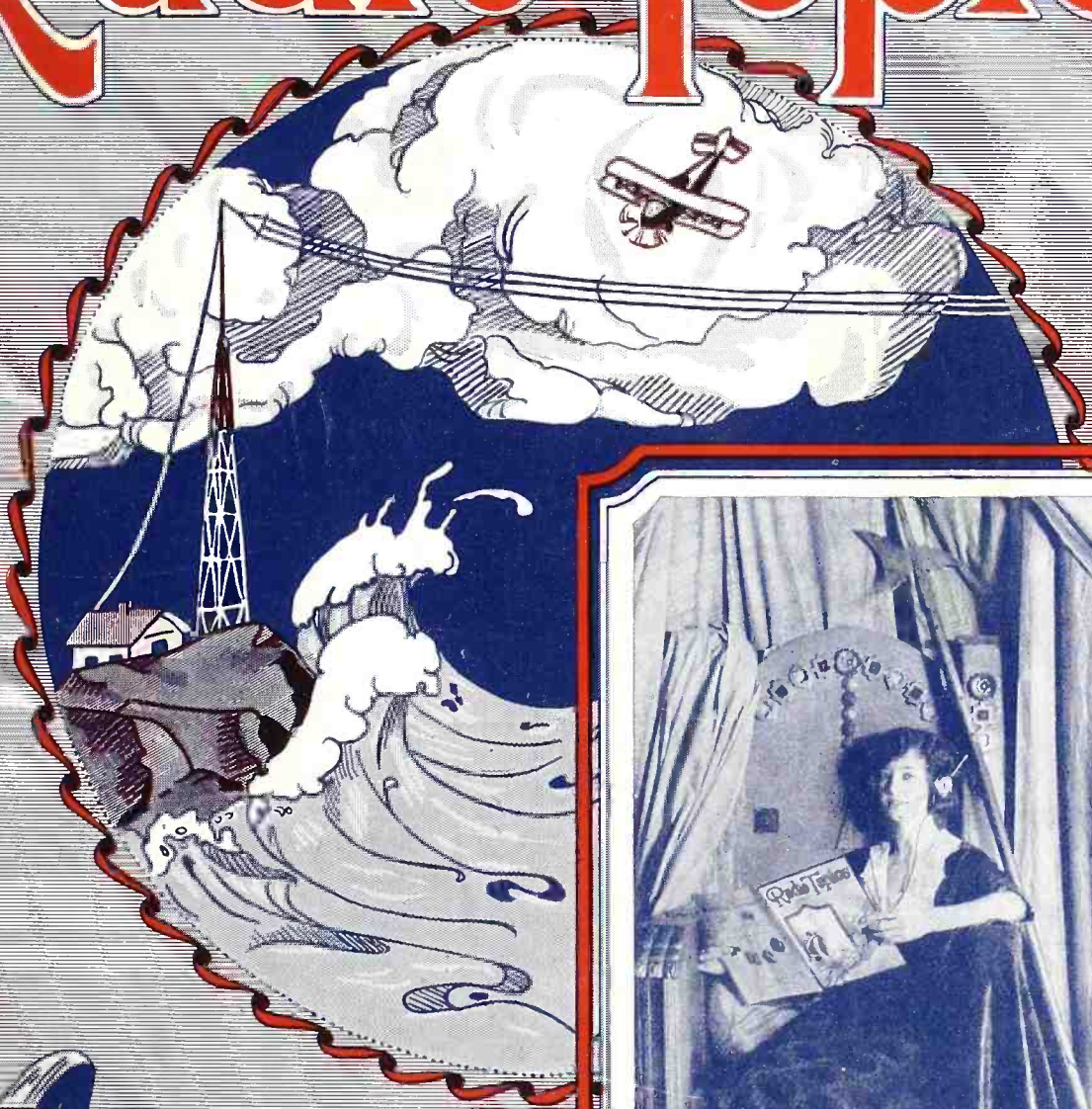


NOVEMBER, 1923

Radio Topics



And the night shall be filled
with music,
And the cares that infest
the day
Shall fold their tents
like the Arabs
And as silently steal away.
—Langston

Atlas Educational
Film Co.
Oak Park Ill.



20 Cents

Marcel Holmquist - Oak Park

MANHATTAN

ELECTRICAL SUPPLY CO., INC.

MAKERS OF THE FAMOUS



MANHATTAN
RADIO HEAD SET

OLDEST AND LARGEST
DISTRIBUTORS OF

Radio  Corporation
of America



*Ask us about the new
Magnawop models. There is
a type for every service*

KENNEDY
EQUIPMENT

114 SO. WELLS ST., CHICAGO

NEW YORK

ST. LOUIS

SAN FRANCISCO

Blairco
Radio

Buy at the Radio Store where they display this sign—the distinguishing mark of Blairco Proven Products.

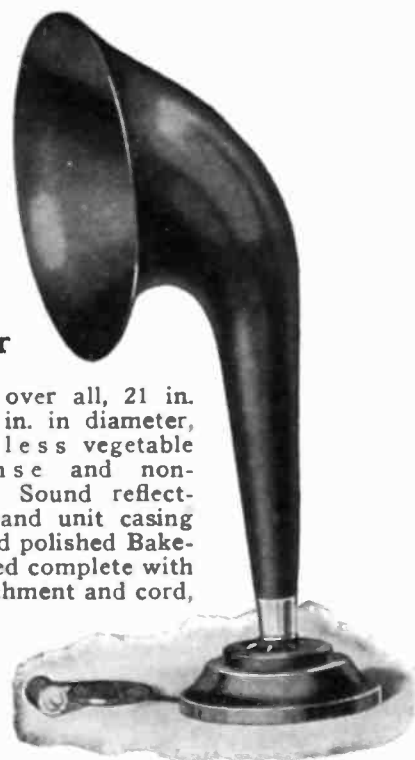


ATLAS HEAD PHONES

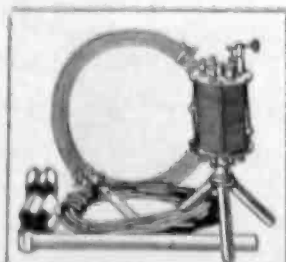
The only high-grade receiver set offered at a reasonable price. Sensitiveness and adaptability positively is unequaled. Price \$9.00.

Atlas Loud Speaker

Height over all, 21 in. Horn, 11 in. in diameter, of seamless vegetable fibre, dense and non-vibrating. Sound reflecting base and unit casing of dark red polished Bakelite. Priced complete with horn attachment and cord, \$25.00.



The ATLAS Gives Tone Volume With Perfect Tone Control



Blairco "4" Crystal Set

Takes 4 head phones—Enables 4 to listen as well as 1. All niched steel 9 in. high. Price only \$7.50.

Complete with copper clad aerial, water-proof lead-in and ground wire, strain and wall tube insulators, lightning arrester ground wire clamp and set of \$9.00 Blairco Headphones, \$17.50.

Dealers: An unbeatable profit opportunity is offered you in the Blairco Proven Products. Write quick for our proposition.

Multiplied enjoyment with your radio follows the use of a loud speaker which, set in any convenient spot, throws out the tones so that a roomful of family and friends can hear.

But in selecting the loud speaker, bear in mind that loudness without clearness is mere noise—and get an ATLAS.

With the Atlas you get the true tone of the original—clear, pure, exquisitely sweet—and perfectly controlled. Tone distortion, distracting mechanical sounds, confusing echoes and blasts—all are noticeably absent.

All is due to the patented double-composition diaphragm—found only in the Atlas. And to the use of finer materials which, with scientific assembling, also insures permanence.

A typical example of the extra quality afforded at no extra cost by all radio equipment sold under the Blairco trademark.

No matter what you want in Radio, buy at the "Blairco" Radio store and get dependable value. Every article sold under the Blairco trade name, whether our own make or others, is of proved superiority. Exacting tests have proved it the best of its kind, bar none!

If you have no Blairco dealer, write us now for Folder and Prices

Mitchell Blair Co.

"First With the Best"

1429 So. Michigan Ave., Chicago



"The wise are free from perplexities."

—Confucius

*Perplexity never comes to the owner of a Grebe "13"
—he is a wise relay man.*

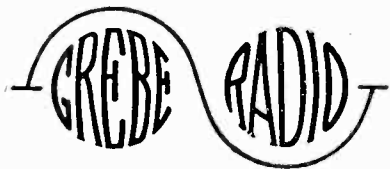
Doctor Mu

The GREBE "13"

A Real Receiver for Relay Men

Four Points of Excellence

1. The perfect combination of Regeneration and Tuned Radio Frequency Amplification. This much-sought-for development gives you sharper tuning, greater distance, greater signal strength and less QRM.
2. Uses all kinds of Tubes. Special resistance units instantly cut in or out by miniature "push-pull" switches, enable you to use any type of tubes in combination.
3. In the non-oscillating condition this Receiver builds spark signals to greater volume—in the oscillating condition all spark signals and practically all "mush" notes are suppressed.
4. The SECONDARY or detector wavelength dial is calibrated direct in wavelengths. This most convenient arrangement enables you instantly to located a station of known wavelength.



Licensed under Armstrong
U. S. Patent No. 1,113, 149

This is a short-wave development of the Grebe Broadcast Receiver, especially adapted to meet the requirements of long distance work on 80-300 metres. It affords sharper tuning, greater range, quieter operation.

Ask your dealer or write us.

A. H. GREBE & CO., Inc.

77 Van Wyck Blvd., Richmond Hill, N. Y.

Western Branch: 451 East 3rd Street, Los Angeles, Cal.

Radio Topics

An Illustrated Monthly Devoted to Radio

Volume III

November, 1923

Number 10



Willie Collier (left) and Sam Bernard, two of America's most popular comedians, discussing the subject dear to everyone's heart—radio. Sam is insisting he can get WJAZ, WDAP, KYW and WMAQ on his radio pencil, which is stretching the truth somewhat. "Stop your kidding, Sam," pleads Collier. "You don't tell me you hear Chicago with that thing, from New York City." (Photo by Kadel & Herbert.)

CONTENTS

Radio Topics Girl.....	Cover
Broadcasters Hold First Convention.....	7
MacMillan Flashes Word From Arctic Region.....	9
The Army's Efficient Radio Net.....	11
The Sun Circuit.....	13
Practical Hints on Designing of Regenerative Receivers— The Cockaday Circuit.....	15
Let Us Introduce Powel Crosley, Jr.....	17
Department of Radio Engineering, How to Build Hazeltine Neurodyne	19
Correspondence From Readers.....	21
Super-Hetrodyne Has Wide Range.....	22
How to Protect Against Lightning.....	23
WBZ Plans Big Radio Season.....	25
Trick Circuits vs. Old Reliable.....	27

PUBLISHED MONTHLY BY RADIO TOPICS

Entered as second-class matter at the Postoffice at Oak Park, Ill., February 25, 1922,
under the Act of Congress of March 3, 1879.

Business and Editorial Office at 1112 North Blvd., Oak Park, Ill.

Chicago Phone: Austin 9300.

New York Office, 240 Broadway

Copyright 1923, by Radio Topics

RADIO TOPICS

The National Radio Monthly



FOUNDED 1921

PUBLISHED EVERY MONTH BY
RADIO TOPICS, PUBLISHERS

1112 North Blvd.

OAK PARK, ILLINOIS, U. S. A.

J. RAY MURRAY, EDITOR
NANKO C. BOS, Managing Editor
WILL M. HIGHT, Business Manager

PUBLISHING AND EDITORIAL OFFICES

Chicago Phone: Austin 9300 Oak Park Phone: Oak Park 3200

Twenty Cents the Copy From All Newsdealers. By Subscription: To the United States and Possessions, Cuba and Mexico, \$2.00 the Year. Remit by U. S. Money Order, Express Money Order, Check or by Draft, payable in U. S. Funds.

To Canada—By Subscription, \$3.00 the Year. Single Copies 25 Cents—Canadian or U. S. Funds.

RADIO TOPICS is on sale the 10th of preceding month. Text and advertising forms close the 22nd of second month preceding issue.

Vol. III

November, 1923

No. 10

Reaching the Multitudes

RECENTLY David Lloyd George, former British premier, visited Chicago and spoke to an audience of 12,000 people at Dexter Pavilion. The little Welchman made a great impression upon his audience, but a vastly larger number heard him that same evening via radio. Through an arrangement with the Chicago Daily News the entire address was broadcast from WMAQ, and it was undoubtedly one of the most successful tests of this or any other station. The ex-premier's speech was remarkably clear and distinct, and by speaking slowly and naturally every syllable of his plea was driven home to his immediate audience in the pavilion and the thousands of listeners scattered all over the United States who chanced to tune in WMAQ that night.

R. C. A. Loses Suit

AN important decision was handed down in the U. S. Southern District Court last month, when Judge Hand dismissed the Radio Corporation of America's suit against the Independent Wireless Telegraph Company for an alleged infringe-

ment of the vacuum tube patents. The R. C. A. attempted to restrict the Independent Telegraph Company's use of tubes in its commercial wireless telegraph stations. The learned judge dismissed the suit and imposed costs upon the plaintiff.

New Circuits

THERE is an ever-increasing demand for new circuits from amateurs all over the country; notwithstanding, new hook-ups are being discovered every day. RADIO TOPICS will be glad to reproduce any new wrinkles along this line which its readers forward, but please, oh, please, make your sketches or drawings as clear as possible. Draw them on white paper and with ink, if possible, but shoot 'em in.

Can you imagine what a thrill Capt. Donald B. MacMillan and his crew get every Thursday evening when WJAZ, Chicago, puts on all its "juice" and talks to that ice-bound group, away up there off the coast of Greenland? Yea, verily radio is a boon to them.

Radio Topics is soon to be on the air. Arrangements are being completed with a broadcasting station in Oak Park, Ill., whereby its many readers will be able to hear direct from their favorite journal.

The Bureau of Standards, Washington, through WWV, has been sending out standard wavelengths so that stations can adjust their sets. The navy is aiding in this also, and methods of calibrating sets properly have been announced several times. It is up to the various transmitting stations now to keep within bounds.

Ear specialists have discovered a new malady. It is known as the "radio ear." Many cases of this have been reported by fans who sit for long periods at their receiving sets with tightly adjusted head sets. Pains in the auditory appendages are first symptoms. The remedy is to loosen up the phones by taking some of the spring out of the piece that extends over the head.

There's a Victor record out that teaches the international Morse code. Did you know it? It's called the Victor-Marconi record, and there are six of them for your phonograph, containing twelve lessons.

Broadcasters Hold First Convention

NATIONAL ASSOCIATION BROADCASTERS MEET AT COMMODORE HOTEL, NEW YORK, OCTOBER 11 AND 12. MANY PROMINENT MEN ATTEND

AT THE First Annual Convention of the National Association of Broadcasters, held at the Commodore Hotel, New York, October 11 and 12, 1923, Mr. Eugene MacDonald, Jr., of Chicago was elected president. Prominent broadcasters from all parts of the country were in attendance and for two days were busily engaged exchanging ideas on the theoretical, mechanical and practical phases of radio broadcasting.

At the Thursday morning session, October 11, Paul B. Klugh, executive chairman, who presided, received the reports of the executive committee, an address was delivered by the executive chairman, the finance committee reported and the report of the manager of the Bureau of Music Release and the legislative committee was read.

Officers Elected

The following officers were elected for the ensuing year:

President—Eugene MacDonald, Jr., Station WJAZ, Zenith Edge-water Beach Hotel, Chicago.

Vice-president—Frank W. Elliott, Station WOC, Palmer School of Chiropractic, Davenport, Iowa.

Vice-president—John Shepard, III, Station WNAC, The Shepard Stores, Boston, Mass.

Secretary—J. Elliott Jenkins, Station WDAF, Board of Trade of the City of Chicago, Chicago, Ill.

Treasurer—Powel Crosley, Jr., Station WLW, Crosley Manufacturing Company, Cincinnati, Ohio.

Board of Directors—Messrs. Harold J. Power, William S. Hedges, Henry A. Rumsey, W. S. Harris, Robert Shepard, Bowden Washington, G. Brown Hall.

Mr. MacDonald was escorted to the chair following his election and thereupon took charge of the meeting.

Action was taken upon the following subjects as indicated:

Amendment of the By-laws to provide for a Listeners' Membership. Full debate on this matter; referred to committee to develop and complete plans to be submitted at next meeting.

Organization of music publishing company. Full debate, referred to Executive Committee for immediate attention.

Extension of tax free music service to hotels, theaters and moving picture shows. Favorable action and plan of procedure authorized.

Legislative requirements debated and procedure determined upon, with full authority to proceed.

News service for members referred to Executive Committee, with authority to proceed to pro-

vide best service obtainable so that members may be placed in the position to broadcast bulletins of late news first.

Record manufacturing company. Action postponed; referred to committee.

Bureau of Music Release activities reviewed. Over 100 numbers released in three months. Less



HERE'S WORLD'S LARGEST ONE TUBE SET

There have been many freak receivers constructed by amateurs and manufacturers, but this one tube set probably outdoes all others for size. Photo shows Miss Agnes Leonard at Radio Show, Grand Central Palace, New York City, operating the receiver. Note the size of the batteries and the tube. (Photo by International Newsreel.)

than 10 per cent of music submitted has been released. Authorization given to expand agencies for collecting MSS, to include Europe and South America.

Vote of appreciation to Radio Press for loyal support in broadcasting problems.

Hold Open Meeting

The Thursday afternoon meeting was an open meeting to which non-members were invited. Mr. Paul B. Klugh, executive chairman, gave a summary of the morning session for the benefit of those who did not attend.

The following addresses were made:

"The Future of Broadcasting" by Eugene MacDonald, WJAZ, Chicago.

"Radio and Goodwill" by Frank W. Elliott, WOC, Davenport.

"Department Store Broadcasting" by John Shepard, III, WNAC, Boston.

"My View of the Future of Wave Lengths, Tubes and Output" by J. Elliott Jenkins, WDAP, Chicago.

"Government Regulations" by Harold Power, WGI, Medford Hillside, Mass.

"What Broadcasting Does for a Newspaper" by Wm. S. Hedges, WMAQ, Chicago.

"A Manufacturer's View of Broadcasting" by Powel Crosley, WLW, Cincinnati.

"The Art of Popularizing a Station" by Mr. N. T. Granlund, WHN, New York.

Banquet Ends Session

At 6:30 the meeting adjourned to Parlor "K" where President MacDonald had provided refreshments, and informal discussions were carried on on the subjects presented during the convention.

At 7:30 the annual banquet was held at the Belmont Hotel. President MacDonald acted as toastmaster and addresses were made by the following gentlemen:

Mr. Paul D. Klugh, executive chairman, spoke on "Why Are We Here"; Mr. D. Rigley spoke on "Why Manufacturers Should Support Broadcasting," and short addresses were made by a number of others.

The banquet adjourned at 11:30, many members accepting a very courteous invitation from Mr. N. H. Granlund of station WHN, to visit his studio, where he had also invited a number prominent actors.

Friday was spent in executive committee meetings.

Chicago Radio Show Nov. 20-25 Arranges Elaborate Program

GENERAL interest in the radio industry and among the radio fans is now centering in the Second Annual Chicago Radio Show, which will be held in the Coliseum, Chicago, from November 20 to 25, and at which will be exhibited for the first time many new ideas in radio. With practically all the exhibition space sold to the leading manufacturers and jobbers before November 1, the management has had plenty of time to arrange an elaborate program.

One of the chief features in connection with the show will be a general survey of radio to determine just what the public wants from the leading broadcasting stations. The Chicago stations have organized to broadcast the question "What would you like most to hear over the radio?" There will be around 500 prizes for the answers and all these answers will be tabulated by the management and in that way what is most popular with the listeners-in will be determined.

Prizes to Be Awarded

It is expected that more than

Radio Profitable

S. L. ROTHAFEL, director of the Capitol Theater, New York City, is not one who doubts the far reaching benefits of radio. Mr. Rothafel, who puts the Capitol Theater on the air every Sunday night, has received the following interesting and valuable gifts of esteem from admiring fans from all parts of the country:

- Fresh flowers.
- Fresh fruit.
- Fresh fish.
- 2 pair of pink sleeve garters.
- 1 book of poetry with the compliments of the author.
- 1 oil painting with the compliments of the artist.
- 141 ballads with the compliments of the composers.
- 7 original cartoons.
- 1 Airedale.
- 1 Police Dog.
- 238 souvenir postcards from radio fans on vacation.
- 17 ditto from honeymoon couples at Niagara Falls.
- 92 ditto from ditto at Washington, D. C.
- 1 hand-embroidered wiskbroom holder.
- 1 quart bottle of what-have-you.
- Who says radio doesn't pay?

200,000 replies, or more than enough to settle for all time any question regarding the popularity of radio, will be received. These replies will be piled on a stage at the show and each night a part of the prizes will be awarded.

The amateur set building contests are also bringing in unexpectedly good results. Entries ranging from crystal to eleven tube superhetrodyne sets have been received from all over the United States and this display, which will be housed in the Coliseum annex, will be one of the big features of the show.

The manufacturers are also turning out a lot of new stuff for the Chicago show. One large eastern firm is preparing to exhibit a recording-radio by means of which speeches by prominent persons, popular songs, etc., can be registered on phonograph records as they come over the air. A simple device is said to be all that is needed to make it possible for every home to make its own phonograph records from the material which is broadcast.

Demonstrate Erla Circuit

The Electrical Research Laboratories of Chicago is building a sensational demonstration of just how the radio waves pass through the Erla reflex circuit. This will be operated by especially designed motors and miniature lightning flashes inside of glass tubes, which will take the place of the usual wiring in an Erla reflex set.

Notable speakers such as Maj. Armstrong, Prof. Hazeltine, Dr. Lee De Forest, H. T. Flewelling and others have been invited to address the crowds at the show and many of them have accepted. There will also be feature concerts broadcast from the Coliseum by means of sealed wires to the local broadcasting stations.

Department Store Radio Show

Rothschild's department store, Chicago, held its second annual radio show October 27, 1923. The ninth floor of the store was devoted to the show, and booths containing exhibits attracted hundreds of visitors. Many of the artists from local broadcasting stations made "personal appearances" and played for the fans.

MacMillan Flashes Word From Arctic Region

First Brief Message From Intrepid Explorer Picked Up By Two New England Amateurs

THE Bowdoin, bearing Capt. Donald B. MacMillan and party, which sailed for the North Pole from Wiscasset, Me., on June 23, has been heard from. The brief message, which was picked up by James A. Trainor of 30 Bloomfield street, Dorchester, Mass., and R. B. Bourne, station 1 ANA (Chatham, Mass.,) read: "Located in latitude 78:30." This brief word was sent by Captain MacMillan from Etah, Greenland, on Smith Sound, one of the bases used by Peary in his dash to the pole.

Donald Mix, radio operator of the Bowdoin, has been trying almost daily since the party reached Greenland to communicate with the American Relay League and other amateurs.

The Radio Relay League recently installed new equipment which will greatly facilitate reception from the Far North, a 500 watt transmitter having been added, this in honor of Hiram Percy Maxim, the inventor, and president of the league. The last previous message was on July 28 from along the coast of Greenland, but this was weak and was not picked up in full by amateurs in this country.

Canada Amateur Hears

Jack Barnslee, operating amateur station 9B6 at Prince Rupert, B. C., also received word from Capt. MacMillan, according to a copyrighted despatch to North American Newspaper Alliance. The message states:

"Ice formed yesterday around the Bowdoin and we are now completely frozen in for the probable duration of ten months. During the last few days Smith Sound

has been covered with young ice and the thermometer is down to 9 above zero. The sun is very low at noon. We have one month more before it leaves us entirely and the long arctic night begins. The sun will not return until the 19th of next February, a period of 118 days.

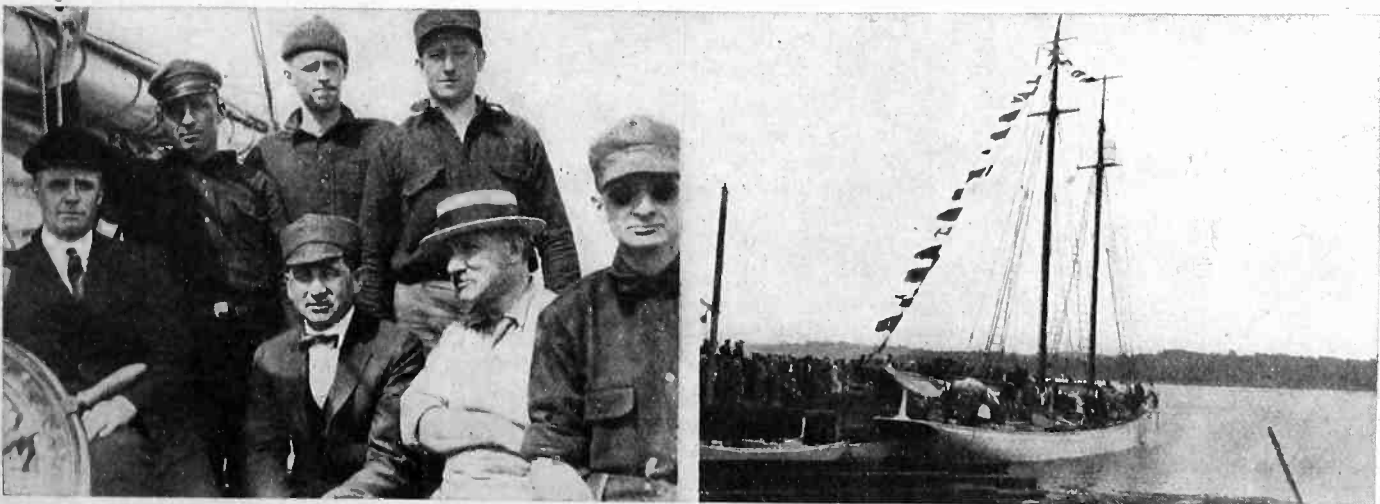
"We have killed a number of seals, arctic hare, walrus and ptarmigan, and are thus far well supplied with meat. Our Eskimos are now preparing to hunt polar bear and reindeer during the twilight of fall. Although troubled at first with considerable static in our radio reception, the concerts and voices are becoming each day more distinct. New antennae are now being erected reaching from the mast of the Bowdoin to the cliffs and should give better results.

"We have heard several hundred amateur stations, some as far

away as Los Angeles, Mexico and the Hawaiian Islands. The Eskimos are very much interested in hearing voices from America and do not understand how it can be possible. We ourselves sometimes find it a trifle uncanny to hear familiar voices and music suddenly sounding out of the deep, white silence of the arctic

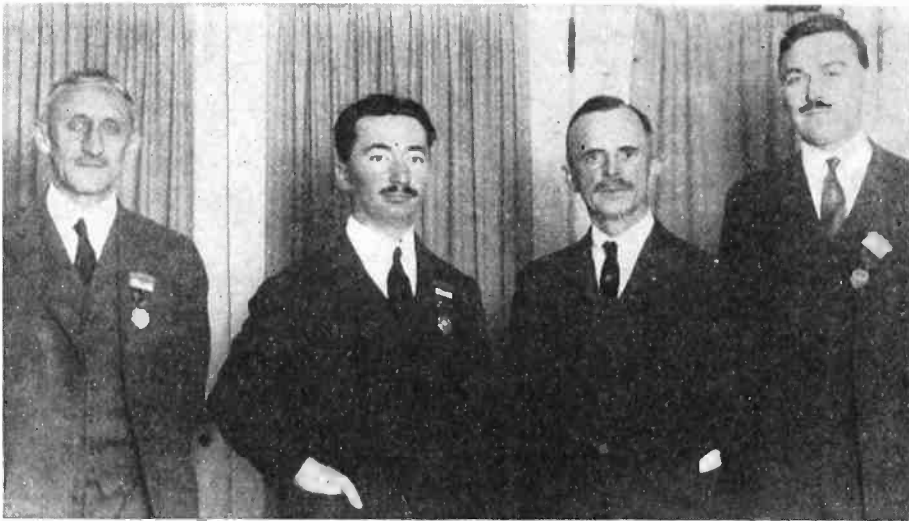


(Above) E. F. McDonald, Jr., aboard the "Bowden" and below is shown one of the immense ice burgs seen off Labrador.



THE "BOWDEN" AND ITS CREW BOUND FOR THE NORTH POLE

(Left) The crew of the "Bowden," with Captain MacMillan at wheel. (Standing) Thomas McCue, Donald Mix, operator, and Sheldon Fairbanks. (Front row) Ralph Robinson, mate; William A. Lewis, cook, and John M. Jaynes, engineer. At the right is shown the "Bowden" leaving the docks at Wiscasset, Maine.



NOTABLES AT RECENT CONVENTION OF A. R. R. L.

Interesting persons from all over the world attended the American Radio Relay League's convention at the Edgewater Beach Hotel, Chicago, in September. Left to right we have—Charles Stewart of St. Davids, P. Q., vice president of the league; Monsieur Leon DeLoy, radio amateur of Paris, France, who came here to arrange for two-way telegraph tests between amateurs of both countries; W. D. Terrell, chief supervisor of radio of U. S. Dept. of Commerce, and A. H. K. Russell, Canadian general manager of league. (Photo by International Newsreel.)

night. When the news gets abroad that we have wireless and motion pictures on the Bowdoin the whole tribe will be here on moonlight nights in November and December.

"MAC MILLAN."

This message was from latitude 78:30 north, longitude 72:30 west, where the Bowdoin is in winter quarters, ten miles north of Etah.

Further Communications

Jack Barnsley, Prince Rupert, B.C., heard from Dr. MacMillan's ship, the "Bowdoin," on October 24, which, because of static, was the first message to come through for several weeks. It contained the following information:

Refuge Harbor, North Greenland, Oct. 24.—Winter is here. Smith Sound is frozen over and the thermometer has dropped to zero. We have cut all our lines out of the ice as the Bowdoin is frozen in solid for the next ten months. Today we harnessed our dogs for the first time to haul the kedge anchor and heavy lines to land. A polar bear and reindeer party was organized and left yesterday for the north to secure clothing and meat for the winter.

Two Weeks More of Light

We have about two weeks more of sunlight and then we expect the thermometer to drop to 60 below zero during the dark period.

We are planning to bury the Bowdoin almost completely in snow to conserve heat and shall build Eskimo snow houses over the cabin entrance. About ten months' coal supply is still on hand and we have an oil attachment and plenty of seal fat in a ring for fuel if necessary.

I learned through our wireless of the failure of the Canadian steamer

Arctic to reach Cape Sabine to establish a post. We had expected to have this party as our nearest neighbors and to visit it during the winter. The nearest people now are Eskimos sixty-five miles to the south; we expect them up during the November and December moon.

Radio Messages Appreciated

The boys are all well. There is no doctor on board, but we are hoping that one will not be necessary.

I begin a series of tidal observations tomorrow, the results of which I will report later. We all greatly appreciate the receipt of news of the outside world from Barnsley, the Canadian amateur wireless station 9BP, at Prince Rupert, B. C.

(Reprinted by permission of North American Newspaper Alliance.)

Suit to Enjoin Radio Amateur Is Up

SECRETARY of Commerce Herbert Hoover may be called as a witness in the suit of Edward McWilliams, wealthy Dwight, Ill., resident, who has brought suit to restrain G. W. Bergman, 18 year old DX amateur. Bergman is the son of a plasterer of Dwight, Ill., and operates his own transmitting and receiving set. The case is on trial at Pontiac, Ill., and involves important questions of legal rights to the air. It may, however, be tried finally in the U. S. Supreme Court, as it involves jurisdiction of the Federal government in interstate commerce traffic.

McWilliams contends that Bergman's station interfered with his listening to his favorite station at night. He states his re-

ceiving set cost upwards of \$500 and it is rendered useless by Station 9CA every evening.

Bergman is district superintendent of the A. R. R. L. He is represented by Attorney Irving Herriott of Chicago. Bergman contends that he is living up to all regulations of the government and that Station 9CA does not interfere with all other receiving sets in Dwight, Ill. The outcome of the suit will be watched with considerable interest.

Milwaukee Elects Officers

THE Milwaukee Radio Amateurs Club, Inc., elected officers for the coming year at its last regular meeting. Following took office:

President, E. T. Howell; M. F. Szukalski, Jr., vice-president; C. S. Polack, secretary; E. P. Ruppenthal, treasurer; L. S. Hillegas-Baird, business manager; F. W. Catel, assistant treasurer and the following directors: C. N. Crapo, 9VD, A. R. R. L. local district supt.; D. W. Gellerup, 9ACE; E. T. Hoewell, Sc. M., 9CVI; M. F. Szukalski, Jr., 9AAP; E. A. Carey, 9ATO; F. W. Catel, 9DTK; M. H. Doll, 9ALR; G. F. Metcalf, 9CKW;

Attorney L. J. Topolinski, general counsel; publications, H. G. Fawcett; technical, D. W. Gellerup; membership, F. W. Catel; program, E. T. Howell; publicity, L. S. Hillegas-Baird; traffic, C. M. Crapo.

The recent Chicago convention of the A. R. R. L. was dismissed.

At the annual meeting of the outgoing officers reported a steady growth in membership and an increase in scope of activities. However, the annual membership drive has been launched, and it is hoped that the total number of members will reach two-hundred before the season closes. The West Allis Radio Club, a suburban society, has been dissolved and its members are joining the Milwaukee club. One large radio association for Milwaukee County and make it a real local chapter of the A. R. R. L. is the goal set for this year's activities.

The committees are all in action. The technical one remains a leader, recently giving an interesting report entitled "C. W. Transmitter Circuits." Many lectures by well-known radio men are being arranged by the program committee. Two have already been given; they were "The New Tatum Chemical Rectifier" by H. L. Olesen, 9CSR, Fansteel Products Co., North Chicago, and "Vacuum Tube Characteristics" by J. H. Miller, Electrical Engineer, Jewell Instrument Co., Chicago.

The Army's Efficient "Radio Net"

By J. FARRELL

ATOP the Munitions Building at Washington there is a series of loop antennae. They excite little interest in the casual passerby, yet beneath them on the third floor of the War Department is located the central office of what is probably the most complete Government land radio system on earth.

No one in the department is more enthusiastic over this infant prodigy of twenty months than is Secretary of War John W. Weeks, under whose administration it was born. In a statement for RADIO TOPICS he said:

"The real importance of radio as a rapid and efficient means of communication both in time of peace and of war was demonstrated in the world war. In France, the American Army co-operated in establishing and operating a net-work of radio communication that was a marvel of scientific achievement. Former methods of dispatching intelligence and directing the movements of armed forces were revolutionized. Although no one factor can be credited with winning the war, radio undoubtedly contributed a large share in the result.

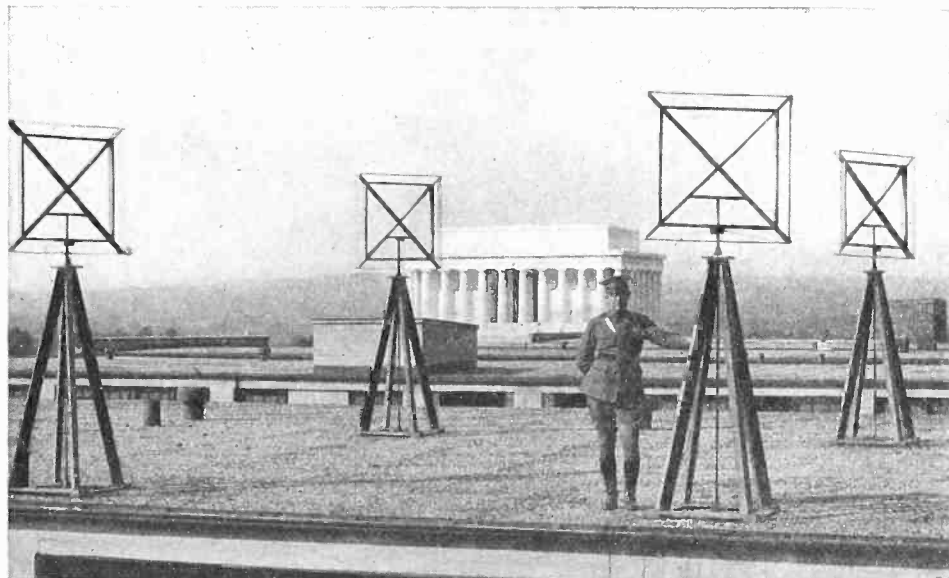
"It seemed to me that there was need for a similar system of radio communication in the United States organized on a military basis to handle every conceivable civil and military emergency that might arise. Twenty months ago our radio work did not go far beyond the field of research. Some outstanding results were accomplished in contributing to radio science, but we also needed a service organization. An entire year was then devoted to developing a complete 'radio net' covering every part of the country.

"Completed and functioning on an efficient basis we have recently made the system available to other Government departments, such as in the dispatch of market news, the apprehending of criminals, in broadcasting warnings of floods and other disasters, and in providing means of communication in areas cut off by storms from wire service. Plans are now under way for tying in the American Radio Relay League with the service to be better able to handle local emergencies."

Consists of 112 Stations

The "radio net," as the system is appropriately called, is made up of 112 radiotelegraph and radiotelephone transmitting and receiving stations located at army posts and headquarters all over the country. In nine corps areas into which the United States is divided for military purposes there are fourteen stations with a radius of 1,000 miles each. These

Central headquarters of the "radio net" are at Washington in the office of Chief Signal Officer Major General George O. Squier. Messages from all corps headquarters are here received direct. Transmission from Washington is accomplished by remote control through the Arlington station. Two new C.W. tube sets with 10 k.w. in the antenna, equal to 100 k.w. arc, were recently installed at Ft. Leavenworth and Ft. Douglas, so that with Leavenworth approximately in the center of the United States intermediate relays are eliminated and direct com-



Receiving loops atop the War Department, Washington, D. C. The white building in the background is the Lincoln Memorial.

stations comprise the "radio net proper" and cost Uncle Sam approximately \$500,000 to build. They are located at Washington, D. C.; Governor's Island, N. Y.; Baltimore, Md.; Atlanta, Ga.; Ft. Hayes, Ohio; Ft. Benjamin Harrison, Ind.; Chicago, Ill.; Jefferson Barracks, Mo.; Omaha, Neb.; Ft. Sam Houston, Texas; Ft. D. A. Russell, Wyo.; Ft. Douglas, Utah; Ft. Leavenworth, Kan., and San Francisco, Calif. All stations are operated by remote control at a distance of from one-half to ten miles. Within the corps areas there are also ninety-eight stations at army posts to provide intercommunication between posts and with respective corps headquarters.

munication established between Leavenworth and Washington, Ft. Sam Houston and Ft. Douglas.

How It Works

Assume a military emergency on the Mexican border. Ft. McAllen or any one or the other seven posts on the border equipped with radio flashes the news to Ft. Sam Houston. The message is relayed to Ft. Leavenworth, thence to the War Department at Washington. Reverse the process and it becomes possible for the War Department simultaneously to instruct all the border posts.

Not only is the service a vast improvement over the former wired telegraph system in use, but

considerable saving in cost of communication has been effected. During the first twelve months of operation more than 62,000 radio messages involving nearly 2,225,000 words were dispatched over the system at a cost of around \$18,000. Compared with commercial rates this represents a saving of \$20,000 for the period covered. Use of radio by the War Department has gradually replaced wired telegraphy to the extent that in less than six months the expense for wired telegraph messages has been reduced from \$5,500 a month to \$1,600 a month.

Although the primary object of the service is its usefulness as a military adjunct and has therefore been organized on a military basis, more recently a broadcasting station has been added at Leavenworth for the dispatch of market reports and other information of general interest gathered by various government bureaus. The entire system has also been placed at the utilization of the Veterans' Bureau, the Department of Justice, the Internal Revenue Division, the United States Shipping Board, and other government agencies in the transaction of official business. Thus, at a moment's notice, it is possible to flash nation-wide alarms of national and international criminals. The Internal Revenue Division is finding the service of great use in apprehending bootleggers, smugglers and other conspirators against the United States; in preventing violation of narcotic laws, and in administering income tax legislation.

Flashes Distress Signals

When the S. S. Honolulu caught fire off the Pacific coast it was an army transport that picked up the distress signals, flashed the news ashore, and proceeded to the rescue. It is expected that the arrangement with the American Radio Relay League for co-operating in radio work with the various army corps headquarters throughout the United States will permit of greater speed and efficiency in handling local emergencies when towns and villages are devastated by fire or engulfed in floods. By getting the news quickly to the army posts armed forces can be rushed to the scene with a minimum of delay. A multitude of uses can be made of this nation-



Central Headquarters at Washington, D. C., of the Army's "Radio Net."

wide service operating with military precision and backed by the Nation's complete military strength.

Conspicuous results have also been achieved by the War Department in the field of radio research. Under the able direction of General Squier revolutionizing progress has been made in furthering the radio art. Readers of RADIO TOPICS are already familiar with General Squier's wired wireless or line radio. With the use of this system it is possible to send forty to eighty telegraph messages and six telephone messages on a single telegraph wire. General Squier is now working on methods for eliminating static and interference in the reception of radio signals, based on the utilization of the resonance wave coil. A new type of portable transmitter and receiver which utilizes resonance wave coils has been designed.

Perhaps equally novel as wired wireless and even more revolutionizing is General Squier's telegraphic alphabet. The method is based on the fact that instead of being differentiated by the difference in time, the dots and dashes will be differentiated by the difference in intensity of sound. The system may be applied to cables, land lines and radio and considerably increase the speed of transmission. A special radio laboratory at the Bureau of Standards has been assigned to General Squier's research staff and every effort is being made to perfect quickly both the new alphabet and static eliminating methods.

Movements of Airship Broadcast

WHEN the giant navy dirigible ZR-1 nosed her way out of a bank of clouds within sight of her home hangar at Lakehurst, N. J., on the morning of October 3, she had completed a record trip to St. Louis and return consuming forty-seven hours and forty-nine minutes. The ship covered approximately 2,200 miles during forty-six hours actually in the air.

As great an achievement as this trip proved in many respects, among the most remarkable features in connection with it was the radio—this in itself was noteworthy. Radio practically replaced wireless which, heretofore was the only means by which airships keep in touch with terra firma.

When the flight started from Lakehurst, N. J., station KDKA of the Westinghouse Electric & Manufacturing Company, located at East Pittsburgh, kept in touch with its progress. Arrangements had been made with correspondents in the different cities over which the dirigible passed to report by radio its movements. After the ZR-1 left St. Louis, Westinghouse Station, KYW, at Chicago, followed its movements and gave a report over radio from its station every fifteen minutes.

Radio fans were advised approximately about the time when it would pass in their vicinity and were asked to keep in touch with KYW and let the announcer know as soon as they sighted the dirigible. This request was met with numerous phone calls and telegrams from many points along its route.

The Sun Circuit

Outlining Captain Gollos' Method of Securing Radio Frequency Amplification Without Regeneration or Distortion by Use of Counter Electro Motive Force for Induction

THE most recent contribution toward the ideal reception of radio broadcasting is the circuit invented by Captain Anatol Gollos, an electrical engineer of many years of experience. Tests made during the summer months in Chicago have proven it the most satisfactory all-around receiver yet produced. Such stations as Los Angeles, New York, Birmingham, Atlanta and intermediate points came in regularly on the loud speaker.

In numerous cases the loud speaker was operated on one step of audio frequency because the volume was too great when plugged in on the second step.

The circuit operates on all broadcasting wavelengths and the quality of reception has been declared by experts to be unequalled by any set heretofore produced.

Captain Gollos' electrical experience dates back to the St. Louis World's Fair, where he had

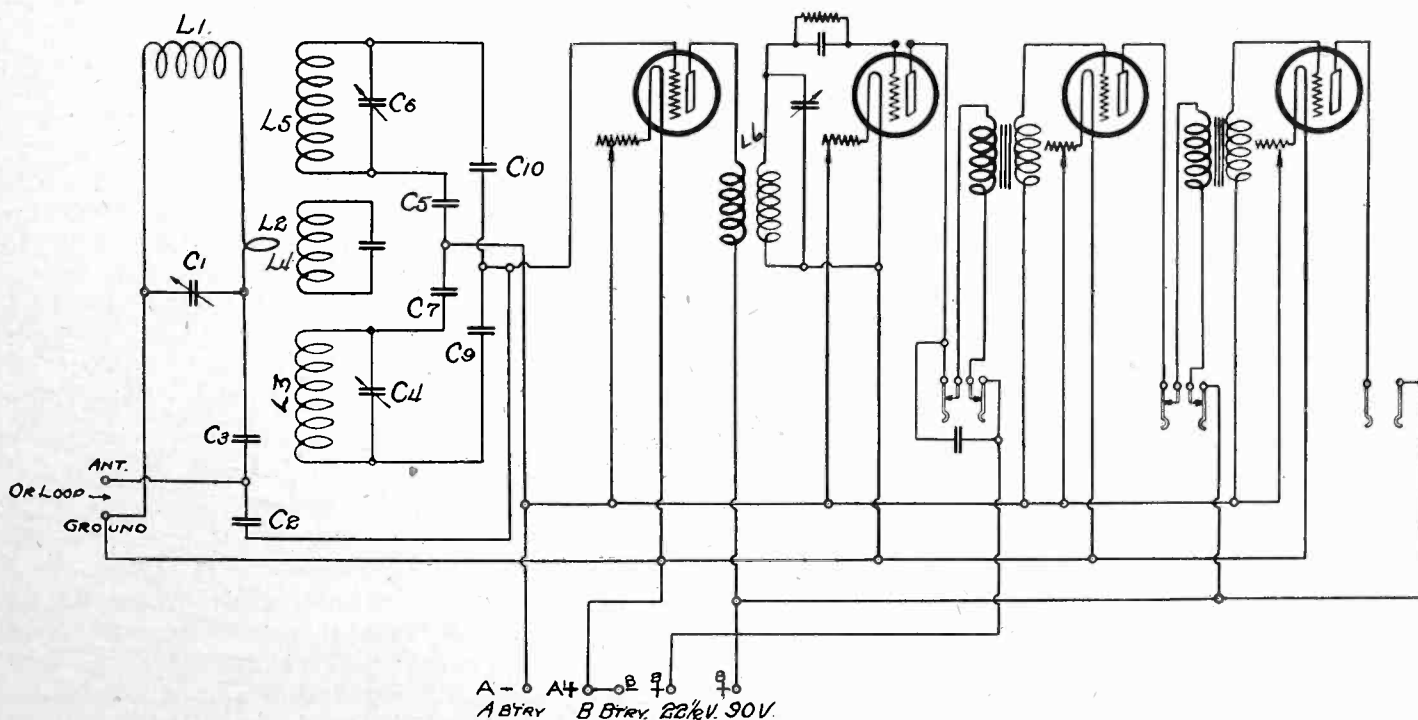
charge of the principal electrical installation for that huge undertaking. Later he planned and installed the electrical equipment in the Chicago & Northwestern R. R. station at Chicago, and is the inventor of the Gollos Automatic Train Control, which was favorably reported on to Congress by the Interstate Commerce Commission. Captain Gollos entered the service of the government in July, 1918, and at Edgewood Arsenal was in charge of all electrical construction, power houses, sub-stations, transmission lines, outdoor transformers, maintenance of all transmission lines and the greater part of the inside installations of the entire plant. For four years he has been electrical engineer of the new Union Station at Chicago. He became interested in radio in its infancy and has spent a small fortune in developing the circuit described in this article.

The experienced radio engineer

will see at a glance how Captain Gollos has brought the principle of counter E. M. F. into play. An academic discussion of the underlying principles of E. M. F. and how the results are accomplished will appear in subsequent issues of this magazine. For the present, however, the layman will be interested in learning something of the construction and what may be expected of it.

With four tubes better results are obtained from the Sun Circuit than with sets employing from five to eight tubes. One step of radio frequency amplification, detector and two steps of audio frequency amplification are used.

The inductance to the grid circuit of the first tube is supplied by coils L 1, 2, 3, 4 and 5, shown in Diagram 1. The compactness of these coils is indicated in Figure 2, which shows the parts ready for assembly. L 6 is a flat honeycomb air core radio fre-

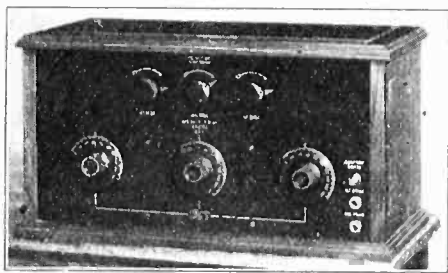


THE SUN CIRCUIT
BY CAPT. GOLLOS

LATEST METHOD OF SECURING RADIO FREQUENCY AMPLIFICATION WITHOUT REGENERATION OR DISTORTION BY USE OF COUNTER E. M. F. FOR INDUCTION - PATENT PENDING - SUN RADIO COMPANY, CHICAGO, ILL.

quency transformer of special design.

It will be noticed from the schematic diagram that coils L 1 and L 2 are tuned by variable condenser C 1. Coils L 3 and L 5 are also tuned by variable condensers. These two coils (L 3 and L 5) are balanced by fixed condensers C 7, C 8, C 9, and C 10 that variable condensers C 4 and C 6 are mounted on one shaft, both coils tuning in perfect unison. Coil L 4 has only the fixed condenser C 5 to balance it with the rest of the



Sun Receiving Set

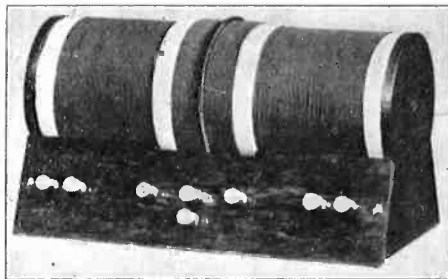
circuit. It will be noticed that the antenna is connected between two condensers C 2 and C 3. Radio frequency transformers L-6 is tuned by variable condenser C 11. The set is tuned by three dials on the panel. The circuit is quite compact, being contained in a box 9x9x18 inches. The standard hook-up for detector and two steps of the audio frequency amplification is employed.

The set is so quiet that the listener is inclined to wonder if it is "alive," as there is no indication whatever of carrier waves. The dials are turned slowly until a broadcasting station is heard and the station logged for future reception. As a general rule, the setting of the three dials is almost uniform, the length of the antenna qualifying this to some extent. Dry battery tubes will produce as good results as the other tubes. When a station has once been logged, it can always be found at the same place on the dials. No shield is used in the set for no body capacity can affect it. As a matter of fact, if the listener will place one hand on Coil L 3 and one on L 5 the reception will be about the same as if his hands were away from the cabinet. However, should he place one hand on either L 3 or L 5 he over-balances the circuit and the reception will have less volume but ab-

solutely without any howling, squealing or other distortion. This fact proves how Captain Gollos has balanced the apparatus. There are no critical condensers to be adjusted after the set is built. The inductance coils L 1, L 2, L 3, L 4, and L 5 are tested for capacity and balanced by fixed condensers. The parts sold by the manufacturer are shown in Figure 2. These parts include the balanced coils with binding posts plainly marked showing the leads, Coil L 1, and also radio frequency transformer L 6. This set has been declared by experts to produce quality of reception unequalled up to the present time. The reception of piano playing is so perfect that one would think the piano was in the next room, and the same may be said of speeches and other broadcasting which has been difficult to receive without distortion. The sun circuit is guaranteed not to regenerate.

In a recent interview with A. A. Howard, president of the Howard Radio Company, who was present at several tests made, he expressed himself as being of the conclusion that the circuit developed by Captain Gollos is not only the equal but far in advance in many respects of any receiving apparatus yet developed.

Mr. Howard was exceptionally delighted with the directional effect when the set was operated by loop, being able to tune in a number of stations such as New



The Sun Set Parts Ready for Hook-up

York, Cincinnati, Pittsburgh and other points with comparative ease and with a volume from the loud speaker that was astonishing. Using an antenna of about 35 feet on the roof of a three story building, as many as 26 different stations were plainly received in the course of two hours.

Denver Third G. E. Station

DENVER, Colorado, has been selected as the site of a powerful radio broadcasting station by the General Electric Company, according to an announcement made recently by Martin P. Rice, director of broadcasting for that company. Work on the new station will be started as soon as the General Electric Company station at Oakland, California, is finished, probably in December.

Denver will have the third and last station in the General Electric program of broadcasting stations. The first WGY, at Schenectady, has been in operation for the past 18 months. Oakland, the second station, is the first to be housed in a structure erected exclusively for broadcasting equipment.

Both the Oakland and Denver stations will be modeled after WGY, so far as equipment is concerned. They will have the same power and sending radius as WGY which, under favorable atmospheric conditions, has been heard on a single transmission in every state in the Union, in England, Hawaii and countries of South America.

Ireland to Open Old Station

ADHERENTS of the Irish Free State plan to set up their own radio station at Clifton, on the west coast of Ireland, and, with a plant powerful enough to reach Chicago, will get the news of the world, free from any taint of British partisanship.

This announcement was made by Francis J. Lowe, secretary of the Friends of the Irish Free State, upon his return from Ireland recently.

Mr. Lowe said: "Free Staters feel that they need unbiased world news which is not subject to British censorship and which is not presented from a British viewpoint.

They propose to re-open the old Marconi station at Clifton. At present the station will carry only as far as New Foundland. They will enlarge its radius so that New York and Chicago can cut in.

Practical Hints on Designing of Regenerative Receivers

PART 6—THE COCKADAY REGENERATIVE CIRCUIT

By PAUL A. PERRY

IN many circuits of the regenerative type, the adjustment of the regeneration of the tube is, at times, very hard to control. A station may be easily received by tuning only the grid circuit, but as soon the plate circuit or regeneration is tuned, in trying to bring up the volume of the signal, the station is entirely lost or the signal "mushed up" so much as to make it most unpleasant for the listener. This is a fault to be found in most all regenerative circuits.

Many modified circuits of the regenerative type have been made in trying to overcome this fault by fixing the value of regeneration for all wavelengths, or combining controls in such a manner as to vary the ratio of regeneration in accordance with the wavelength. However, these methods have a tendency to broaden the tuning of the circuit as well as confining the methods of tuning to such an extent as to greatly decrease the ability of the operator in separating stations transmitting on very close wavelengths.

Another serious drawback to the usual regenerative circuit is its seeming inability to amplify weak signals in the same ratio as the strong ones. This is why these circuits are so highly criticized for their distortion.

In the operation of the tube, the received energy, which is fed back into the grid, causes a greater energy impulse in the plate circuit. When this greater impulse is re-fed into the grid circuit, almost instantly the resulting energy output of the tube is greatly increased, and, unless very carefully operated, the tube will not regenerate at a constant ratio. It is impossible to build a regenerative circuit which is entirely free from distortion because of the foregoing reasons, but it is possible to build one which will be nearly free from distortion as well as easily and sharply tuned.

Every electrical circuit, especially one containing a coil or inductance, sets up a resistance—known as electrical inertia—to any current flowing through it. Some of this current must be used up in overcoming the inertia, the amount depending upon the size of the coil, the wire used, etc., and is always considered as a loss because of the drop in the resulting output energy.

Regulated in Condenser

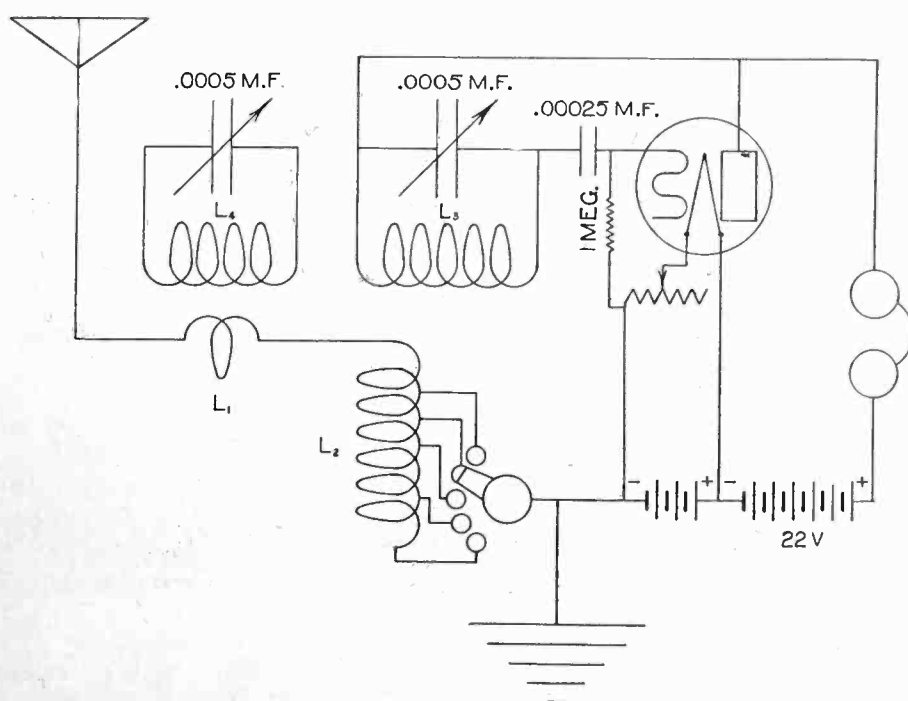
In radio circuits, where only high frequency alternating currents are handled, this inertia and

loss may be regulated at will if a variable capacity, or condenser, is introduced across the coil. The rapid charging and discharging of the condenser, together with the normal resistance of the coil, causes a much greater inertia, especially to alternating currents, than in electrical circuits and is known as impedance.

Working on this theory of impedance, Lawrence M. Cockaday started out to correct, as nearly as possible, the usual difficulties of the regenerative circuit. The result of his work is the Four Circuit or Cockaday tuner, as shown

in the drawing. With this circuit, it is possible to fix or stabilize the oscillating tube at any point. By placing the "absorbing circuit," L_4 , in inductive relation with the grid inductance, L_3 , adjustments of the absorbing circuit can be made such that any amount of energy may be taken from the grid circuit. For weak signals, little or no energy may be absorbed, while for strong signals that amount may be absorbed until the signal is the clearest and most free from distortion. When tuning for an unknown station, the regeneration of the tube may be left at a fixed point.

As will be seen from the diagram, the regeneration is obtained by the Ultra-Audion type of feedback. The absorption circuit, or fourth circuit, is merely a method of controlling the amount of regeneration needed. Like the Reintartz circuit, the headphones are placed in the high voltage lead, which feeds the plate current, where only their direct current resistance is effective, and not in the plate oscillatory circuit where



The Cockaday Regenerative Circuit

their high impedance would act as a choke coil.

A Simple Circuit

Although at the first glance the circuit seems complicated, a little study will reveal it to be very simple and easily constructed. The one turn inductance, L_1 , about L_4 , gives the same coupling action as a coupler whose wavelength is adjusted only by the switch at L_2 . The secondary circuit is tuned to the antenna-ground circuit by means of a fixed inductance, L_3 , and a .0005 M. F. (23 plate) variable condenser. The absorption circuit also consists of a fixed inductance, L_4 , tuned with a .0005 M. F. (23 plate) shunted across it.

All coils must be very carefully made and in direct accordance with the following instructions:

The coils L_4 and L_3 are wound with number 18 single cotton covered wire on a tube $3\frac{1}{4}$ inches in diameter and about 7 inches long. The windings will take only $5\frac{5}{8}$ inches, the remainder to be equally divided as margins for the mounting screws at each end.

Beginning at the left, coil L_4 , consisting of 34 turns of wire, is wound into place. Right next to it, but separated by a space equal to one turn, L_3 is wound in the same direction for 65 turns. These coils are wound so that their direction of winding is as one continuous coil.

The primary, L_2 , is a two bank wound coil of number 18 single cotton covered wire consisting of 43 turns on a piece of tubing $3\frac{1}{4}$ inches in diameter and about $1\frac{1}{2}$ inches long. Seven taps are taken off in the following manner: first—the beginning of the coil, second—the 3rd turn, third—the 7th turn, fourth—the 13th turn, fifth—the 21st turn, sixth—the 31st turn, and seventh—the end of the coil. If the bank winding proves too difficult, a single layer solenoid may be made but still following the above instructions. If a single layer solenoid is made, the length will be extended to about 3 inches. The coupling coil, L_1 , consists of only one turn of heavy wire—number 14 such as used in wiring sets—wound around L_4 , and in the same direction, about $\frac{1}{4}$ inch from the beginning of the L_4 coil.

When wiring the set, care should be taken to place the coil

L_2 at right angles to L_3 , as shown in the drawing, and not the L_4 coil.

The grid-leak is connected between the negative lead of the "A" battery and the grid with a variable resistance of from 1 to 2 megohms. The grid condenser has a capacity of .00025 M. F. It is recommended that it be of mica construction, as this type is more quiet and will stand a greater breakdown voltage.

In tuning, it will be found that the tube will oscillate more freely as the impedance value of the absorption circuit is decreased through lowering the value of its variable condenser. The oscillation value may be left fixed while the signal is being tuned in with the secondary condenser and primary switch. After the desired signal is obtained, the regeneration, and volume, may be increased by a re-adjustment of the absorption circuit by means of its condenser.

When once familiar with the controls, the operator will thoroughly appreciate its unusual selective ability. With the number of broadcasting stations, confined between the wavelengths of 200-550 meters, constantly increasing, sets having better selectivity, as

the above circuit, will become an absolute necessity to those who wish uninterrupted reception.

Applause Cards Prove Popular

One of the hits of the Radio Show held in New York during the week of October 6 to 13, was the distribution from the booth of the Dictograph Products Corporation, of envelopes containing five applause cards.

These applause cards have been received with the greatest enthusiasm by the radio public, as it gives them for the first time, in a simple form, a means of showing their approval or disapproval, as the case may be, of the programs being rendered by broadcasting stations.

The radio public has become quite critical of the programs which are being furnished and stations, from time to time, ask expressions of opinion and approval, in order that they may be able to keep in touch with the public's pulse and in order that they may be able to furnish to the public such entertainment as the majority seem to appreciate and demand.

The applause card was originated by the Dictograph Products Corporation, has been copyrighted and is being distributed by them to jobbers and dealers throughout the country and will be available for further distribution in shops.

This is the first organized effort to link up broadcasting listeners more closely with the stations from which they receive their amusement, and will bring about a much closer spirit of co-operation and is recognized as a splendid piece of advertising and very effective.



SELECTING WINNERS IN RADARIO CONTEST

Hundreds of manuscripts were received by Station WLW and *Writer's Digest* in the first radario contest conducted by them. Those in the group are Miss Helen Schuster Martin of Schuster Dramatic School; Powel Crosley, Jr., of Crosley Mfg. Company; Fred Smith, studio director (standing); Thomie Prewitt Williams, Cincinnati Conservatory of Music, and T. C. O'Donnell, editor, *The Writer's Digest*.

Let Us Introduce P. Crosley, Jr.

(A brief sketch of the President of the Crosley Manufacturing Co. and the Precision Equipment Co. by ALVIN RICHARD PLOUGH.)

POWELL Crosley, Jr., has risen to the position of leader in the world of commerce, by sheer hard work and sound vision of the possibilities in store for one who has charge of his faith in whatever is undertaken. Probably the most important branch of the business in which he is interested, is the manufacture and development of radio receiving apparatus. It is in this branch of the radio industry that he is called by many "the Henry Ford of Radio," because of the factory system of production and the reasonable price at which his receiving sets are sold. His slogan is: "Better—Costs Less."

As president of both the Crosley Manufacturing Company and the Precision Equipment Company, he fills a unique position in the radio world, as both organizations do an international business.

The radio business is the infant industry. Its growth has been so rapid that few have kept up with it or had the foresight of this man who devotes most of his time to the development of factory production methods, in order that more equipment may be manufactured without a loss of quality. Another great problem that has been solved in the laboratories of the aforementioned companies, is the simplicity in operation of the receiving sets. It is no longer necessary for the owner of a receiving set to be an engineer to operate the equipment.

* * *

Radio apparatus could not be sold if there were no broadcasting stations to send out the music and other forms of entertainment. There is the old-time code for communication, but very few people want to take the trouble to learn it and besides, it would not be possible to receive the voice without special apparatus.



POWELL CROSLEY, JR.
President Crosley Mfg. Company

In order that the public might have the very best in broadcast concerts, Mr. Crosley maintains one of the most powerful and efficient broadcasting stations in the country. It was from this WLW station that the first Radario or radio play was given; the first Sunday school lessons; broadcast of band music for mammoth Crosley Model XJ in parade, which replaced marching musicians; and many other novelties in radio broadcasting.

Mr. Crosley only became interested in radio in 1921 and when you realize what he has accomplished in the short time from then until now, it is truly a remarkable achievement. There is a sort of romance to the way he became the owner of the Precision Equipment Company. Powel Crosley, 3d, then nine years old, wanted "one of those radio sets" like his boy chums had, so his dad set out to get one for him. It was Washington's birthday and when the salesman in the store of the Precision Equipment Company told him the equipment would cost nearly \$130, there was a retarding of the purchase for the time being. Possessing a good business mind and realizing that there was not the merchandising value represented for the money, Mr. Crosley saw the opportunity to make radio equipment that could be sold at a reasonable price.

Less than two years after the visit to the Precision Equipment Company, one of the oldest radio manufacturing concerns in the industry, Mr. Crosley bought the company and became its president. This company is being operated as a separate organization, with headquarters at Blue Rock and B. and O. Railroad, Cincinnati.

* * *

The early career of Powel Crosley is very interesting. Before going to work, his academic education consisted in public school and military preparatory school, one year of engineering work in college and two years at law school. He is now thirty-six.

His first job was rebuilding some old telephones during a summer vacation while in the public schools. This was followed by work in various phases of the automobile business during summer vacations from college. During his last year in law school he was employed by a large bill-posting company to acquire leases on locations for their signs. Before completing his course in the

Popular Soprano



Miss Lillian Aileen Landwer, soprano, who sings from Station KYW.

Station KYW's audience has enjoyed, at different times, the richness of Miss Lillian Aileen Landwer's soprano voice. Miss Landwer has sung at all the best clubs in Chicago, as well as at the different radio stations throughout the city, and is at present a member of the quartette of the Warren Avenue Congregational Church of Chicago. She is a well-known voice teacher.

Miss Landwer is scheduled to appear at KYW again this winter.

law school, he decided that there were opportunities for quicker financial returns than in law, so he did not complete his course but obtained a position with a Cincinnati concern selling municipal bonds. This was followed by the organization of a small company, of which he was president, to manufacture a low-priced, six-cylinder car. This was in the days when there were not more than two or three six-cylinder cars on the market. Although the first car was built and operated successfully, others were never put into production because of lack of sufficient capital.

A few years later, he took up

advertising and sales work, which was followed by the organization of another automobile manufacturing company to build a light four-cylinder car. Neither of these companies went into production, due to the lack of sufficient capital.

It was then Mr. Crosley determined never again to attempt to operate on other people's money. He had experienced several disappointments and now started over again, with the intention of making advertising his life. He associated himself with an advertising agency on a drawing account of \$20 a week in 1914, and later changed his connection to another agency. By 1916 he had built up a fairly large and profitable clientele. Through the service rendered to one of his clients, he was induced to become interested in the organization of a company to sell one and later several automobile specialties. This company he purchased outright in the spring of 1917 and it has grown to be one of the largest concerns of its kind in this country.

From all this it will be seen that Mr. Crosley has exceptional ability in business organization. But it was his realization of the difficulty of obtaining an efficient and inexpensive receiving set in 1921 and due to the fact that he wanted something to manufacture which would keep his wood-working plant in full operation—that he plunged into the radio business and turned out simplified apparatus which could be manufactured in large quantities and sold at low prices.

Colleges Exchange Radio News

A collegiate radio news exchange will be established in the near future, according to an announcement from the University of Chicago. A radio broadcasting station is to be established by Frederick Loeb at the Zeta Beta Tau fraternity house, 5401 Ellis avenue. The station will take news of the university published in *The Maroon* and will broadcast it for the benefit of college papers at other mid-west universities. It is expected that stations WRM at the University of Illinois and WHA at the University of Wisconsin will co-operate in the enterprise.

Department of RADIO ENGINEERING

Radio Topics Institute

NANKO C. BOS, Chairman Advisory Board



Look for the Approval Seal

Such as the one just above which are furnished manufacturers whose radio merchandise has been tested and approved by the Institute Laboratory. We urge you to purchase only such apparatus, for it carries the guarantee of our organization.

Send all inquiries and material for test, calibration, or reconstruction to RADIO TOPICS INSTITUTE, Oak Park, Ill.

How to Build a Hazeltine Neutrodyne

By EDSON CALDWELL

RADIO-FREQUENCY amplification has proven to be the only real efficient method of increasing the impulse energy of any radio signal. When speaking in the term of radio-frequency amplification, it is meant that the signal is amplified at its original frequency without the necessity of rectification and its accompanying losses.

The original frequency of a radio wave, even at its highest wavelength, is such a fast vibration as to be inaudible. As the wavelength of a radio wave increases, the frequency of the oscillations decreases, and vice-versa at an inverse ratio. For example, a signal whose wavelength is 180 meters has a frequency of 1,667,000 complete cycles per second, while a signal whose wavelength is exactly double, or 360 meters, has a frequency of only half, or 833,500 cycles per second.

The action of a condenser in a radio circuit is that of an instantaneous storehouse of the received energy—that is—it instantly ab-

sorbs and then discharges the incoming energy through the circuit. Although this action may be considered as being instantaneous, there is an elapse of time, which, when the higher frequencies are being received, causes a lag in their current flow with its consequent generation of counter oscillations. As wavelength depends entirely upon the amount of inductance and capacity contained in the circuit, it is impossible to avoid all capacity in a radio circuit. Even an inductance coil contains some self-capacity caused by the laying of an insulated wire closely beside or above another. However, the capacity of a radio circuit for the reception of high frequencies, may be cut to a minimum by the construction of special shaped inductances and the elimination of unnecessary condensers.

One Serious Drawback

Radio-frequency amplification has the one serious drawback of being very sensitive to the capacities in

the necessary tubes and transformers. These capacities, although extremely small, cause the generation and feeding back of the counter oscillations in the tubes, making them howl and squeal. This is the main reason for radio-frequency amplification being so unpopular with the broadcast "fan."

However, Professor L. A. Hazeltine devised a method of connecting the grids of the radio-frequency amplifying tubes together, yet separating them by the use of very small condensers, as shown at C_1 and C_2 in the diagram, thus creating a flow of currents which would oppose and neutralize the counter feed back oscillations. Because of this neutralizing effect, the circuit was given the name of Neutrodyne.

The circuit is very easily operated and unusually selective in tuning. When once a station is received with a particular antenna, that station will always be received at the same dial readings as were used before. Unlike the regenerative type of receiver, the carrier wave of an interfering station will not change

the dial readings of a station when the Neutrodyne type of receiver is used. If a record is kept of the dial readings of the stations received, any one station, when in operation, may be tuned in by only placing the dials at the positions noted in the record.

Really Simple Set

Although from the diagram the Neutrodyne receiver may seem at first complicated in construction, it can really be easily and cheaply made in any experimenter's workshop. The only exacting work is the construction of the transformers and neutralizing condensers.

The antenna-ground circuit may be either a tuning coil, two honey-comb coils connected as a loose-coupler, or the usual vario-coupler. The diagram shows a modified vario-coupler with its usual primary and secondary tuning condensers. It will be noticed that the negative filament side of the secondary is connected to the ground and also, through the primary switch, to the primary. This method of construction is highly recommended, as the chances of the set howling are greatly reduced while the action as that of a vario-coupler in tuning remains the same.

The two transformers, RT-1 and RT-2, are constructed by securing pieces of tubing, the smallest about $2\frac{1}{2}$ inches in diameter and the other with an inside diameter just large enough to tightly slip over the winding of the smaller. On the

smaller, or inner, tube is wound 15 turns of No. 22 double cotton covered wire, and on the outer, 60 turns of No. 26 double cotton covered wire. The coils should first be wound into place and then coated with a collodion solution to hold them. After they are dry, the outer, or secondary, is slipped into place over the primary winding.

Connect Plate to Primary Side

The plate and high voltage leads are connected to the primary side of the transformer, while the grid and filament leads of the next tube are connected to the secondary winding.

Be sure that the windings of both coils are in the same direction and that when the transformers are connected in the circuit, the plate and grid connections enter the primary and secondary windings of both transformers at the same points in order to keep the currents traveling in the same direction. If one transformer coil is connected so so that its current "bucks," or opposes, the current flow of the other, both howling and poor amplification will result. The lengths of the tubes will depend upon the method used in mounting. Usually the primary tube is the longer, to take care of the mounting screws which go into it, being about 3 inches in length, while the secondary is only 2 inches long. These dimensions will give a margin of about 1 inch on each side of the primary winding and $\frac{1}{4}$ -inch on each side of the secondary. The secondaries of

the transformers are tuned to resonance with the incoming wave by means of a .0003 M. F. (11-plate) variable condenser shunted across each of them, as shown in the diagram.

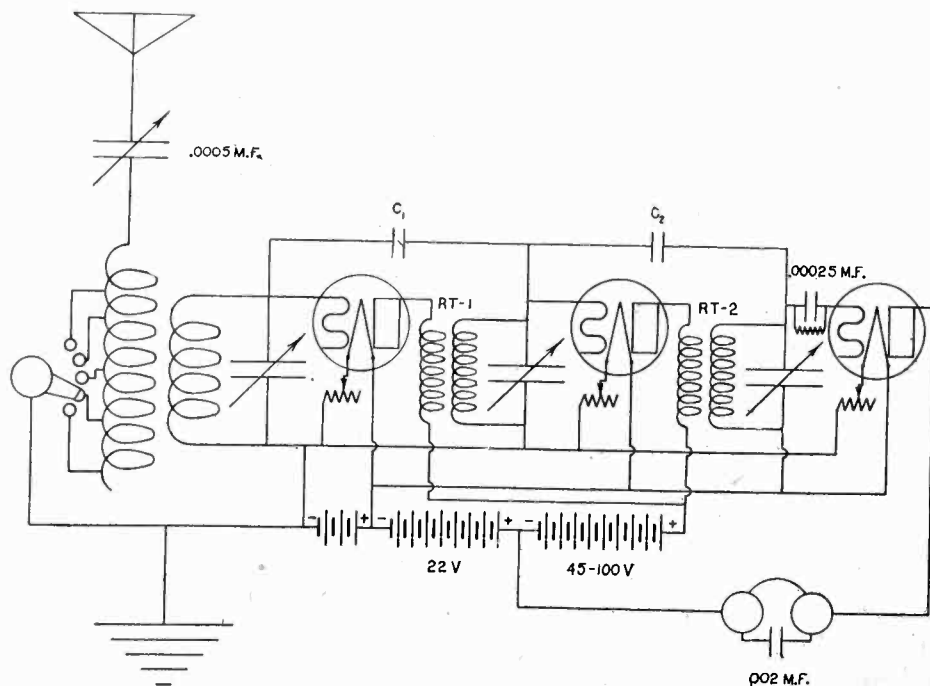
The small neutralizing condensers, C_1 and C_2 , are made by slipping a piece of varnished cambric tubing, "spaghetti," over two pieces of number 14 bare wire, such as used in connecting up a set, whose inside ends are spaced about $\frac{1}{4}$ -inch apart. Over all, so as to fit tightly, is slipped a small copper or brass sleeve about $1\frac{1}{2}$ inches in length. The insulating tubing should extend about $\frac{1}{4}$ to $\frac{1}{2}$ -inch on either side of the outer metallic sleeve.

Importance of Correct Wiring

In wiring the outfit, the usual precautions as to proper spacing of wires and the use of as short and straight leads as possible must be observed. The transformers should be well spaced and set at right angles to each other so as to avoid any undesirable coupling between them. The diagram of connections should be closely followed.

After the set has been completely wired, hook it up to an antenna and tune in a station. When the station is tuned in, extinguish the filament of the first tube while still listening for the signal. If the signal is still heard, adjust the first neutralizing condenser, C_1 , by sliding the outer metallic sleeve along, until the signal becomes inaudible. The first tube is now lit and the second neutralizing condenser, C_2 , adjusted in the same manner as used for the first tube. When both neutralizing condensers have been adjusted, the position of the outer sleeves are fixed with a drop of sealing wax. No other adjustments of these condensers will be necessary, and if the initial adjustments are correct, the circuit will operate on all wavelengths without oscillation in the radio-frequency amplifiers.

The constructor of this circuit will be rewarded with a receiver that will give him clear, distortionless reception over great distances, even when atmospheric conditions are bad. It is simpler in operation than most radio-frequency sets, and has proven to be an excellent receiver in those locations which seem "dead" to radio signals.



The Hazeltine Neutrodyne Circuit

CORRESPONDENCE WITH THE INSTITUTE

THIS department is conducted by Paul A. Perry, Technical Editor, RADIO TOPICS. Any inquiries addressed to him will be answered promptly, provided stamped and self-addressed envelope is enclosed with inquiry.

Please make your questions as concise or brief as possible.

This is your department. Use it freely.

TECHNICAL EDITOR, RADIO TOPICS,
1114 North Boulevard, Oak Park, Ill.

Being a constant reader of the RADIO TOPICS and having recently purchased some Atwater Kent instruments and on hooking them up not being satisfied with results, I am writing to you for information.

Will you please furnish me with the correct placing of instruments as shown on sketch in order to get DX broadcasting.

You will see that I have at present practically the same hook-up as given in one of your recent issues of RADIO TOPICS. I am using a 23-plate variable condenser in aerial. Should this be cut down or increased? I am also using a 23-plate condenser variable in the ground.

I am using a storage battery and UV 201-A as detector and same for Amp. The Det. unit and the 2-stage Amp., have a rheostat already installed in their units, which I presume has a rating of about 4 ohms. I have installed a Bradleystat between storage battery and filament of Det., to control the burning of tubes. Is it necessary to add a 30 ohm rheostat in addition to the Bradleystat? I am troubled with hissing and steaming most of the time. What would you consider the proper length of an aerial for this outfit? My present aerial is 145 feet single No. 14 insulated wire 40 feet above tin roof, and ground about 8 feet securely fastened to water pipe, pipe scraped clean before fastening ground clamp, I use No. 18 wire on plate on B battery for Det. and 98 for Amp. My variometers are the same; both have the same number of windings. I sure would appreciate a full description of how to use these units to get the best results.—L. M. C., Washington, D. C.

ANSWER: In response to your inquiry, would advise that your circuit on the Atwater-Kent is alright outside of the 23-plate condenser in the ground and aerial. Use one of these either in the ground or aerial but not in both places.

The Bradleystat in the detector circuit is good but cut the detector out that is already on the unit as the Bradleystat is built to control the one tube by itself. Two rheostats will give you too much resistance.

The fact that you are only using 18 volts on the plate of your detector which is a 201-A is probably where your trouble lies as this is a hard amplifying tube and you should gradually

keep increasing the voltage on this tube while you listen in until maximum results are obtained even if you go to your full 98 volts. This tube will stand it.

Your results would probably be better if you used a C-300 detector with 18 to 22 volts on the plate, as the soft detector is more sensitive.

You also need a grid condenser and leak on your detector unit which you did not show on your drawing. It is attached between the grid and grid variometer.

All the rest of the circuit including your aerial seems O. K.

I have a six-tube frequency set (three radio, two audio and detector unit) using three circuit tuner with two potentiometers.

I am having trouble getting many stations and when I have three or four on the same position, have trouble in tuning them out. What I want to know is this—

Could I use a wave trap in aerial and get more stations with less interference? If so, how would you build the trap for this set?

Also I have a pair of Delton headphones, manufactured at Marion, Ind., 2,200 ohms capacity. Would Baldwin C type phones be sensitive to more signals?

On cool nights I am able to tune in more than five or six stations and I figure I am not getting the best results for this 6-tube set.—O. S. M., Indianapolis, Ind.

ANSWER: You are evidently hearing the stations on your radio set in spite of the radio frequency, not because of it. You will get better results if you will take off the radio frequency and use your three circuit tuner with two stages of audio.

You could use a wave trap but we cannot offer any advice as to how to improve your radio frequency tuner as you did not send your circuit.

We do not know anything about the phones you mention. We do know, however, the Baldwin is an excellent phone.

A wave trap is made by shunting a 75-turn coil with a variable condenser and putting this in series with your antenna.

I have a Cino three-circuit set in three cabinets—two variometers and a vario-coupler in first; detector and potention-

meter in second and two stages of audio frequency in third.

Can you tell me if it is possible to put a stage of radio frequency between the first and second cabinets?

If so please send me diagram so I may hook it up.—O. A. R., Cincinnati, Ohio.

ANSWER: We are sorry to say that you cannot put a stage of radio frequency between the first and second cabinets of your set as you desire. However, it can be placed before them all, that is between your aerial and set which would probably be no objection.

We are enclosing diagram for this of the tuned impedance radio frequency type which has proven out to be about the most reliable of the radio frequency circuits. You can use the same "A" battery, but use a separate "B" battery.

Do not get discouraged if you do not get Honolulu or Australia at first. Radio frequency is a more or less ticklish proposition and will take considerable tinkering with until it works properly. An Anti-Capacity switch is very good to use in case you want a switching mechanism to cut your radio frequency in and out.

In your June issue of RADIO TOPICS, Volume III, on page eight, you have an illustration of a radio set constructed by Mr. V. M. Moen of St. Paul, Minn. Would you kindly oblige me by sending me a hook-up of this set.—G. W., Cincinnati, Ohio.

ANSWER: In response to your request for a hook-up of Mr. Moen's receiver, we are glad to say that you will find a complete circuit and description of this set in the September issue of RADIO TOPICS on page 19.

Will you please publish in your Service Department of RADIO TOPICS a hook-up for a set consisting of one vario-coupler, two variable condensers, one WD-11 tube?—F. C., Newport, Ky.

ANSWER: In response to your request, will say that we will try to fulfill your wishes as soon as possible by publishing the circuit of the vario-coupler, two variable condensers with the WD-11 tube.

We trust that you will follow RADIO TOPICS and find other interesting articles and hook-ups until we can publish your "pet" circuit.

In one of your issues of RADIO TOPICS early last winter, you published an article on the construction of a single tube receiving set, similar, I believe, to the Chicago Radio Laboratory's "Zenith" set.

Will you please send me the diagram and complete construction of this set.—J. H., Astoria, N. Y.

ANSWER: The description to which you refer is that of the Zenith set. The diagram together with complete construction data was published in the January, 1923, issue of RADIO TOPICS. Because of the length of such data, we are sending you, under separate cover, a copy of that issue so as to enable you to construct directly from the original instructions. We would appreciate receiving some reception data which you obtained at your station with this set when you have it finished.

Super-Heterodyne Has Wide Range

RECEIVER MADE TO SPECIFICATIONS OF MAJOR E. H. ARMSTRONG—DISPLAYED AT RADIO SHOW—A HIGHLY SELECTIVE INSTRUMENT

A SUPER-HETERODYNE receiver constructed by Harry W. Houck, a member of the Radio Club of America, under instructions and specifications furnished by Major E. H. Armstrong, attracted unusual attention at the recent Radio Show in Grand Central Palace, New York. It was declared to be one of the most notable advancements in radio at the show. This super-heterodyne receiver was used to reproduce all of the broadcasting for the officials of the show.

While the Houck set was on display it was not exhibited as a manufacturer's product. It attracted unusual attention and was universally acclaimed a wonder.

Beautiful Instrument

The set on display at the show was contained in a handsome mahogany cabinet, about the size of an ordinary standard regenerative receiver with two stages of audio frequency amplification and contained eight tubes.

It is freely predicted that the super-heterodyne will soon be declared the absolute standard for radio reception because of its remarkable selectivity properties.

The Armstrong receiver contains:

Two stages of transformer coupled radio frequency amplification, first detector, oscillator, three stages of intermediate frequency amplification and then the second detector.

The output from this detector goes through two stages of audio frequency for normal loud speaking work. At the show it was fed into a high power amplifier in order to give sufficient volume in the large hall.

Tuned-Frequency Circuit

The improvement which has been attained in the new receiver lies in the construction and arrangement of the intermediate-frequency transformers. These have been wound for a specific frequency, and are so arranged that the first stage is really a tuned-frequency circuit, but uses fixed windings and fixed capacities in the plate and grid circuits. By this arrangement it has been possible to get high ratios in

the transformers. The result is that three stages of this intermediate amplification are equal to at least five stages of the old resistance coupled type.

The first two stages of radio-frequency amplification, which precedes the first detector, consist of the regulation type of transformers, suitable for the broadcast range. These stages are not shielded. The three intermediate stages are each separately shielded so that the tubes and their transformers are completely inclosed—top, bottom and sides, in a well-shielded case—the leads from the stage to the other passing through insulated bushings.

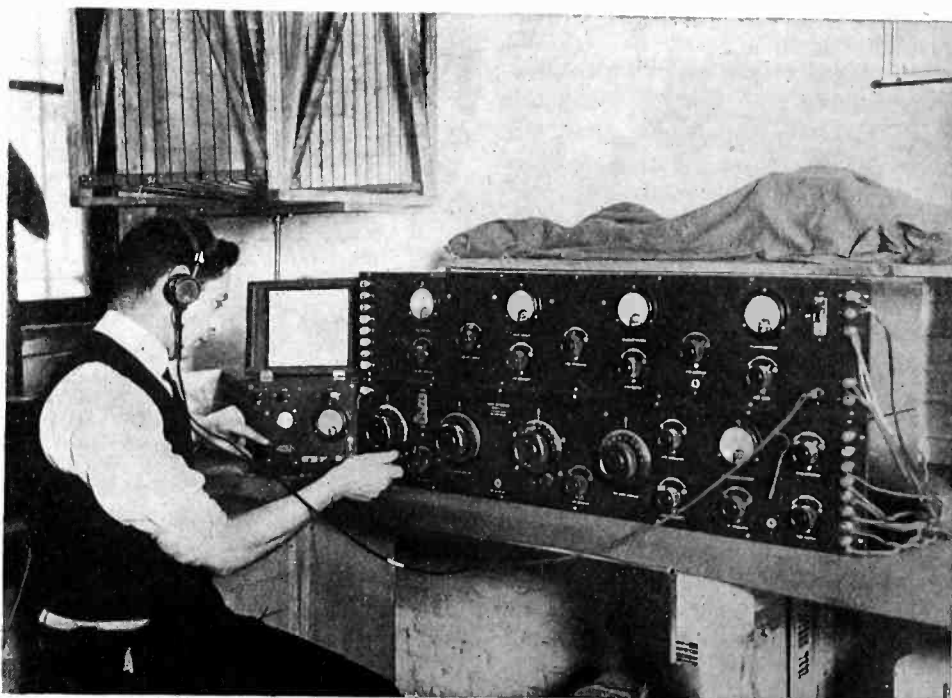
The Radio Club of America was chosen to do the official reception work for the show, in order to eliminate any possibility of confusion, and there was a wonderful opportunity of testing out the remarkable efficiency of this receiver.

A Severe Test

The show was held in the Grand Central Palace, which is situated directly above the assembling yards of the Grand Central Terminal.

There is probably no place in the city of New York where so much electrical equipment is in constant operation, yet the receiver completely rejected any of this type of interference and gave pure, undistorted reproduction of speech and music.

In the preliminary tests, before the show was actually opened, a committee was appointed to operate the set by the Radio Club of America and do a great deal of experimental work, under the supervision of Major Armstrong, chairman of the committee. During these tests some very remarkable reception work was accomplished. For instance, it was easily demonstrated that Station WGY of Schenectady, WDAP at Chicago and the Philadelphia stations could be brought in on the loud-speaking apparatus clearly and distinctly, while WJZ and WEA, the two local New York stations, were in full operation. There was absolutely no interference from the latter, despite the fact that WJZ was less than 200 yards away from the receiving equipment.



A SUPER HETERODYNE—MOST SENSITIVE SET

This fourteen-tube super-heterodyne receiver is claimed to be the most sensitive receiver in the world. It was built by Claude Golden and uses a loop especially constructed (shown at left). Signals from Europe and the west coast are heard with this receiver, it is said. A good idea of the number of controls and adjustments necessary may be gotten from the photo, but for selectivity and all-around efficiency the super heterodyne has never been equaled. (Photo by Kadel & Herbert News.)

How to Protect Against Lightning

By A. REISNER

ONE of the great, but unreasonable fears which the radio novice entertains, concerns the dangers of lightning. They feel that since the aerial wires are suspended in the air, the lightning strokes are apt to strike it and so do damage both to the radio set and themselves. These fears are entirely unfounded as an elementary understanding of the nature of lightning shows. It is therefore appropriate that this subject be explained to the radio novice, especially so at this time of the year, since lightning storms do occur more frequently in summer time and the novice is therefore more worried about lightning now.

Lightning as it is ordinarily seen by the observer, consists of a streak or flash of light across the sky. This is similar to a spark of electricity which is seen when two live wires are struck together and pulled apart, only the power in the lightning stroke is millions of times greater. A spark of electricity flows between two wires which are at different electric voltages. The lightning stroke, which is in reality an enormously magnified electric spark, also jumps between two objects which are electrified and at different voltages. Modern investigation shows that clouds are highly electrified to different voltages. The space between the clouds is, of course, an insulator. But we know that if we apply a high enough voltage to any insulator, the insulator breaks down and an electric spark results. In the same way when the clouds become so highly electrified that the insulation of the intervening space cannot withstand it, a terrific spark takes place between the clouds which are at such different voltages. This is the lightning stroke.

* * *

Now if this discharge of electricity, or lightning, only took place between clouds which are high overhead, there would be nothing to think about. However, the lightning discharge will take place between any two objects which are at different electric voltages, if only this difference is great enough. Now any object on earth is at the same electric voltage as the earth,

and the earth is considered to be at the lowest possible voltage. Since clouds are greatly electrified, therefore, electric or lightning discharges take place from cloud to earth. It should be mentioned here for the sake of information, that although the difference in electric voltage between cloud and earth may be much greater than that between cloud and cloud, the lightning discharge does not always take place between cloud and earth. The reason for this is that the separation between cloud and earth is greater than the separation between

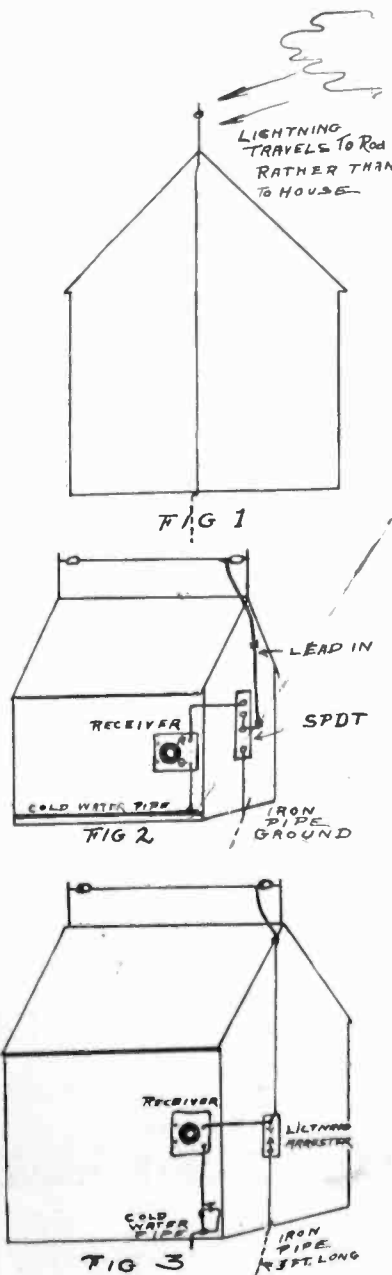
cloud and cloud and the lightning takes the path of least resistance.

It is this discharge between cloud and earth which is dangerous, for evidently anything on earth may be struck. Now when will this lightning produce actual damage? Suppose a lightning stroke hits a farm house. If the lightning has no definite path to take when it strikes the farm house, all the energy in the stroke is used up on the farm house and it may destroy it. Suppose, however, that we stick on top of the farm house a long metal rod and connect the lower end of the rod into the earth. We said above that lightning takes the path of least resistance. It will therefore discharge to the rod on the roof, since the rod extends way above the roof towards the clouds. Not only that, but since the rod is metallic, it is a conductor of electricity and will collect the discharge of lightning from the cloud more easily. For these reasons the lightning stroke will always strike this metal rod and not the structure on which it is erected. However, if the rod is not connected to the ground, the lightning discharge still has no definite path to take, hence it may destroy the rod and the building.

If the rod is connected to ground though, as seen in Drawing 1, the lightning has a definite path to take—namely, it travels to earth. The earth behaves, in its action towards electricity, like an enormous reservoir, and it has a tremendous capacity for storing electricity, no matter how much flows to it, it can always receive it without causing any change in its condition. It is as though we had an infinitely great water reservoir. No matter how much it rained it would never be filled. Therefore, since the lightning which strikes the rod has a definite path to the earth, and since the earth can receive any amount of electricity, without batting an eye you might say, no harm is done to the rod or any object on which the rod is.

* * *

The radio novice will see now that the presence of a metallic rod which is properly grounded serves to lead the lightning discharge to the ground. By so doing, the rod—



Sketches of lightning arrestor and two good ways to construct lead-in to obviate all danger of lightning.

which the reader will recognize as the lightning rod so often spoken about—prevents the lightning from striking the house on which it is erected, for it offers a lower resistance path by extending up in the air and going to the ground. Thus the rod protects the house. Not only does it protect the house, but it also may serve to protect nearby objects. The lightning may have a tendency to strike these objects. But the lightning rod presents such an easy path for it that it flows to the rod. What the rod does, therefore, is that it offers an easy path for the lightning to take, it collects the lightning which then travels into the ground and can do no damage.

An aerial is a system of metal wires extending in the air. It therefore attracts lightning to it, but the aerial is always grounded, either by a switch or through the set. Hence the aerial conducts a lightning discharge to the ground and so avoids any trouble. The novice should now see that instead of the aerial being a dangerous element, a lightning liability or risk, it is in reality a help to avoiding lightning troubles. It collects the lightning discharge, provides an easy path for the lightning current to take to earth and so protects the house on which it is erected and sometimes neighboring houses.

* * *

The radio novice should therefore have no doubts on the question of the safety or risk of his antenna. However, if he is a little nervous, he can do a few things which should assure the most skeptical ones. In the first place, by making a good ground which has low resistance, the path which lightning takes to ground will be better and easier for it. This is best done by sinking a metallic plate, say one foot square, a few feet into ground and soldering a wire to it. The heavier the ground lead the better.

When installing your set, use a single pole double throw switch for a lightning switch in the manner shown in Drawing 2. The SPOT is best mounted just outside the window. The antenna lead-in is connected to the center post of the switch. The antenna terminal of the set is connected to the upper post of the switch. The outside metal ground is connected to the lower post of switch. When the set is in use, the switch is thrown upward, thus connecting the antenna to the set. The antenna is there-

R. A. C. Loses Suit

A DECISION handed down recently by Judge Learned Hand of the United States Southern District Court dismisses the suit of the Radio Corporation of America vs. The Independent Wireless Telegraph Company, for an alleged infringement of the vacuum tube patents. The costs of the suit were put on the R. C. A.

W. H. Taylor, Jr., who represented the defendant made a motion for its dismissal and the decision followed. The R. A. C. filed a bill of complaint charging the defendant with having used vacuum tubes, sold for amateur and experimental wireless purposes solely, in commercial wireless telegraph stations, and asked the court to compel the Wireless Telegraph Company to immediately cease such use. Also to account for and pay to the Radio Corporation the profits it had made and damages the R. C. A. had sustained.



SUPERVISOR OF U. S. RADIO

D. B. Carson, Commissioner of Navigation of Department of Commerce and director of Uncle Sam's radio service. He supervises all land and ship radio stations within the United States, which, exclusive of sets used for receiving and not licensed, number 20,000. (Photo by International Newsreel.)

fore grounded through the set. When the set is not in use throw the switch downward. This connects the antenna to the ground, thus affording in both cases the low resistance path to ground for proper protection against lightning.

As a final and positive safeguard the novice may use a lightning arrester of any type approved by the Board of Fire Underwriters. There are any number of them on the market. This is connected as shown in Drawing 3. One terminal of the lightning arrester is connected to the lead-in of the antenna, the other to the outside metallic ground. The lightning arrester consists primarily of a minute air gap. This gap offers a very high resistance to radio frequency currents. Therefore, the signalling currents of radio frequency do not flow through to ground, but take the easier path through the receiver which is tuned to them. However, the lightning discharges which flow down the antenna, are of such a nature, that the receiver offers a tremendous resistance to them, while the air gap of the lightning arrester has a much lower resistance. The lightning discharge therefore flows down the antenna through the arrester to ground, whether the receiver is in use or not.

The writer has attempted to sketch briefly but adequately, the action of lightning, so that the novice will forget his fears about lightning dangers. If these suggestions here are followed, the radio novice will realize that an antenna, far from endangering his safety, really ensures it.

Life of Dry Cells

Dry cells do not last forever. If your receiving set is used frequently, don't expect the batteries to last for more than a month or six weeks.

Radio as an aid to the police has been clearly demonstrated in Philadelphia and New York. Many automobile thieves and other crooks have been apprehended because the radio was quicker than the thieves' quickest get-away. Score another use for radio.

WOC says: "Speaking of radio, it literally has the country 'by the ears.'"

WBZ Plans Big Radio Season

By L. H. ROSENBERG

PLANS for both improving Radio Station WBZ and initiating new ideas for fall and winter broadcasting are now being made by the Westinghouse Electric Company at Springfield, Mass., which will make the station distinctive in the field of broadcasting. The new arrangement will include radical changes in the method of broadcasting musical recitals and the introduction of lectures that will make the station unique in broadcasting circles.

Springfield is one of the most prominent musical centers of New England and, although it is not generally known outside of the community, the number of musically inclined people per capita is greater than any other center in the country, with the exception of Boston. In the past, the musical programs have been very similar to other radio stations throughout the country. The artists and musicians in the city and vicinity gave varied programs of instrumental and vocal music which brought forth generous applause from the radio fans from near and far.

These musical programs have been arranged with due regard to the artist's ability and the planned needs of the radio station. It was firmly believed that these programs were the proper thing for broadcasting and the many letters received proved this point. As station WBZ was one of the first broadcasting stations in the country (as it began operations in September, 1921), it was only natural that some pioneering had to be done.

Popular Music Demanded

As time went on, however, it was observed that although the music was appreciated, something was lacking in the presentation to assure its complete success. It might be stated in passing that after the first novelty of radio wore off, there was a great demand for more popular music than what was given. The directors of the station were firm in their belief, however, that a great amount of popular music would not stand the test of time and therefore classical music was made to predominate the program under protest from some of the radio listeners.

This belief was strengthened by

the comments that began to come in and the policy of broadcasting only good music was strictly adhered to. In fact, it appeared as if the public had begun to appreciate music and as far as radio was concerned, the demand for popular music had greatly diminished.

It is this condition that now confronts the radio station, and judging from the fans, the present policy could be continued indefinitely. But WBZ thinks that the present methods in their entirety are not adequate to make for permanent broadcasting and it is thus looking into the future, as it were, to anticipate the public's desire.

The public, or that portion of them who before the advent of radio, never heard a classical concert and therefore did not appreciate good music, are now becoming more and more interested in music. Although they are not trained in the art, they are beginning to appreciate music, and it is the natural feeling that they desire to know more about it.

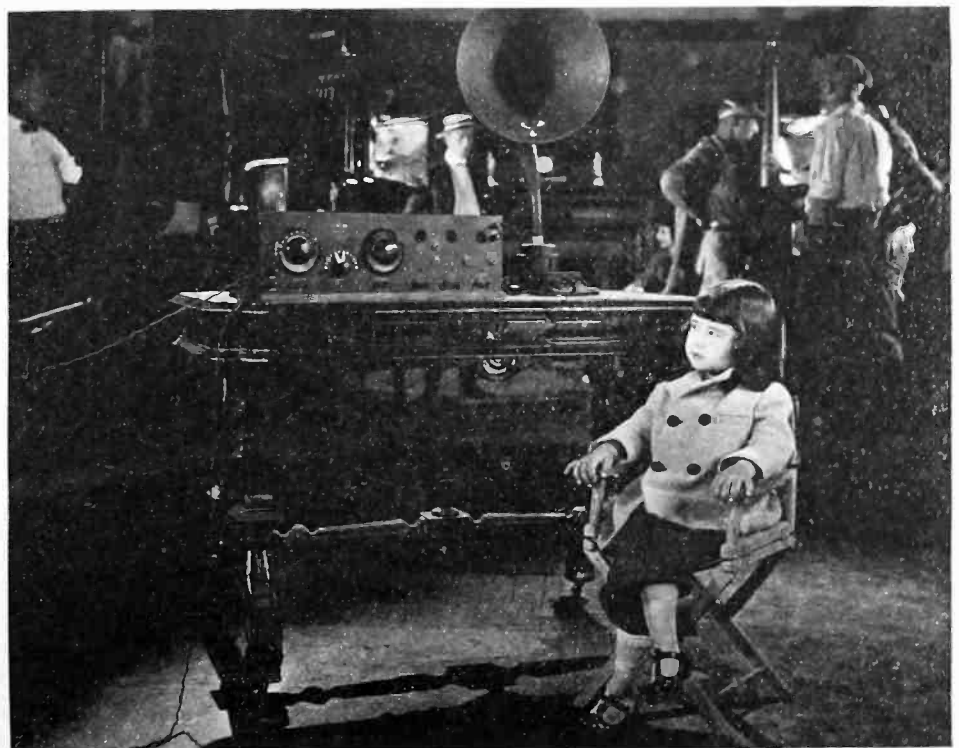
A Course in Music

For this reason, WBZ is planning to give music in such a man-

ner that the public will come to know music. Courses in music, written so the lay public can understand them, will be given with illustrations of the music talked about. In other words, a study of music will be made by the public from both the viewpoint of the composer and the elements of the art with illustrative interpolations.

This will not be done in miscellaneous talks, but will be given in a series of lectures that will give the interested radio fan a complete course in music. It is thought that this plan will add a new impetus to radio music by the radio fan and will do much to hold his interest in radio.

It has been the practice of radio stations in the past to allow magazines and other agencies to broadcast miscellaneous material which may or may not be of interest to the radio listener. Most of the material broadcasted was given by persons who had a selfish purpose in giving it. They either wished to advertise themselves or their business. The material that they broadcasted was, therefore, more or less indirect advertising and the public was always aware of this



BABY PEGGY'S A REGULAR FAN

Waiting between scenes in her work at the Universal studios, Baby Peggy, the highest salaried child star in movies, enjoys music, speeches and bedtime stories over the radio. A Grebe receiver is used by the little tot.

fact. They said, however, that is, most of them, that as they were getting the material free of charge that "Beggars cannot be choosers," and were satisfied with the broadcasts. The broadcasters have found it rather difficult to make a good selection of the material, and often-times incorrect statements would slip into these talks.

Lectures to Be Given

The speeches by prominent personages, however, always were well received, but in order to maintain a program, the majority of stations were notable to obtain such people every night in the week.

In view of the great number of miscellaneous addresses that are thrust upon the public, it is thought by WBZ that it might be a good idea to go to the other extreme and broadcast only a series of lectures. Heretofore, this policy has been restricted because of the unreliability of radio for distant purposes.

Radio, at this time, surely, should be advanced to such a state that difficulties of interference and non-reception within a reasonable distance from the station, are not present. If these problems have not been solved to the highest degree, their solution will come more quickly if a definite interest to listen-in on certain occasions is manifest.

In view of these conditions station WBZ intends, for fall and winter broadcasts, to initiate continuous events. This will be done to motivate the program and assure the constant listening in of radio fans within constant hearing distance of the station.

Story Writing Taught

Take for instance, the course in "The Art of Writing Short Stories." This department will be conducted by Dr. J. Berg Esenwein of the Home Correspondence School. Dr. Esenwein is well known throughout the country for his courses in journalism and is considered one of the best authorities on the subject. He was, for a number of years, the editor of Lippincotts Magazine which went out of existence shortly after he resigned the editorship. Dr. Esenwein has prepared a series of ten lectures on short story writing which will not be given merely as detached informational talks, but in such a manner that they will have the definite purpose of teaching the listeners interested in the subject. The course will be given at periodic intervals and at the end of the



E. B. Mallory, manager of Radio Sales Department, Westinghouse Electric & Mfg. Co., New York, who has accepted the invitation to become chairman of Radio Communication Committee of American Marine Congress, which meets in New York November 5-10, to be held in connection with American Marine Exposition. Mr. Mallory is now chairman of radio section of Associated Manufacturers of Electrical Apparatus.

course, radio fans who would try their hand at writing will be invited to submit stories. The best stories that are written along the lines suggested by Dr. Esenwein will receive prizes.

It is thought that this course will maintain interest in the lectures, as there will be a definite goal at the end of the course.

In the same manner it is planned to give courses in Economics, Psychology, English Literature and many other subjects. Each course will have a definite object and the radio students will receive a reward in college credits or otherwise recompensed.

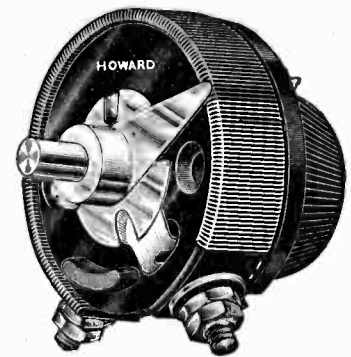
An arrangement has been made with the Northeastern University, a prominent evening school in New England, whereby these courses will be given by some of the foremost professors of this part of the country. Also, arrangements are under way with Massachusetts State Extension Department for courses especially adapted to the interest of women and girls.

Although many of the plans are in the making, by September a complete system will be laid out to fit the needs of a New England broadcasting station to render the best possible service to the radio audience. WBZ is of the opinion that these efforts will bring renewed and continued interest in radio broad-

casting. After a few years of experimental broadcasting to try to analyze the needs and desires of the radio fans, it is now time to put the stations of the country on a real utilitarian plan so that the greatest number of people may benefit from the great expenditure of time, money and energy that is being placed on broadcasting.

The Howard Midget Rheostat

To meet the long felt want for small rheostats, the Howard Radio Company is now manufacturing its Midget Rheostat, made in three different resistances, 6½, 25 and 40 ohms. The diameter of the base is 1 5/8 inches.



These rheostats are identical in design and construction with their Standard Rheostats, being built of the same high grade materials. This rheostat has been designed more particularly for use in small portable sets where space is limited. The above cut shows the exact size of rheostat.

Radio Apparatus Sold on Time

AN attractive and conservative deferred payment plan for the purchase of radio apparatus, available to every responsible person, has just been announced by the Iodar Sales Company, Not Inc., of Oak Park, Ill.

This organization is not attempting to push any particular line of apparatus, but offers a very diversified line, their slogan, "ANY piece of ANY make," means a national service to the many who are interested in purchasing on a plan of this sort.

The plans of this organization include the publication of a monthly bulletin, the "Iodar Service Bulletin," the installation of a broadcasting station and the maintaining of an efficient sales service available to everyone.

"Trick" Circuits vs. Old Reliable

By E. X. PERT

SO many complaints about radio receivers have come to our attention that are more or less unreasonable that we have looked into it and believe we have found to a certain extent just where the difficulty lies. We have in mind one young radioist in particular who seems to be in continual difficulty with his receiver. It is either a case of "My set went into the awfullest howl one ever heard just when he was going to give his call letters," or "My set went dead last night when I had a lot of friends over to hear it." You know yourself how it is, although you may not always know what caused it.

On looking into some of his trouble we find that he was bitten by the radio bug about a year ago and instead of starting off modestly with a crystal set or a single circuit tube set, he scorned them all and started in with some sort of twin super-reflex set that he heard about and which "took the wall paper off the walls" when once tuned in.

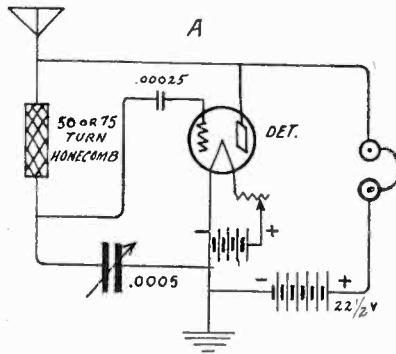
Whether the paperhanger made an exceptionally good job of it or whether it was his tuning, we do not know, but after he discarded the set and started on another of his triple-action ultra-regenerators with about the same result as the first set, he eventually heard a station about five hundred miles distant, with a corresponding increase in the region of his chest. His experimenting may some day produce another super-regenerative machine, provided the "B" battery line doesn't become attached to the "A" line too often, but after he gets a distant station on about four or five tubes he does not realize that the same station may be heard on one with probably about the same volume.

* * *

The thing for him to do is to forget about the diaphragm breakers and start in with the construction of a good single circuit tuner, we'd say, and after learning how to tune with it and see what makes the wheels go round, start one of his famous receivers and after getting WGY or some such station, switch to his first set and

see if his wonder is getting the signals as loud as the more stable tuner.

The chances are that for about the first year or so it will not do so and he can find out for himself in short order. In case his friends come over, it takes but a minute



to take his Leviathan's only rival off the antenna and let his friends hear some real music and distance and thus create new radioists.

The single circuit tuner, as we all know, is a simple tuner capable of some wonderful results in the right hands and offers quite a field in the way of experimenting to make it tune sharper and have greater selectivity.

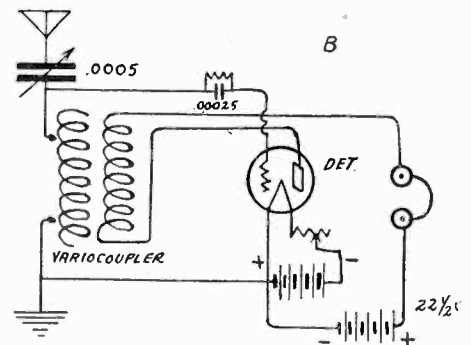
We personally are strong for the experimenting, but in spite of all the new supers, which are a great attraction, have done considerable tinkering around with a single circuit tuner, enjoyed it immensely, and, incidentally, have listened to a station 4,500 miles distant from our home town, Chicago.

We have been learning new things about the set nearly every

time we monkey with it and after we learn all there is to know about it will probably experiment around with a more advanced "twin six" and see what the results will be in comparison with our original set.

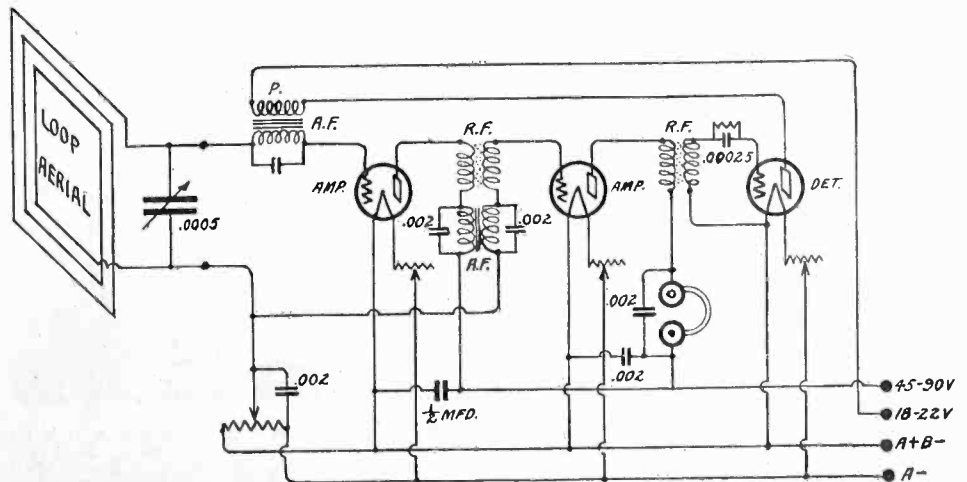
If we just remember that it took Armstrong himself six months to learn how to tune in his own super-regenerative circuit we can then see why the amateur fan complains about his not doing all that was claimed for it.

There are a host of new circuits that have been devised, mostly all by professional radio engineers, and we believe that some of them show some wonderful possibilities, but unless you are expert at "making them holler when



they're dumb," start off with the more easily controlled stable tuner and learn the A B C's first.

We know of reflex sets that actually brought in stations 1,500 miles distant on loop aerials, but in all cases this was the result of about six months of patient experimenting and the use of two to



A Reflex feed back. Circuit which has received stations 1,500 miles away on a loop

five vacuum tubes and a crystal. There is a thrill in the fact that this is being done on a small loop of wire, but, we believe that terrific distances could be obtained with the same material when used in conjunction with the old standby, the outside aerial, and that the place to look for long distance reception is with the outside aerial.

For the amateur who is just beginning to get interested in radio we would recommend the A or B circuit in the diagrams, and for the more advanced amateur the C circuit has been made to receive a distance of 1,500 miles on an ordinary loop aerial after considerable changing of condenser values and general tinkering around.

It is a hard proposition to get a receiver to work after copying some circuit, when trying reflexing, as tubes, locality, amount of wire used in hooking the set and the general arrangement of the parts in relation to one another, to say nothing of the type of transformer used, must all be taken into consideration.

Good luck to the fan who stays with it. It is by experimentation that we find new circuits and ways to make tubes do more work for us, but let us go at it intelligently and start with the simpler things first and learn a little about them.

It will keep a large percentage of fans from giving radio up in disgust, who will not know what they are missing by not having a receiver on hand that works, to get the thrill of listening to some station in the small hours of the night that is thousands of miles away.

Jones Condenser Cleaner, 10c

At your dealer's, postpaid from us, 12c

Cleans between the condenser plates without bending and causing a short circuit. Dust will collect and unless removed condenser leaks.

Every radio fan should have this inexpensive radio accessory. Send today for catalog of other accessories, including the "Multi Plug," on request.

Howard B. Jones
612 S. CANAL ST.
CHICAGO, ILL.



Uses Radio to Fight Dope

ANOTHER use for the radio has been found by Mrs. Wallace Reid, widow of the popular movie star who fell a victim of the drug habit. In every town that she visits, in her tour of the country with the screen drama "Human Wreckage," she delivers from the stage an interesting and straightforward talk on the evils of drugs, and wherever there is a radio broadcasting station she gives a ten minute talk to the radio fans.

"I have found through this method," said Mrs. Reid, to a Radio Topics correspondent, upon her recent visit to Chicago, "that I can reach more people and drive home my arguments with greater force than by many weeks of travel and personal appearances.

"Everywhere I have been, New York, Boston, Kansas City, St. Louis, Detroit and Chicago, the radio stations have readily consented to aid me in my fight against the drug evil by making known the terrible consequences of the widespread traffic in narcotics."

Through her talks over the radio Mrs. Reid has enlisted the aid of senators, governors and mayors throughout the country to

support campaigns against the sale of drugs and to establish hospitals where the drug victims may be treated.

New Basket Weave Inductance

THE Crosley Varind (patent pending) is a new type of variable inductance consisting of tapped basket weave primary and movable basket weave tickler.

The advantage of this type will be obvious to the radio engineer, wherein the importance of low distributed capacity with consequent low internal resistance, combined with flat fields still further decreasing high dielectric losses, more nearly produces an ideal condition for the purpose, than any type heretofore developed.

The proportion of the coils has been so arranged as to bring about gradual variation of mutual inductance without altering the heavy inductance of the primary. This variation permits minimum to maximum coupling. The effect of the low resistance of this unit is sharpness of tuning to a remarkable degree and the consequent elimination of interference.

Radio-Telephony in Chile

Another step forward was taken recently in the development of radio-telephony in Chile when for the first time in its history a conversation was held between a private broadcasting station (characteristic of "A. B. C."), belonging to a Chilean amateur in Vina del Mar, on the Pacific coast, and Tucuman, Argentina.

The Vina del Mar station was distinctly heard in a radio club in the latter city at midnight, whereupon conversation was kept up for over an hour, during which congratulations over the important development in South American radio-telephonic communication were exchanged. A few days later conversation was established between the Chilean coast and Buenos Aires—a distance still greater by five hundred kilometers.

It is reported that musical programs from the Vina del Mar station are clearly heard on board vessels along the Chilean coast.



Mrs. Wallace Reid broadcasting a talk on the evils of the drug habit. Mrs. Reid has enlisted the radio in her fight against "dope," and talked from stations in Kansas City, St. Louis, Pittsburgh, Boston, Newark and Chicago recently.

Official Mexican Band Gives First Radio Concert

THE Zenith-Edgewater Beach Hotel broadcasting station WJAZ on the evening of Sunday, September 30, gave to its listening audience throughout the United States a rare treat which was fully appreciated as is evidenced by thousands of letters received.

The official Mexican Police Band of eighty-seven pieces sent to this country by President Obregon appeared in full uniform and rendered a concert of continuous playing lasting over one and one-half hours. Many of the band stood during the entire time, and there was no intermission. Inquiry of the director of the band if they did not desire an intermission was made and his reply was, "Oh, an hour and a half of straight playing is nothing. In Mexico we often play steadily for three hours."

This band came to the United States on the heels of the recent recognition of Mexico as a friendly handclasp from President Obregon. To put it in the words of the Mexican Consul, "We can express our appreciation most appropriately through music." The Mexican Consul also stated this was the first appearance of this band at any radio broadcasting station.

Twenty years ago the band was organized by Velino M. Preza who is still conductor and has seen it grow not only in the affections of the Mexican people, but in the esteem of foreigners, and especially of the highest musical critics. The Chicago Daily News music critic after hearing the band made the following comment: "Some of our American bands might well learn how to play our popular jazz music from the way in which the Police Band of Mexico City played it yesterday. Their music was refreshing and highly enjoyable."

In 1908, when President Diaz met Mr. Taft, then president, in conference on the Mexican border, this band furnished the musical setting, and President Taft personally expressed his appreciation and extended his felicitations to the conductor.

It is a symphony band, and every member is a Mexican and a musical expert. The requirements for admission are extremely rigid. The youngest member is twenty-

two and the oldest sixty-five. There are no string instruments in the band other than two bass viols. There are twenty clarinets, ten cornets, six saxophones, etc., etc. An extremely difficult combination to put out over the radio, and preparations were in progress five days to properly stage and reproduce this band from station WJAZ.

The name of this band is somewhat a misnomer and would indicate a relation with the police force, but in reality all members are accomplished civilian musicians.

This mark of friendliness on the part of President Obregon in sending to the United States this wonderful band has cost the Mexican government approximately \$100,000.

On Sunday evening directly in front of the band in the Marine dining room of the Edgewater Beach Hotel were seated as guests of the hotel at dinner the Mexican Consul in the seat of honor and the consuls representing the following countries: Great Britain, Argentine, Colombia, Cuba, Czecho Slovakia, Denmark, France, Germany, Japan, Netherlands, Spain, Sweden, Uruguay. The consuls' table was decorated with the flags of the various nations there represented.

Meteors Cause Statics

Atmospherics or "static," the nightmare of the radio operator, may be in some cases due to meteorites which, arriving suddenly in the uppermost regions of the atmosphere cause electric disturbances which herald their coming to radio listeners over half the surface of the earth. That is the suggestion made by a radio expert at a scientific meeting in England.

He was a veteran of the Great War and while listening in on his radio-telephone noted the resemblance between some of the atmospheric and the swish of a shell passing high overhead. He then thought that the sound might really be due to a little "dud" of a meteorite with which the earth is bombarded continually from the depths of space, and propounded it as an interesting though possibly "mad" theory. The explanation suggested is that the arriving stranger sets up an electric disturbance which is responsible for the irregular waves known as atmospheric.

Reliable
RADIO
Goods

Distributors for:

Radio Corporation
of America

Grebe
Magnavox
Atwater Kent
Brandes
Murdock
Nath. Baldwin
Frost
Burgess
Gould
Eveready

Western Electric

Acme
All American
Carter
Dubilier
Signal
Chelsea
Cutler-Hammer
Howard
Eby
Bradley
Jewell

Western Coil

and other manufacturers of high standing.

Free Catalog Illustrated,
sent on request.

Dealers: Buy reliable equipment from a house of established reputation. Send for catalog of tested and approved apparatus and our discount sheet.

Julius Andrae & Sons Co.

114 Michigan St. Milwaukee, Wis.

ANDRAE In Business Since 1860

We Repair

The Following

Radio Tubes

And Guarantee Them

WD-11 ... \$3.50	UV-199 ... \$3.50
WD-12 ... 3.50	C-299 ... 3.50
UV-200 ... 2.75	UV-201A ... 3.50
UV-201 ... 3.00	C-301A ... 3.50
C-300 ... 2.75	UV-202 ... 4.00
C-301 ... 3.00	C-302 ... 4.00
DV-6 ... 3.00	DV-6A ... 3.50

Mail Orders solicited and promptly attended to

Dealers and Agents, write for Special Discount

H. & H. RADIO CO.

P. O. BOX 22-R

Clinton Hill Sta. Newark, N. J.

SEND NO MONEY



A limited quantity of Standard Make, high grade, fully guaranteed typewriters at lowest price ever offered.

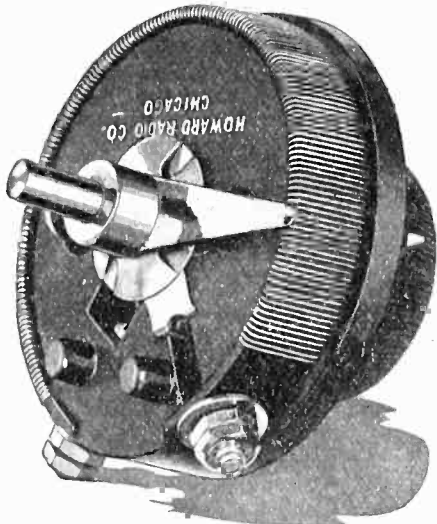
FREE TRIAL

for five days in your own home. Easy monthly payments. No "red tape". Send Today for Free Booklet of Valuable Typewriter Information, also Special Sale Bulletin.

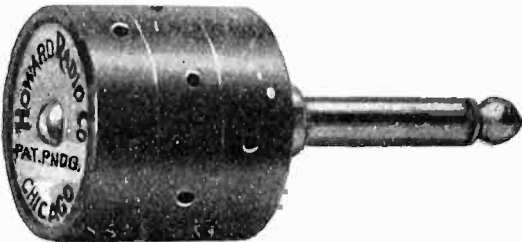
Smith Typewriter Sales Co.
-360 E. Grand Ave., Chicago, Ill.

A MICROMETER RHEOSTAT

The standardized Rheostat, furnished in three resistances, to fit all tubes: 6½, 25, 40, and 60 ohm Rheostats



Patent No. 870,042



As implied by the name, this Rheostat is provided with a **POSITIVE** and **EXTREMELY SENSITIVE CONTROL**.

By its use "gas tubes" may be operated at the peak of the receiving efficiency.

The desired control is obtained by turning the **SINGLE KNOB** through less than **ONE** complete turn.

THINK OF IT! ANY FRACTION of the resistance contained in a wire **EIGHTY INCHES LONG** may be inserted in the circuit by operating the **SINGLE KNOB** through **LESS THAN A COMPLETE TURN**.

Also, duplicate settings can be made at any time, without difficulty.

SPECIFICATIONS

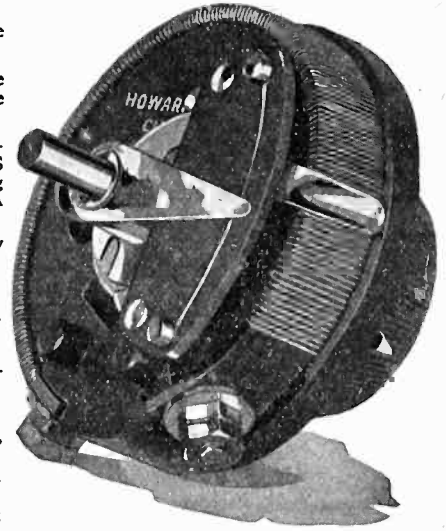
Resistance—zero to approximately seven ohms.
Current carrying capacity 1½ amperes.
Temperature co-efficient practically zero.
Base and knob—special heat resisting composition.

PRICE \$1.50

Price including special dial described below, **\$1.75**

MICROMETER ATTACHMENT. The micrometer attachment described in connection with the above rheostat has been so designed that it can be placed on any regular Howard rheostat in about one minute's time. Price for attachment only 50 cents.

HOWARD MICROMETER RHEOSTAT



Micrometer Rheostat, Exclusive License under C. R. L. U. S. Patent No. 1,461,634

We manufacture a special dial for use with micrometer rheostat and attachments described above. **PRICE 25 CENTS.**

The Howard Multi-Terminal Plug, the Quick Change Plug, makes instant connections for any number of receivers from one to six pairs.

Sold with the Guarantee of Satisfactory Performance. Price \$2.00.

HOWARD RADIO COMPANY

Discounts to the
Electrical and
Jobbing Trade

4248 NORTH WESTERN AVE., CHICAGO, ILL., U. S. A.

These Apartment Houses are Radio Equipped

AT the Pennsylvania Apartment Hotel, Thirty-ninth and Chestnut streets, Philadelphia, which is now nearing completion, engineers are busy installing a modern type of receiving apparatus on the roof, which will be used in supplying radio programs to the main dining room, the lobby, lounges, smoking room, banquet hall and grill room.

The two other radio equipped apartment houses in Philadelphia will be the Garden Apartments, at Forty-seventh and Pine streets, and the Lincoln Drive Apartments, which will be built within the next few months. They will differ from the Pennsylvania in that each apartment will be equipped so that its occupants may listen in either with headphones or loud speakers. This will be in addition to the equipment in lobbies and dining halls.

The Lincoln Drive Apartment equipment will permit reception from three different stations simultaneously, and the circuits are designed so that any one of the three broadcast features can be given to the entire building or individual tenants may have their choice. In addition, there is to be a miniature broadcasting equipment in the building by which orchestra music or the voice of a speaker in one room can be transmitted to all other rooms. According to officials of Durham & Co., radio engineers who are installing the equipment, it will be the most complete ever attempted.

The Garden Apartment's equipment is also quite elaborate and includes specially designed circuits to enable tenants to use either headphones or loud speakers in their rooms. A system for signaling to the radio room is also in-

cluded, so that tenants who may desire to "switch" from one station to another can notify the operating room.

At the Pennsylvania Hotel engineers of Durham & Co. have interconnected a novel paging system with the radio equipment, so that the telephone operator may by plugging in a microphone talk to any one or all of the output stations and make whatever announcements she may desire.

Charger Tested

Subject to the severest of tests the Home Charger came through in splendid style at the recent convention in Cincinnati, O. A gold Seal Home Charger was selected from stock and first rendered inoperative by being thrown out of adjustment. The recharger was then connected to three-cell lead battery and the line voltage varied between 80 and 125 volts. It performed perfectly according to an affidavit furnished Radio Topics.



New and Novel Radio Patents



SOUND-PRODUCING INSTRUMENT

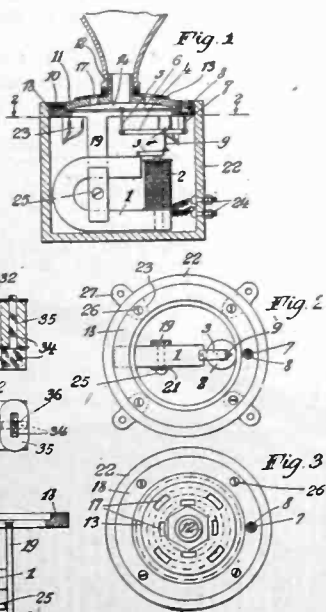
(Patent No. 1,463,372, issued to Egbert A. Reynolds, Yonkers, N. Y., under date of July 31, 1923.)

A device to provide an improved, simple and effective means for magnifying the vibrations of a diaphragm within an appropriate sound chamber which will mechanically and electrically reproduce speech and sound waves electrically conveyed to the instrument, delivered in a magnified or amplified volume, with means for regulating the volume and intensity of the sound reproduced, controlling its quality, timbre and rotundity and adapted to control or modulate both mechanically and electrically, sound waves emanating from a telephone, phonograph, violin, horn or other instrument.

An electro-magnet attached to one pole of a permanent magnet, so arranged as to bring the free end of the core of the electro-magnet in close proximity with the free pole of the permanent magnet, that the flow of magnetic flux may always be as free and strong as possible, attaching by means of a pivot or pin, a short thick armature to the free end of the permanent magnet, allowing it to extend over and become actuated by the electro-magnet.

On the free end of the armature is a hook or attachment for engaging a lever held substantially parallel to such armature by means of a link or rod, one end of such lever being pivotally connected with a diaphragm, and the other end with an adjustable screw for regulating the proximity of the armature to the core of the electro-magnet, by means of a link or rod and lever, the latter being provided with a notch or groove to prevent the link or rod from slipping, and for the further purpose of keeping the working parts permanently in alignment.

The diaphragm is encased in a non-magnetic metal case with a large opening beneath, rigidly attached to the permanent magnet by means of a standard, provided with a lug, fitted between the two prongs or legs of the permanent magnet, and held rigidly by means of a clamp and screw. The sound chamber above the diaphragm is preferably made by the attachment of a front plate, with the inner surface plain, corrugated or recessed to suit the purpose for which any particular instrument may be intended, such variations being made to serve as a muffler, an air-cushion in the reproduction of harsh articulations, or for such modifications as may be found desirable in the transmission and amplification of speech or music, the front plate being also provided with openings, over which we place an adjustable plate, lined with felt, or other sound-proof material with similar openings, held in place by a ferrule or nut. Such chamber can be



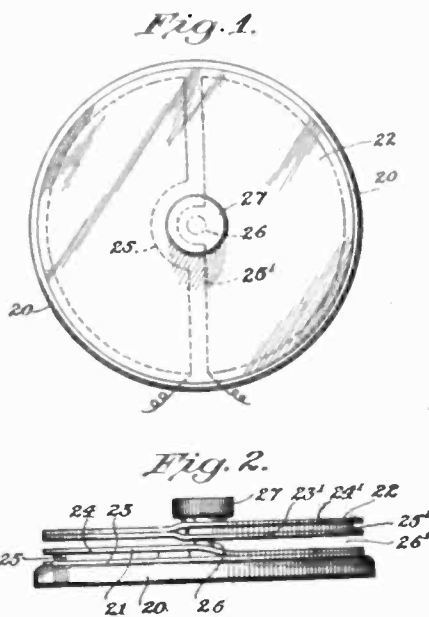
Sound Reproduction Instrument

conveniently formed by screwing the front plate into the flanges of the diaphragm case, clamping the periphery of the diaphragm between suitable washers or cushions and holding the front plate at the desired tension upon the diaphragm by means of a set screw.

NEW CONDENSER

(Patent No. 1,468,653, issued to Clarence D. Tuska, Hartford, Conn., under date of September 25, 1923.)

This invention relates to condensers. A condenser involving the invention may be employed with utility in various ways in the electric and allied arts, although in practice it has demonstrated particular advantage as part of the equipment of a wireless telegraph station.



C. D. Tuska's Condenser

Referring to the drawings: Figure 1 is a plan view of a form of condenser.

Figure 2 is an elevation of the form shown in Figure 1.

The condenser involves in its makeup at least two elements which are relatively adjustable to vary capacity.

Figs. 1 and 2 show a flat construction. The bases in this type is denoted by 20 and the elements or members of the active condensing portion by 21 and 22 respectively. In this kind of condenser the member 21 is practically of half disk formation, the member 22 being a complete disk. Said member 21 consists of superposed half disks 23 and 24 of paper and an interposed half disk sheet 25 of tin-foil, the tin-foil being so disposed between the paper sheets 23 and 24 that there will be a selvage or marginal portion of paper material entirely around the tin-foil. The adjustable member 22 of disk form is fastened to the spindle 26 supported for turning movement by the base 20. The spindle 26 has a manipulating knob or finger piece 27 at its other end to facilitate its adjustment. This spindle rotates freely in the member 21. Through the member 22 the spindle 26 fixedly extends. This member 22 consists as shown of disks 23' and 24' and an interposed half disk 25' of tin-foil.

In order to show the construction illustrated in Figs. 1 and 2 it has been necessary to separate the elements of the condenser much further than actually occurs in practice. For instance, in a condenser having a capacity of .0002 M. F. the stationary elements of the condenser represented by the numeral 21 would present a practically flat upper surface because the half disk sheet 25 of tin-foil would be only .0015 inch thick.

The paper and tin-foil are usually adhesively united in some convenient way. Although the paper stock wholly covers and encloses the tin-foil, this may not always be necessary.

HEAD SET

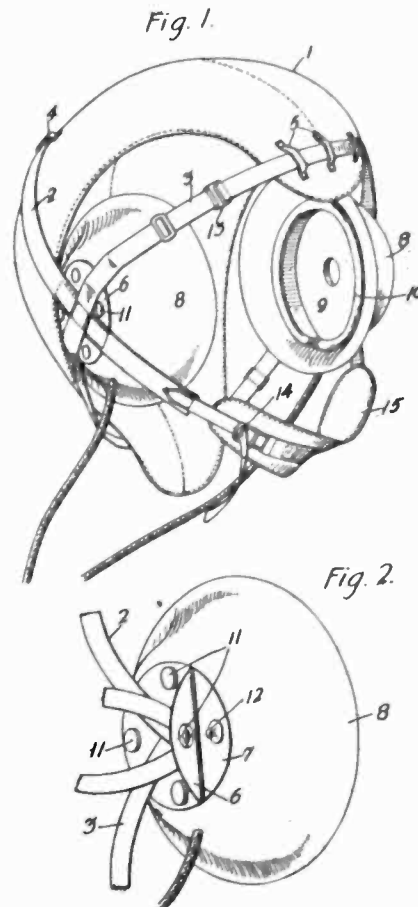
(Patent No. 1,463,810, issued to Albert F. P. Gilson, of Norwood, N. J., August 7, 1923.)

This invention relates generally to telephone head sets and particularly to an improved form of support for the receiving instruments.

The invention consists in mounting the receivers on a suitable head gear by means of readily separable fasteners, so as to provide for making a rapid removal, interchange or replacement of instruments with a minimum of trouble and without the use of tools of any description. The parts of the head gear which directly support the receivers preferably take the form of adjustable elastic straps which, in combination with flexible seats for the receivers and an arrangement of the fasteners that provide for changes in the relative positions of the receivers on their seats, produces an effective means for securing any desired degree of closeness of adjustment of the receivers to the ears of the operator.

In the drawing, Figure 1, is a view in perspective of a telephone head set embodying a preferred form of the invention; and Figure 2 is a similar view on an enlarged scale of a receiver, showing in detail the means for attaching it to its seat.

Referring to the drawing, there is shown in Figure 1 an instrument-supporting head harness in which a broad leather band or skull-cap member 1 is arranged to fit closely the median line of the head of the wearer from the base of the skull to the forehead, and act as a main supporting member for two elastic bands 2 and 3 with which the cap member 1 is equipped. Suitable loops 4 and 5 serve to attach the elastic bands 2 and 3 to the cap member 1 and provide a longitudinal sliding movement of the band there through for adjusting purposes. It will be seen that the elastic bands 2 and 3 are arranged to cross each other substantially at right angles at points adjacent the ears of



Improved Head Set

the wearer, and at the points of intersection receiver-supporting or seat members 6 are provided, which are preferably formed of flexible material such as fabric or leather.

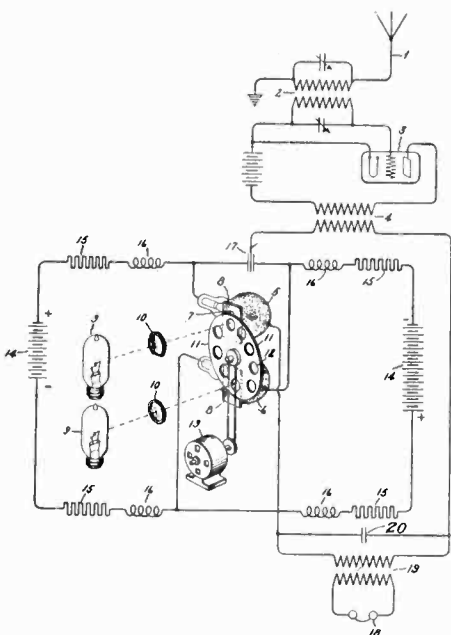
The seat members 6 have the general form of a disc and are stitched or otherwise permanently attached to the oppositely disposed points of intersection of the bands 2 and 3. Formed to co-operatively engage the seat members 6 are similar disc-shaped members 7 carried by the bases of the soft rubber cup members 8 in which the receiving instruments 9, surrounded by inner cup members 10 of sponge rubber, are mounted and shielded from extraneous noise.

HIGH-FREQUENCY SIGNALING SYSTEM

(Patent No. 1,457,988, issued to Charles A. Hoxie, Schenectady, N. Y., under Date of Sept. 11, 1923)

This invention relates to signaling systems and more particularly to a system for receiving and detecting high frequency signals such, for example, as those which are employed in the wireless transmission of intelligence.

One of the objects of this invention is to provide a simple and efficient means for detecting high frequency signals. A more specific object of my invention is to provide a means for detecting signals produced by means of high frequency continuous currents.



High Frequency Signaling System

In carrying this invention into effect, the inventor employs a circuit upon which the signaling waves may be impressed, a light sensitive device which has the property of permitting current to flow through when an electrode thereof is subjected to the influence of light. Also provides means for varying or interrupting the illumination of this device in such a way that the signaling current flowing in the circuit may be interrupted periodically in a predetermined desired manner, and a rectifying effect may thereby be produced which will cause the current flowing in the circuit to be capable of operating a suitable form of indicator.

As indicated in the drawing, radio signals received upon the antenna 1 are impressed by means of a coupling transformer 2 upon the input circuit of an electron discharge amplifier 3. The amplified signaling current in the output circuit of amplifier 3 is impressed by means of a coupling transformer 4 upon a circuit which includes two photoelectric cells 5 and 6. Each of these cells comprises a cathode of a material such as sodium or potassium which has the property of emitting electrons when subjected to the influence of light and a cooperating anode enclosed in an evacuated receptacle. The two cells are oppositely connected in the circuit so that when both are illuminated current will flow in both directions through the circuit. The receptacles of 5 and 6 are enclosed in a light proof casing or are covered with some opaque material ex-

cept for small windows which are opposite slits 7 in the plates 8. As a means for illuminating the cells two incandescent lamps 9 are provided which are so arranged that the light therefrom will pass through lenses 10 and fall upon the slits 7. Between the lamps 9 and the cells, a disc 11 with openings 12 therein is interposed so that when the disc is rotated by means of a motor 13 the illumination of the two cells will be simultaneously and periodically interrupted.

Each of the cells has in circuit therewith a source of potential 14 which is connected to the cells through resistances 15 for adjusting the current through the cells to a point on the operating characteristic where the current will be most sensitive to changes in the potential applied to the cell. Choke coils 16, which are inserted in the supply circuits prevent the high frequency signaling currents from flowing in these circuits and condensers 17 in the circuit upon which the signaling currents are impressed prevent the sources of potential 14 from being short circuited through the signaling circuit. The circuit upon which the signaling currents are impressed may also include any desired form of indicating device. In the present case a pair of telephone receivers 18 which are associated with the signaling circuit by means of a transformer 19. The primary of this transformer is shunted by a condenser 20 for bypassing the high frequency component of the signaling current.

40,000 Radio Sets on Farms

THE speed with which farmers have taken up radio for practical and social purposes is shown in a recent survey made by the United States Department of Agriculture.

County agricultural agents estimate that there are approximately 40,000 radio sets on farms in 780 counties. This is an average of 51 sets per county. Applying the average to 2,850 agricultural counties a total of more than 145,000 sets on farms throughout the country is estimated.

The county agents' estimates cover every state. In New York it is estimated that in 37 agricultural counties there are 5,502 sets on farms. The county agent for Saratoga County, New York, reported 2,500 sets in the county. In 51 counties in Texas there are 3,085 sets. Forty-three counties in Illinois show 2,814 sets; 26 counties in Missouri, 2,861 sets; 42 counties in Ohio, 2,620 sets; 40 counties in Iowa, 2,463 sets, and 26 counties in Kansas, 2,054 sets. New Jersey, Pennsylvania, Michigan, and Minnesota have between 1,000 and 2,000 sets each.

Federal weather forecasts, crop reports, and market quotations are now broadcast from 150 radio stations throughout the country. Special agricultural news in the form of so-called "Agriograms" and talks on various phases of work of the Department of Agriculture is sent out regularly from 250 broadcasting stations.



Three Aces!
BURGESS
RADIO BATTERIES

IN the experience of radio engineers, amateurs and experimenters there is a suggestion which clearly points the way to the battery buyer who desires the most fitting and practical combination of electrical energy, low cost per hour of service, long shelf life and uniformity of discharge.

"ASK ANY RADIO ENGINEER"

More than a mere phrase these words express the preference of radio engineers who have learned the limitations of ordinary batteries and who have found in Burgess products the built-in efficiency which Burgess has achieved to an unequalled degree.

These "Three Aces," the famous Burgess "B"—the new *double strength* Radio "A," and our latest product, the Vertical "B" Battery are playing an important part in correct and dependable reception of radio broadcast. Each is

"A Laboratory Product"

Good dealers everywhere recommend and sell Burgess Batteries

BURGESS BATTERY COMPANY

Engineers—DRY BATTERIES—Manufacturers
Flashlight—Radio—Ignition—Telephone

General Sales Office:
Harris Trust Building, Chicago
Laboratories and Works: Madison, Wisconsin

Branches:
New York Boston Washington St. Paul
Kansas City New Orleans

In Canada:
General Offices and Works: Niagara Falls, Ontario
Branches: Toronto, Montreal, Winnipeg, St. John



Amateur Builders of Radio Receiving Sets

The Second Annual CHICAGO RADIO SHOW, to be held in the Coliseum from Nov. 20 to 25, inclusive, will award the following prizes in two contests open to amateur builders of radio receiving sets.

For the most unique crystal or one-tube receiving set built by any student in any public or parochial school in Cook County, Ill.:

First Prize	\$25.00
Second Prize	20.00
Third Prize	15.00
Fourth Prize	10.00
Fifth Prize	5.00

For the best home-made receiving set built by any amateur in the United States, using any hook-up:

First Prize	\$75.00
Second Prize	50.00
Third Prize	25.00

All sets entered in these contests to be exhibited in the Show. For further details and Entry Blanks write to Contest Dept., Chicago Radio Show, 127 North Dearborn Street, Chicago, Ill.

The amateur exhibit will be in addition to the exhibits of all the leading radio manufacturers. Manufacturers who have not as yet obtained their allotment of space are advised to get into immediate communication with the management of the SHOW.

OFFICE:
SUITE 520
127 No. Dearborn Street

JAMES F. KERR
Manager
Telephone State 4161

Solid Comfort

comes with the use of the

TRADE MARK
AUDIOPHONE

REG. U. S. PAT. OFFICE

because nothing is lost from the original broadcasting.

Not only is it easily possible to distinguish the words of the speaker, but also the minute gradations in pitch, timbre and quality of overtones which distinguish individual voices.

The Audiophone is complete and self-contained—needs no separate battery or other accessories—goes to you ready for use on connecting to your receiving set. It will prove a source of lasting pride and pleasure.

Audiophone Sr., price.....**\$32.50**

Audiophone Jr., price..... **22.50**



Bristol One-Stage Power Amplifier

If greater volume is desired, over what you already obtain, use the Bristol One-Stage Power Amplifier. No C Battery required. Price**\$25.00**

Write for Bulletin and address of the nearest dealer handling our instruments.

The Bristol Company
WATERBURY, CONN.

THE BRISTOL COMPANY
Waterbury, Conn.

Please send me without cost or obligation to myself Bulletins Nos. 3006 and 3011-P on Bristol Audiophone and One Stage Power Amplifier.

Name

Street and No.....

City and State.....

characteristics which make it of extreme value in long distance radio communication. It does not require lofty towers for elevating



INHABITANTS OF MARS "LISTEN IN"
In the photoplay, "Radio Mania," which Herman Holland made for distribution by the W. W. Hodkinson Corp., the plot revolves around a young man's experiments and his attempts to communicate with Mars. Here is where a universal code would come in handy.

purposes; consists of a single or double wire about nine miles long for long wave reception and one antenna unit permits of simultaneous reception from several stations. The reduction of atmospheric disturbances makes the "wave antenna" particularly valuable.

Beverage is but 30 years of age. He has specialized in the development of radio receiving apparatus since his graduation from the University of Maine four years ago.

John H. Morecroft, professor of radio communication at Columbia University and vice president of the Institute of Radio Engineers, presented the check for \$500 to Beverage.

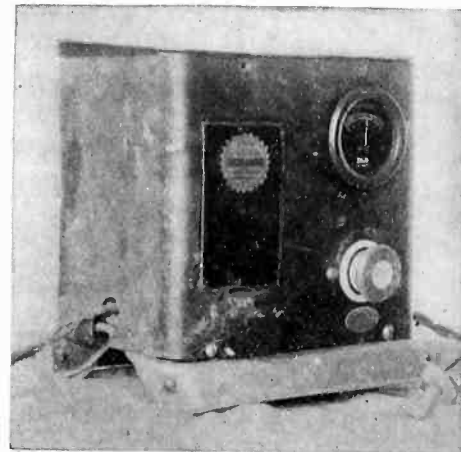
Radio Man Gets \$500 for Invention

HAROLD H. Beverage, an engineer of the Radio Corporation of America, was tendered a vote of honor by the membership and board of officers of the Institute of Radio Engineers at their last meeting, for his contribution to radio communication devices of the so-called wave antenna.

Beverage was also presented

with a cash prize of \$500, the Liebmann Memorial prize, this amount being the annual interest on an investment made by the late Colonel Morris Liebmann, a well known radio engineer.

Each year this sum is given to the most deserving individual whose radio inventions or developments are of outstanding practical importance and serve to materially enhance the progress of the art. The "wave antenna" which Beverage invented has many outstanding



A Homecharger that withstood severest tests at a recent convention in Cincinnati, Ohio.

Have You Heard the "SUN SET"?

Incorporating a New Discovery of Non-Regenerative Circuit
Full, True, Velvety Naturalness of Tone Never Before Achieved

WONDERFUL reception of a genuine quality radio fans have never heard before is offered in this Sun Receiving Set.

A revolutionary circuit discovery and development is what accomplishes this. The Sun Circuit makes the Sun Receiving Set different and infinitely better in every desired radio requirement.

MARVELOUS TONE VALUES! For the first time you receive a mellow, clear, human voice, soprano singing especially. And the piano sounds just like a piano.

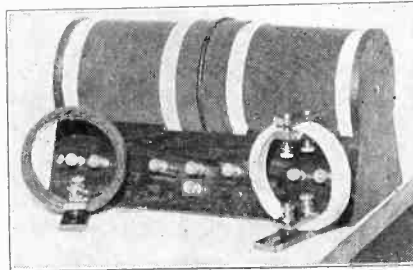
Loud speaker reproduction gives a pure, smooth, naturalness radio lovers have long sought, clear and true, holding the delivery volume even on the longest range reception.

The accurately balanced counter E. M. F. non-regenerative Sun Circuit functions absolutely free from distortions, howls, squeals, whistles or the hissing spill-overs common in other sets.

No shield is required in this set, as body capacity in no way affects it. When tuning-in, your set is absolutely quiet till you reach clear music or voice. Once you have logged your stations you need only turn your dials to the numbers recorded and you are instantaneously tuned in.

The Sun Set operates with only four tubes, but gives greater selectiveness and satisfactory volume with wider range than any other five to eight tube set.

*Always
Something New
Under the Sun*



The Sun Parts Ready for Hook-up

*Shines
Above
Them All*



THIS SUN SET, ONE HUNDRED FIFTY DOLLARS

To insure quick delivery order your set now from your dealer. The indications are that Sun Sets will be scarce before Christmas. No such instantaneous popularity has ever been accorded a complete receiving set as has been given to the "SUN." This is the reward of outstanding merit. Try to get one from your dealer, but if he disappoints you, order from us direct.

The Sun Circuit parts should be purchased from your dealer. These parts include the Counter E. M. F. coils tested and accurately balanced by five fixed condensers, with binding posts plainly marked for immediate hook-up, also Special Radio Frequency Transformer and Loading Coil with details of how to build the set. If your dealer is unable to supply you, we will mail you these Sun Circuit Parts, complete for \$24.00.

SUN RADIO COMPANY

4248 North Western Avenue

Phone Keystone 2480

Chicago, U. S. A.

The Receiver

famous thru Performance

Telmaco



Type B-R Receiver

fully meets the requirements of the discriminating purchaser because of the following features:

EFFICIENCY OF OPERATION: Securing volume, distance (1500 miles with single tube is not unusual), selectivity: broadcasting stations one-half mile distant are tuned out by a slight turn of condenser dial.

EASE OF OPERATION enabling the novice to secure satisfactory results.

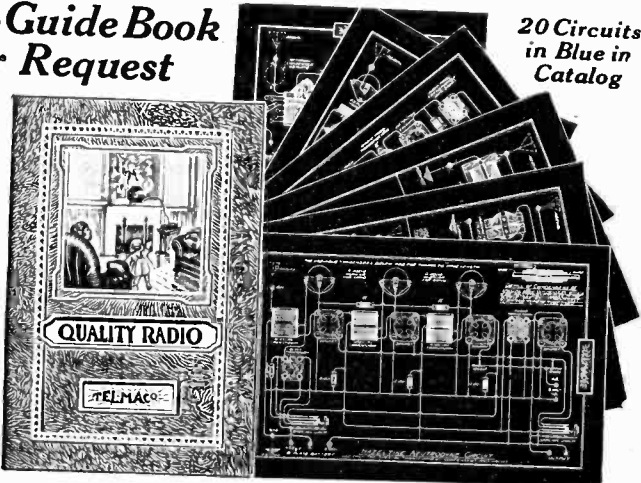
HIGHEST QUALITY OF WORKMANSHIP AND MATERIALS.

\$25.00 PRICE within the reach of everybody. Manufactured exclusively for us by U. S. Patent No. 1113149, Oct. 6, 1914.

Tri-City Radio Electric Supply Co., licensed under Armstrong
Telmaco BA 2-Stage Amplifier for the Above \$20.00

Our New Radio Guide Book Sent at Your Request

Our new 64-page Catalog No. TCR contains twenty of the most popular radio circuits printed in blue. These include the Hazeltine Neutrodyne, Grimes Inverted, Colpitts, Flewelling, Reinartz, Diode Electrad, Heterodyne, Super-Regenerative and many others. Each article used in circuit is attractively pictured instead of appearing in straight schematic form. Besides containing blue prints, the best in radio is also illustrated and described. Catalog sent postpaid for ten cents. Each circuit worth double.



JOBBERS We have an attractive proposition for a few more bona-fide Jobbers
DEALERS If your Jobber cannot supply you order direct

TELMACO Radio Division
TELEPHONE MAINTENANCE CO.
 20 So. Wells St., Dept. C, Chicago, Ill.
 Quality Radio Exclusively

Sexton Tolloed the Bell

MANY stages of amplification and three different wavelengths are used to get Arlington time signals to the farmers in the vicinity of Medusa, Albany County, N. Y.

C. J. Waldron, a Medusa resident, lives next door to the church. He has added a few feet to the length of the bell rope and every noon, after tuning in WGY, the General Electric Company station

at Schenectady, N. Y., he sits in his rocking chair with phones on head and bell in hand, waiting for the long Arlington note which marks twelve o'clock. At the long note he pulls the bell rope, and the bell, which is a big one, broadcasts the time signal miles around.

By the time the famer gets the signal it has passed through three different wavelengths, Arlington broadcasts on 2,500 meters wave-

length. WGY receives the signals on a special apparatus and then amplifies the received signals and rebroadcasts on 380 meters. Mr. Waldron again amplifies the signal for the farmers. The wavelength of the bell tone has not been measured.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC. REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, Of RADIO TOPICS, published monthly at Oak Park, Illinois, for October, 1923. State of Illinois, County of Cook, ss.

Before me, a notary public in and for the state and county aforesaid, personally appeared William M. Hight, who, having been duly sworn according to law, deposes and says that he is the business manager of the RADIO TOPICS and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher—RADIO TOPICS, INC., Oak Park, Illinois.

Editor—J. Ray Murray, Oak Park, Illinois. Managing Editor—Nanko C. Bos, Oak Park, Illinois.

Business Manager—William M. Hight, Oak Park, Illinois.

2. That the owner is: (If the publication is owned by an individual his name and address, or if owned by more than one individual the name and address of each, should be given below; if the publication is owned by a corporation the name of the corporation and the names and addresses of the stockholders owning or holding one per cent or more of the total amount of stock should be given.)

Nanko C. Bos, 200 S. Humphrey, Oak Park, Illinois.

B. W. Stolte, 3554 So. Halsted St., Chicago, Illinois.

Telfer MacArthur, 1112 North Boulevard, Oak Park, Illinois.

John N. Bos, 200 S. Humphrey, Oak Park, Illinois.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)
 None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona-fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is.....
 (This information is required from daily publications only.)

WILLIAM M. HIGHT,
 Business Manager.

Sworn to and subscribed before me this 12th day of October, 1923.

M. L. WALPOLE,
 (My commission expires June 30, 1925.)
 (Seal)

WGY Players Begin Dramatic Season

THE WGY Players opened the second season (1923-1924) at the General Electric Company broadcasting studio, Schenectady, N. Y., Thursday night, October 4, with "Three Live Ghosts." During the previous season 43 plays were presented.

Plans for the new season include the acting of one play weekly. As a result of the receipt of over 6,000 letters, over a four-day period, "The Sign of the Cross" will be repeated. Among the other productions planned will be a special adaptation of "County Fair," by Neil Burgess.

Several new features will figure in the 1923-1924 season. Plays selected from those written especially for radio as a result of the WGY \$500 prize contest will be put on, the winning play being featured. Many other especially prepared radio dramas will be produced, several of which will have their initial performance at WGY.

A Horse Race Novelty

Edward H. Smith, director of the players, with the assistance of engineers, carpenters, etc., is planning and constructing new devices allowing the more vivid representation to the radio fan of new scenes and actions. One of these novelties will be a horse race.

A new method of directing plays has been effected at the WGY studio, which will be put into practice during the coming season. During rehearsals, the director, in a separate room, will listen in with a pair of headphones, hearing the performances exactly as would the listeners throughout the country on the night of the performance.

Corrections will be made and instructions given by means of a loud speaker installed in the studio where the rehearsal is conducted.

Changes in Cast

The cast of the WGY players for the season of 1923-1924, will be as follows:

- Edward H. Smith, director and leading man.
- *Rose Cohn, playing opposite Mr. Smith.
- Lola Sommers
- Margaret V. Smith
- *Arline Montgomery
- *Helen Campbell
- Edward E. St. Louis
- Frank Oliver
- *Jerome Lovenheim
- *John Loftus
- *Charles S. Baumes

*New members.

Six new members have been added to the cast. Five of these

Look at This Radio Set



Isn't it a dandy? And it performs just as well as it looks. The Ace Type V is a long range receiver and stations from coast to coast are heard distinctly. An Ace two-step amplifier in connection with this set at \$20.00 makes use of loud speaker practical. Has Crosley multistat which permits use of any make tube. Think of the fun you'll have this winter with this set—the excellent musical entertainment. See your dealer now—if he can't supply you, order direct. Remember the low price—\$20.00. Ask for "Simplicity of Radio"—it's FREE. Don't delay because every day you do without this set you are missing a world of entertainment.

**ACE
TYPE V**
Formerly called
Crosley Model V

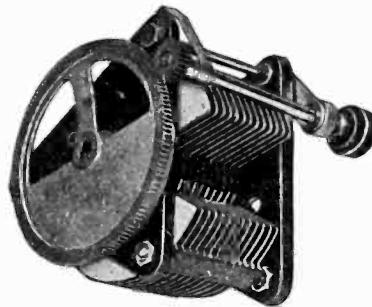
**Armstrong
Regenerative
Receiver**

\$20.00

Licensed under Armstrong U. S. Patent No. 1,113,149

THE PRECISION EQUIPMENT COMPANY
1123 VANDALIA AVE. POWEL CROSLY, JR., Pres. CINCINNATI, OHIO

Sharpen Your Tuning



No operator of a radio receiving set need be told of the advantage of sharp precise tuning. It is not always clear, however, how this may be obtained. After a good tuning coil has been chosen look to the CONDENSER for the answer.

Here are some of the important features: Sharp tuning through low loss design, using hard rubber properly placed—heavy brass plates soldered together keeping capacity constant and greatly reducing danger of short-circuiting—low zero capacity giving wide wavelength range—a CONTINUOUS VERNIER formed by a gear and pinion combination. Only one setting required.

Made in three sizes, 250, 500 and 1000 m.m.f. to fit every circuit. Mounted condensers are fitted with calibrated direct reading capacity dial.

Prices \$3.00 to \$8.50. Send for Educational Pamphlet "Quality Condensers" and new RADIO BULLETIN 91-T.

General Radio Company

Manufacturers of Electrical and Radio Laboratory Apparatus
Massachusetts Ave. and Windsor St.
CAMBRIDGE MASSACHUSETTS

Public Sales

We Have Purchased

122,000 Pair

U. S. ARMY MUNSON LAST SHOES

Sizes 5½ to 12, which was the entire surplus stock of one of the largest U. S. Government shoe contractors.

This shoe is guaranteed one hundred per cent solid leather, color dark tan, bellows tongue, dirt and waterproof. The actual value of this shoe is \$6.00. Owing to this tremendous buy we can offer same to the public at \$2.95.

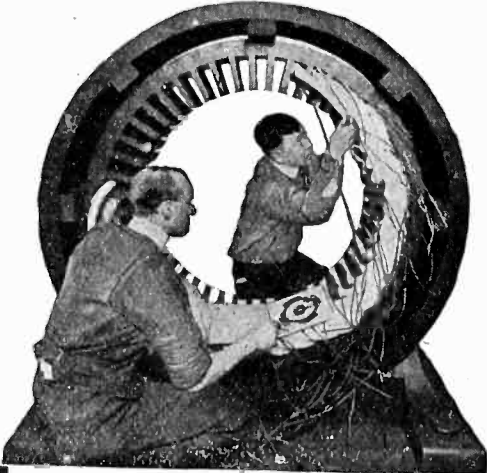
Send correct size. Pay postman on delivery or send money order. If shoes are not as represented we will cheerfully refund your money promptly upon request.

National Bay State Shoe Company

296 Broadway, New York, N. Y.



Railroad Fare



Student Winding a Stator

To the Great Shops of **Coyne**

We pay your railroad fare to Chicago—the Electrical Center of the World—from any place in the United States. Grasp the opportunity to see the country at our expense. Come to Coyne—learn electricity in 3½ months. Get a complete training so you can make big money as Power Plant Operator, Superintendent, Telephone man, Construction worker, auto, truck or tractor electrician, battery man, radio expert, or you can go into business for yourself as electrical contractor, dealer, auto ignition or battery expert and make from \$3,000 to \$20,000 a year. Hundreds of our graduates today are making big money and you can do the same if you grasp this opportunity—act now.

Learn Electricity In 3½ Months

No books or useless theory. You are trained on \$100,000 worth of electrical equipment. Everything from door bells to power plants. You work on motors, generators, house-wiring, autos, batteries, radio, switch-boards, power plants—everything to make you an expert ready to step right into a position paying from \$45 to \$100 a week.

Radio Course FREE

We include the following free with the regular course;

- (1) A complete course in auto, truck and tractor electricity and storage batteries. Greatest outlay of auto, electrical and battery equipment in the country.
- (2) Course in Radio—the marvel of the age. Constructing, installing and operating. You can build your own wireless telephone set.
- (3) A life scholarship in the Coyne school. You can stay as long as you wish and return for further training at any time in the future.

Earn While You Learn

We help students to secure jobs to earn a good part of their expense while studying.

Send Coupon Now

Don't delay a minute—send that coupon in **right now** for our big free catalog and full particulars of Free Railroad Fare offer. Act now!

B. W. COOKE, President

Coyne Trade and Engineering School
Dept. 5993 1300-1310 W. Harrison St., CHICAGO

B. W. Cooke, Pres. Coyne Trade and Engineering School,
Dept. 5993 1300-1310 W. Harrison St., Chicago, Ill.

Dear Sir: Please send me free your big catalog and full particulars of your special offer of Free Railroad Fare and two extra courses.

Name

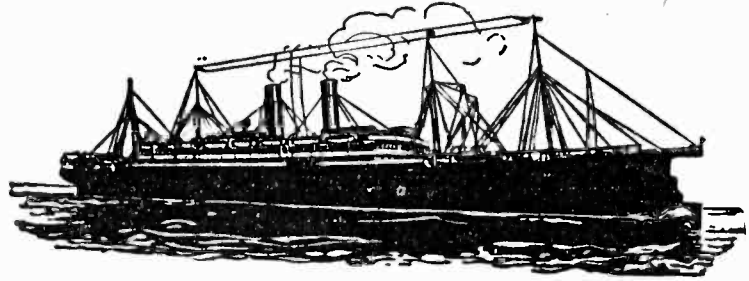
Address

ANNOUNCEMENT

THE GREAT NORTHERN STEAMSHIP COMPANY

(Incorporated)

BOSTON, MASS.



Announces that arrangements are now being made for monthly

\$110 Round Trips to Europe

Boston—Southampton

\$110

ONE WAY \$65

Connecting for

London, Liverpool, LeHavre

Boston—Gothenburg

\$138

ONE WAY \$75

Connecting for

Christiana, Stockholm, Helsingfors,
Danzig, Riga, Copenhagen

THE ABOVE PRICES INCLUDE RAILROAD FARES TO POINTS AS FAR NORTH AS STOCKHOLM

The Company plans to carry approximately two thousand passengers monthly. Make your plans now for a trip during the coming season.

Lives of passengers will be protected by

EVER-WARM SAFETY-SUITS

which prevent drowning and protect from exposure

A round trip, with all expenses on ship-board included, at no more expense than a vacation right here at home! To meet the ever increasing demand in this country for an inexpensive and at the same time thoroughly comfortable and enjoyable trans-Atlantic voyage, is the prime object of the Great Northern Steamship Company. Organized by progressive business men who realize the exceptional opportunity offered now for inexpensive travel in Europe, the Company will cater to the thousands of

intelligent persons who wish to visit the battlefields of France, the Shakespeare country, Scandinavia, the Land of the Midnight Sun, etc. A chance of a lifetime! So it would seem; but it is more than that. The Company is building for permanent business, setting a new standard of high-class ocean travel on a one-class basis. That this can be done at a fair margin of profit has already been proved and is further outlined in our prospectus. You'll find it extremely interesting.

WE WILL ALSO SHOW YOU HOW YOU MAY BECOME A PART OWNER IN THE MOST TALKED-OF ENTERPRISE IN YEARS

✂ Cut out and mail us with your name and address ✂

A. Wikstrom
Information Dep't
Edmunds Bldg., Suite 54
Boston, Mass.

I am interested in securing full information regarding a trip to:

(Mark with a cross)	One way	Round trip
England
France
Germany
Sweden
Norway
Denmark
Baltic Provinces
Finland
Russia

Name

Street or R.f.d.

City or Town

State

A. Wikstrom
Information Dep't
Edmunds Bldg., Suite 54
Boston, Mass.

I am interested in becoming part owner in the Great Northern Steamship Company.

Please send me proposition and full particulars.

Name

Street or R.f.d.

City or Town

State

were selected from the student players who were given an opportunity to develop their talents during the summer months of this year. Among these five is Rose Cohn, who, under the instruction of Mr. Smith, developed such marked talent, that she was selected to play leading parts during the new season. The other four are Arline Montgomery, dialect or character work; Jerome Lovenheim, "heavy" man or "villian"; and Charles Baumes and John Loftus, who will play miscellaneous parts.

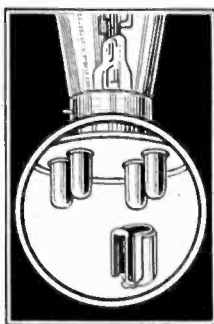
A noteworthy addition to the ranks of the WGY players for the coming season is Helen Campbell, a stock actress of recognized standing. She has been, for a number of years, a well respected character actress, being exceptionally well adapted for such work. She has been variously associated on the stage with Bert Lytell, Leonore Ulrich, Mahlon Hamilton, Clara Joel, Fay Bainter and others.



This little fellow is Jack Earle, a movie star in Century comedies. He's so tall his head makes an excellent site for an aerial, thus his portable set comes in very handy when he's not engaged in making pictures, for he's a regular radio fan.

GAMBLING?

YOU ARE IF YOUR RADIO TUBES ARE UNPROTECTED



Your Vacuum Tubes are the most delicate parts of your Radio Set.

They are easily blown out—you have probably already had this exasperating experience—it is apt to happen at any time.

"B" Battery wires accidentally crossed for only an instant with the filament leads or sudden excess current from the "A" Battery will do it.

You can prevent this and save yourself money and inconvenience and relieve your mind at a trifling cost.

INSTALL RADECO SAFETY FUSES

on all your tubes. Applied in an instant to one of the filament terminals. Will fit any standard tube going in any standard socket.

Price 50 cents each, sent postpaid and fully guaranteed. Do not delay. Order now. Specify type of tube used.

DEPT. 4

Radio Equipment Company

Manufacturers and Distributors of Standard Radio Equipment

630 WASHINGTON STREET

BOSTON, MASS.

New England's Oldest Exclusive Radio House

Dealers:—Write for our proposition

"THE BETTER RADIO" PIERAGICO

The Perasco Kewpie



A radio receiver built especially for those who are satisfied only with the best. Anyone may easily tune in and enjoy any program within 1,000 miles.

Perasco Kewpie \$25

(Descriptive folder sent on request)
Dealers Desired

PERRY RADIO SUPPLY CO.

218 WASHINGTON BLVD.,
RIVER FOREST, ILL.



COCKADAY 4 Circuit Coils

All four coils, A, B, C and D wound with green covered fiber on special heavy impregnated fiber. D coil is especially bank-wound to take care of the new high wavelengths. Complete with wiring diagrams \$3.00

Special Cockaday 17 plate cam vernier condensers, each \$1.00

10c brings complete plans for building a sure, acting 2,000 mile range set. Complete lists of parts not to exceed \$25.00, including tubes, batteries, phones, etc., with each set of plans; stamps accepted.

Radio Instruments Co.

17 N. Wabash Avenue Chicago, Ill.

Say you saw it in

"RADIO TOPICS"

when writing to advertisers

BROADCASTING STATION complete equipment for sale—Station known as WIL, located in Washington, D. C. This station needs no introduction. Its performances for the last two years speak for the set. This station will be in operation until it is sold. For particulars write to the Continental Electric Supply Co., 808 Ninth St., N. W., Washington, D. C.

Radio Catalogue Free

Write us
a post card—

and we will send you free this 52 page catalogue of radio sets and parts. It also contains explanation of radio terms, map and list of broadcasting stations and much radio information, including an explanation of successful hook-ups and circuits.

You will be amazed at the low prices Ward's quote. A complete set for \$32.50 equalling sets at \$60 elsewhere—a \$23.50 set that under favorable conditions has a radius of 500 miles and more.

This catalogue contains everything for the expert and amateur. Complete sets and every improved part for building sets, all the most up-to-date devices—at the lowest possible prices.

Headquarters for Radio

Montgomery Ward & Co. is headquarters for Radio, selling everything direct by mail without the usual "Radio-profits." Why pay higher prices? Ward quality is the best and the prices will often save you one-third. Everything sold under our Fifty Year Old Guarantee,—Your Money Back if You Are Not Satisfied. Write today for your copy of this complete 52-page Radio Book.

Write to the house nearest you. Address Dept. 3-R

Chicago Kansas City St. Paul Portland, Ore. Fort Worth

Montgomery Ward & Co.

—The Oldest Mail Order House is Today the Most Progressive—



Extension Course From WBZ

IN order to further the use of radio so that it may be put to utilitarian uses, Westinghouse Radio Station WBZ at Springfield, Mass., has arranged with the Massachusetts Division of University Extension for a number of courses in which the successful student will obtain a certificate of perfection at the completion of the course.

Two courses have been arranged at the beginning—one intended primarily to interest men and boys, the other for women. If the original courses are received with enthusiasm, other courses will be offered from time to time.

These are the arrangements which have been made. For the men a course will be given in "Radio Reception and Transmission." It will be sufficiently elementary to appeal to those radio enthusiasts who are interested chiefly in the results that they can get with their own sets, and who do not care to go very deeply into technical details. At the same time, it will be broad enough to furnish a sound foundation for a more advanced and technical study of the subject. If a sufficient number of people show interest in this first course, a second and more advanced one may be given later in the year.

Ten Lectures in Course

The course will consist of ten lectures, one to be broadcasted from this station by Edward H. Goodrich of Springfield, each Wednesday evening, from 7 to 7:20 p. m. The first lecture was given on Wednesday evening, October 3.

For women, WBZ will broadcast a course in "Household Management," consisting of eight lessons and given each Tuesday evening from 7:40 to 8 p. m., beginning on Tuesday evening, October 16. The instructor will be Miss Agnes H. Craig, teacher of domestic science in the Springfield School Department. The arrangements for this course are similar to those for "Radio Reception and Transmission."

All radio users within range of this station are, of course, welcome to become part of the audience at these lectures.

PATENTS

To the Man with an Idea

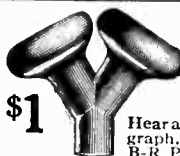
I offer a comprehensive, experienced, efficient service for his prompt, legal protection and the development of his proposition.

Send sketch of 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
81 Owen Bldg., Washington, D. C.
2278-M Woolworth Bldg., N. Y. City



\$1

Loud Speaker \$1

Radio Adapter
Hear all broadcasting through phonograph. Make your own horn. Attach B-R Phonadapter to YOUR phonograph. All can hear. Entire family, neighbors, guests can hear operas, lectures, latest news, with this adapter. Stretches over receiver of any standard type head-set and attaches to tone-arm of ANY phonograph. Made of soft, pure gum rubber. Quickly attached and removed. Thousands in use. Will not amplify or distort. For single receiver

For pair of receivers (more than twice the volume) \$1

Go to your dealer. If he cannot supply you send money order, check or currency at our risk. Prompt delivery—postpaid. Also send us name of favorite radio dealer.

The Beckley Ralston Company
1811 So. Michigan Ave., Chicago, Ill.

Operate a Loud Speaker on One Tube

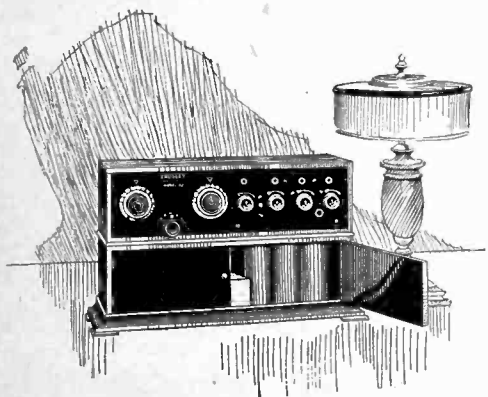
We have a new wonder circuit that will efficiently work your loud speaker on a single tube on local stations. Over 2,000 miles have been covered loud and clear with phones. Parts are few and inexpensive. Easy to build. Send 25c for hook-up and complete instructions.

LEUMAS RADIO LABORATORIES
311 Fifth Avenue New York



Abroad at Home with a CROSLY MODEL X-J

PRICE \$65



CROSLY MODEL X-J

A 4 tube radio frequency set, incorporating one stage of Tuned Radio Frequency Amplification, Detector and two stages of Audio Frequency Amplification, with jack to plug in on three tubes for head phones; new Crosley multistats, universal rheostats for all makes of tubes; new condenser with molded plates; filament switch and other refinements of details. A mahogany battery cabinet which makes the set completely self containing may also be had to fit the Model X-J at a cost of only \$16. See illustration above.

See this beautiful receiver at your dealers.

New York Office, C. B. Cooper, 1803 Tribune Building, 154 Nassau Street, Beekman 2061.

Boston Office, B. H. Smith, 755 Boylston Street, Room 316.

Chicago Office, 1311 Steger Building, 28 E. Jackson Blvd., R. A. Stemm, Mgr.

Philadelphia Office, J. H. Lyte, 65 North 63rd Street.

St. Louis Office, Robert W. Bennett Co., 1326 Syndicate Trust Building.

List prices on our equipment west of Rockies 10% higher. In Canada add duty.

Wonderful opera from New York, love songs from the tropics, dance music from Chicago; stock quotations, stirring speeches, amusing stories from where you will—all these pleasures and utilities are brought truly, clearly, right to your fireside if you own a Crosley Model X-J Radio Receiver.

This beautiful new Crosley 4 tube Model contains the same units as the famous Crosley Model X, with added refinements of detail which make it even better. At bringing in distant stations, the Model X established many records during the past year. Sebring, Fla., continually heard Honolulu. A man writes from Nassau, British West Indies, "First of all on Friday night, June 29, 1923, I heard Honolulu." He goes on to relate that practically all stations in the United States were brought in clear as a bell.

With the Crosley Model X-J even better receptions are assured. We unhesitatingly claim that it is the best radio receiver ever offered, regardless of price.

For Sale by Good Dealers Everywhere

Write for free catalog which shows the complete Crosley line of instruments and parts. In it you will find just the receiver to suit your needs and pocketbook. Crosley Receivers without batteries, tubes and head phones range in price from the efficient 2 tube Model VI at \$28 to the beautiful Console Model at \$150.

CROSLY MANUFACTURING COMPANY

POWEL CROSLY, JR., President

1123 ALFRED STREET

CINCINNATI, OHIO

CROSLY

Better - Cost Less
Radio Products

May We Give You Any of These?—

It won't cost you a cent to get any of these things. Just secure a few subscriptions to Radio Topics and they are yours

You, as a reader of RADIO TOPICS, know that you, as well as your friends, should be regular subscribers. Sign them up and get whatever you wish.

A well built variocoupler, complete with dial, which sells for \$6.50, will be mailed to you postpaid for 3 one-year subscriptions.



Manhattan 2,000 ohm phones sell for \$6.00. You may have a pair postpaid for 3 one-year subscriptions at \$2.00; total \$6.00.

A variometer, complete with dial, is also yours for 3 one-year subscriptions to RADIO TOPICS.

You may also have a full set, consisting of a variocoupler and two variometers, with dials, whose value is about \$18.00, for only 8 one-year subscriptions.

Just send us subscriptions, either renewals, new ones or your own, whose total at our rate of \$2.00 per year equals the price of the item you want, and we'll send it immediately prepaid.

All of the items listed on this page are fully guaranteed.

If there is something you want not listed, we'll arrange to get it.

A WorkRite splendid loudspeaker made of a composition and having a receiver in the base with extension cord. It costs \$12.00, and is yours for 6 one-year subscriptions.

Address: RADIO TOPICS

CIRCULATION MANAGER

1116 NORTH BLVD.

OAK PARK, ILL.

Get a Job Like These Earn \$3500 to \$10,000 a Year



20 Years Old— Makes Almost \$500 a Month

Harold Hastings of Somers, Mass., says: "The profit on my electrical business amounts to \$475.00 a month. My success is due entirely to your instruction. You make your men just what you say—Electrical Experts. No man will ever make a mistake enrolling for your course."



Dickerson Gets \$7500 a Year

"I earned \$30 a week when I started with you—\$50 a week when half through your course. Now I clean up at the rate of \$7500 a year. Thank you a thousand times for what you did for me. Electricity pays big on the farm." Herbert M. Dickerson, Warrentown, Va.



\$20.00 a Day for Schreck

"Use my name as a reference and depend on me as a booster. The biggest thing I ever did was answer your advertisement. I am averaging better than \$500 a month from my own business now. I used to make \$18.00 a week." A. Schreck, Phoenix, Ariz.



Pence Earns \$9000 a Year

W. E. Pence, Chelalis, Wash., says: "Your course put me where I am today, Mr. Cooke—making \$750 a month doing automobile electrical work—think of it—\$9000 a year. Besides that I am my own boss. My wife joins me in thanking you for what you did for us."



\$30 to \$50 a Day for J. R. Morgan

"When I started on your course I was a carpenter's helper, earning around \$5.00 a day. Now I make from \$30 to \$50 a day and am busy all the time. Use this letter if you want to—I stand behind it." J. R. Morgan, Delaware, Ohio.



Spare Time Work Pays Stewart \$100 a Month

"Your course has already obtained a substantial increase in pay for me and made it possible for me to make at least \$100 a month in spare time work. You can shout this at the weak fellows who haven't made up their minds to do something yet." Earl Stewart, Corona, Calif.

in the Big Pay Field of **ELECTRICITY**

It's your own fault if you don't earn more. Blame yourself if you stick to your small pay job when I have made it so easy for you to earn \$3500 to \$10,000 a year as an electrical expert. Electrical Experts are badly needed. Thousands of men must be trained at once. One billion dollars a year is being spent for electrical expansion and everything is ready but the men. Will you answer the call of this big pay field? Will you get ready now for the big job I will help you get? The biggest money of your life is waiting for you.

I Will Train You at Home

I will train you just like I trained the six men whose pictures you see here. Just like I have trained thousands of other men—ordinary, everyday sort of fellows—pulling them out of the depths of starvation wages into jobs that pay \$12.00 to \$30.00 a day. Electricity offers you more opportunities—bigger opportunities—than any other line and with my easily learned, spare time course, I can fit you for one of the biggest jobs in a few short months' time.

Quick and Easy to Learn

Don't let any doubt about your being able to do what these other men have done rob you of your just success. Pence and Morgan and these other fellows didn't have a thing on you when they started. You can easily duplicate their success. Age, lack of experience or lack of education makes no difference. Start just as you are and I will guarantee the result with a signed money back guarantee bond. If you are not 100% satisfied with my course it won't cost you a cent.

Free—Electrical Working Outfit and Tools

In addition to giving my students free employment service and free consultation service, I give them also a complete working outfit. This includes tools, measuring instruments, material and a real electric motor—the finest beginners' outfit ever gotten together. You do practical work right from the start. After the first few lessons it enables you to make extra money every week doing odd electrical jobs in your spare time. Some students make as high as \$25 to \$35 a week in spare time work while learning. This outfit is all FREE.

Mail Coupon for FREE BOOK— The Vital Facts of the Electrical Industry

The coupon below will bring you my big free electrical book—over 100 interesting pictures. The real dope about your opportunities in electricity—positive proof that you, too, can earn \$3500 to \$10,000 a year. Send for it now. Along with the book I will send you a sample lesson, a credit check allowing you a \$45.50 reduction, my guarantee bond and particulars of the most wonderful pay-raising course in the world. Send the coupon now—this very second may be the turning point in your life. Send it while the desire for a better job and more money is upon you, to

L. L. COOKE, Chief Engineer

Chicago Engineering Works

DEPT. 97-A 2150 Lawrence Ave., Chicago

The Cooke
Trained Man
is the Big
Pay Man



L. L. COOKE, Chief Engineer
Chicago Engineering Works, Dept. 97-A
2150 Lawrence Ave., Chicago, Ill.
Without obligating me in any way send me the "Vital Facts," your Free Book, Sample Lessons and particulars of your Free Outfit Offer Free Employment Service, and proof that you can fit me for a big-pay electrical job.
Name _____
Address _____

WorkRite Former

\$2.00



This aircore Transformer has been perfected for use in the Neutrodyne method of receiving. It should be used with .0004 mfd. variable condenser for tuning to all broadcasting wavelengths. It can also be used as a transformer for tuned radio frequency reception, or fixed coupler with condenser across secondary. It is made with tubes of moulded Bakelite and wound with green silk wire. Extreme care has been taken to see that the tubes are properly spaced and just the right number of turns of wire are used, insuring maximum efficiency. Like all WorkRite products, it has been thoroughly tested by other laboratories as well as our own before being put on the market. It will measure up to the "WorkRite" standard of quality and efficiency.

Watch for the WorkRite Variable Condenser

WorkRite Super Vernier Rheostat



This improved WorkRite Vernier Rheostat is just the instrument you have been looking for, 50,000 possible adjustments. A turn of 1-32" will separate two stations or clear up one. Made in three different resistances so that there is a WorkRite Vernier Rheostat for every tube now on the market. 6 ohms, \$1.00; 15 ohms, \$1.15; 30 ohms.....\$1.25

WorkRite E-Z-Tune Dial
Snappiest Dial on the market. Has a knurled flange on the rim for delicate leverage. Price75c

WorkRite Resistance Cartridge

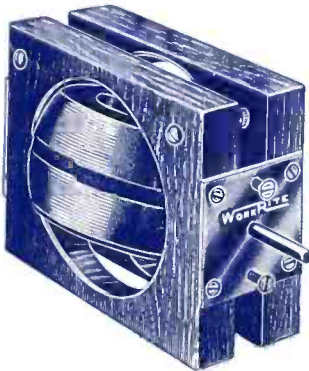
Raises the resistance of your 5 or 6 ohm Rheostat to the 15 or 30 ohms required for UV 199, and similar tubes. Price, either 15 or 25 ohms.....40c

WorkRite Neutralizing Condenser



Neat, compact and very efficient. This instrument has a glass insulation on the outside which greatly expedites neutralizing the set. Price each, 25c.

WorkRite Tuner Team



WorkRite Super Variometer



WorkRite 180° Super Variocoupler

Tunes out local stations and gets the one you want. This famous Tuner Team is made up of two WorkRite Super Variometers and one WorkRite 180° Super Variocoupler. Variometer is made from polished mahogany. Variocoupler made from moulded Bakelite and wound with green silk wire. Range 150 to 705 meters. Shaft 3-16".

WorkRite Super Variometer, each.....\$3.50

WorkRite 180° Super Variocoupler, each.....\$3.50

WorkRite Nonmicrophonic Socket



Here is the right Socket for use with your UV 199 and C 299 Tubes. It is moulded with a sponge rubber base in one piece which is even better than the soft rubber recommended for use with these tubes. Very neat and attractive. Price60c

WorkRite Hydrometer
You need one for your storage "A" battery. Full instructions with each instrument. Price75c

WorkRite Head Set
Very Sensitive. Light and sanitary. Try one and see. Price\$6.00

WorkRite Switch Set
Just what you want. Use the block for drilling panel. Arms and points made to work together. Price50c

**"WORKRITE RADIO PARTS
WORKRITE"**

THE WORKRITE MANUFACTURING CO.

5536 EUCLID AVENUE

CLEVELAND, OHIO

(BRANCH OFFICE, 536 LAKE SHORE DRIVE, CHICAGO)

Say you saw it in "Radio Topics" when writing to advertisers.