	WHV.
Service Radio Equipment Co.	Toledo, Ohio	360	WJK.
Ship Owners Radio Service	New York, N. Y.	360	WDT.
Union College	Schenectady, N. Y.	360	WRL.
University of Minnesota	Minneapolis, Minn.	360, 485	WLB.
University of Wisconsin	Madison, Wis.	360, 485	WHA.
Warner Bros.	Oakland, Calif.	360	KLS.
Wasmer, Louis	Seattle, Wash.	360	KHQ.
Westinghouse Electric & Mfg. Co.	Springfield, Mass.	360	WBZ.
Westinghouse Electric & Mfg. Co.	Chicago, Ill.	360	KYW.
Westinghouse Electric & Mfg. Co.	Newark, N. J.	360	WJZ.
Westinghouse Electric & Mfg. Co.	East Pittsburgh, Pa.	360	KDKA.
Western Radio Electric Co.	Los Angeles, Calif.	360	KOG.
Western Radio Co.	Kansas City, Mo.	360, 485	WOQ.
White & Boyer	Washington, D. C.	360	WJH.

Boy Tells How To Make 'Em

By EDWIN NIELSEN

(16 years of age)

EDWIN NIELSEN is a Chicago boy who works for a big newspaper at night and makes receiving sets and experiments with them when he gets a chance. His article is brief but if there are points needing more detailed explanation inquiries may be addressed to him in care of the Radio Age. Send self addressed and stamped envelope to Edwin Nielsen, Care Radio Age, 1311 Garrick Building.

The Editor.

THERE are now about 80 radio stations in the United States, that are sending out news reports, market reports, opera and musical concerts, EVERY DAY. All of this broad easting may be received by ANYONE who wishes to listen to it. It can be received on outfits that are almost entirely home-made, and are so simple that they can be made by even the unskilled worker, though with a set of the kind I have in mind, the beginner must not expect to receive from any very great distances, as it will not receive messages from over 50 miles.

With receiving outfits at such a low price, there ought to be a set in every home, even if it be the simplest set that was ever devised.

A radio outfit is usually composed of an aerial system to catch the waves that are sent out by the sending station, a ground system to catch the waves that come from the ground through which they travel as well as through the air, a tuning system to allow the operator to listen to any single sending station so that he does not hear merely a jumble of sounds, a detector system which changes the radio waves to electro-magnetic waves or waves which will act upon the magnets in the telephones and produce sounds, and in the new sets a condenser system to make the sounds clearer and louder.

A receiver that would work well especially for the Radiophone concerts would be composed of: 1st, a tuning coil; 2nd, a condenser, preferably of the Variable type; 3rd, a crystal detector; 4th, a small fixed condenser; and 5th, and last, a pair of receiving telephones.

The tuning coil is what is known as a two slide tuning coil and is made of a cardboard tube, wound with about 250 turns of No. 22 wire. The tube is then fastened to two square pieces of wood, which has two copper or brass rods, about one-fourth inch square, fastened to it. Two sliders are then made of brass bent to fit around the square rod and soldered at the place indicated in Figure 1.

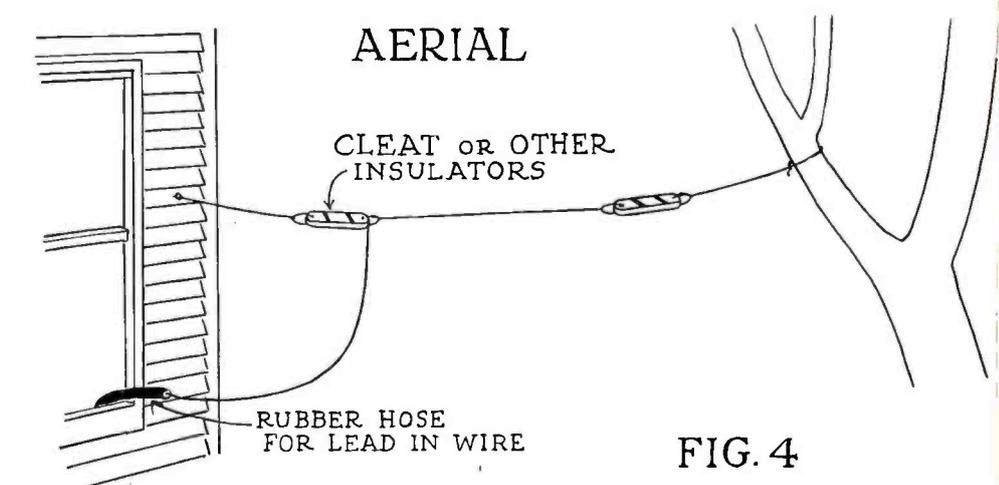
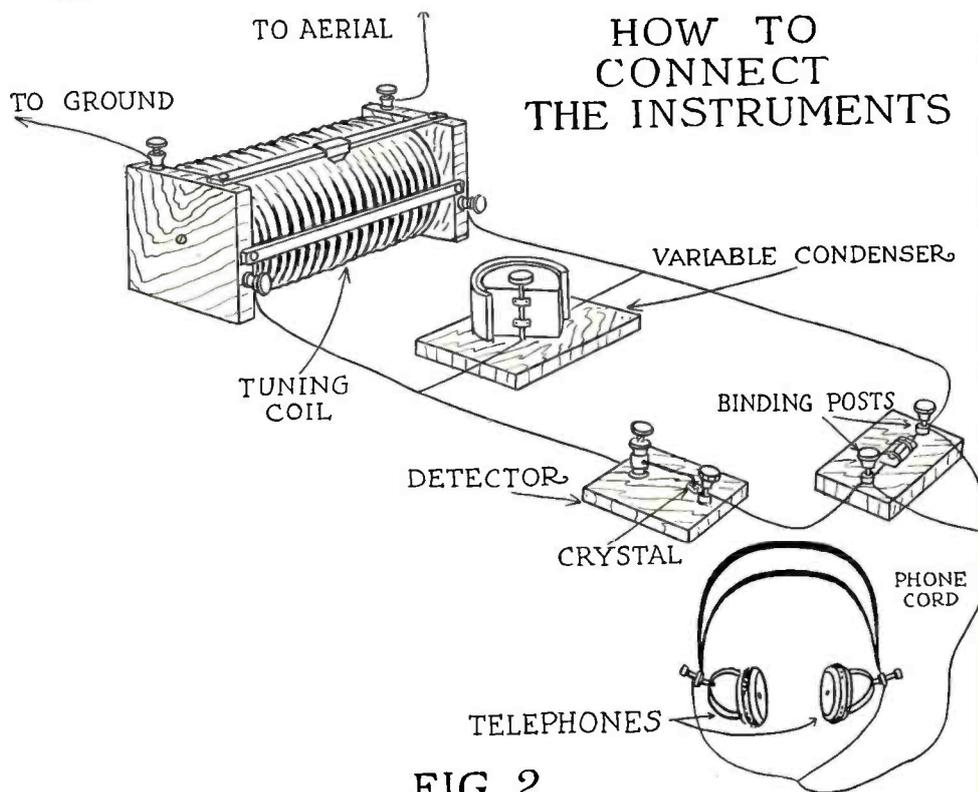


FIG. 4



HOW TO CONNECT THE INSTRUMENTS

FIG. 2

Figure 1 on following page

the rods, keeping contact with the wire, and enable the operator to tune in different stations till the desired station is clearly heard.

In figure 1, "A," is the cardboard tube. "B" shows the round wooden discs which fit inside the tube and allow the tube to be firmly fastened to the square blocks, "C" which holds the whole coil in an upright position so that it can be operated readily. "D" shows the method of making the sliders. In figure 2, the complete coil may be seen with both sliders shown, and all instruments in place.

The variable condenser can be made of a semi-circular piece of wood cut according to the directions in figure 3. There are good variable condensers

where from 3 to 65 plates. They will improve any set, as about 60% of the tuning is done by a variable condenser. A fixed condenser can be made of three sheets of tinfoil separated by mica sheets. The middle sheet of tinfoil must protrude at one end of the mica and must not come in contact with the other sheets of tinfoil. The whole condenser is held together with rubber bands and wires are fastened to the protruding edges of the tinfoil.

The detector can be made with two binding posts, a piece of stiff wire, hair pin, or pin, and a piece of Galena crystal. The binding posts are fastened to a wood base about an inch and a half apart, the crystal fastened to one of them, the wire fastened to the other.

Boy Tells How To Make a Home Set

Continued from page five

and the point of the wire resting on the crystal. The instruments are then connected as indicated in Fig. 2.

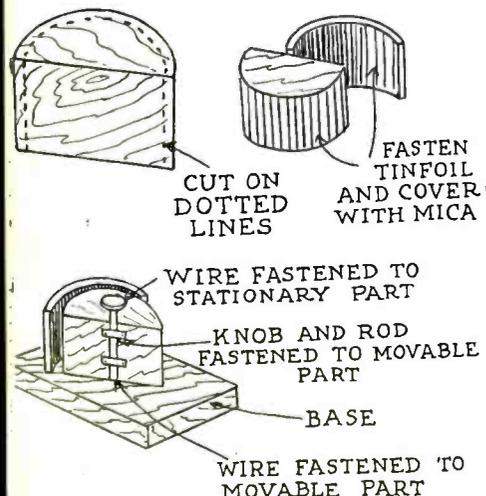
The aerial can be of any one of the many types illustrated but a single one of 14 gauge wire from 75 to 100 feet in length well insulated will work as good if not better than the others. By good insulation I mean that the wire must not touch anything except porcelain, glass, rubber or other substance that will NOT conduct electricity. Fig 4 shows a single wire aerial with the insulators in place. The round wire must be fastened to a water pipe or gas pipe, or any other pipe that goes beneath the surface of the ground.

The most important instruments now needed are the telephones, and as they cannot be made, they must be bought and as the best instruments are of little use unless the telephones are good, I would suggest that they be a good pair that you will not have to discard even when you get an expensive outfit.

To operate the set after you have everything connected you have to move the sliders of the tuning coil till you get the station you wish to hear, as loud as you can get it, then the movable part of the condenser is turned back and forth until the signals come clearest.

If you do not get results, the crystal detector is the probable cause, and the wire must be made to touch the crystal in different places, in search of a sensitive spot where the signals can be heard. If this does not work the crystal must be discarded and one that is more sensitive purchased.

VARIABLE CONDENSER



SMALL FIXED CONDENSER

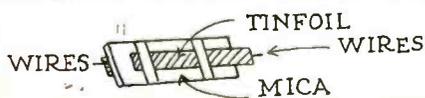
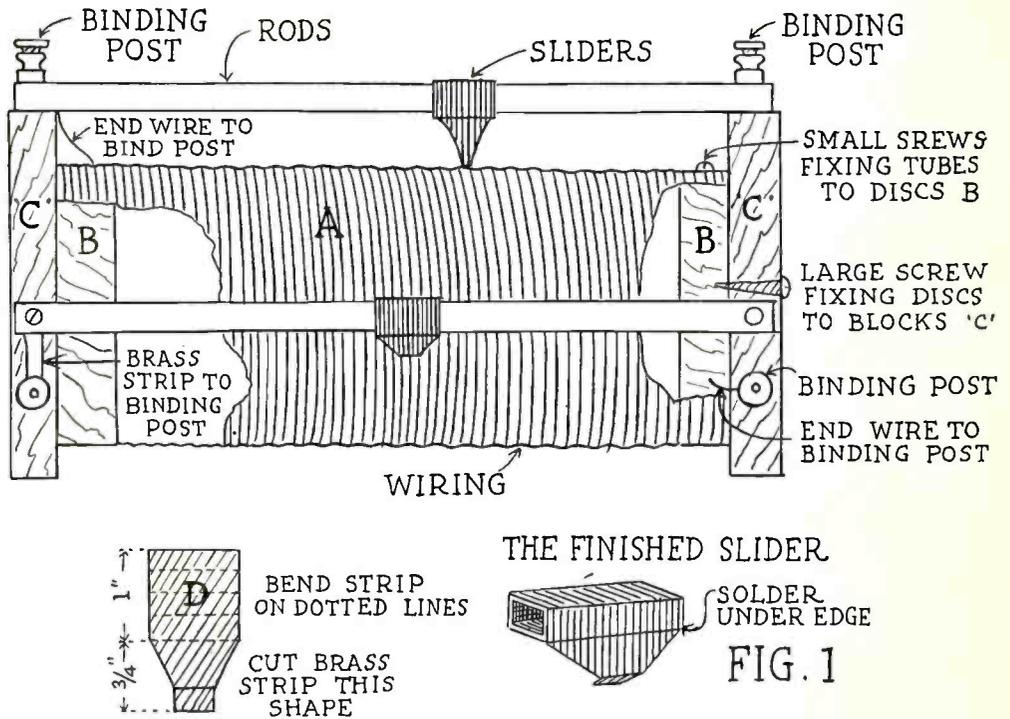


FIG. 3



Radio on the Farm

Neither the telephone nor the automobile made so great an advancement in the farmer's contact with the village and the city as the radiophone is doing. Farmer boys, quick to seize upon the radio receiving set as a scientific mystery that must be mastered, have brought the rural districts into close association with one another and with the life of the big cities. The result is not only entertaining but it is decidedly useful.

An eastern inventor says he will make a plow which can be directed by radio. Many of these dreams may come true but there are other developments in radio that engage the practical farmer in the practical present. For example, there is the plan of the Chicago Board of Trade to establish a radio system of crop and produce reports and market quotations which will be heard throughout a radius of 500 miles from Chicago.

W. A. Wheeler, of the United States Department of Agriculture, says there is no single use of radio, except for marine and aerial purposes, that should take precedence over its utilization for the benefit of agriculture.

"There are more than 32,000,000 farmers," said Mr. Wheeler, "nearly one-third of the population of the United States. Radio is the only means of getting to them quickly and at small cost. The time element in dispatching weather predictions to the farmer is a big factor. In cutting hay or harvesting grain an hour's delay in receiving a weather report may mean a loss of

solve the problem."

As in the city it is the boy who is leading the march toward the perfected radio age in the country. In Ocean Grove, N. J., a group of boys who were interested in radio, pooled their knowledge of the science and co-operated in a financial way to establish a radio receiving station, from which they send out telephone calls and messengers with the latest reports on weather, the markets and the crop situation. This club, known as the Ocean County Radio Club, has become so popular that boys in other counties and other states are following the Jersey example. This has attracted the active interest of many agricultural colleges.

The St. Louis University is broadcasting national and local agricultural reports. The United States Department of Agriculture broadcasts this service from stations at Cincinnati, Omaha, Washington, North Platte, Neb., Rock Springs, Wyo., Elko and Reno, Nevada. These are received by thousands of state bureaus, agricultural associations, banks and other interests which relay them to individual farmers.

The official weather prophet in England sends out warning of approaching thunderstorms by radio and a charge is made of six cents per message.

The Farm Bureau Federation of Chicago announces plans to complete its service of sending out by radio market figures, reports and activities of the American Farm Bureau, The United States Grain Growers, the Illinois Agricultural Association and the National

How To Make A Radio Set For \$6

A WIRELESS LESSON BY UNCLE SAM HIMSELF

“**H**ow can I make a radiophone receiving outfit for a small price and listen in on the concerts, speeches, news reports, weather forecasts, etc., that are broadcast each night from the sending stations nearest my home? I know very little about electricity but thousands of novices are making their own radio sets and I want to make one, too. I do not understand the long words used in most explanations. I want somebody to tell me in simple language, with clear diagrams, just how it can be done.”

One of the main objects in starting Radio Age is to answer in this first issue, and in all succeeding issues, the foregoing question—a question asked by hundreds of thousands of boys and their daddies.

Proof that the government is impressed with the necessity for helping radio beginners is supplied in the following article. So many boys and girls in radio clubs wanted the information that the States Relations Service of the U. S. Department of Agriculture asked the U. S. Bureau of Standards to prepare the article for beginners. If all points are not made clear send stamped envelope with request for explanation and Radio Age will give you the desired information.

The Editor.

THIS article tells how to construct the entire receiving station, including antenna as well as a crystal-detector receiving set. This station will enable one to hear the messages sent from medium-power transmitting stations within an area about the size of a large city, and to hear high-power stations within 50 miles, provided the waves used by those stations have wave frequencies between 500 and 1500 kilocycles per second (i. e., wave lengths between 600 and 200 meters). Much greater distances are often covered, especially at night. If a person constructs the coil and other parts as indicated, the total cost of this set can be kept down to about \$6.00. If, however, a specially efficient outfit is desired, the cost may be about \$15.00.

Essential Parts

There are five essential parts: the antenna, lightning switch, ground connections, receiving set, and phone. The received signals come into the receiving set through the antenna and ground connection. In the receiving set they are converted into an electric current which produces the sound in the “phone.” The phone is either one or a pair of telephone receivers worn on the head of the listener.

The purpose of the lightning switch is to protect the receiving set from damage by lightning. It is used to connect the antenna directly to ground when the receiving station is not being used.

When the antenna and the connection to the ground are properly made and the lightning switch is closed, an antenna acts as a lightning rod and is a protection rather than a source of danger to the building.

The principal part of the station is the “receiving set.” In the set described herein it is subdivided into two parts, the “tuner” and the “detector,” and in more complicated sets still other elements are added.

Antenna

The antenna is simply a wire suspended between two elevated points. Wherever there are two buildings, or a

tenna should not be less than 30 feet above the ground and its length should be about 75 ft. (See Fig. 1.) While this figure indicates a horizontal antenna, it is not important that it be strictly horizontal. It is in fact desirable to have the far end as high as possible. The “lead-in” wire or drop-wire from the antenna itself should run as directly as possible to the lightning switch. If the position of the adjoining buildings or trees is such that the distance between them is greater than about 85 ft., the antenna can still be held to a 75 ft. distance between the insulators by increasing the length

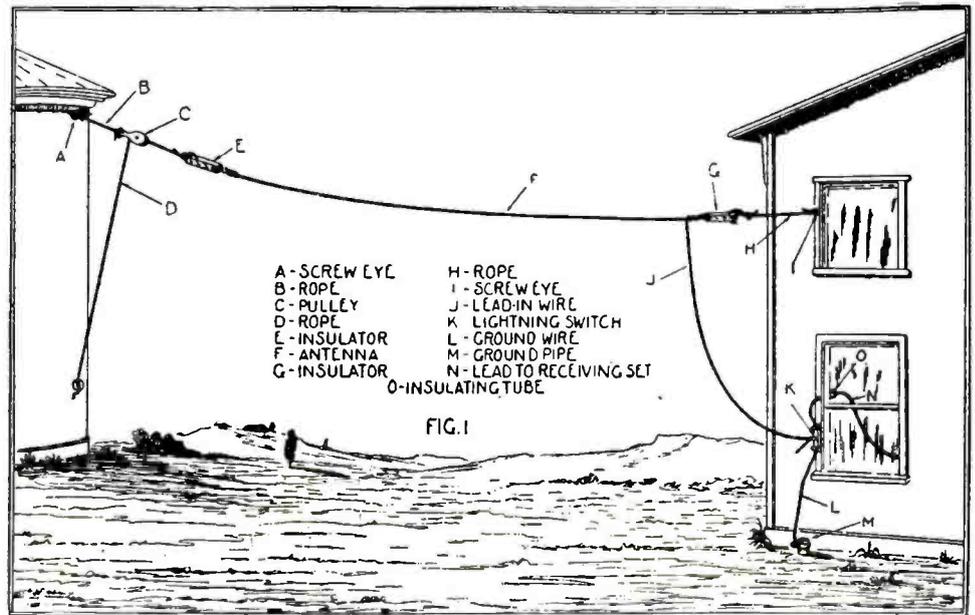


FIG. 1

house and a tree, or two trees with one of them very close to the house, it relieves one of the need of erecting one or both antenna supports. The an-

of the piece of rope (D) to which the far end of the antenna is attached. The rope (H) tying the antenna insulator to the house should not be lengthened to overcome this difficulty because by so doing the antenna “lead-in” or drop-wire (J) would be lengthened.

Details of Parts.—The parts will be mentioned here by reference to the letters appearing in Figs. 1 and 2.

A and I are screw eyes sufficiently strong to anchor the antenna at the ends.

B and H are pieces of rope $\frac{3}{8}$ or $\frac{1}{2}$ inch in diameter, just long enough to allow the antenna to swing clear of the two supports.

D is a piece of $\frac{3}{8}$ or $\frac{1}{2}$ inch rope sufficiently long to make the distance between E and G about 75 ft.

C is a single-block pulley which may be used if readily available.

Insulators

E and G are two insulators which may be constructed of any dry hard wood of sufficient strength to withstand the strain of the antenna; blocks about $1\frac{1}{2} \times 2 \times 10$ in. will serve. The hole should be drilled as shown in Fig. 1 sufficient

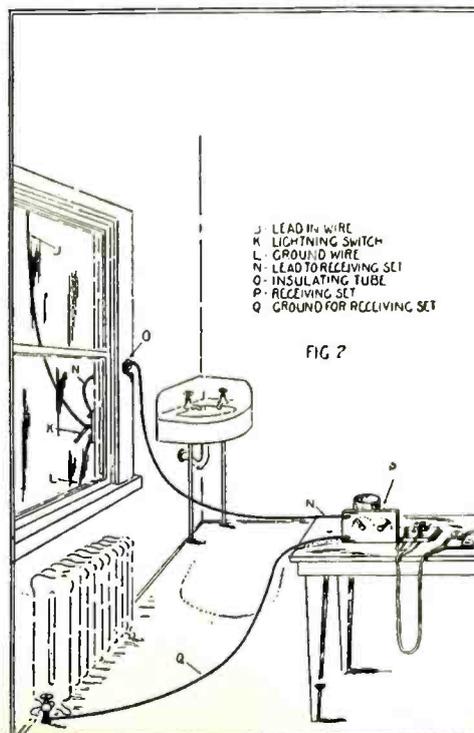


FIG. 2

How to Make a Radio Set for \$6

Continued from page seven

ficiently far from the ends to give proper strength. If wood is used the insulators should be boiled in paraffin for about 1 hour. If porcelain wiring cleats are available they may be substituted instead of the wood insulators. If any unglazed porcelain is used as insulators, it should be boiled in paraffin the same as the wood. Regular antenna insulators are advertised on the market, but the two improvised types just mentioned will be satisfactory for an amateur receiving antenna.

F is the antenna about 75 ft. between the insulators E and G. The wire may be No. 14 or 16 copper wire either bare or insulated. The end of the antenna farthest from the receiving set may be secured to the insulator (E) by any satisfactory method, being careful not to kink the wire. Draw the other end of the antenna wire through the other insulator (G) to a point where the two insulators are separated by about 75 ft., twist the insulator (G) so as to form an anchor as shown in Fig. 1. The remainder of the antenna wire (J) which now constitutes the "lead-in" or drop-wire should be just long enough to reach the lightning switch.

Lightning Switch

K is the lightning switch. For the purpose of a small antenna this switch may be the ordinary porcelain-base, 30 ampere, single-pole double-throw battery switch. These switches as ordinarily available, have a porcelain base about 1 by 4 in. The "lead-in" wire (J) is attached to this switch at the middle point. The switch blade should always be thrown to the lower clip when the receiving set is not actually being used and to the upper clip when it is desired to receive signals.

L is the ground wire for the lightning switch; it may be a piece of the same size wire as used in the antenna, of sufficient length to reach from the lower clip of the lightning switch (K) to the clamp on the ground rod (M).

M is a piece of iron pipe or rod driven 3 to 6 ft. into the ground, preferably where the ground is moist, and extending a sufficient distance above the ground in order that the ground clamp may be fastened to it. Scrape the rust or paint from the pipe before driving in the ground.

N is a wire leading from the upper clip of the lightning switch through the porcelain tube (O) to the receiving set binding post marked "antenna."

O is a porcelain tube of sufficient length to reach through the window casing or wall. This tube should be mounted in the casing or wall so that it slopes down toward the outside of the building. This is done to keep the rain from following the tube through the wall to the interior.

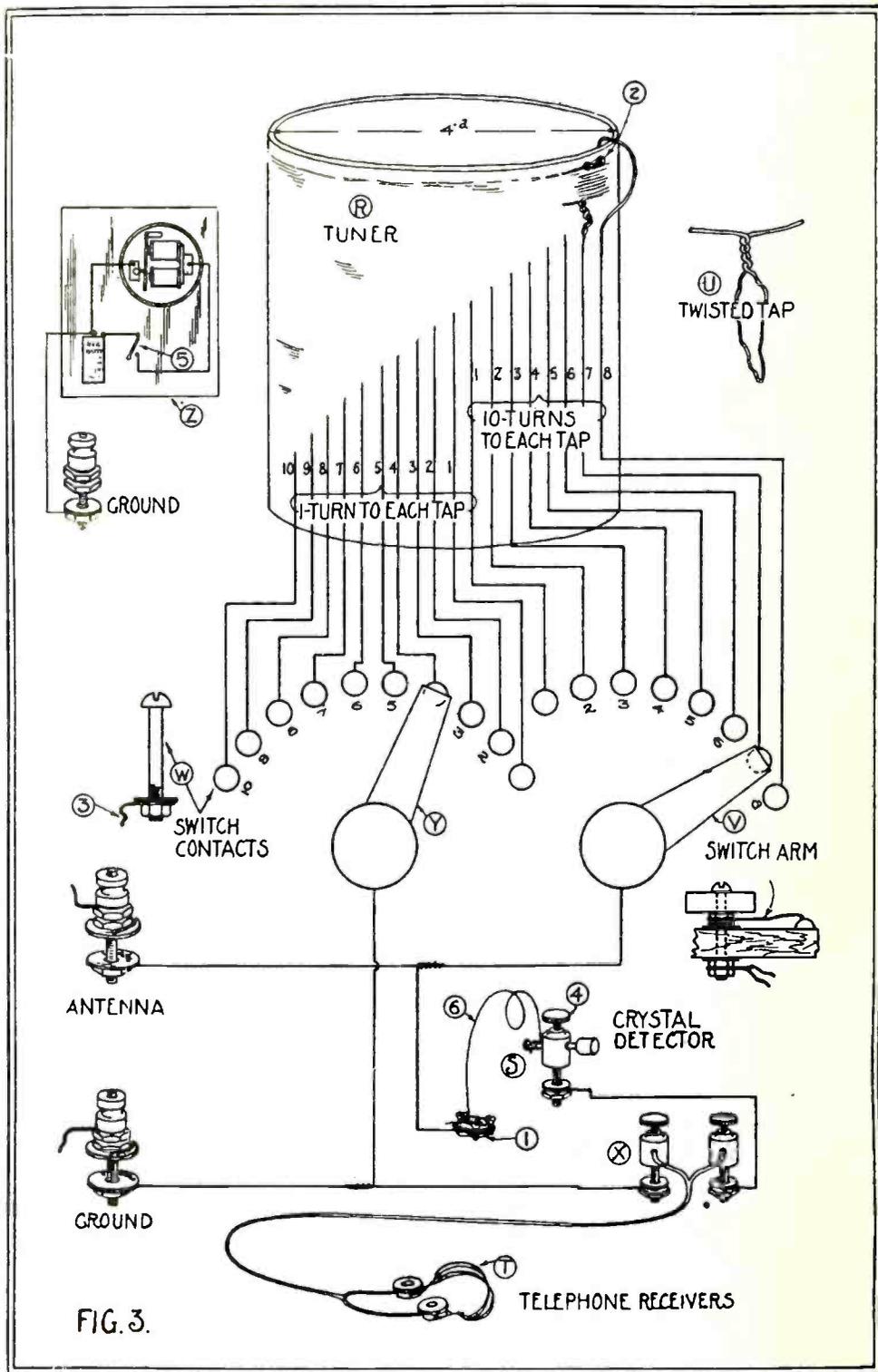


FIG. 3.

Ground Wire

Fig. 2 shows the radio receiving set installed in some part of the house.

P is the receiving set which is described in detail below.

N is the wire leading from the "antenna" binding post of the receiving set through the porcelain tube to the upper clip of the lightning switch. This wire, as well as the wire shown by Q, should be insulated and preferably flexible. A piece of ordinary lamp cord might be unbraided and serve for these two leads.

Q is a piece of flexible wire leading from the receiving set binding post marked "ground" to a water pipe, heating system or some other metallic

conductor to ground, except M, Fig. 1. If there are no water pipes nor radiators in the room in which the receiving set is located, the wire should be run out of doors and connected to a special "ground" below the window, which shall not be the same as the "ground" for the lightning switch. It is essential that for the best operation of the receiving set this "ground" be of the very best type. If the soil near the house is dry it is necessary to drive one or more pipes or rods sufficiently deep to encounter moist earth and connect the ground wire to the pipes or rods. This distance will ordinarily not exceed 6 ft. Where clay soil is encountered this distance may be reduced to 3 ft., while

New Radio Trade Features

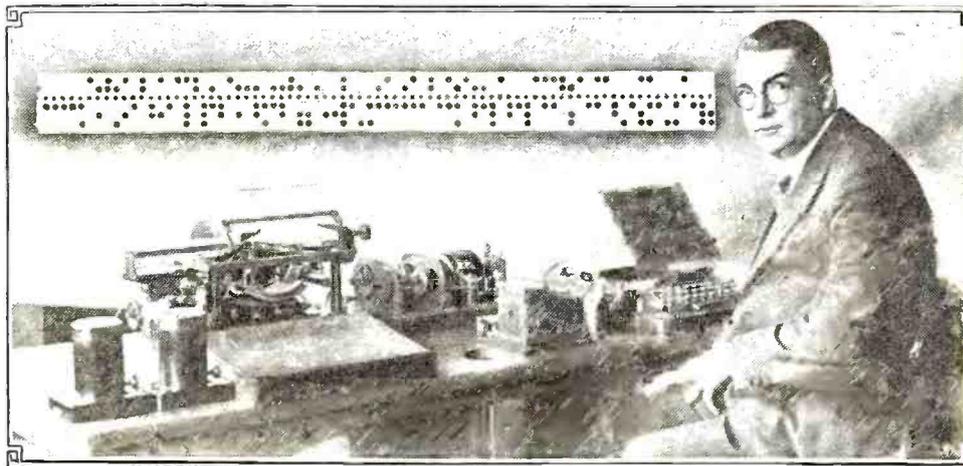
IT is expressing it conservatively to say that every day there is some new and interesting development in radio operation, radio utility or in radio invention. Some of the novelties are more interesting than important.

But others are beacon lights showing the way to perfection in radio uses that were unhopd for a comparatively short time ago. We present two radio devices which should interest not only the radio trade generally but the many thousands of individuals who are following with amazement the progress of the sound-wave in its silent attack on a lot of our old ideas and customs.

With the ordinary receiving set you have several instruments scattered about a table with wires connecting the different parts. The designer of the Simplex Radiola, J. H. Newman, encloses all these parts in a fine cabinet similar to a phonograph cabinet, a real piece of furniture. The set is complete for receiving any telephone or telegraph messages within a radius of 1000 miles of the sending station.

The features of this machine are: an auxiliary panel with switches for the batteries and horn, rheostat for reducing the volume of sound and also increasing it, etc. Two drawers are provided for writing materials, extra headphones, books and any other materials used.

This machine has been operated in hotel lobbies and before audiences in theatres with tremendous success.



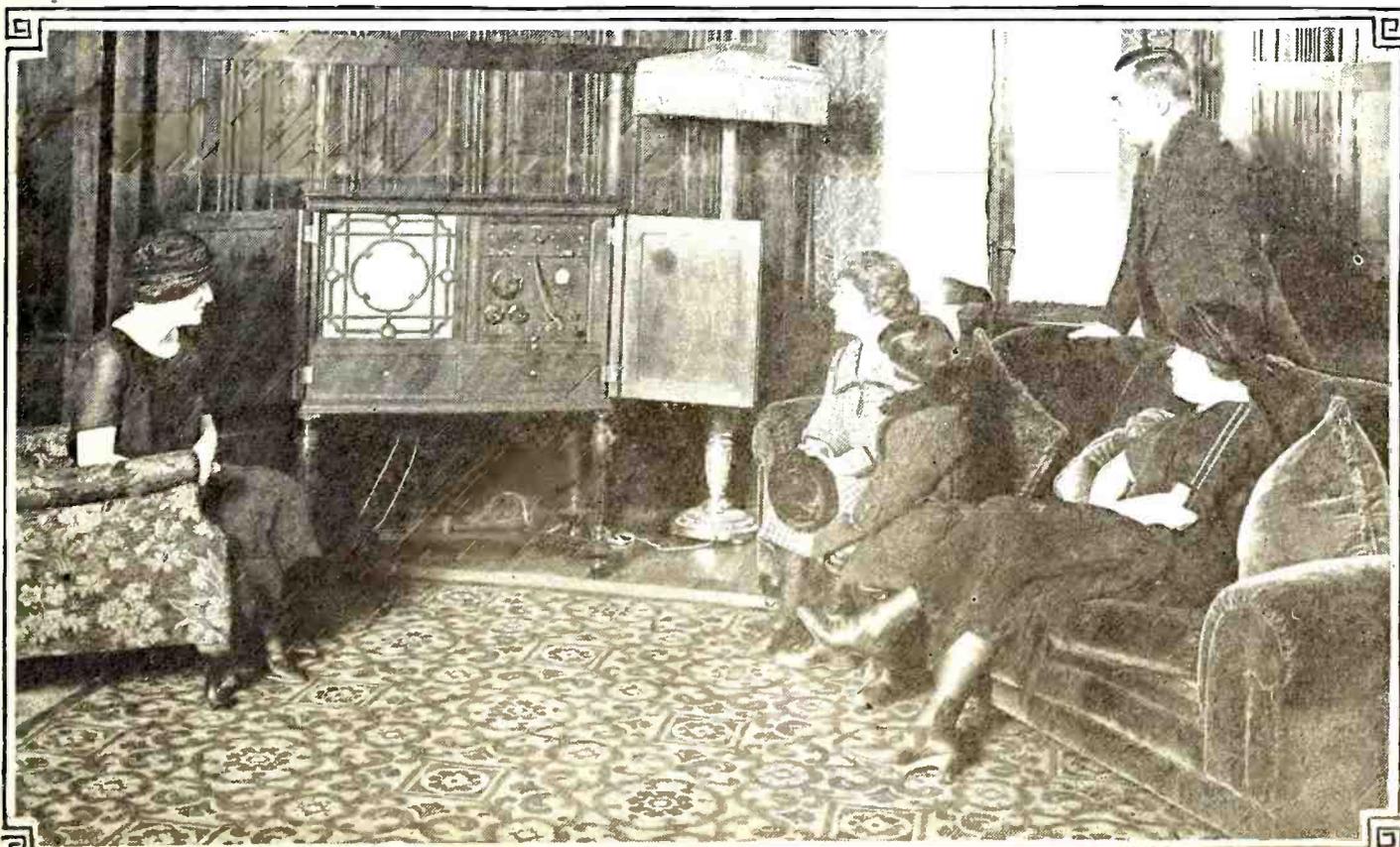
Secrecy in wireless communication may be obtained by the adoption of printing telegraph machines similar to those used on press and commercial telegraph circuits in many parts of the country. Experiments have been under way by the Morkrum Company for months with automatic wireless printers and the system has proved successful.

The printing machines use a tape in which a punching mechanism, operated by the keys of a typewriter keyboard, perforates holes in various combinations of five positions. This tape by means of an automatic transmitter and rotary switch, controls the grid circuit of a c. w. transmitting set and sends interrupted c. w. signals. At the receiving station, the Radio signals are

received in a sensitive receiving set and in place of the telephones, a specially designed relay is connected in the circuit. This relay in turn controls a rotary switch, which operates five magnets in the receiving page printer and sets up the combination which corresponds to the one transmitted from the perforated tape at the transmitting station.

Secrecy is attained because code combinations can be varied at will and the rotary switches at transmitting and receiving stations must also be synchronized and the speed of these two switches can be varied.

Further information about the Radiola and the Radiotype will be furnished by Radio Age on request.



Questions and Answers

Under this heading *Radio Age* will publish questions and answers each month. The answers will be written by efficient technicians. Readers should limit themselves to five questions in each letter. It is preferable that they should write on one side of the page only and use special care to make their name and address readable.

F. E. C. Elmwood—Kindly let me now what I would need and the construction of a loud speaker (magnavox type), suitable for a set equipped with loose coupler, A. P. detector and two age radiotron amplifier.

Answer—It is not practical to make home-made magnavox receiver. A loud speaker may be made by coupling single sensitive receiver, such as the Aldwin or Browne, to a horn or to our phonograph. You can purchase coupling device that is made for the purpose.

E. K. encloses a standard heterodyne hook-up that is coupled to the secondary of an audion receiver and asks:

1. The size of each coil (five altogether) to receive P. O. Z.

2. Is there any advantage in using 10 volts on the oscillator through a filter?

3. Is an A. P. amplifier suitable for the oscillator and a W. E.-V. T. 1 as the detector?

Answer—1. Use two 1,000-turn coils for primary and secondary, with some small coil of such as 25 turns to couple the heterodyne. The heterodyne may have two 750-turn coils. You probably would get better results using an Armstrong hook-up with the other bulb as a step of amplification.

2. There is no advantage. It might work, however. The Navy tried this tune some time ago, but has discarded it.

3. The tubes you mention are excellent for the purpose. Use 45 volts or more for the plate.

J. B. says: I am using one of the small crystal sets that are so popular, and I would like to know if there is any simple way of increasing my overall efficiency.

Answer—The aerial and ground are the logical place to start. See that your antenna is kept far away from chimneys, roofs, trees, chimneys or any objects that may steal energy. Solder all connections, increase your antenna and lead-in insulation. Connect your ground lead to gas and water pipes, radiators and any other grounded objects about the station. Try out several different crystals. When you find a really sensitive detector you will have improved matters immensely.

T. H.—I just moved from the country where I had a 100-foot aerial which I used in conjunction with a receiving instrument having two steps of amplification. The owner of the house I now live in has refused me permission to erect any aerial. I tried a loop, but with very little success. What can I do to the set to make the loop recep-

Answer—A larger loop may help you. Failing, we suggest that you add another step to your detector and another to your amplifier. This will give you the desired results.

Q. X.—My aerial is 55 feet long and 30 feet high. Can this be improved upon?

Answer—Yes. Run your aerial out to as near 100 feet as you can. The height is all right providing there is no immediate object which towers over or flanks it.

M. B. says: A friend of mine wants to hook in his set on my aerial. He lives in another house. Do you think that two sets operating from the same aerial will give good results to both of us? If not, can we run another aerial parallel to the one I am using without causing interference to each other?

Answer—Two sets cannot be operated from the same aerial at the same time. If you refer to receiving set there will be no interference from either of the two parallel aeriels. On the other hand, however, if you have transmitting set there is a merry time in store for both of you, with all the interference on earth for both of you while trying to operate at the same time especially if one of you is trying to receive.

C. E. R. says: I have a loose coupler and audion detector, singing does not come in plain, however the announcer's voice comes in plain. Is there any way in which I can make singing come in plain? (b) Can I make this outfit louder without using any additional apparatus? (c) My aerial is 75 feet long, 30 feet high at one end and 20 feet high at the other, would it improve conditions if I were to make it 100 feet long? (d) Does it weaken the B battery to have it connected? (e) Does it dim the signals when there is a splice in the lead-in about two feet from instruments?

Answer (a) The only way we can answer this is to tell you that the announcer is an exceptionally good, clear, distinct and forceful speaker at Station KYW. (b) The only way we could determine how you could do this is to examine your hookup, mail us a copy of your hookup, and we may be able to give you some help. (c) Yes, this would be an improvement, however, we would suggest that you raise your aerial a few more feet. (d) We would have to see your hookup before answering this question. (e) If you have the connection soldered it will be perfectly satisfactory, and will not decrease sig-

W. B. encloses copy of hookup and asks (a) What is the approximate wave length of my set? (b) Could you suggest any improvement which might improve this set? (c) Are values of grid leak and condenser correct or would you suggest a change?

Answer (a) Your approximate wave length is 800 meters. (b) The only change we could suggest is, make your B battery variable, we think that you might possibly get better results using less voltage on your detector. (c) We think you are using the correct capacity for grid condenser, however, you should employ a variable grid leak, as different tubes and conditions require different values of leakage across the condenser, a variable condenser at this point would also be very desirable. However, you can determine the value required at this point, and then make a fixed condenser of the correct value, which will be satisfactory.

B. J.: A receiving set could be made to fit in a cigar box. Wind the tuning coil on a block of wood instead of a cylinder. The other pieces do not take up much room.

F. S.: Lester Hart of Rockville Centre, L. I., is using a home-made variometer regenerative receiver, and has copied practically all of the distant phones. The secret seems to be that he is using one of the old audiotron tubes that are remarkably sensitive. His B battery is made up of flashlight cells, which he claims work better than the usual block battery. One peculiarity in his circuit is that he uses no grid-leak. This works fine with some tubes. It must be remembered that grid-leaks were unknown in the early days of the vacuum tube.

A. B. C.: Many people going into the radio game start with a small tuning coil and crystal detector, then eventually someone will talk to them about building a big set. This immediately creates the impression that if they construct a tuning coil about five times as large that they will hear better. In this they are mistaken. The only thing this does is increase the wave length of the instrument, and does not increase the loudness or efficiency of the set. Get just as much wire on the coil as is necessary and then stop.

R. L. asks: Could I receive KYW with a crystal detector and phones?

Answer—Yes, you could receive this station with a crystal detector and phones; however, you should employ a

Pickups

ROLAND ROGERS has ordered a radiophone for his enterprising store in Wapakoneta, O. Butcher & Steinmetz have put in a receiving outfit in their store at Waynesfield, O.

DR. REMSBERG, of Princeton, Ill., entertained friends with a radiophone report of the Greb-Gibbons fight. Many Princeton residents have receiving sets.

THE BELL TELEPHONE Company is planning a radiophone system with a station in each large city.

MUSIC PUBLISHERS are demanding a tax from all sending stations that broadcast their copyrighted music. What would the song-writers say if some of their songs were denied the ether waves? Impure air some day may have a double meaning.

AMATEURS, even the very green

readers who are interested may write Radio Age for further information.

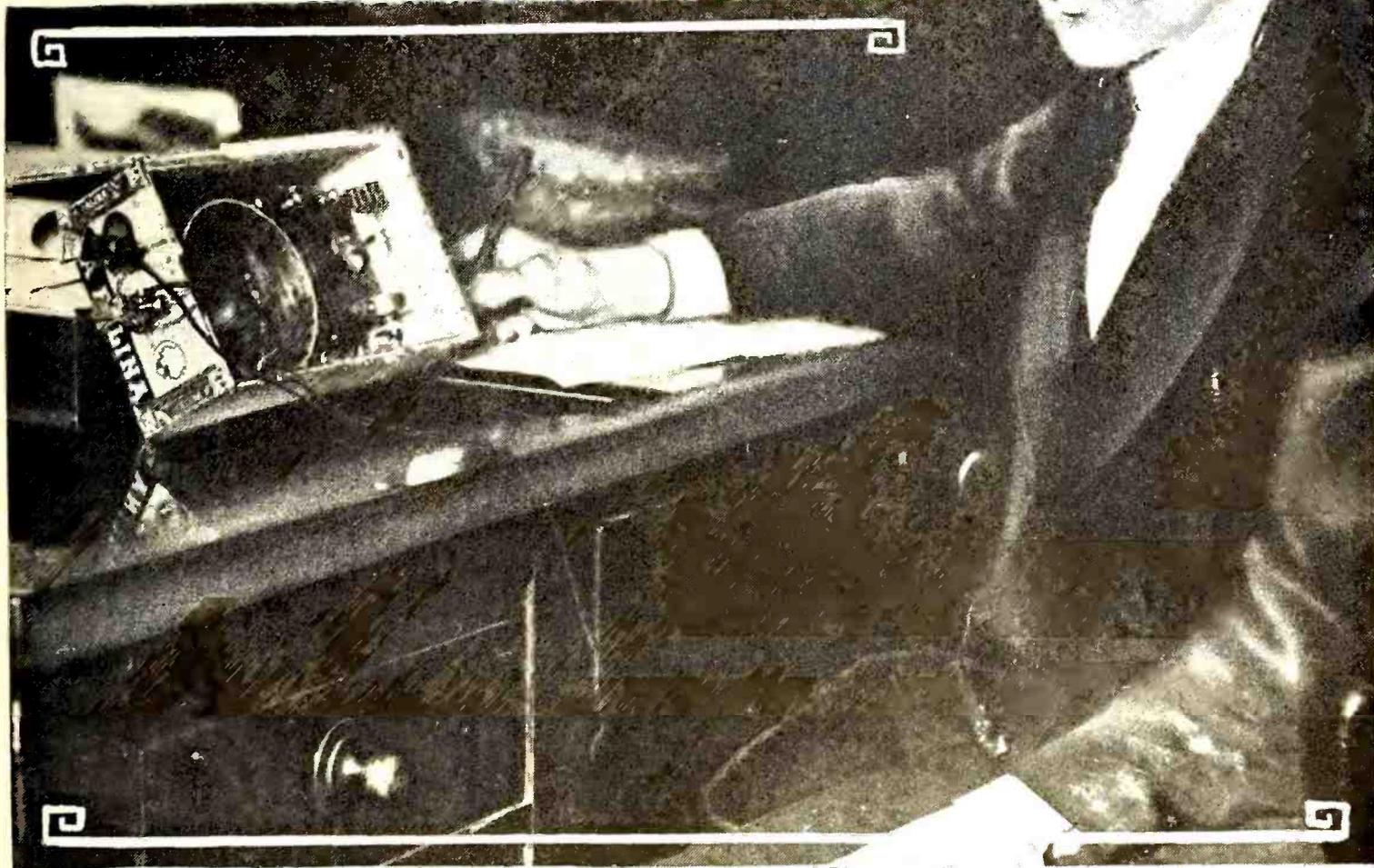
CLEVER INVENTORS are trying to find a way to send and receive messages that cannot be understood by others. This effort applies to telephony, not to wireless telegraphy. The plan is to distort the speech so that it will be unintelligible except at the receiving end, which has a set adjusted to straighten out the distortions.

MINING OFFICIALS are considering the radiophone as a means of averting loss of life in mine accidents. They would equip the miner's cap with a miniature transmitter which could send alarm to a powerful receiving station at the mouth of the mine. The receiver would not only catch the signal but locate the point of danger.

hear William Jennings Bryan, who was talking in Pittsburgh.

JOHN EDWARD SNYDER is installing a radio receiver in his ice-cream parlor in Peoria, Ill.

CENTRAL HIGH SCHOOL in Ray



Herbert Parish, a sixteen year old youth of Milwaukee, filled up a Radiophone set in an hour that can receive messages the same as a regular outfit except at extremely far distances. Herbert hopes some day to join the Signal Corps and believes that he could make good use of his speed in the army. —International Photo.

ones will find the little book "Radio Hook-ups" of great value and interest in their making of receiving sets and in operating them. Another good book for amateurs is "Design Data for

THE CANADIAN GOVERNMENT is considering the permitting of amateurs to use continuous wave transmission up to 250 meters wave length.

JOE ATIERTON, at Macomb, Ill.,

County, Illinois, is ten miles from a railroad or postoffice but has installed a radio set and is now right in the middle of the throbbing world. The students will receive and disseminate

How to Make a Radio Set for \$6

Continued from page 8

in sandy soil it may be increased to 10 ft. If some other metallic conductor, such as the casing of a drilled well, is not far away from the window, it will be a satisfactory "ground."

Tuner, Detector and Phone

The detector and phone will have to be purchased. The tuner and certain accessories can be made at home.

Tuner (R, Fig. 3)—This is a piece of cardboard or other non-metallic tubing with turns of copper wire wound around it. The cardboard tubing may be an oatmeal box. Its construction is described in detail below.

Crystal Detector (S, Fig. 3)—The construction of a crystal detector may be of very simple design and quite satisfactory. The crystal, as it is ordinarily purchased, may be unmounted or mounted in a little block of metal. For mechanical reasons the mounted type may be more satisfactory, but that is of no great consequence. It is very important, however, that a very good tested crystal be used. It is probable also that a galena crystal will be more satisfactory to the beginner.

The crystal detector may be made up of a tested crystal, three wood screws, short piece of copper wire, a nail, set-screw type of binding post, and a wood knob or cork. The tested crystal is held in position on the wood base by three brass wood-screws as shown at 1, Fig. 3. A bare copper wire may be wrapped tightly around the three brass screws for contact. The assembling of the rest of the crystal detector is quite clearly shown in Fig. 3.

Phone (T, Fig. 3)—It is desirable to use a pair of telephone receivers connected by a head band, usually called a double telephone headset. The telephone receivers may be any of the standard commercial makes having a resistance of between 2000 and 3000 ohms. The double telephone receivers will cost more than all the other parts of the station combined, but it is desirable to get them, especially if one plans to improve his receiving set later. If one does not care to invest in a set of double telephone receivers, a single telephone receiver with a head band may be used; it gives results somewhat less satisfactory.

Accessories—Under the heading of accessory equipment may be listed binding posts, switch arms, switch contacts, test buzzer, dry battery, and boards on which to mount the complete apparatus. The binding posts, switch arms and switch contacts may all be purchased from dealers who handle such goods or they may be quite readily improvised at home. There is nothing peculiar about the pieces of wood on

Cost of Parts

The following list shows the approximate cost of the parts used in the construction of this radio receiving station. The total cost will depend largely on the kind of apparatus purchased and on the number of parts constructed at home.

Antenna—	
Wire—Copper, bare or insulated, No. 14, 100 to 150 ft., about .....	.75
Rope— $\frac{3}{8}$ or $\frac{1}{2}$ inch. 2c per foot.	
2 insulators, porcelain .....	.20
1 pulley .....	.15
Lightning switch—30 ampere battery switch .....	.30
1 porcelain tube .....	.10
Ground connections—	
Wire (same kind as antenna wire.)	
1 clamp .....	.15
1 iron pipe or rod .....	.25
Receiving set—	
$\frac{1}{2}$ pound No. 24 copper wire double cotton covered .....	.75
1 cardboard box.	
2 switch knobs and blades complete	1.00
18 switch contacts and nuts .....	.75
3 binding posts—set screw type .....	.45
2 binding posts—any type .....	.30
1 crystal—tested .....	.25
3 wood screws, brass, $\frac{3}{4}$ in. long .....	.03
Wood for panels (from packing box.)	
2 pounds paraffin .....	.30
Lamp cord, 2 to 3c per ft.	
Test buzzer .....	.50
Dry battery .....	.30
Telephone receivers	4.00 to \$8.00*
Total	\$11.00 \$15.00

If nothing but the antenna wire, lightning switch, porcelain tube, crystal, telephone receiver, bolts and buzzer are purchased this total can be reduced to about \$6.00.

*Still more efficient and expensive telephone receivers are available at prices ranging to about \$20.00.

may be obtained from a dry packing-box and covered with paraffin to keep out moisture.

Details of Construction

The following is a detailed description of the method of winding the coil, construction of the wood panels, and mounting and wiring the apparatus:

Tuner—See R, Fig. 3. Having supplied oneself with a piece of cardboard tubing 4 in. in diameter and about $\frac{1}{2}$ pound of No. 24 (or No. 26) double cotton covered copper wire, one is ready to start the winding of the tuner. Punch two holes in the tube about $\frac{1}{2}$ in. from one end as shown at 2 on Fig. 3. Weave the wire through these holes in such a way that the end of the wire will be quite firmly anchored, leaving about 12 inches of the wire free for connections. Start with the remainder of the wire to wrap the several turns in a single layer about the tube, tightly and closely together. After 10 complete turns have been wound on the tube hold those turns snugly while a tap is being taken off. This tap is made by making a 6 in. loop of the wire and twisting it together at such a place that it will be slightly staggered from the first tap. This method of taking off taps is shown quite clearly at U, Fig. 3. Proceed in this manner until 7 twisted taps have been taken off

turns have been wound on the tube then take off a 6 in. twisted tap for every succeeding single turn until 10 additional turns have been wound on the tube. After winding the last turn of wire anchor the end by weaving it through two holes punched in the tube much as was done at the start, leaving about 12 in. of wire free for connecting. It is to be understood that each of the 18 taps is slightly staggered from the one just above, so that the several taps will not be bunched along one line on the cardboard tube. See Fig. 3. It would be advisable, after winding the tuner as just described, to dip the tuner in hot paraffin. This will help to exclude moisture.

Panel and Base

Having completed the tuner to this point, set it aside and construct the upright panel shown in Fig. 4. This panel may be a piece of wood approximately $\frac{1}{2}$ in. thick. The position of the several holes for the binding posts, switch arms and switch contacts may first be laid out and drilled. The "antenna" and "ground" binding posts may be ordinary $\frac{1}{8}$ in. brass bolts of sufficient length and supplied with three nuts and two washers. The first nut binds the bolt to the panel, the second nut holds one of the short pieces of stiff wire, while the third nut holds the antenna or ground wire as the case may be. The switch arm with knob shown at V, Fig. 3, may be purchased in the assembled form or it may be constructed from a thin slice cut from a broom handle and a bolt of sufficient length equipped with four nuts and two washers together with a narrow strip of thin brass somewhat as shown. The switch contacts

\$50 Prizes for Boys

Radio Age will pay prizes as follows for the best original articles (with drawings) from boys of 18 years and under, on

How to Make Home Radio Receiving Sets:

First Prize	- \$20.00
Second Prize	15.00
Third Prize	- 10.00
Fourth Prize	5.00

Articles must be clearly illustrated and must be not longer than 2000 words, or shorter than 1000.

Another special prize of \$10 will be awarded to the boy of 18 or under who writes and illustrates (with rough sketches) the best original article of about 500 words on how to make the best variable and the best fixed condenser at home.

Winners will be announced in Radio Age--July Number.

(W, Fig. 3) may be of the regular type furnished for this purpose or they may be brass bolts equipped with one nut and one washer each or they may even be nails driven through the panel with an individual tap fastened under the head or soldered to the projection of the nail through the panel. The switch contacts should be just close enough that the switch arm will not drop between the contacts, but also far enough apart that the switch arm can be set so as to touch only one contact at a time.

The telephone binding post should preferably be of the set screw type as shown at X, Fig. 3.

Instructions for Wiring

Having constructed the several parts just mentioned and mounted them on the wood base, one is ready to connect the several taps to the switch contacts and attach the other necessary wires. Scrape the cotton insulation from the loop ends of the sixteen twisted taps as well as from the ends of the two single taps coming from the first and last turns. Fasten the bare ends of these wires to the proper switch contacts as shown by the corresponding numbers in Fig. 3. One should be careful not to cut or break any of the looped taps. It would be preferable to fasten the connecting wires to the switch contacts by binding them back of the binding post marked "ground" (Fig. 3) to the back of the left-hand switch-arm bolt (Y), thence to underneath the left-hand binding post marked "phones." A wire is then run from underneath the right-hand binding post marked "phones" to underneath the binding post (4, Fig. 3), which forms a part of the crystal detector. A piece of No. 24 bare copper wire about 2½ in. long, one end of which is twisted tightly around the nail (the nail passing through binding post 4), the other end of which rests gently by its own weight on the crystal (1). The bare copper wire which was wrapped tightly around the three brass wood-screws holding the crystal in place is lead to and fastened at the rear of the right-hand switch arm bolt (v), thence to the upper left-hand binding post marked "antenna." As much as possible of this wiring is shown in Fig. 3.

Directions for Operating

After all the parts of this crystal-detector radio receiving set have been constructed and assembled the first essential operation is to adjust the little piece of wire, which rests lightly on the crystal, to a sensitive point. This may be accomplished in several different ways; the use of a miniature buzzer transmitter is very satisfactory. Assuming that the most sensitive point on the crystal has been found by method described in paragraph below, "the Test Buzzer," the rest of the operation is to get the radio receiving set in resonance or in tune with the station from which

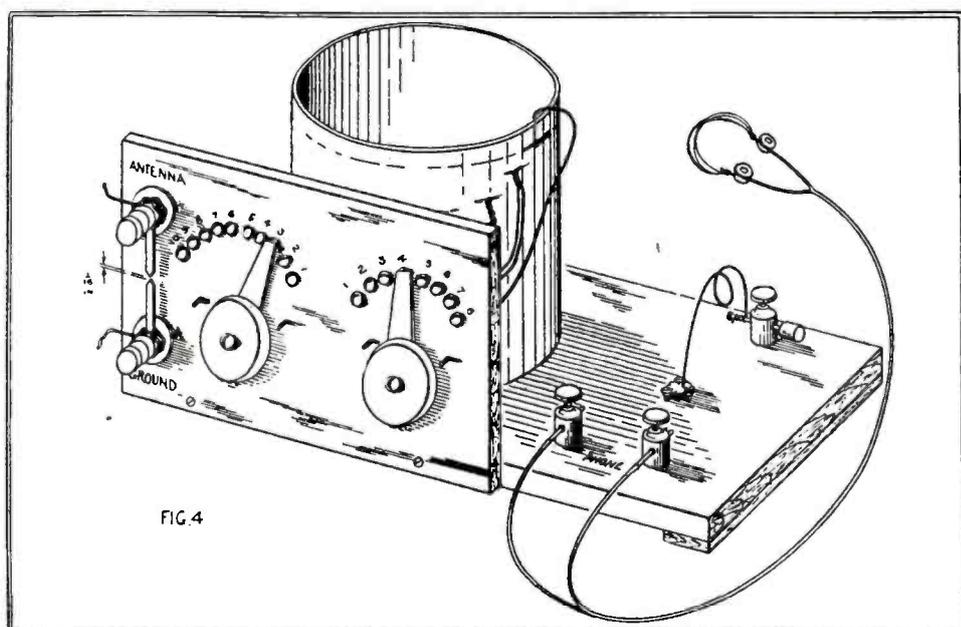


FIG. 4

one wishes to hear messages. The tuning of the receiving set is attained by adjusting the inductance of the tuner. That is, one or both of the switch arms are rotated until the proper number of turns of wire of the tuner are made a part of the metallic circuit between the antenna and ground, so that together with the capacity of the antenna the receiving circuit is in resonance with the particular transmitting station. It will be remembered that there are 10 turns of wire between each of the first 8 switch contacts and only one turn of wire between each 2 of the other contacts. The tuning of the receiving set is best accomplished by setting the right-hand switch arm on contact (1) and rotating the left-hand switch arm over all its contacts. If the desired signals are not heard, move the right-hand switch arm to contact (2) and again rotate the left-hand switch arm throughout its range. Proceed in this manner until the desired signals are heard.

It will be advantageous for the one using this radio receiving equipment to find out the wave frequencies (wave length) used by the several radio transmitting stations in his immediate vicinity.

The Test Buzzer (Z, Fig. 3) — As mentioned previously, it is easy to find the more sensitive spots on the crystal by using a test buzzer. The test buzzer is used as a miniature local transmitting set. When connected to the receiving set as shown at Z, Fig. 3, the current produced by the buzzer will be converted into sound by the telephone receivers and the crystal, the loudness of the sound depending on what part of the crystal is in contact with the fine wire. To find the most sensitive spot connect the test buzzer to the receiving set as directed, close the switch (5, Fig. 3) (and if necessary adjust the buzzer armature so that a clear note is emitted by the buzzer), set the right-hand

switch arm on contact point No. 8, fasten the telephone receivers to the binding posts marked "phones," loosen the set screw of the binding post slightly and change the position of the fine wire (6, Fig. 3) to several positions of contact with the crystal unit until the loudest sound is heard in the phones then tighten the binding post set screw (4) slightly.

WILLIAM TERRELL, a Peoria man was suspected of stealing a radio outfit. A wireless telephone message broadcast from the Bradley station described the instrument. An amateur operator in Peoria promptly reported that Terrell had tried to sell him such an instrument. Terrell faces the grand jury now. Pretty slick thief who can't hide from those wireless waves!

Great Radio Shows

Continued from page three

Delegations from many of the neighboring states have made reservations. A party of at least 30 dealers went from Detroit alone. The smaller cities and rural districts within easy receiving distance of the local broadcasting stations are among the most enthusiastic centers. All roads in the radio field lead toward Pittsburgh during the week.

The American Radio Exhibitors' association conducting the show has compiled information concerning the industry which is available to all the dealers, distributors and manufacturers. Special shipments of complete sets and supplies have been made by several of the manufacturers. This material is available for the public at the exhibition, says the Pittsburgh Press. Competent engineers are on hand at the information booth to answer any questions concerning radio which the visitors may ask.

Learn the Code

Before one starts receiving, he should master the language of the air. This is not the sound that is broadcast—but the dot and dash signals of the International Morse Code.

Don't throw up your hands in despair. It is not hard to learn. Once mastered, you will be able to get the full pleasure of "listening in"—you will get the secrets that are flying about all the time.

A little practice each day and you will be fascinated by decoding these mysterious dots and dashes.

Cut out this chart. Mount it on cardboard for ready reference.

The code may be learned by visualization. But it is much easier to learn it by sound. A tapping of a pencil will do. The best way, however, is to rig up a little buzzer and hear the real thing.

Get a high pitched buzzer, an ordinary telegraph key and a common dry battery. They can be purchased in any supply store at a small cost.

Mount the key on a table or desk, allowing plenty of room for the forearm. Connect the battery and buzzer according to the diagram.

When your hand is set have your wrist clear and your thumb resting lightly against the knob of the key. The index and third fingers should be on top and the other two fingers should be curved back into the hand.

The wrist should do the sending—the thumb and fingers acting merely as a guide for the wrist.

The spring in the key should be screwed down just enough to force the key up after each wrist action.

Dubuque (Ia.) Times.

B. F. ELBERT, manager of a Des Moines, Ia., theater, will have music by wireless as a substitute for an orchestra.

ALBERT E. PROFFITT, of Providence, R. I., has discovered a means of listening in on telephone conversations with his radio outfit. He declines to tell how he does it. The secret lies in the wiring of his amplifier.

Boy Scouts

Boy Scouts are sure to become an important factor in radio. It was a boy scout at the recent radio conference in Washington who arose and made an eloquent appeal for a closer union between the various government departments and broadcasting stations so that the boys in all communities might learn more of what is going on in the United States. He even suggested that the boys be permitted to listen

in on the debates in Congress.

Unless that scout has heard some of our long-winded statesmen wind-jamming in the Senate or the House, he has little idea of what he is letting himself and other boys in for. But each new revelation might help him to cast an intelligent vote later on.

Boy Scouts are organizing their radio members so that they will be of assistance

to the government in emergency. A better, more promiseful spirit could not be manifested by the little fellows who are to be the future masters of the magic science.

INABILITY TO GET PHONES for radiophone receivers is delaying the installation of many amateur plants in Peoria, Ill.

Soldering

Any person installing a radio set should know how to solder and do it right. A book might be written on the subject but only a few points will be given here.

1. Be sure the wires of the parts to be soldered are absolutely clean. File, scrape or sandpaper them until they are bright.

2. Use a good soldering flux. Get a can of good soldering paste and learn how to apply it. Use as little as possible and when the joint is completed carefully wipe off all surplus paste which acts as a conductor and may short circuit the wires. Never, under any circumstances, use muriatic or hydrochloric acid cut with zinc. Electrolysis takes place and produces a corroded joint.

3. Always remember that the parts must be as hot as the melted solder before a good joint can be produced. Never let the soldering iron get red hot. A green flame around the iron indicates that the copper is burning and should be removed from the fire.

4. To "tin" the "iron" heat on a gas stove until the green flames just begin to show, take off the "iron" and file until the copper shows brightly. Dip the tip in a little paste and immediately rub on a bar of solder. This will leave the tip of the "iron" covered with solder and bits of solder may be picked up and deposited wherever desired. If the "iron" is not "tinned" solder will not stick and it is next to impossible to solder joints.

—Orval Whishman in Rockford Star.

WIRELESS CODE

THE MORSE ALPHABET

A B C D E F G

H I J K L M N

O P Q R S T U

V W X Y Z &

NUMERALS

1 2 3 4 5

6 7 8 9 0

PUNCTUATION MARKS, ETC.

Period Interrogation Comma

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Phone Dearborn 5465 JOHN T. NUTTALL, Principal

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Address.....

Radio in School

Thousands of boys are studying practical radio in the public schools. The number of boys devoting their major time to this work is particularly large in the Chicago Technical High Schools. In many schools, in addition to the regular courses in electrical study the boys have radio clubs. Lane, Tilden and Crane, the three larger "tech" schools have clubs and interest in them and in radio is increasing daily.

The president of the Peoria School Board has said that radio will be placed on the list of studies "as soon as it becomes practical" and any number of boys in Peoria reply that it is practical already. They want radio classes now. The radio club of Waukegan High School has seventeen members and some of them have sets with which they can hear music broadcast from Chicago.

Athletic events in which rival high schools are engaged are so closely followed by stay-at-home students that the radio has been brought into action to carry play by play the progress of the struggles. This plan recently was adopted with success by Roekford, Ill., high school during a contest with Urbana, at Urbana.

Radio interest is by no means limited to the technical and other high schools. Varsity men are just the same sort of fans as their younger brothers. As a matter of fact all men are boys when it comes to playing with ether waves and listening to the invisible choir. Michigan University announces a Radio night for April 29. Fielding H. Yost, athletic director at Ann Arbor, plans to make it a wireless reunion of alumni. Faculty members, glee club singers and athletic stars will participate in the program and it will be broadcast.

News will be broadcast once a week from the University of Wisconsin station at Madison. The wave length is 360 meters. The news digest will be sent each Friday night at the close of the weekly radiophone concert.

Wisconsin students carry on a news exchange between the newspapers of other colleges in Wisconsin and in other states from 10 to 12, midnight, every Monday.

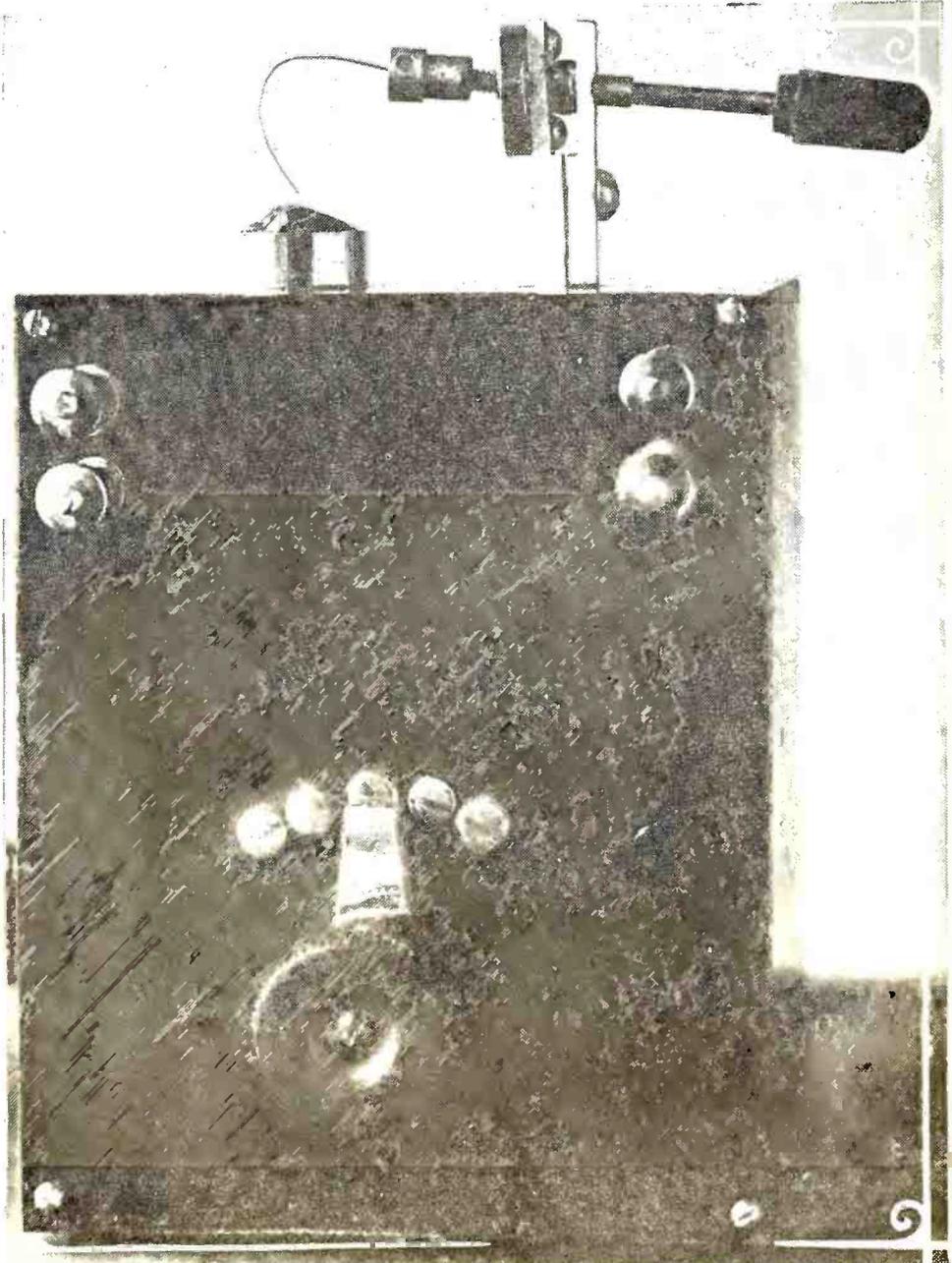
Bradley Station, Peoria, Ill., is improving the apparatus of the Bradley Institute. The present sending wave length is 200 meters but it will be increased to a possible 450 meters with the new equipment.

Union College, Schenectady, N. Y., has resumed its broadcast service. The station will broadcast under its newly assigned call letters WRL but the club retains its old license 2XQ for purposes other than broadcasting.

It is reported in the press that New York University will permit students to stay at home and get their lectures via the radiophone. Maybe so, maybe so, but let us not get too close to the

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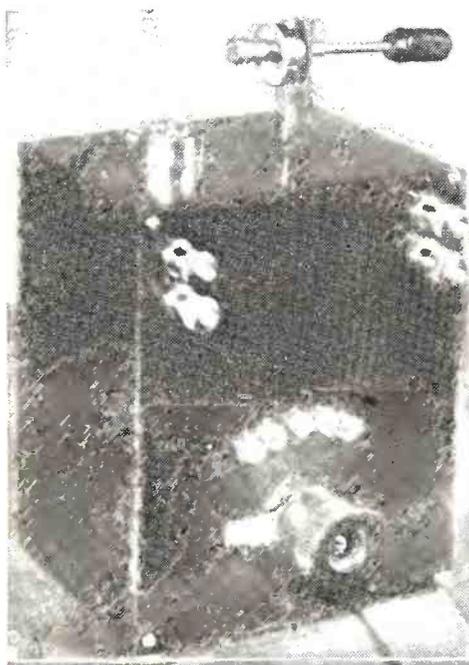
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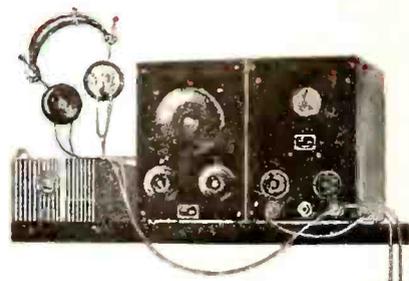
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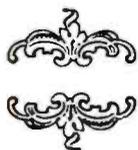
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