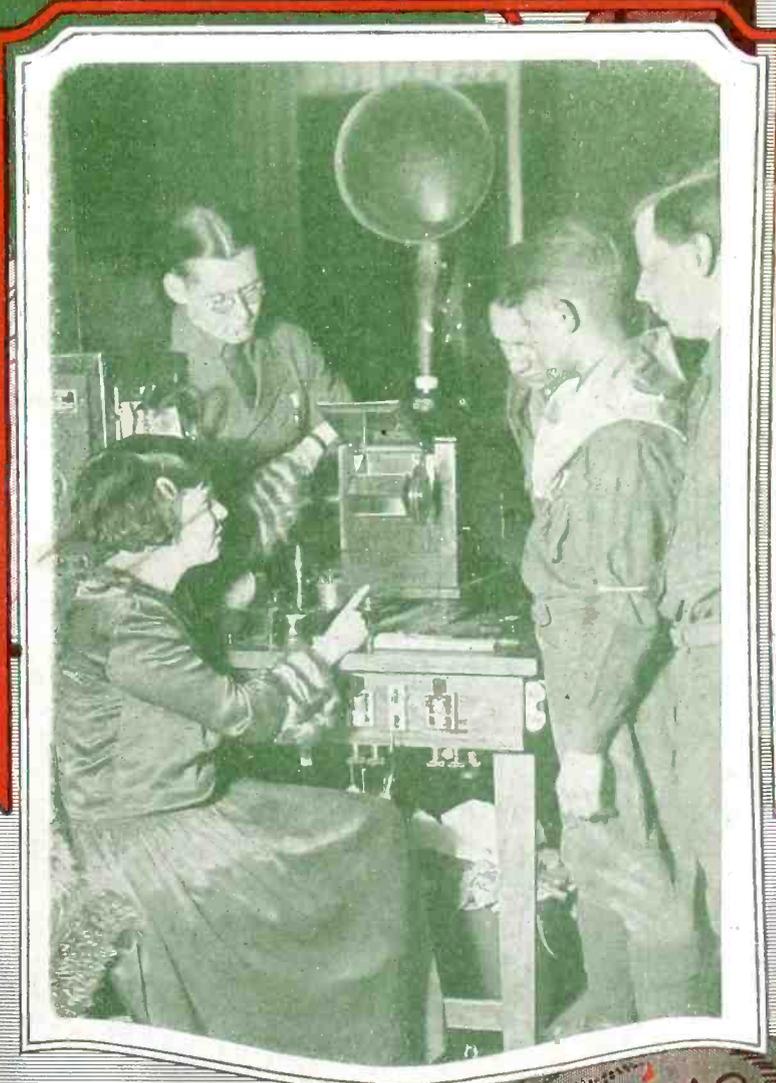
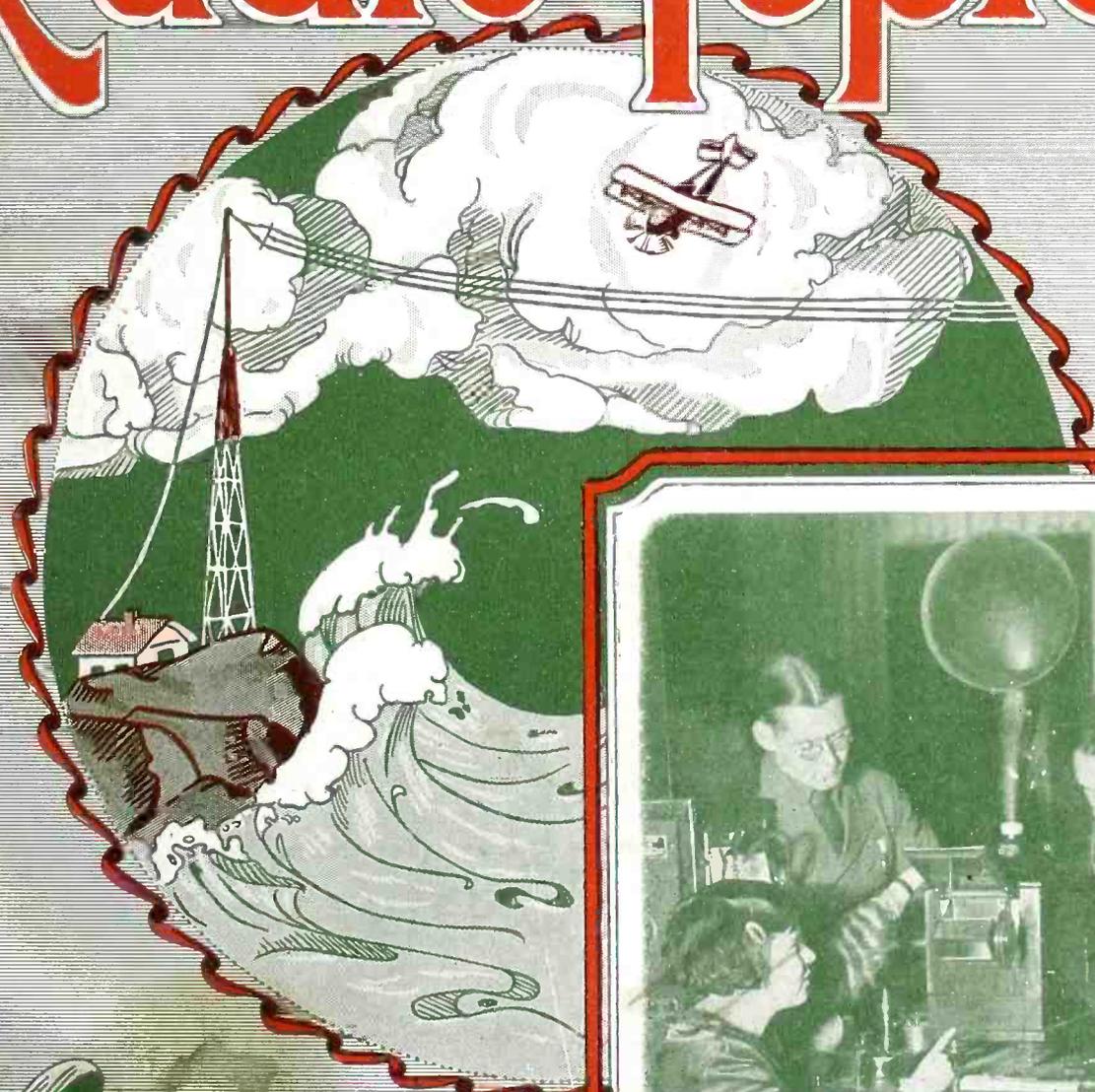


MARCH, 1924

# Radio Topics



20 Cents

Axel Halmquist - Oak Park

# **M**ANHATTAN ELECTRICAL SUPPLY CO., INC.

MAKERS OF THE FAMOUS



## **M**ANHATTAN LOUD SPEAKER

Oldest and Largest Distributors of

Radio  Corporation  
of America

*The Manhattan Loud Speaker  
with its "concert modulator"  
gives real tone quality.*

114 SO. WELLS ST., CHICAGO

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# Eveready gives you the right battery for every radio use!

**E**ACH Eveready Radio Battery represents thirty years of battery building experience. Each Eveready Battery represents millions of dollars invested in men, methods and machinery. Overseeing Eveready production is the greatest battery laboratory known to science, where every particle of raw material is required to pass Eveready's exacting tests. To insure Eveready serviceability, batches of Eveready Batteries are constantly being set aside for performance tests. And, finally, daily shipments keep dealers supplied with fresh Eveready Batteries, packed full of power.

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## EVEREADY Radio Batteries

*—they last longer*

### *The radio dry cell triumphant*

For economical, satisfactory radio, light the filaments of your dry cell tubes with the Eveready Dry Cell Radio "A" Battery. Will unfailingly outlast any other at 1/8 ampere current. Full instructions for getting this Economical Eighth on labels and in our booklets. This battery will exceed your expectations in economy and performance.

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### *This battery is a wonder worker*



Eveready's biggest contribution to economical and more satisfying radio is the Eveready "C" Battery, a triple-use, universal battery. It will make the loud speaker respond with a new fullness and naturalness of tone, and save much money by making the "B" Battery last still longer. Connect it with the grids of audio frequency amplifiers and notice the big difference. Can also be used as an "A" Battery for 192 type tubes in portable sets, and as a "B" Battery booster. Eveready Radio Battery No. 771—use it!

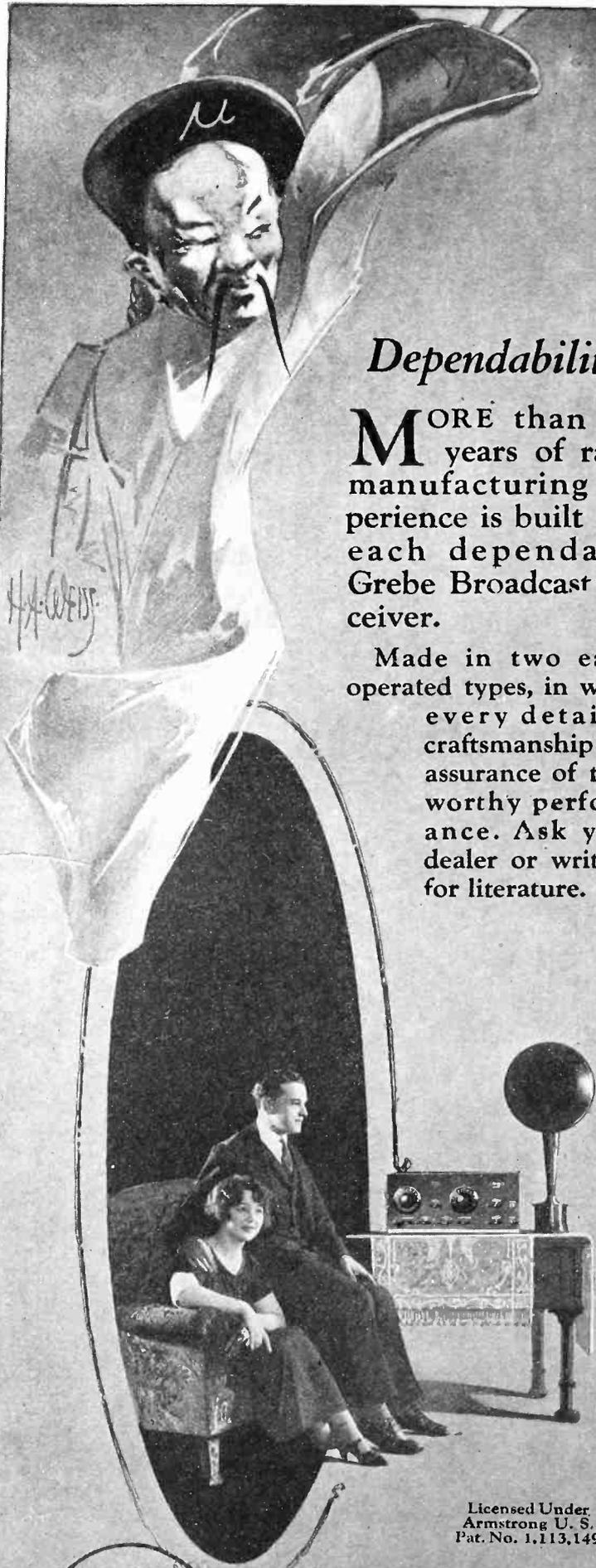
**NATIONAL CARBON COMPANY, Inc.,** New York and San Francisco

Headquarters for Radio Battery Information

CANADIAN NATIONAL CARBON CO., Limited, Factory and Office, Toronto, Ontario

Illustrations and accompanying text on radio batteries used here as examples. If you have any radio battery problems, write to G. C. Farnon, Manager, Radio Division, National Carbon Co., Inc., 191 Olive Street, Long Island City, N. Y.

"THE AIR IS FULL OF THINGS YOU SHOULDN'T MISS"



*Dependability!*

**M**ORE than ten years of radio manufacturing experience is built into each dependable Grebe Broadcast Receiver.

Made in two easily operated types, in which every detail of craftsmanship is an assurance of trustworthy performance. Ask your dealer or write us for literature.

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66



It is only when the cold season comes that we know the pine and cypress to be evergreens.

Confucius —  
In the real test of performance the

**GREBE**

Broadcast  
Receiver  
establishes its true merit.

*Doctor My*



Type CR-14 — A 3-tube dry cell Regenerative Receiver . . . . \$110.00  
(Accessories extra)



Type CR-12 — 4 tubes. Combines Regeneration and Tuned R.F. . . \$175.00  
(Accessories extra)

# Radio Topics

*An Illustrated Monthly Devoted to Radio*

Volume IV

March, 1924

Number 2



PASSION PLAYERS GET CROSLY SET

Anton Lang, "Christus" in the cast of the Passion Play, receiving a radio receiver from Powel Crosley, Jr., for installation in Oberammergau, Bavaria. Andreas Lang, who plays "Peter" and Guido Mayr, who plays the role of "Judas," are interested spectators.

## CONTENTS

Broadcasters Defy Music Men.....	7
Oak Park Now on the Air.....	9
The World Radioized, by H. N. Bundesen.....	11
Big Radio Show at Washington.....	14
Mail Planes Radio Equipped.....	15
Interference—Radio's Big Problem, by E. F. McDonald.....	17
Push and Pull Amplification, by C. R. Bluzat.....	19
Proper Antenna Construction, by Frank Conrad.....	25
How Radio Serves the Public, by W. J. Wetherbee.....	27
New Patents .....	31

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*The National Radio Monthly*



FOUNDED 1921

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month preceding issue.

Vol. IV

March, 1924

No. 2

## Score Again for Radio

**R**ADIO came to the rescue of the railroads and the newspapers recently following the blizzard that swept the northern half of the United States. With all wires down and many cities cut off from outside communication, radio came to the front and not only kept trains running, officials informed of what was going on, but also supplied the newspapers with their "copy."

The demand of the Actors' Equity Association in New York that broadcasting stations be made pay for the services of actors who recite or sing for the entertainment of the radio public met with but slight notice from the broadcasters. E. F. McDonald, president of the National Association of Broadcasters, summed it up thus: "If the actors and actresses are displeased with the free publicity they are getting, the radio stations will refrain from giving it to them. Perhaps they'll want the newspapers to pay for printing their pictures next."

The stockholders of the Commonwealth Edison Company—between 34,000 and 35,000 in number—listened to the proceedings of the annual stockholders meeting by radio. It was impossible to hire a hall large enough to hold them all, so the radio was employed. KYW broadcast the proceedings of the meeting.

## Does Radio Hurt Playhouse?

**T**WO widely different views of the effect of radio on the theatre are expressed in statements from William A. Brady, the producer of S. L. Rothafel, the impresario of the Capitol Theater, New York. Mr. Brady maintains "unless the radio business is curtailed immediately by organized effort it is likely to make the legitimate stage about as profitable as an ice cream factory in Alaska."

However, Mr. Rothafel, who is a pioneer in using radio, says:

"For the past years we have been broadcasting the musical program of the Capitol Theater, first as an experiment and now as a permanent feature of our service. As I see it, the business of any theater management is to use every effort to build up the good will of his house in every available way, for increasing theater attendance is the reflection of increasing good will for the house, which pays in dollars and cents.

"If a theater's broadcastings reflect the 'esprit de corps' of the house in its endeavor to please its patrons, the radio advertising will prove to be of great value. However, if it is done as a fad or a thing of the moment, the result will bring keen disappointment. Before attempting to broadcast our program we made many experiments to discover the best method to link the radio as an ally of the theater. The radio is here to stay and its field is so tremendous that it is foolish to try to combat it, whereas we have proved that, if successfully done, it is a potent force for increasing the number of our patrons. The exact value in dollars and cents cannot be computed, but the fact remains that we have had over 400,000 letters from fans, praising the innovation, while only four letters have been received panning the programs. Undoubtedly what has proven of benefit to the Capitol Theater can be used successfully in other theaters throughout the country."

## Talk Isn't Cheap

**I**T isn't going to be cheap to stump by air, the political campaigners are learning. Ten dollars a minute has been named as the price by an eastern broadcasting station, and you can't buy less than ten minutes of time. It is doubtful whether at this rate it would pay the average political office-seeker to drive home many arguments.

# Broadcasters Defy Music Men

THEATREMEN AND HOTELS JOIN RADIO UNITS IN  
A FINISH FIGHT ON SONG PUBLISHERS

**T**HE nation-wide fight of the Radio Broadcasters against the American Society of Composers, Authors and Publishers, who refuse to allow their songs to be broadcast without payment of a license fee, came to a head in Chicago at the recent meeting of hotelmen, theatre owners and radio broadcasters, held at the Hotel La Salle, Chicago.

There were representatives of the ten thousand motion picture theatre owners of the country, 800 dancing masters and music teachers, and about 2,000 hotel owners, as well as the National Broadcasters' Association, and at the sessions held February 6 and 15, they tossed down the gauntlet to the song publishers, refusing to enter into negotiations with them and accused them of using strong arm methods.

## Two Publishers Resign

Two of the "Big Six" song publishers—Waterson-Berlin & Snyder, and Will Rossiter—have withdrawn from the A. S. C. A. P. and scouted threats of the society to force them to remain members because they are under contract. Their letters appear in another column.

Will Rossiter's letter reads as follows:

National Broadcasters' Association,  
1265 Broadway, New York City, N. Y.  
Gentlemen: This is to advise you and your members that I have this day sent my resignation to the American Society of Composers, Authors and Publishers, of which I have been a member.

Very truly yours,  
Wm. Rossiter.

The letter from Waterson-Berlin & Synder Co., states:

"We are members of the American Society of Composers, Authors and Publishers.

"We are not in sympathy with their program, insofar as it has for its purpose the collection of money in any form from broadcasting stations, hotels moving picture theatres for the privilege of playing our copyrighted music.

"It is our intention at the earliest feasible time to resign from this organization so that our copyrighted music may be performed publicly without payment for any license or any fee or tax of any nature whatsoever.

"We want to go on record as opposed to any organization which has as its purpose the collecting of money from agencies which we believe to be of distinct value to us in advertising our products.

"To this end, insofar as we have the authority to do so, we hereby give permission to publicly perform our copyrighted music without any further authority from us, and we will refuse, if we can legally do so, to prosecute or to join in the prosecution of any one publicly performing our copyrighted music."

## Can't Force Them In

As to forcing the recalcitrants to remain members of the Society of Publishers because they are under contract, "That's a joke," said E. F. McDonald, president of the Broadcasters' Association. "They cannot sue one of their members without that member's consent."

Mr. Paul B. Klugh, executive chairman of the Broadcasters' Association, stated: "This controversy has become national in scope and is being echoed in Washington." Efforts will be made to obtain governmental action and possible legislation. In a letter to the song publishers he stated:

"Unfortunately your objectives go far beyond ordinary recognition of what you term your rights. They enter the realm of high taxation, with every likelihood that the burden will grow each year.

"It is difficult to reconcile such strong arm methods with any bona fide desire to seek a fair solution of this question."

Mr. Klugh's letter points out broadcasters are divided into three classes: "(1) those who do not care to use your music; (2) those who claim you have no legal rights, constantly use your music, and propose to fight you to

the last trench; (3) those who have licenses from you."

Tracy Drake of the Blackstone and Drake hotels, representing the Hotel Owners' Association among others, after the meeting said: "We're all a unit now, and we're going to show these people where they get off at."

## Bill Permits Free Music

A revision of the copyright laws that were drafted before the radio broadcasting stations came into use, is sought by Representative Walter H. Newton, of Minnesota. He has introduced a bill in Congress that will permit the free use of copyrighted music by the movies, theatres, hotels and radio stations. This measure is practically the same as that introduced on June 21, 1921, by Representative Lampert and an effort will be made to secure early consideration of the bill by the committee on patents. It is likely the bill will come up for action by the House this season.

An attempt is being made by the American Society of Composers, Authors and Publishers, to apply the law that was passed years before the advent of the radio broadcasting station, to cover their playing of music that is copyrighted by their members. That such a thing is wrong, is shown by the new bill just introduced by Representative Newton, who believes the playing of copyright music for movies, theatres, hotels and radio stations, is for the benefit of the public and without remuneration to the players. He holds that such performances popularize the music and increase its sale to the public and he believes that the radio stations, movies, theatres and hotels, should not be required to make payment to the publishers.

Representative Newton also complains that certain publishers, acting through secret representatives posing as patrons, have induced movies, theatres, hotels and radio stations to play certain copyrighted music, then demand payment of a license fee because

(Continued on page 38)

## Two Members of Music Publishers Resign

### Music Men Can't Withdraw

**J.** C. ROSENTHAL, general manager of the American Society of Composers, Authors and Publishers, has issued a statement that Messrs. Will Rossiter and Waterson, Berlin & Snyder cannot resign from the society, reading as follows:

"It is true that two of our members have tried to resign. But there is nothing doing on resignations as long as their contracts are in force, and neither one of these expires until January 1, 1926. They evidently overlooked such a little matter as a binding contract.

"In the matter of Rossiter we don't care one way or another, as he has not really had anything worth while in the past five years. And we do not anticipate any trouble with Waterson, either, as his contract is explicit and binding, as he probably now realizes.

"The trouble was brought about chiefly by the radio which has grown to such an extent and is still growing as to cut very deeply into the sales of phonograph records. This is a serious problem and is daily growing more serious.

"Several of the largest broadcasting stations have taken out licenses with us for the use of our music, but there are a lot that have not. Rossiter and Waterson have probably reached the conclusion that the giving of free rights to these broadcasting stations will be helpful to their general business.

"These are only defections or attempted defections and while we are not worrying about anything else happening we will enforce the terms of our contracts to the letter. In the event of Rossiter and Waterson attempting to evade or ignore these contracts we will go into court and get an injunction compelling them to live up to the agreement."

Denmark now has officially licensed 3,109 private radio receiving sets Charge d'Affaires O. B. Harriman, Copenhagen, reports. School pupils rank first with 473; commence, shipping and industry, second with 448.

Telephone Randolph 5481

**Will Rossiter**  
THE CHICAGO PUBLISHER  
30 W. LAKE ST.  
CHICAGO, ILL.

MEMBER 111  
Board of Chicago  
Association of Broadcasters  
Music Publishers Executive Assn  
Chicago Music Club  
American Society of Composers,  
Authors and Publishers

February 4th, 1924.

National Association of Broadcasters,  
1225 Broadway,  
New York City, New York.

Attention: Mr. Paul B. Klugh,  
Executive Chairman.

Gentlemen:-

This is to advise you and your members  
that I have this day sent in my resignation to the  
American Society of Composers, Authors, and  
Publishers, of which I have been a member  
very many years.

*Will Rossiter*

ADDRESS ALL COMMUNICATIONS TO NEW YORK OFFICE

**WATERSON-BERLIN & SNYDER CO.**  
MUSIC PUBLISHERS

CHICAGO  
BOSTON  
PHILADELPHIA  
SAN FRANCISCO

STRAND THEATRE BUILDING  
BROADWAY AT 47th STREET  
TELEPHONE BRYARE 2214

HUFFALO  
PITTSBURGH  
MINNEAPOLIS  
CINCINNATI

NEW YORK, February 5, 1924, 192

National Association of Broadcasting  
#1225 Broadway  
New York City, N.Y.

ATTENTION: Mr. Paul B. Klugh  
Executive Chairman

Gentlemen:

We are members of the AMERICAN SOCIETY OF  
COMPOSERS, AUTHORS & PUBLISHERS.

We are not in sympathy with their program,  
insofar as it has for its purpose the collection of money  
in any form from Broadcasting Stations, Hotels, or Moving  
Picture Theatres for the privilege of playing our copyright-  
ed music.

It is our intention at the earliest feasible  
time to resign from this organization so that our copy-  
righted music may be performed publicly without payment for  
any license or any fee or tax of any nature whatsoever.

We want to go on record as opposed to an Organ-  
ization which has as its purpose the collecting of money from  
agencies which we believe to be of distinct value to us in  
advertising our products.

To this end, insofar as we have the authority  
to do so, we hereby give permission to publicly perform our  
copyrighted music without any further authority from us, and  
we will refuse, if we can legally do so, to prosecute or to  
join in the prosecution of any one publicly performing our  
copyrighted music.

Very truly yours,  
*H. Waterson*  
FOR:  
WATERSON-BERLIN & SNYDER CO.

HW:FR

Reproduction of letters received by the National Association of Broadcasters from Will Rossiter and H. Waterson and H. Waterson-Berlin & Snyder. (Reproduced through the courtesy of Exhibitors' Herald.)

# Oak Park, Ill.—Now On Air



Telfer MacArthur

**T**HERE'S a new station on the air—WTAY—which is broadcasting nightly, except Sunday and Monday, between the hours of 6 and 8 p. m. This is known as the Oak Leaves station, and is operated by the Pioneer Publishing Company, 1112 North Boulevard, Oak Park, Ill., the home of RADIO TOPICS.

The new station is located atop the Oak Park Arms Hotel, corner of Washington boulevard and Oak Park avenue, and was formally opened February 9. The antenna of WTAY may be seen for blocks standing out above everything else in the Chicago western suburb.

Celebrities from all the Chicago stations were on hand the opening night and helped dedicate the new station. Mr. and Mrs. Jack Nelson from the Drake Hotel, Jerry Sullivan, the Harmony Girls, Frederick Agard, and Bob Coogle, as well. Dean Remick, George Smith, Mr. and Mrs. Warren K. Howe,

L. M. Clausing, the Cambridge Sisters band played from WJAZ, the Zenith Edgewater Beach station, E. Whitney from WMAQ, Chicago Daily News, and Herbie Mintz, and Sen Kaney from KYW, the big Westinghouse station, Chicago.

## MacArthur Promoted It

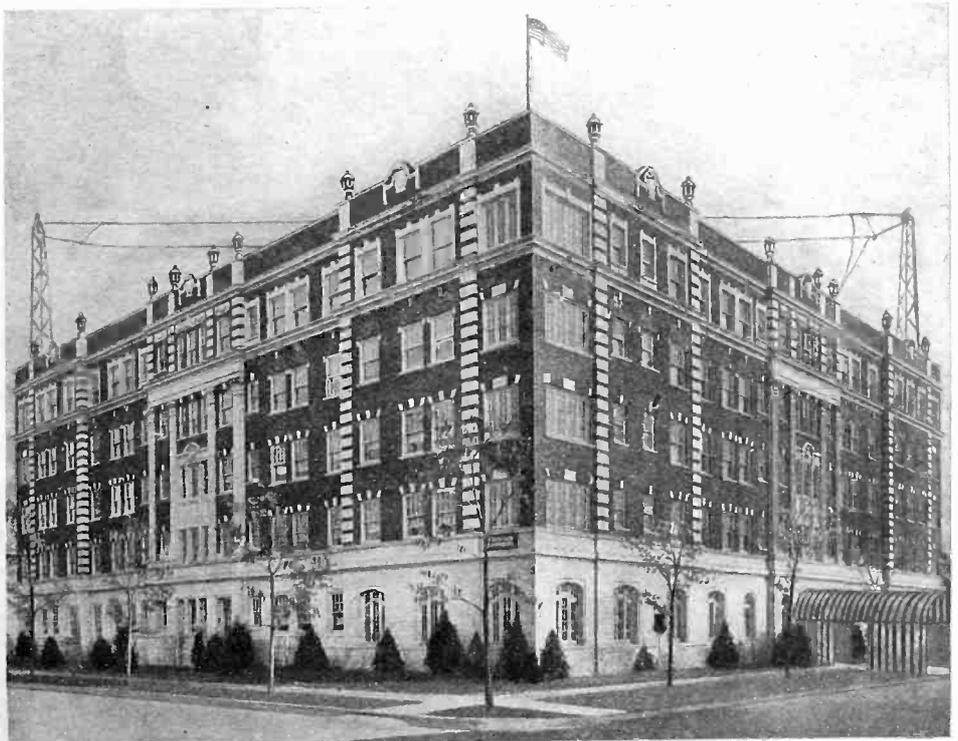
The new station was made possible through the untiring efforts of Telfer MacArthur, publisher of Oak Leaves, who interested other citizens of the suburb in the scheme to advertise the city. A. E. Lorenz, president of the Oak Park Arms Hotel, and Harry A. Parrish, vice-president and general manager of Oak Park Arms Hotel, were also active in the organization of the new station.

L. E. Dutton, a licensed operator and radio engineer of considerable experience, has been chosen as the operator for WTAY. As an amateur and commercial operator, Mr. Dutton has been engaged in radio work since 1910. After serving two and a half years in the navy during the World War, he toured the world as a commercial operator, returning to the U. S. A. in 1921 to enter the department of commerce as assistant U. S. radio inspector for the Ninth District, which includes thirteen states. In the last four years Mr. Dutton has covered 265,000 miles, he says. He installed radio on battleships in the Panama Canal zone last November.

## Tests Show Efficiency

During tests made previous to opening the station it was heard distances of 1,000 miles away. The power of the transmitter of the new station is rated at 500 watts output. The wavelength is 278 meters.

Hugh B. Marshall is studio manager and Miss Margaret Farr is musical director. At present the



Oak Park Arms Hotel, Oak Park, Ill., the home of Station WTAY, the newest middle west station, operated by Pioneer Publishing Company, publishers of Oak Leaves.



Harry A. Parrish

microphones are located in the hotel lounge, but arrangements are being made to equip a studio on the top floor of the hotel.

The operating room is on the top floor of the Oak Park Arms and the antenna extends from the northeast corner of the building to the southwest. The best of talent is being selected for the regular evening concerts and the station has been receiving comments from all over the country upon the excellence of its programs.

There will be weekly concerts by the Siloam Commandery Band which is declared to be one of the finest musical organizations in the world. These will be given every Thursday evening under the direction of Edwin D. Wade, commander of Siloam Commandery, No. 54, Knights Templar, Oak Park, Illinois.

### Pneumonia Victim Asks for WTAY

**A**RTHUR L. BEINER of the Chautauqua Concert Lyceum and Home Talent department of Waterson-Berlin and Snyder Company, who sang the other night at the new Oak Park station WTAY, has received the following interesting and touching letter from a nurse in Williamson, N. Y. As Mr. Beiner says, "there is so much human in-

terest in the incident that more of this 'milk of human kindness,' evident in the writing, could well be brought to the public attention, since there seems to be a crying need for more of it in a world that knows so much of crime and sensational reading matter:

February 16, 1924.

"Dear Mr. Beiner:

"Trusting that is your name. At any rate I am hoping this reaches the composer of 'Down in Hackensack, New Jersey.'

"I am a trained nurse and am caring for a pneumonia patient who no doubt will pass out some



Edwin D. Wade

time tonight. He has taken such comfort during his illness listening on the radio. Tonight is the first of the WTAY ever received and can't tell you how much we enjoyed your song. All through his illness he has enjoyed the radio. We heard your lovely voice, oh! so very plain and he said, 'I would applaud if he could hear me.' Please sing it again, Mr. Beiner. We heard you at 9 o'clock p. m.

"My patient is 45 years old and the father of six children, the oldest being 13 and the youngest 1 year. Their means are very meager and they can't afford to lose their father and husband. His temperature is now 104, pulse 120 and respiration 27. The doctor's last words were, 'look for the end in at least twenty-four hours.' Just imagine anyone requesting a radio concert 'on the way out.' I have another nurse here and we are still doing our best to preserve life, so if we pull him through we will blame 'Hackensack, New Jer-

sey,' for he loved it and wanted to hear it again. We hope you will accept the congratulations we send and when we see your song published you can bet we will purchase it.

"The weather here is cold tonight—10 above zero—moonlight, and still. This little home is out in the country, making surroundings quite contrary from what my assistant and I are accustomed to. We are Rochester nurses.

"Best wishes and many thanks for the solo.

"Very truly,  
"MISS BLANCHE WING,  
"426 East Main St.,  
"Rochester, N. Y., Apt. 24."

### WEEKLY SPORT REVIEW—

**A** REVIEW of the Week's Sports" by Elmer Q. Oliphant, one of the best known men in the athletic world, will be given each Monday night at 6:15 o'clock by radio from WGY, the General Electric station in Schenectady.

Mr. Oliphant, who won his letter in four major sports at West Point and gained national fame as one of the best all-around athletes at the military academy, is now director of athletics and physical training at Union College. Before entering West Point, Oliphant played football for three years at Purdue University.

His weekly talks will be limited to 15 minutes and will comprise a general review of what has taken place in the sporting world the preceding week.



A. E. Lorenz

# The World Radioized

## Radio and the Pursuit of Happiness

By H. N. BUNDESEN, M. D., Commissioner of Public Health, Chicago

**T**HE following article appeared in the Weekly Bulletin published by the Chicago Department of Health, January 26, 1924, and contains some pertinent facts concerning radio which it might be well to remember.

Dr. Bundesen says: "Radio brings a new outlook on life, which makes for happier family life and less domestic discord. Children are less apt to get into mischief while their attention is focused upon messages or music coming in over the receiver. They soon learn that quiet is essential to enjoyment of the pleasure that radio affords."

In the present age of invention and discovery many things contribute to the health and happiness of civilized society. Traveling has been robbed of the hardship of pioneer days and is now comfortable, rapid and easy. Ready communication by telephone, telegraph and other means has annihilated distance and brought the most isolated places into touch with each other and with the world at large. Labor-saving devices reduce hazard, render labor more productive and conserve health.

Even recreations have been profoundly influenced by mechanical invention. The moving picture and the talking machine have done much to place wholesome amusement within easy reach of all, and have added greatly to the pleasure and attractiveness of home life.

And now there appears the crowning achievement of modern inventive genius, the radio-phone, a most remarkable instrument by which messages, music, lectures, sermons, health lessons and many forms of useful information are broadcast to millions of fire-sides, there to contribute to domestic happiness and contentment, and to promote the physical and mental well being of man, woman and child.

The radio, through the recreation it affords, is beneficial to the

normal human body and mind. It stimulates the activity of the digestive, respiratory and other organs. It gives relaxation, comfort and happiness and relief to persons suffering from nervousness, stress of overwork, worry or mental exhaustion. It is a large factor in maintaining normal equilibrium, in breaking the monotony of daily routine and counteracting the excessive tension of life today.

### Radio in the Home

How to occupy leisure time to advantage is an important problem in the home of the average individual. The deadening monotony of housework, if unbroken by other interests, and its depressing effect upon the mentality is a matter of common knowledge. The intensive grind of the average man's work, too, has its disturbing effect upon nerves and mental equilibrium.

To both man and woman, tired from the day's labor, the evening at home often means a dull and stupid prospect, which often required too much effort to vary by going to a movie or a theater, or

seeking other form of entertainment. Time, therefore, hangs heavily and dissatisfaction, impatience and domestic friction sometimes follow as a natural consequence. This leads the more energetic members, particularly older children, to seek amusement away from the rest of the family.

Because of the radical modification of our habits of life, due to economic conditions, there is need of more opportunity for normal and healthful recreation, particularly those forms which make home life more attractive and which promote rest and relaxation. The radio-phone fulfills this need and satisfies a long felt want.

The radio has become a ready medium for bringing contentment into the home. The broadcasting of good music is one of the features of the radio programs. Good music, in addition to its amusement value, has a soothing effect upon the nerves and is otherwise beneficial. It seems to allay irritation, brings a sense of peace and contentment and stirs pleasurable emotions. Its value from an educational standpoint is unquestioned. Acquaintance with the



HIS MASTER'S VOICE

"Hypo," the famous dog belonging to Billy Ellerman, manager of the Edgewater Beach Hotel skating rink, who has turned radio bug. "Hypo" takes delight in listening to the strange voices wafted from WJAZ. (Photo by Underwood & Underwood.)

music of the masters is broadening in its influence, produces a desire for further study, not only from the standpoint of amusement, but as a form of culture. There is also the exhilarating effect of "jazz" music, which is particularly attractive to the younger generation. The mild emotional excitement, brought about by the stimulating effect of "jazz" rhythm, is beneficial to normal processes of the body and has the additional advantage of promoting physical exercise in the form of dancing.

#### Brings Contentment

The man who has a radio outfit has something to look forward to when he gets home after a day at his work. He anticipates a pleasant and restful evening after dinner. His hours until bedtime are pleasantly occupied. Also for the housewife the radio affords an incentive for an occasional rest from the day's routine in order to hear whatever is being broadcast and thus relieves the monotony of the day.

The radio brings a new outlook on life, which makes for happier family life and less domestic discord. Children are less apt to get into mischief while their attention is focused upon messages or music coming in over the receiver. They soon learn that quiet is essential to enjoyment of the pleasure that the radio affords.

The radio is now being used as a means of broadcasting many forms of useful information, more especially upon health subjects. Prominent men are daily giving talks on some subjects pertinent to the interests of the average citizen, and through this means matters relating to health are broadcast to larger audiences than it is possible to reach in any other way. It is worth while to listen with patience to such topics as relate to health, because in these talks are lessons that are of value to all. The subjects of conservation of health, the means of prolonging life and measures for avoiding illness are constantly being brought into the home through the radio, and it is through such means that more people receive health lessons than through any other single agency. As for children, the habit of listening in should be formed early, not only in order to derive immediate benefit, but to broaden

their store of knowledge. The numerous talks and lectures given over the radio stimulate the developing intellect of the child and aid mental growth in keeping pace with the physical development.

#### All Classes Enjoy It

All classes of individuals derive benefit from radio programs. The business man who has devoted every thought and impulse over a period of years to making money, to conscientiously trying to support his family and to laying aside a competence for old age, looks forward to the time when, some day, he will be able to relax and play, and enjoy the leisure which he is temporarily foregoing. Then there is the woman who has nothing to do, who is childless or whose children are grown up, who flits about playing bridge, going to teas or wandering about the city watching the crowds and making all sorts of efforts to kill time. To her the radio comes as a blessing, something which promotes interest and gives something to think about. By its means the business man may take his leisure as he goes along. The best thought and entertainment in the world is available to him and a variety of diversions are his in any amount desired.

There is an unfortunate class of individuals who are partially deaf and have difficulty in hearing conversations or ordinary spoken words. It has been noted that such individuals hear very well over the telephone and similar devices. To these, the radio affords unlimited opportunity for pleasure and instruction. Although heretofore unable to hear a concert or a play or a lecture in a hall or theatre, they can now enjoy all of these things over the radio. The benefit and happiness which these unfortunates derive from this source can readily be imagined. The instrument also brings cheer to inmates of institutions for the helpless, such as old people's homes, sanitariums, asylums and hospitals. In no other practical way could so much pleasure and instruction be brought to them.

The radio strengthens the family tie by producing a common interest.

It is not a fad, but a stable means of communication and is here to stay. Scientists are at

work developing its enormous possibilities for pleasure and happiness, for education and enlightenment, for protection of the community. The price range places it within the reach of everyone.

#### Every Family Needs One

While it is true that the radio is occupying a great part of our daily interest, it need not displace other interests. On the contrary, the pleasure afforded by the radio stimulates interest in other activities, stimulates desire for further development along cultural lines and induces a thirst for knowledge. The Health Department advises that every family procure a radio set. When it is installed in the home, the husband will find a happier and more contented wife; the wife will find an eager and less irritable husband. Parents will find their children developing mentally and better satisfied to remain at home. Teachers will find that children are easier to instruct than formerly, as a result of preliminary education by the radio.

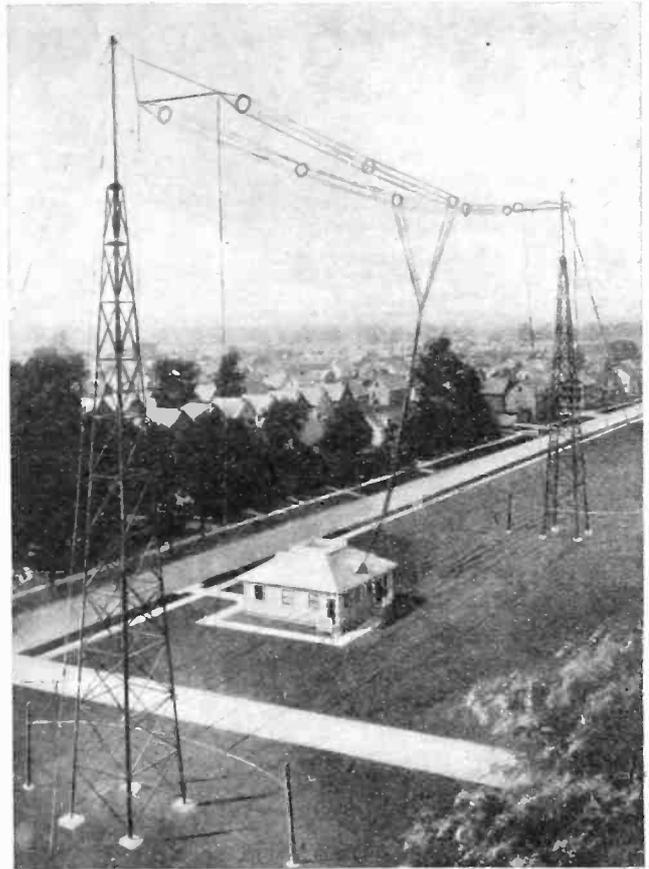
One of the greatest benefits to be derived from the radio in the home lies in the fact that it keeps the youth at home, off the street, out of bad company and out of mischief. It keeps the young man from seeking undesirable amusement away from the family influence. The radio has a profound influence for good upon morals of youth. It undoubtedly tends to keep the young man away from the pool room, from the gambling den and the cheap dance hall. It keeps him at home by broadening his interests, affording the pleasures needful to youth within the home atmosphere. It thus exerts its influence in counteracting tendencies toward delinquency or criminality by keeping him away from bad associates and within the home influence. In short, the radio benefits and entertains the old and the young. It strengthens the home ties by offering a common ground of mutual interest upon which parents and children may meet.

The radio is one of the blessings of modern civilization, a great aid not only in annihilating space and time, but a powerful factor in promoting health, happiness and contentment.



**CARTOONIST MEETS POWEL CROSLY, JR.**

Sidney Smith, highest salaried cartoonist in the world, and creator of "Andy Gump" in the Chicago Tribune, welcomed by Powel Crosley, Jr., at station WLW, the Crosley broadcasting station, Cincinnati.



A general view of the Willard Storage Battery station WTAM, located at Cleveland, Ohio.



**CHARLES RAY**

The popular movie star, entertained thousands of radio fans recently with a talk from the Chicago Evening American's studio, broadcast through Westinghouse station KYW. Did you hear him? This is Charles posing for the cameraman as he talked.



**ALL SET FOR MIDNIGHT REVUE**

W. Remington Welch, organist at the McVickers Theatre, Chicago, at the mighty Wurlitzer organ, answers a few hundred requests for certain musical selections every Wednesday and Friday night. E. O. Olmstead, publicity director of the theatre, reading telegrams and letters received. The music is broadcast through KYW, Westinghouse station, Chicago.

# Big Radio Show at the Capital

**R**ADIO dealers with the cooperation of officials of the Federal government, will stage in Convention Hall, Washington, D. C., the week of March 19 to 26, one of the most pretentious radio expositions ever held in the United States.

With the array of exhibits that have featured radio shows in other cities, augmented by special government displays, some of which have never been on public view, Washington's first radio show is destined to attract nationwide attention.

The Department of Commerce, which has supervision and control over all of America's activities in the field of radio; the Bureau of Standards, the government's famous experimental laboratory, and other Federal agencies interested directly or indirectly with radio and its development, will take an active and leading part in making the radio exposition in the nation's capital an epoch in radio history.

The fighting arm of the government—the army, navy and marine corps—also will be represented at the show with exhibits of historical value.

Officials of the government departments, including President Coolidge, the chief executive, and members of his cabinet, are expected to take an important part in the elaborate and unique entertainment features of the show.

## President Coolidge to Speak

Efforts are being made by the committee in charge of the show to have the president speak on the subject of radio on the opening night of the convention, which will be broadcast to the nation through a chain of high powered broadcasting stations scattered across the continent and linked together by telephone lines. Secretary of Commerce Hoover, the "Czar" of radio; Secretary of War Weeks, Secretary of Navy Denby, and Chief Radio Supervisor Terrell, as well as the master radio minds of the Bureau of Standards, are to be urged to participate in the show program.

Besides the government exhibits, the secrets of the modest appearing laboratory of C. Francis Jenkins, noted Washington inventor, whose creative genius has given to the world the motion picture machine and the even more remarkable apparatus which transmits pictures by radio, will be revealed publicly for the first time in Washington's show.

Mr. Jenkins has declined flattering offers to exhibit at radio shows in other sections of the country the remarkable machine which makes it possible for pictures, movable or stationary, and even great panoramas of transpiring scenes to travel on the radio waves.

The whole apparatus is comparable to a camera with lens in Washington and its photographic plate in Boston; with this difference, that the one lens in Washington may put its picture on ten, one hundred or a thousand photographic plates in as many different cities simultaneously, and at distances limited only by the power of the broadcasting station.

## New Jitney Radio

Other Washington inventive geniuses are coming to the show with radio inventions that never before have been seen at similar exhibits in New York, Chicago, Philadelphia, Boston and other large cities. For instance, the first coin controlled radio receiving set ever created will be on display. This device, the invention of D. J. Richardson, will reveal for five cents, what the ether waves are saying. It presents a number of unique features and differs from all other vending machines in that it assures prospective patrons that it is in working operation before they deposit a coin in the receiver.

Robert Lawrence, who came into radio fame through the broadcasting of community singing fests through WCAP, the Chesapeake & Potomac Telephone Company station, is director of the entertainment program.

Convention Hall, the scene of the big event, will be wired

throughout for the public speech amplification system. Amplifying horns will carry the program features to the most remote corner of the big auditorium, and thereby preclude crowding any one point.

The first radio show in Washington which is believed to be an annual affair in the future, will be held under the auspices of the Radio Merchants Association of Washington, of which William P. Boyer, a leading dealer in radio apparatus, is president. Fred S. Lincoln, a prominent Washington business man, is chairman of the general show committee.

## Twenty Churches Broadcast

Educational institutions and newspapers have recognized the value of broadcasting, it is indicated by the February Radio Service Bulletin, issued by the Bureau of Navigation of the Department of Commerce. And there is an increasing number of churches which have found the radio an effective aid in their work.

The latest list of stations broadcasting weather reports, music concerts and lectures shows 95 broadcasting stations connected with universities, colleges and other schools. The same directory lists 46 newspapers or publishing houses which have their broadcasting stations; while 20 churches are shown in the lists. This does not, however, include a number of churches whose services are broadcasted through some other station, it was pointed out. Three of the broadcasting stations are handled by national guard regiments of as many states. Two states have broadcasting stations for their bureaus of markets, while nine municipalities, chambers of commerce or boards of trade have broadcasting stations, part of these being used for city police forces, and some others being community affairs.

# Mail Planes Radio Equipped

**S**TEPS have been taken, at the instigation of the Postoffice Department at Washington, to make the air safer for government mail planes by equipping them with one-man radio sets. The first experimental coast-to-coast flight, following preliminary tests conducted by radio engineers and air-mail service officials at Schenectady, N. Y., was a complete success. Pilot Jack Knight, of Mail Plane No. 245, in his recent cross-country flight was in almost continuous communication throughout the flight with landing stations along the route. The installation of radio equipment of planes in the trans-continental air-mail service is expected to ensue at an early date.

**T**HE resultant advantages are obvious when it is realized that in time of heavy snowstorms or dense fogs, especially at night, a pilot is likely to stray from his course and find it difficult to locate his next landing station, or even be forced to risk his life and loss of his valuable cargo by coming down on unfamiliar ground. Although aided by powerful beacon lights along the way, it is not unusual for a pilot to lose his bearings while flying at night.

Radio transmitting and receiving sets eliminate these dangers. By talking with the landing stations, the pilot can be directed accurately on his course. He can be warned of weather conditions ahead of time to avoid storm centers by detouring.

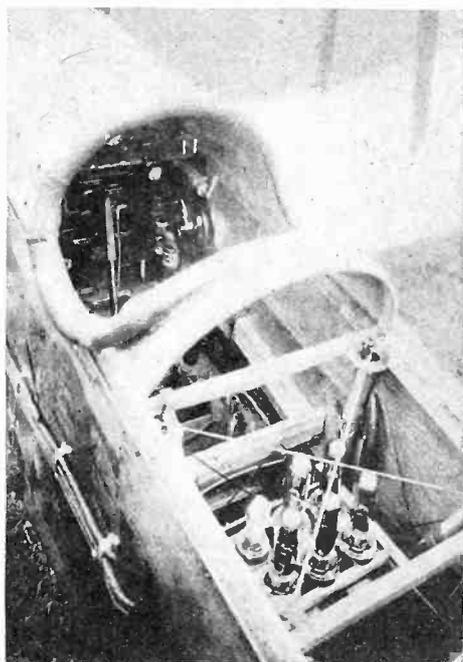
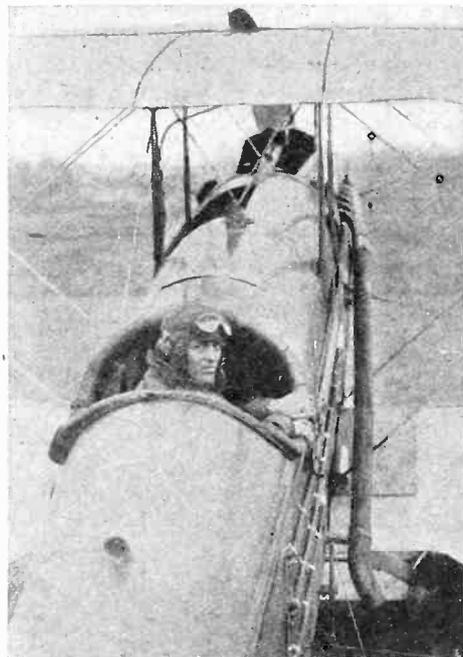
For these and many other purposes, radio equipment on the mail planes will be invaluable,

Postoffice Department officials declare.

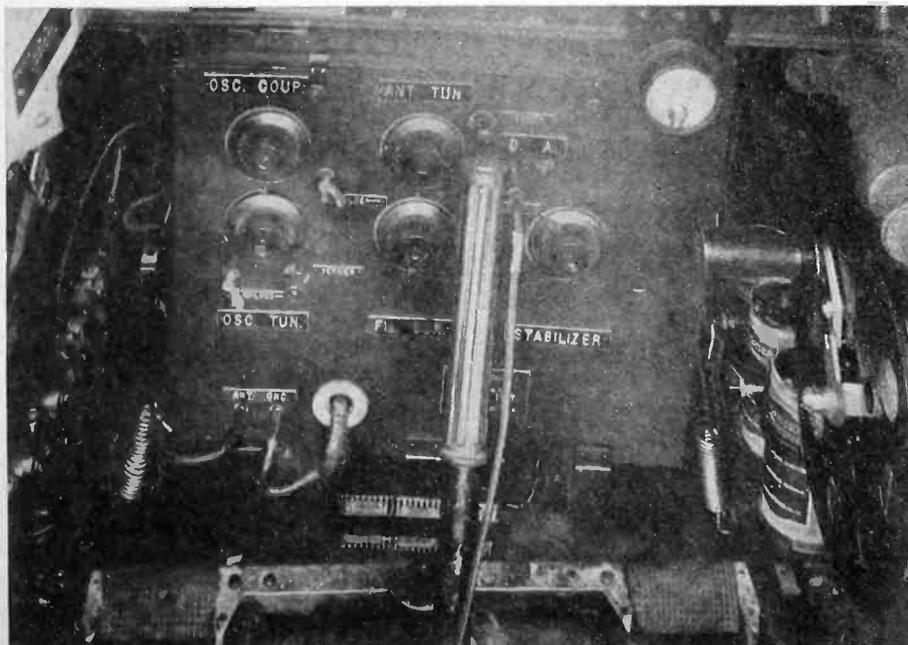
Hopping off at Hazelhurst Field, L. I., Pilot Knight, flying the first air-mail service plane to be equipped with radio kept in constant touch with landing stations within two hundred miles and over, talking one minute-out of every ten. The messages were sent on a 220-meter wavelength. Knight flew at an average of 2,000 feet, using a device to shut out the sound of the motor. His voice was easily heard by landing stations up to a distance of 245 miles.

## Powerful Equipment

Radio equipment used in the flight tests were developed especially for the purpose by the General Electric Company's radio department, acting in conjunction with C. F. Egge, general superintendent of the air-mail service, and Eugene Sibley, radio traffic supervisor. It is said to be without ques-



(Above) Pilot Jack Enright hopping off at Schenectady, N. Y. (Below) Cockpit of U. S. mail plane, showing receiving and transmitting sets.



Close-up view of radio equipment of U. S. mail plane as it looks to pilot from his seat in cockpit (Gilliams Service.)

tion a long step forward in the commercialization of airplane radio.

The equipment is powerful and highly efficient, but at the same time so simple that anyone can operate it after brief instruction. Of necessity, the apparatus must be installed in such a manner that the pilot may control it with a minimum of effort. Planes in the air-mail service carry only one man in order to conserve space for the mail bags. This means the pilot must operate the radio instruments in addition to his duties in piloting.

Consequently the equipment must be practically as easy to use as an ordinary telephone.

The pilot, in order to talk, merely throws the switch handle, conveniently mounted under his seat, to the transmit position and turns a large knob—the antenna variometer—until the ammeter mounted on the board in front of him shows a maximum reading. That is the whole process of tuning the transmitter. He then locks the knob in position and it is only necessary to throw the handle from “transmit” to “receive” as desired.

#### Super-hetrodyne Type Receiver

The receiver is of the “super-hetrodyne” type, selected because of its sensitivity and high selectivity, the latter reducing engine noises and other interferences to a minimum. While the seven-tube “super-hetrodyne” receiver sounds complicated, this particular one is, in reality, very simple, as it is designed in such a way that only two control-knobs are necessary to adjust it in tuning.

Ordinarily it is not possible to “duplex” on the plane, although this may be done and in fact was done at the landing station during experimental tests. The pilot must throw his switch back and forth to talk or listen, but that requires only a single movement of the hand and can be done in a fraction of a second. The famous XL or thoriated tungsten filament tubes were used throughout and contributed largely to the successful operation and high efficiency of the apparatus.

The high voltage required for the plates of the 50-watt transmitting tubes is supplied by a 52-pound, 700-watt dynamotor, operating from a 12-volt battery and delivering direct current at 1,000 volts. The storage battery charges continually while the engine is running, in exactly the same manner as the starting battery of an automobile.

#### Novel Antenna

The antenna for the mail plane radio equipment consists of a 200-foot trailing wire. This is carried on a special reel in the cockpit and let out when the plane takes to the air. A counter-poise, consisting of the engine, the gas-tank and all the struts and wires of the plane, connected together by binding straps, is used for the ground connection.

Exposure to the elements does not reduce the efficiency of the apparatus. During the time the installation work for the preliminary

tests was in progress it rained constantly for two days and nights. As the equipment was covered only by canvas, it became thoroughly saturated with moisture, to such an extent that the aluminum brackets and other parts were dotted with moisture-spots. Nevertheless, the tests were carried out with great success. The equipment was tested out on the ground without being dried, and operated perfectly. During one of the preliminary trial flights both rain and snow were encountered, but neither interfered with the operation of the set.

The preliminary tests comprised trial flights from Schenectady to Hazelhurst Field, L. I., and air distance of 175 miles, during which the pilot carried on a continuous conversation with the landing station at Schenectady. Having demonstrated to their own satisfaction that radio equipment on mail planes was not only feasible, but was in every way practicable and highly desirable, officials of the air-mail service instructed Pilot Knight to test the apparatus further by putting it into actual use on a trans-continental flight.

Planes carrying mail for the Pacific coast and intermediate points leave the air-mail service station at Hazelhurst Field every morning. During his flight in Plane No. 245 Pilot Knight sent and received messages at frequent intervals. Tests were conducted with landing stations at Chicago, Omaha, North Platte and other cities along the way. At no time did he experience any difficulty in hearing the voice of the ground operator. Messages sent from the plane also were heard clearly. After crossing the Rocky Mountains, Pilot Knight established communication with the San Francisco station and held it until his landing at the completion of the flight.

During the trip Knight's leather helmet was equipped with receivers automatically clasped to his ears. A microphone was adjusted around his neck and was always within speaking distance of his lips. The radio telephone on the plane, it is said, was merely a “make-shift” arrangement. It will be perfected along lines suggested by Pilot Knight after his experimental flight.

#### Tests Were Successful

As a result of the successful tests, all planes in the air-mail service will be equipped with radio

sets, according to an air-mail service official at Hazelhurst Field.

Manufacturers of Airplanes are studying the data obtained during the flight with deep interest. They see in it a means of safeguarding passenger planes and extending the use of airplanes for commercial purposes. When the projected trans-Atlantic air service becomes a reality, in the near or distant future, the planes employed will undoubtedly be furnished with radio equipment, enabling the pilot to communicate with stations on both sides of the Atlantic and to get his bearings from the shore while in flight over mid-ocean.

Many accidents, some of them fatal, that have occurred during recent years might have been prevented if the plane had been equipped with sending and receiving sets, officials point out. The instance is cited of the naval dirigible that broke away from its field moorings, Mineola, L. I., last year and drifted far into Canada. For many days the fate of the two aviation officers on board was problematical, while their families and relatives were kept in agonizing suspense. The officers themselves suffered great physical distress, nearly perishing from cold and hunger before they could be located. With radio equipment on board, they could have broadcast directions to the searching party sent out to look for them, and in this way effected their immediate rescue.

More than once have airplanes crossing the Rocky Mountains lost their way in banks of dense fog and made perilous landings. Often, while flying at a high altitude, the aviator encounters unfavorable elements and dangerous air currents caused by unsettled weather conditions. With a radio set in his plane, he can obtain reports from U. S. Weather Bureaus and be advised of conditions prevailing along his route of flight.

Members of the Aero Club of America, government officials and others interested in the development of aerial transportation service are confident it will not be long before all government planes are adequately equipped with radio telephone apparatus for receiving and transmitting messages. They find in the successful results of Pilot Jack Knight's experimental light unqualified evidence of the tremendously important role radio is destined to play in protecting the lives of air pilots and passengers.

# *Does Your Receiver Re-radiate? Read this* Interference—Radio's Big Problem

By E. F. McDONALD, Jr.  
*President of the National Association of Broadcasters*

**I**N ANALYZING the radio interference situation at the present time, it should always be remembered that while broadcasting is of paramount importance to millions of people throughout the country, there are other phases of the radio industry which must be considered and upon which depend much of the commerce of the world.

Trans-Atlantic and ship-to-shore radio traffic are of vital importance. The work of the serious radio experimenter is also of the highest value in furthering the advancement of the radio art.

In order that the broadcast listener may get the most out of his radio receiver, a thorough knowledge of the causes of the interference which he occasionally experiences together with the various means available for their reduction or elimination is essential.

## Many Kinds of Interference

There are, of course, various types of interference occasioned by different causes. The two most annoying at the present time are telegraph code interferences from ship and shore stations working on low wavelengths of around 450 meters, and the re-radiation of radio receivers of improper design or improperly operated by unskilled users. It is to the interest of all participating in the radio industry to assist in correcting these conditions as well as the other causes of interference.

The National Association of Broadcasters has been in conference with the Honorable Herbert Hoover, secretary of commerce, on the subject of ship interference, and through his efforts and co-operation is arranging for international regulations providing for the carrying on of ship-to-shore traffic on wavelengths outside the broadcasting band. This article, therefore, treats only with the interference created by re-radiation from radio receivers.

It is a popular fallacy that all that is necessary to put a stop to

any undesirable condition is the passing of legislation. Unfortunately this idea has occasionally taken root and grown into something that constitutes a real menace at the heart of our American civilization. There is nothing more detrimental to the morale of a nation than the adoption of legislation which is obviously impossible of enforcement and which, through the ease with which it may be ignored, teaches wholesale disrespect for not only the law, but the authorities that make it.

## Hard To Regulate

We have, at the present time, a startling example of an "iron-clad" law which so far at least has been impossible to enforce, and which has possibly worked at greater evil than that which it was designed to eliminate—the Prohibition Amendment. During the war the Navy Department undertook through its Intelligence Service, to prohibit the use of transmitting and receiving apparatus throughout the country. The prohibition on transmitting was comparatively easy to enforce, but although every effort was made to eliminate reception, in the final analysis it came down simply and squarely to reliance on the loyalty and patriotism of the individuals which go to make up our great nation.

Obviously the individuals who really desired to use radio for ulterior purposes had no such sense of loyalty and as a consequence, to a great extent all that was accomplished was the prohibition of the use of radio receivers in the hands of those who would not use them in any case to the disadvantage of the country, whereas it was practically impossible to stop the use of such apparatus in the hands of those intent on serving their own ends.

For these reasons, the adoption of legislation prohibiting the use of receivers which feed back energy into the antenna is

obviously absurd. The adoption of an act of this kind would be comparatively easy but the enforcement would require a greater force of officers and special agents than we have at the present time attempting to enforce prohibition. Certainly our government cannot afford such an expenditure even if it were possible to completely eliminate radio feedbacks by such means.

It should be remembered that in the first place the locating of the offending receivers which feed back into antennae would be comparatively difficult, and even when they were located, it would be a simple matter for the user of a set of this kind to disconnect the tickler coil or whatever means was used to feed back the energy, while the inspector was present, and attach it the moment he left. The enforcement of any such act would also be rendered extremely difficult because of the statutes prohibiting the entrance of private dwellings without proper search warrants.

## The Feedback Evil

Granting that the feedback from radio receiving sets is harmful and that preventative legislation if not impossible, at least is impractical, what is to be done? Only end the present annoyance but, through uniform retail price and its advantages from the selectivity standpoint, will be desirable for general public use. Let's have no more unenforceable legislation!

Obviously the solution of the problem is constructive action on the part of the radio manufacturer. At the present time the laboratories of eight of the largest manufacturers of receiving apparatus are at work night and day on the production of a simple device to be connected ahead of receivers feeding back which will not allow the passing of this energy out of the antenna. Such

a device when developed and perfected will be put on the market by the manufacturers according to an agreement among them, at practically actual cost, so that the users of all types of sets will have the benefit of this device without undue expense. It is not fair or reasonable to expect the users of feedback receivers to junk and throw away apparatus representing the investment of many hundreds of thousands of dollars, when by the addition of some simple device the harmful re-radiation can be entirely removed and reception improved.

The public will not be hard to persuade to use a device which will cost little and which will not only through reciprocity eventually eliminate all feedback howls, but will also improve reception and increase the selectivity of a receiver with which it is used.

It is often said that one of the most interesting phases of radio to the novice is its possibility of original experiment. Many of the more important developments in the radio field have been made by novices. From this standpoint then, the development of a one-way valve to prevent radiation

from receivers certainly offers wonderful possibilities. With the general public interested in the development of a universal attachment of this kind, as well as with the well equipped laboratories of the larger manufacturers of radio apparatus earnestly working on the problem, it is safe to predict that not much time will elapse before there is available a universal radiation preventer which will be adaptable to all types of receivers and will not only end the present annoyance, but, through uniform retail price and its advantages from the selectivity standpoint, will be desirable for general public use. Let's have no more unenforceable legislation!

### We Give Credit

On Page 5 of the February issue of RADIO TOPICS we printed a copyrighted photo of English chorus girls rehearsing to the tunes of a radio. Through error in our editorial department credit to Underwood & Underwood was not given and we hasten to give proper credit herewith.

### Long Distance Applause

WHAT is believed to be the record long distance telephone call in applause of a radio concert came to WTAM, operated by the Willard Storage Battery Company, Cleveland, O., during a recent concert for Pacific Coast listeners that went on the air at 3 a. m.

The call came from L. G. Baldwin, who was listening in at Los Angeles, California. Baldwin told the staff of WTAM that the signals were clear enough to carry through several rooms on a loud speaker.

During the concert Baldwin put the call through getting his connection at 4:30 a. m. Eastern Standard time.

Several hundred letters and telegrams were received in the days following the three o'clock in the morning concert from others on the Pacific Coast.

The concert was planned at the unusual hour to avoid local interference at Cleveland and in the east and also to allow the far western broadcasters to complete their performances.

## The Broadcasters' Problem—What to Give 'Em



# Department of RADIO ENGINEERING

## Radio Topics Institute

NANKO C. BOS, Chairman Advisory Board



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# Push and Pull Amplification

By C. R. BLUZAT, TECHNICAL EDITOR

THE radio fan is always looking toward better and louder reception. At the same time, from a standpoint of economy, he uses dry cell tubes. These tubes have a lower output than power tubes and other tubes operating on 6 volts battery. When the third stage of amplification is reached internal noises and external noises such as static are amplified along with signals, and distortion takes place which is most likely due to "overloading" of the tubes. This last cause of trouble can be efficiently removed by the use of Push-Pull Amplification. A short discussion of amplification will help the reader to understand the method proposed as a solution to "overloading."

When the incoming signals have been detected, they are impressed on the primary of the first audio transformer under the form of audio frequency currents. A varying voltage is thus impressed on this primary and is stepped up in the secondary in a ratio ap-

proximately equal to the ratio of turns of the secondary to the primary for a well designed transformer. This magnified varying voltage is impressed on the grid of the first amplifying tube.

If the average voltage of the grid is chosen properly, the tube will amplify as explained below.

Curve I is made plotting plate current against grid voltage, the voltage on the plate and the filament current being kept constant.

The curve for which the plate voltage is 100 volts consists of three parts; two curved ones ab and cd, and one straight one bc. The "steepness" of this part bc is a measure of the amplification factor of the tube. Thus to a certain change in grid voltage corresponds a change in the plate current. The steeper the portion bc the better; a bigger variation in plate current taking place for the same variation of grid voltage. For instance, for a variation of voltage eg we have a variation of plate current em if the plate

voltage is 60 volts and a variation of current ne when the plate voltage is 100 volts. The curves drawn with different plate voltages 40, 60 and 100 show that increasing plate voltage gives a steeper curve, that is better amplification. Curve abcd is the curve with the maximum plate voltage that the tube can stand and no better amplification curve can be obtained.

It can be shown here how tubes are "overloaded" and how distortion occurs. Let us assume that, by the proper C "bias" battery the grid voltage be at e when no music is received, O is the point of operation of the tube. For variations of voltage above and below e up to g and f we have perfect amplification, the plate currents being proportional to the grid voltages. For bigger variations of voltages such as ei and eh the plate currents do not vary proportionally to the grid voltages; we have less volume and distortion. The tube is said to be

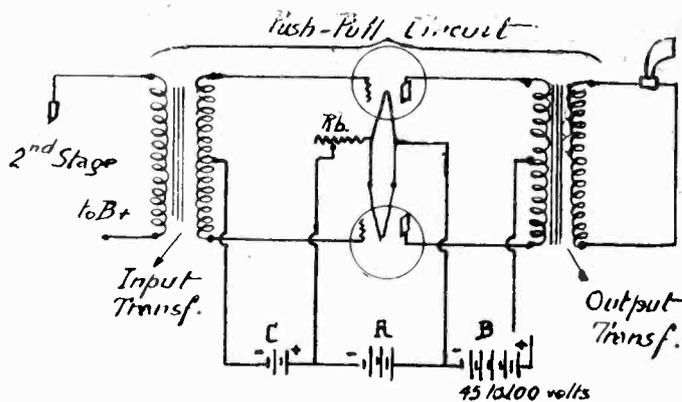
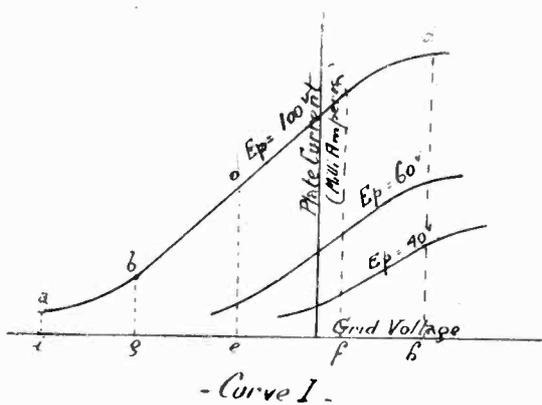


Fig 1

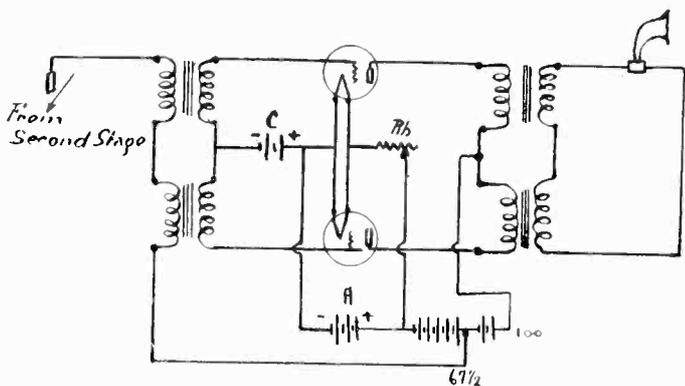


Fig 3

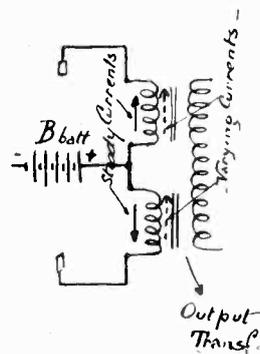


Fig 2

"overloaded." As a remedy to this inconvenience the "push and pull amplification" method is to be used, patent of which was granted to E. H. Colpitts of the Western Electric Company; it was originally used as a repeater on telephone lines.

With an arrangement such as shown on Fig. 1, the variations of voltage on the grid of each tube are half of what they would have been if one tube only was used, half of the secondary belonging to each tube, o being a tap at the middle of the secondary winding. Then the variations of voltage on each tube, instead of being eh, ei, will become eg and ef corresponding to the straight portion of the curve which gives distortion less amplification. The outputs of the tube add themselves for the following reason; when one grid is positive as compared to point O, the other tube grid is negative. A positive potential increases the plate current of the tube, a negative potential on the other tube grid causes a decrease in its plate current, as shown on curve I.

If we refer to Fig. 2 when no music is received, the steady plate currents are in opposition in parts

a and b of the windings. When there is an increase in the plate current of tube 1, a varying current flows in the same direction than the steady current as shown by the dotted arrow. At the same time, there is a decrease in the plate current of tube 2; for this the varying current flows opposite to the steady plate current, as the dotted arrow shows. So both varying currents flow in the same direction, add themselves and produce a stronger variation of flux, resulting in a bigger current induced in the secondary.

Fig. 1 shows the hook-up with transformers specially designed for "push and pull amplification." Power tubes will give the best results. But ordinary amplifier tubes will give good results; UV-201-A or WD-12 being recommended, the first ones giving more volume than the second. Only one rheostat is used. With UV-201-A and six volts A battery a Carter six-ohm rheostat gives satisfaction. A fixed resistance of three to four ohms can also be used with UV-201-A and a filament control jack.

Up to 100 volts on the plate can be used, with the proper C voltage. The mentioned tubes will

work up to 45 volts on the plate without a C battery. Above that value, one volt C battery must be used for each ten volts increase.

Ordinary audio transformers can be used as shown in Fig. 3. They must be of the same ratio, otherwise the load would not be equally divided between the two tubes. A common ratio of 3 to 1 is recommended. Results will not be as good as with the specially designed transformers, due to slight differences in the windings and the fact that the impedance of the input circuit is twice as high as with one tube.

The writer will be very glad to hear from fans who will try this improved type of amplification.

### There's a Big Difference

Powel Crosley, Jr., has been referred to as the "Henry Ford of Radio," but he really is the anti-thesis of Henry Ford, because the radio keeps the people at home and the automobile takes them away from the fireside. Perhaps a happy medium could be reached in equipping each auto with a radio set.

## CORRESPONDENCE WITH THE INSTITUTE

**T**HIS department is conducted by C. R. Bluzat, 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.

### TECHNICAL EDITOR:

It is my intention to purchase a broadcast receiver in the near future.

I have been considering receiving sets for quite a while and have decided that the set I buy shall be either an Erla three-tube duo reflex (Electrical Research Laboratories) or a Sunset (Sun Radio Company.)

Please advise me which set, in your opinion, is the better, bearing in mind that I desire clear and faithful reproduction.—F. D. H., Cincinnati, Ohio.

ANSWER: In answer to your query, both sets give clear reproduction if properly operated. The three tube Erla, with its stage of radio-frequency and two reflex, has a splendid range, and the crystal detector makes it favorite for clear reproduction. If you buy them already made, have them tested, and you will be the final judge as to quality of reception.

### TECHNICAL EDITOR:

Would you kindly furnish me the information I desire, in regards to an antenna for receiving stations north and south?

I can get east and west south to Joliet and north to Milwaukee.

Our house has a peak roof, 25-foot lot, houses on each side.

My aerial at present is running east and west.—F. J. E., Chicago.

ANSWER: In answer to your inquiry, in order to receive stations located north and south you will have to erect an antenna running north and south. If your lead-in is towards north you will receive stations north better than stations south. The reverse will occur if your lead-in is towards south. Such a directive antenna can be made of a single wire 100 feet, 10 feet above the roof with a lead-in of 30 to 40 feet. With two antennae, one west and east, the other south and north and the good set you now have, you will be able to cover a very big range.

### TECHNICAL EDITOR:

Please send me your best single circuit hook-up and also what is the best size coupler and what size wire to use and number of turns thereon. I have a small variocoupler with stator 3 in. in diameter and about 3½ high. I read some time ago in RADIO TOPICS of your

long distance reception with single circuit and I would like to try that hook-up if obtainable.

Can you please answer why is it the person next door operating a Grebe receiver absolutely kills my single when they are tuning. If I am listening on a wavelength of 500 meters and they tune in to the same wavelength, my outfit roars out the signal, then when they tune away from this wavelength my signals become so faint I can hardly hear at all? How can this be remedied?

Any help you can give me will be greatly appreciated. My outfit is a Reinartz, and I thought I was getting fine results until the other machine next door was installed.—L. M. F., Racine, Wis.

ANSWER: In answer to your inquiry, the trouble you have is not in your receiver, but comes from "next door." The person next door does not know how to tune his set. In order to bring in the loudest signals he moves the tickler coil too far. His set is then working as a small transmitting outfit and radiates, which accounts for your music being distorted or "killed."

You are not the only one to be disturbed, as this radiating action can be felt at several blocks distant. The best solution is to meet your neighbor in a friendly way, have him compare the results you get before and after his set is tuned improperly. Show him how to tune his set so it will not radiate. For this, the tickler coil should be adjusted, starting from zero and increasing until a position just below the oscillating point; this oscillating point is indicated by a hissing in the phones. If you reach that hissing point, turn the tickler so it will disappear. Your neighbor will find that his set, properly operated, will give him better results and you will be able to enjoy the concerts.

You may, also, in order to lessen the interference, move your antenna as far as possible from his and put it at right angles with it.

We will be pleased to hear from you as soon as you get full benefit from the above advice.

### TECHNICAL EDITOR:

Last spring I wrote you as to what would be a satisfactory receiving set to

purchase at a reasonable price, and you recommended the Crosley. I ordered Model XV and it has been perfectly satisfactory.

Shortly after I installed my outfit I was caught in an automobile accident and had my both hips and legs broken, and I have not been able to walk around yet only on canes, so my outfit certainly has been a comfort to me, as I have been able to operate it since two months after I was hurt. Now I'm going to trouble you again for a little more information, if you will oblige me by answering the questions herewith:

No. 1. The top story of our house is furnished, used as a storeroom and is about 40x60 feet, with 9-ft. ceiling, joists not finished. How would I string wires in this for antenna? Are both ends of this wire connected to the receiver, one run to receiver and would it require a ground wire? What size wire would be suitable? Would covered copper wire do? The building is about 45 feet high.

No. 2: Since I installed my outfit there are a lot of people who are anxious for receivers around here. How would I get in touch with some good system that would receive over 1,000 miles that I could get the wiring plans of and procure the parts and assemble these outfits at low cost that I could work at until I get able to be around again? The circuit most suitable would be 3 bulbs, using lowest amount of battery, as through the country it is almost impossible to have "A" batteries recharged unless shipped outside.

No. 3: How could I cut the quantity of "A" battery down on my Crosley XV? It requires an awful lot of recharging. Am using 200 and 201 bulbs. I also have a set of UV-12 on dry cells, but they do not receive near so well and are very noisy in turning the filament bulbs and you could not hear much but roar.—W. E. H., Norton, N. B., Canada.

ANSWER: In answer to your inquiry, I advise that you use a two-wire antenna, about 50 feet long and connected as my sketch shows. A ground wire is necessary; it ought to be as short as possible and of a fair size, such as No. 12; it may be bare wire.

Three circuit regenerative sets, properly operated, have a range of a thousand miles, and with two stages of audio amplification will operate a loud speaker. Erla reflex circuits, 2 or 3 tubes, have a better range, but are more difficult to operate. You might try the 3-tube Neutrodyne as appeared in November issue of RADIO TOPICS. If you write to Chicago Salvage Stores, 509 S. State street, Chicago, they will furnish you with their prices for their "knock-down" sets, which are easy to assemble.

The noise in your WD-12 may be due to poor connections and most likely to discharged "A" or "B" batteries. These tubes are very satisfactory. For volume, UV-201-A tubes are to be preferred. They require four dry cells in series (6 v) and draw 25 amperes each. It is not advisable to run more than one tube on four dry cells, as their duration is considerably shortened if they furnish a higher current than 25 amperes. UV-199 is a good tube. It uses only .06 amp. and requires two dry cells only. Up to four tubes it can be operated from a set of three cells.

## A Single Control Receiver

**C**ONTRARY to general belief, most things in this world do not "just happen." There is usually a series of prior events which predetermines the final result. The person on the outside is not familiarized with the earlier moves and he assumes the completed article is just "dumb luck."

The Bristol Grimes combination is one of those things which doesn't just happen. Let us read the story.

Some time ago when my Inverse Duplex was still in its infancy, I bought a power amplifier which, strange as it may seem, required no "C" battery. Upon combining it with my circuit, I was surprised at the volume and



the quality. It was the missing link in my development. No other set could produce that volume without sacrificing that quality.

That Power Amplifier was made by the Bristol Company. Negotiations were immediately started with them which led up to their purchase of the remaining ten licenses under the Grimes Inverse Duplex System, an ideal combination which permitted the high efficiency of the Grimes circuit to be fully realized through the quality reproduction of the Bristol Power Amplifier.

The next efforts were devoted toward simplicity. It was realized that a radio set was merely a means to an end and therefore should not require a correspondence school diploma for successful operation. The final result was a single control set which even a five year old child can operate and which has stood the ex-

treme test of perfect performance in the hands of the blind. Several invalids confined to their beds are also satisfied owners of this single control set.

Many years of radio experience taught us that satisfactory reception depended a great deal on local surroundings. No one given set will operate equally well under all conditions. The Bristol set was therefore designed to be readily adaptable to these many conditions by flexibility in the methods of reception. By merely throwing a switch the set may be operated by loop or by antenna. A single connection in the rear adapts it most effectively to a long or short aerial. In many localities, it may operate with a ground connection only. No other set has the many possibilities for correct installation in particular receiving locations and with these determined, one knob does all the tuning!

Other refinements have been added such as a protecting cover over the entire set, capable of being locked! A special jack has been installed for phone operation and when tuning in, automatically reduces the volume on the loudspeaker. A meter is used to permit most efficient operation of the amplifier tubes—greatly increasing their length of life as well as the life of the batteries. In every way possible this set has been made the latest word in radio and is one of the best adaptations of my Inverse Duplex Principle.

This set, as illustrated above, ready for operator, is now being manufactured and placed on the market by the Bristol Company of Waterbury, Conn.

### Iowa City Now on the Air

The new 500-watt broadcasting station at the University of Iowa, Iowa City, Iowa, will operate on 484 meters, dividing operating time with the Palmer School of Chiropractic, Station WOC, at Davenport, Iowa.

The Iowa City station has been assigned call letters WHAA and will be heard on Sunday afternoons and on Tuesday, Thursday, Saturday and on Sunday evenings.

### New Klosner Rheostat Saves Tubes

Obviously, rheostats were built for the explicit purpose of protecting the most delicate and valuable part of a radio set, "its vacuum tubes." Without rheostat protection, V. T's cannot exist.

True, even with rheostat protection, the operating life of a V. T. is surprisingly short, this is due to several reasons, primarily, improper rheostats. Individuals who have access to their use, do not realize that thru the operation of improper rheostats they are killing their tubes, long, very long before their time.

With the fundamental purpose of building a rheostat that would function as a real tube protector, Klosner engineers entered the research class and today proudly exhibit the fruit of their efforts, the new Klosner rheostat. A real tube protector and filament control.

It comes with ordinary knob or a neat dial made of genuine bakelite, two inches in diameter.

### Handy DX Record

The Standard DX Radio Book Co. of Chicago has just published a handy, compact little volume for recording dial readings and other information. The book contains a master station control sheet with all the more important broadcasting stations listed according to call, city, meter and nights on which they are operating. In the back of the book there are blank pages for DX records, giving date, time, station, city, dial readings, distance, weather conditions, etc. It is a very handy volume and every owner of a DX receiver will find it invaluable in keeping tab on his dial readings. It sells for twenty-five cents a copy. H. C. Young, 845 South Wabash avenue, Chicago, is the publisher.

### Believe It or Not

There was a drummer who was so thin

He wouldn't go out alone

For fear some great big hungry dawg

Might take him for a bone.

One day when he was walking out

And got all out of breath,

He fell through a hole in the seat of his pants

And choked himself to death.

—Crosley Radio Weekly.

# Demand for Radio Increases Daily

**A** MONUMENT to the public demand for radio apparatus and American industry has sprung up in Buffalo.

The immense plant of the Federal Telephone and Telegraph Company, Buffalo, N. Y., has become a vast community of workers, striving to feed the appetite of the radio-hungry American people.

At the outbreak of the World War this manufacturing plant was engaged mainly in the manufacture of high grade telephone equipment.

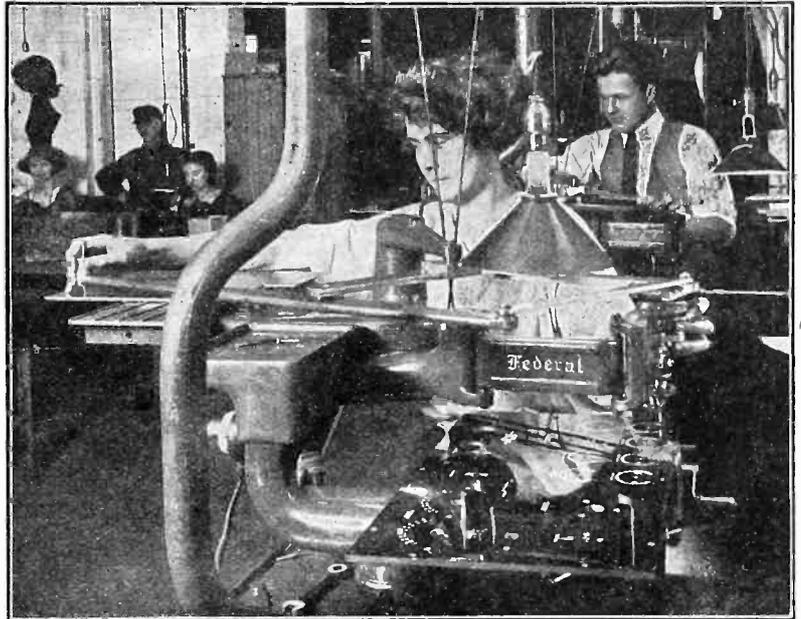
Like many other industries, radio was spurred on by the needs of our country during the war, until now it stands alone as the one which commands the greatest attention of the nation's masses.

Today the Federal Telephone and Telegraph Company makes radio equipment almost exclusively.

## An Immense Plant

An idea of the magnitude of its organization may be obtained from the following facts:

The factory at present employs over 800 operatives. A 50 per cent increase is contemplated during the coming month. It is expected that 30,000 complete sets of every kind will be turned out in the next few months. Completed sets have yet to become as popular as the home built set. Many more parts are sold as units



Drilling and engraving panels for Federal 61 sets.

than are used in the assembly of complete sets. The demand for radio is so great that Federal alone expects to produce over 175,000 headsets this year.

Any one who is capable of work is hired and given a chance, but the rigid inspection of each one's work is such that a great many employes become discouraged over their failure to produce parts which do not come up to the specifications.

## Modern Machinery Used

Upon entering the factory, visitors are noticeably impressed with the immensity of the plant and the vast number of persons

engaged in making and assembling the various parts.

The most complete and modern machinery has been installed to insure accuracy and precision.

A person who purchases Federal radio, little realizes the large number of machines and operations needed to produce even the most insignificant looking part.

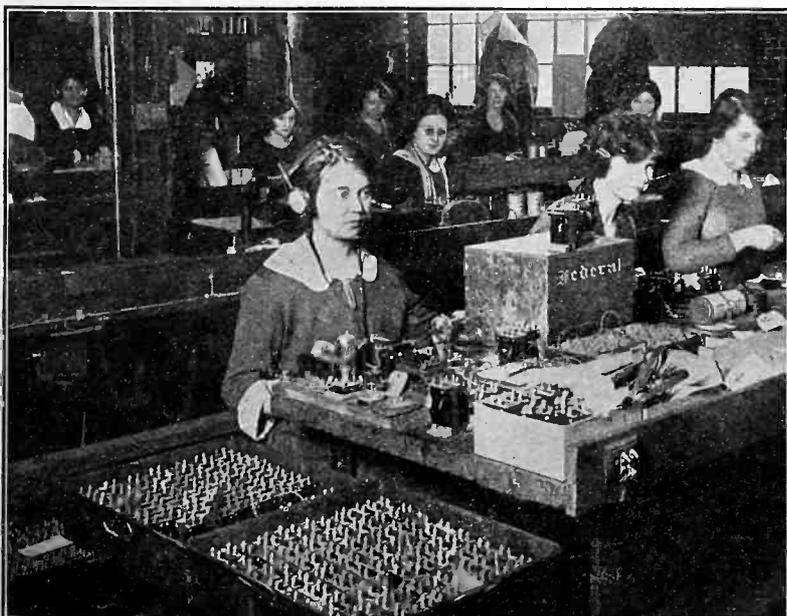
There are at present eleven engraving machines, used solely for the cutting of the lettering into the panel fronts of the sets.

One of the most impressive sights is the new multiple drill machines. These marvelous machines drill 20 holes at the will of the operator in just one pull of the lever.

## Shop Never Closes

There are so many different kinds of nuts and screws and other miscellaneous parts used in the manufacture of radio that it is necessary to run the machine department night and day to keep up with the requirements of assembly. All of the output of the various departments is used solely in Federal equipment. No work is done for outside concerns. Millions of screws and punchings must be purchased each month to supplement the output of what is probably the largest machine shop which, practically speaking, is engaged exclusively in radio production.

All of the bakelite moulding is done outside of the factory. The



Young ladies employed to test sets. Each part passes rigid inspection.

entire capacity of a large punching plant is contracted for as a supplement to the twenty punching presses in the plant proper.

Despite the fact that there are over 40 hand and automatic screw machines in the plant, it is necessary to have done in outside places more work of this kind than is actually done in the factory.

The tool making department alone employs thirty men who do nothing but make special fixtures, dies and punches for machines.

The storage warehouse, packing and shipping departments and other buildings, all in process of expansion, require much greater floor space than the factory building proper.

### Countless Operations

There are countless operations which never occur to the prospective owner of a Federal set, such as the nickel, and copper plating of metal parts, the enameling of metal cases, the assembly of the transformers, the testing of every part and set.

A large office force is required to handle the mass of correspondence and orders.

A whole section is devoted to answering persons who write in and say they heard WGR, the big Federal station. An excellent method of logging such testimonials discloses the fact that the average reliable distance which WGR covers is 550 miles.

The personnel comprising the radio sales force in the United States only, numbers over 100.

All this in answer to the demand of the public for more and better radio.

### Two New Stations on the Air

**T**HE largest and most powerful radio broadcasting station in Canada, operated by Canadian National Railways, was thrown open February 27. The call of the new station is CKCH, and is the first of a chain of stations to extend across Canada. A musical program and talk by Sir Henry W. Thornton, chairman and president of the board of directors of the Canadian Railway, opened the station.

The new station expects to have a range beyond that of any station in the dominion, due not only to its up-to-date equipment, but also to the height of its aerial, which stands on the roof of the Jackson building and reaches 200 feet above the ground.

It will broadcast on a wavelength of 435 meters. The initial program was relayed by station CHYC, Northern Electric Company, Montreal, on a wavelength of 341 meters, so that radio listeners everywhere in Canada and the United States should have no difficulty in receiving the program.

### Boston Has Fine Station

Another new station is WBZ, located on the Brunswick Hotel, Boston, Mass.

Programs of classical and popular music, jazz music, lectures and

theatrical features will be broadcast. On the top of the Brunswick Hotel has been built a studio that equals anything that has been done in the past for convenience and beauty. In the building that has been constructed on the roof of the hotel is the studio, 30 by 40 feet in size, and a reception room with a ladies' parlor.

In order to make the project successful, it was necessary to have constructed an entirely new line from Boston to Springfield, by the Western Union Company. This line is slightly over one hundred miles in length and connects the studio at the Brunswick with the radio station at East Springfield, Mass.

At Springfield this telephone line goes to Station WBZ of the Westinghouse Company, located at this company's plant. For the past two months the radio station has been undergoing a complete renovation so that when the studio opens, everything will be in first class condition. The signals will radiate from the long antenna 210 feet above ground and supported from massive steel towers.

The three interests, the Boston Herald-Traveler, the Westinghouse Electric & Manufacturing Company and the Brunswick Hotel of Boston, have been working day and night for the past two months to get everything ready for the opening date. A new era in remote studio broadcasting will be started and the radio fans will have a new station that will equal and perhaps surpass anything that has been done in broadcasting.

### Calls Troops by Radio

Radio was employed for the first time in mobilizing the national guard when the 132nd Infantry of Chicago, commanded by Col. William E. Swanson, was notified via the ether to report at the armory at 2640 West Madison street. As soon as the order was received from Springfield directing the mobilization of the regiment to be held in readiness to move to Herring, the adjutant relayed the information to station KYW and it was broadcast.

It is estimated that more than 50 per cent of the soldiers either received the message themselves or were notified of it by neighboring radio fans.



A corner of the assembling room where Federal 61's are made.

# Proper Antenna Construction

By FRANK CONRAD

*Assistant Chief Engineer, Westinghouse Electric & Manufacturing Company*

**T**HE element of the antenna which determines its ability to pick up or give off signals is its effective height. The term, effective height, does not mean the height from the ground connection to its topmost point, but is more nearly the average height from ground connection to the center of its exposed area. For an antenna consisting only of a straight vertical wire the effective height is about two-thirds its actual height, while for an antenna having a large horizontal top structure the effective height is very nearly the actual height. The only purpose of the horizontal top element of a receiving antenna is to give a greater effective height for a given actual height.

When a regenerative vacuum tube receiver is used the extent to which the signal can be built up by regeneration is independent of the antenna height if all parts of the antenna are equally exposed to the incoming signal. However, the amount of interference which is picked up will be proportionate to the height, and we must, therefore, endeavor to select a location which will permit of minimum height.

As the lower part of the antenna will usually be more or less shielded it is necessary to make some compromise between signal strength and selectivity. For installation in cities a height of 20 feet with a horizontal top of the same length will usually be found ample for reception of distant signals. For use when interference is slight or in country districts the height may be increased to 30 feet. It is of course assumed that for strictly local reception an indoor antenna will be used.

\* \* \*

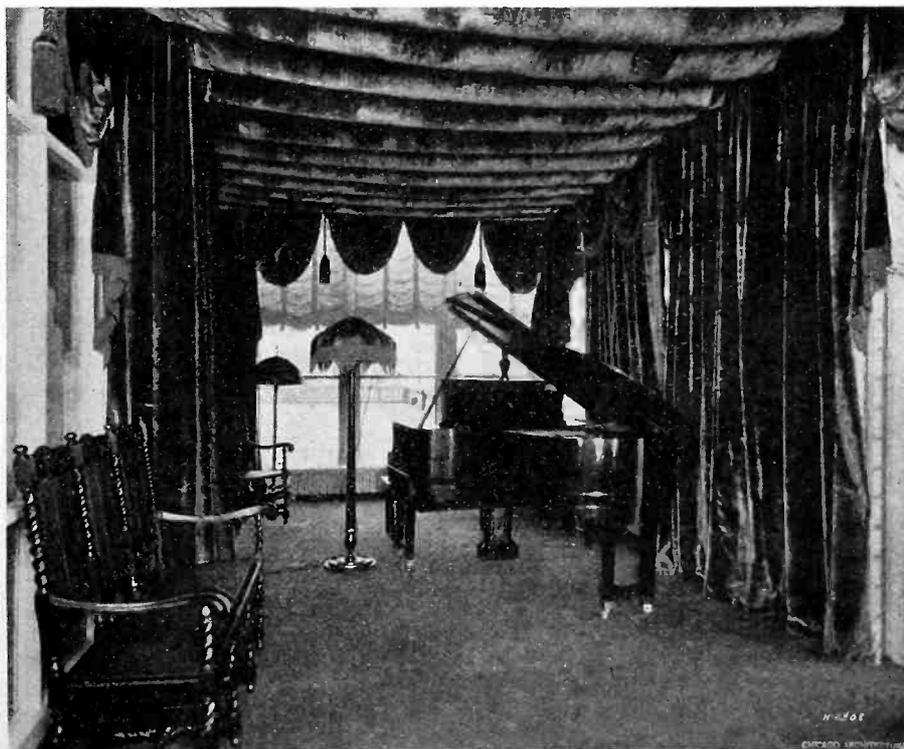
It is unnecessary to use more than one wire for any part of the antenna and the size of this wire is unimportant. It should be well insulated at the supporting points and be spaced as far as possible from conducting objects. If the

outer end of the top wire is attached to a tree, a break insulator is placed in the wire well outside the branches. This top wire should not be over or near any objects such as a metal roof, as the effective height of the antenna will probably be about the height of this top wire above the metal roof. If a supporting structure is available, a straight vertical wire without top horizontal part will be satisfactory, or it may extend in a diagonal direction from the side of the building near the receiving set to a point some twenty or thirty feet above on an adjoining building or other support with clear space between.

For the best results the ground connection should be made to some conducting area on about the same level as the receiver. A steam or hot water heating system gives a good ground. Avoid a long ground wire, as this gives height and lack of selectivity without compensating additional signal strength. This is an important point when the receiver

is installed in an upper floor of a building such as an apartment. In this latter case the piping system of the building will furnish a good ground. Never run a separate wire down to the ground floor. The wires from antenna and ground where they approach the receiver should be separated as much as possible and the receiver should be placed as near as possible to the point where the antenna wire enters the building. The ground connection should be made to the nearest part of the conducting system which is to form the ground and it is often an advantage to connect to more than one conductor—such as the heating and water or gas pipes.

If your receiving set is not giving the results you think it should, look over your antenna structure to see how it meets the conditions outlined. Thus it is possible that by a change in the height you can obtain the selectivity desired or by a change in its location you can improve the strength of signals from distant stations.



This is Station WJAZ, Chicago, studio, located at the Edgewater Beach Hotel, which you have heard many times in the last year.

### Pleased Prize-Winner

**I**N acknowledgment of the Zenith receiver recently awarded him, Chauncey Hoover of Marshalltown, Ia., has the following to say:

Radio Topics,  
Oak Park, Ill.  
Gentlemen:

I take pleasure in acknowledging receipt of the Zenith radio set awarded me as a prize in the "Electrical Principles and Problems" contest recently conducted through your valued magazine and wish to thank you for the same.

I have been a subscriber to RADIO TOPICS since its first issue and it is one of the radio magazines

or five years as an operator and experimenter; have built and also purchased different sets and assisted in installing many others, but I am getting better results from Zenith than I have ever had before. Its selectivity makes reception of both broadcast and code very clear and many of the objections I have found in some of the other makes have been eliminated in the Zenith.

Again thanking you, I am,

Yours very truly,

CHAUNCEY HOOVER,  
Member A. R. R. L. Sta. 9AMU.  
Marshalltown, Ia.

### Radio Receiving in Grand Canyon

By S. R. WINTERS

**A** PARTY representing the Geological Survey of the United States Department of Interior recently returned to Washington from a two and one-half months' surveying expedition through the Grand Canyon of the Colorado River. About three hundred miles of the roughest waters imaginable were traversed in making the first discovery of this mighty chasm. The enclosed photograph of a one-wire antenna shows how for the first time a radio-telephone receiving outfit was installed between canyon walls.

Using four wooden boats for making the voyage through the turbulent waters of the Grand Canyon of the Colorado River, no attempt was made to install the radio-receiving set for service on these boats. Instead, while voyaging on this river, the wireless equipment was enclosed in a watertight box or compartment. However, each evening, provided the party was not exhausted from the day's work, an antenna similar to the one shown in the enclosed illustration was installed and wireless communications received regularly at the various points where the crew of the Geological Survey camped.

The antenna, as shown in the accompanying photograph, consisted of one wire fastened to a makeshift mast and from the top of the latter carried upward alongside a steep cliff, which after being insulated,



Antenna installed in Grand Canyon of Colorado River for receiving radio messages for the Geological Survey, U. S. Department of Interior.

was tied by means of a string to a ragged projection on the wall of rocks. The ground wire was either placed in moist soil or preferably in a stream of water. Signals proved to be stronger when the ground wire was in water than when planted in moist soil.

The particular radio-receiving set used was the Aeriola Senior, which weighs barely more than twenty-five pounds and is distinguished for its easy operation and the clarity with which it brings in signals from a distance. On one occasion this outfit had to be repaired but on all other occasions it proved to be serviceable through this perilous and extended trip down the Colorado River.

Invariably, KHJ, the broadcasting station of the Los Angeles Times, at Los Angeles, California, was heard though this wireless equipment was set up between walls of rock to a height of from 1,000 to 2,000 feet. Stations in San Francisco, and Salt Lake City, were also heard and upon one occasion signals were received from a broadcasting station located in Colorado Springs. Among the outstanding reports received by this exploring party of the Geological Survey, were the announcement of the death of President Harding, news of the Japanese earthquake and the results of two games of the World Series baseball.



Chauncey Hoover, member of A. R. R. L. who won the Zenith radio receiver, awarded as a prize by RADIO TOPICS in its "Electrical Principles and Problems" contest.

I prize most highly among the several I take. Its articles are always up to the minute and I find them very instructive. The benefits I received from Mr. Anthony's lessons alone, as contained in the contest, aside from the prize received, have been worth more to me than all I have ever paid in subscriptions or can pay for many years to come. Anyone interested in radio or the fundamentals of electrical principles could well afford to study these articles if they are yet available. RADIO TOPICS is full of other articles along radio lines just as instructive and helpful. It is a pleasure to recommend your magazine to radio fans.

I also want to say a word in regard to the Zenith outfit sent me. I have been in radio work for four

# How Radio Served the Public

By *WILSON J. WETHERBEE*  
*Director of Station KYW*

**R**ADIO fans of the Central West were given a peep behind the scenes of newspaper and railroad offices during the recent severe snowstorm that swept down from the north and broke down telegraph and telephone poles, cutting off many cities from the outside world. Mr. Wetherbee tells how the Chicago broadcasting stations came to the rescue of the railroads and newspapers in the emergency and worked long hours sending and receiving news and messages from the stricken territory.

**V**OICES across the white, wind-swept spaces — voices emanating from towering antennae, from which through the day and the long hours of the night came the messages for which a storm stricken country waited. Chicago, Pittsburgh, Springfield, Mass., Hastings, Neb., where the Westinghouse Electric & Manufacturing Co. operates broadcasting stations; stations at Omaha, San Francisco, Seattle, Davenport, New York — all units in the great transcontinental radio communicating system which leaped into existence overnight to serve the country when snow, sleet and high winds disabled telegraph lines and in many instances paralyzed transportation.

Early Monday morning when the storm which was advancing toward Chicago had already worked havoc in the West, the Chicago Evening American and Edison studios of Westinghouse Station KYW received calls for help from press services and railroads. Instantly these two studios were transformed. They became in a second a combination of a train dispatcher's office, and the wire rooms of metropolitan newspapers. From Monday morning until 3 o'clock Wednesday afternoon the entire staff of KYW was on duty endeavoring to maintain communication between cities which had been isolated by the storm.

### Worked Long Hours

Up in the operating room of KYW on top of the Edison build-

ing, the technical staff of the station, under the direction of Dwight Myer, assistant chief engineer, kept constantly on the alert, stopping only to snatch a hasty lunch or to sleep for a half hour or so.

Chicago radio fans were afforded more than a casual peep behind the scenes of newspaper and railroad offices on Monday night, which is customarily silent. Fans, who tuned in expecting to hear their favorite out-of-town stations, heard something which ran like this:

"This is KYW, Chicago, calling WOC, Davenport. Received your message Okeh. Will stand by for you. Go ahead, Davenport."

And then perhaps: "KYW — KYW — calling WPAH at Waupaca, Wisconsin. Relief train has been sent from Chicago. Relief train has been sent from

Chicago — Relief train has been sent from Chicago — KYW calling WPAH, Waupaca."

Then, later in the night: "This is KYW, Chicago — KYW, Chicago — World Crier announcing for Hearst newspapers in Los Angeles, San Francisco and Seattle. Stations on west coast please copy and forward."

Then came important news copy from Chicago and the East. It was read, of course, much more slowly than is the custom in the "World Crier" service. Even the punctuation was included.

### Fans Played Part

The radio listener played an important role in the relief work which was carried on. When Station WPAH at Waupaca was calling KYW for relief for a train which was stalled near that city, the receiving operator was listening to Omaha, and of course, being able to tune in only one station at a time, did not hear the



**SOMETHING NICE IN A BIG BATTERY**  
 Miss Myrtle Carmitchel, of Cleveland, O., who appears to have inside information on the Willard storage battery.

appeal of WPAH. Immediately after the call from WPAH went into the air the telephones of the Chicago Evening American and Edison studios were flooded with calls telling the operators that Waupaca was trying to get KYW. There came telegrams bearing the same message from all parts of the United States. Wyoming and Connecticut joined in the effort of other states to aid the Waupaca station to get the ear of KYW. The receiving operator immediately tuned to WPAH's wavelength and re-received the message.

A train had been stalled for more than twelve hours. Passengers were suffering from cold and hunger. The message was given immediately to the offices of the Chicago & North Western Railroad Company and a relief train was sent out.

During the entire time that telegraph communication lines were disabled the operators at KYW were in almost constant communication with the dispatchers of the Chicago & Northwestern and the Burlington railroads. Train orders were put into the air at frequent intervals, thereby expediting to any appreciable extent the work of the transcontinental lines.

#### Aided Newspapers

KYW's announcers took the places of telegraph operators for the International News Service, the Cosmopolitan News Service, and the Universal News Service. News, which customarily flows over the telegraph lines, was hurled into space to be picked up by newspapers subscribing to those services. Listeners were able to receive a complete record of the day's happenings before it appeared in the papers. The Associated Press was also using wireless to transmit its news. Station WMAQ aided that news service.

Station WJAZ, the Edgewater Beach Hotel station, also did notable work during the hours when communication was cut off. News and railroad orders were transmitted by the station.

Thousands of congratulatory telephone calls, wires and letters have been received by the Chicago stations for the work done during the storm. Programs of entertainment were almost entirely



BEAUTIES IN FIRST RADIO BEAUTY CONTEST

Mary Costello, Helen Hamilton, Mathilda Brooks and Statira Childress, who entered the WLW St. Valentine's night contest recently held by the Crosley Company, Cincinnati, O.

disregarded by the broadcasting units which devoted their time to serving the storm isolated country.

One listener expressed his opinion in these words:

"It was a job well done. Radio broadcasting has assumed a new significance in the eyes of the world."

### Exclusive Agricultural Programs

**A** NEW type of forensics for radio is to be developed by Sears-Roebuck Agricultural Foundation for the new broadcasting station which is being erected by the foundation to broadcast exclusive agricultural programs.

Samuel R. Guard, director of the foundation, said that this new type of forensics for radio, which is different from any now in use, will adapt the speeches to the medium. It will be developed especially for radio, because one cannot talk into a microphone as one would talk from a stump or a stage.

"It is no wonder listeners either fall asleep or tune in on a jazz number after listening to a speech over the radio for a few minutes," continued Mr. Guard. "It is my belief that the platform type of oratory is not especially suited to radio. The foundation's station will adapt the type of delivery for this wonderful new medium."

The new station will be located on the main building, using the

fourteen story tower for one aerial post. Another post of equal height will be erected on the opposite side of the building. The station will have a wavelength of 448 meters, and will be the largest made and sold by the Western Electric Company. It will carry a class "B" license, the highest issued by the government. The studio will be located on the eleventh story of the tower, with the operating room on the fourteenth floor. In addition to the main studio, there will be a branch downtown in the loop district, with special leased wires through the city to points of advantage for the entertainment features of the program, which will include the best music and theatrical talent. By having the station located in the open district and free from the absorption by all buildings, it is estimated that it will be possible to put more energy in the air than any other station in Chicago.

The programs broadcast by this station will be balanced agricultural programs, which will challenge the farmers' attention and hold it. Facts of real value to the farmer will be broadcast so far as the educational phase of the program is concerned. Theatrical stars will bring the stage to the farmers' parlor, and there will be bedtime stories for the country kiddies. An interpretation of market trends and a current events feature, explaining what is going on in agriculture all over the world will be given, according to Mr. Guard. This new station, which will be the only one in the United States broadcasting exclusive agricultural programs, will be on the air this month.

### KGO Heard in Somoa

Islands of the Southern Pacific Ocean have been brought within range of American radio broadcasting. KGO, the new 1,000 watt station of the General Electric Company at Oakland, Calif., was heard two evenings out of five at Apia, British Samoa, a distance of 4,750 miles from Oakland.

### Schools Have Radio

San Francisco schools are to be equipped with radio receiving sets. One of the receivers has already been set up in the new Galileo High School. The plan is part of the board's \$12,000,000 school program.

# R. F. and A. F. Amplification

By M. C. BATSEL

*Radio Engineer, Westinghouse Electric and Manufacturing Company*

CONSIDERABLE confusion exists regarding the functions of radio frequency and audio frequency amplifiers. The following paragraphs give the distinguishing differences between these two methods of amplification, and to point out the advantages of each.

If music or speech is received by means of a detector tube only, without regeneration or other amplification, the music is not very loud, even when received from a nearby, powerful station. Distant stations, though received distinctly, may be so weak that they are heard with difficulty. When weak stations are heard distinctly, they may be made as loud as desired by using audio frequency amplification. If headphones are to be used, there is little or no advantage in using more than one stage of audio frequency amplification, as experience has shown that if the music or speech cannot be heard distinctly with one efficient stage of amplification and good headphones, they cannot be heard with any amount of audio frequency.

If an efficient loud speaker is used two stages of audio frequency amplification will give about the same strength as an ordinary phonograph, provided the music can be heard distinctly on the detector tube alone, and if sufficient power can be delivered by the last amplifying tube. It is often advisable to use two tubes in parallel in the last stage of amplification unless a much higher plate voltage is provided for this stage than is used for the first stage. Additional stages of audio frequency amplification can be added to make the music or speech as loud as may be desired.

In order to preserve the quality of music and speech, the audio frequency amplifier must be capable of amplifying practically all audible frequencies. All noises due to batteries and tubes are, therefore amplified to the same extent as the music. For this reason it is necessary to use plate

circuit batteries especially designed for use with vacuum tube amplifiers and to have all parts of the circuit well insulated.

## Audio Frequency for Loud Speaker

Audio frequency amplification is absolutely necessary for satisfactory operation of a loud speaking receiver. Since the advent of radio broadcasting, much development work has been done to improve the audio frequency amplifier, and, as a result, amplifiers have been developed which produce practically no distortion of music or speech and loud speaking receivers are now available that reproduce music so accurately that it meets with the approval of the most exacting critic.

All radio detectors that can be used for the reception of music are least efficient when the received currents are weakest. For this reason radio frequency amplification is desirable.

Radio frequency amplification strengthens the received currents before they are changed to audio frequency by the detector. Thus by using radio frequency amplification, stations can be heard distinctly which cannot be heard on a simple detector with any amount of audio frequency amplification.

The most widely used and simplest form of the radio frequency amplifier is the form represented by the Armstrong regenerative circuit. This is also the most efficient means of obtaining radio frequency amplification. No additional tubes are required, the same tube being used as a radio frequency amplifier and a detector. Most all efficient radio frequency amplifiers that operate on the wave lengths used for broadcasting, function because of regeneration.

The regenerative detector tube produces about the same amount of amplification as can be obtained by using two stages of radio frequency with transformers. If more amplification is desired than can be had with a re-

generative tube it is necessary to use at least three stages.

## R. F. Gives Sensitivity

The benefits accruing from the use of a great amount of radio frequency amplification are: It gives greater sensitivity; smaller antennae or coil antenna may be used; and, because of the greater sensitivity, very loosely coupled antenna and secondary circuits may be used, resulting in a great selectivity.

The greatest use for multistage radio frequency amplifiers is where receivers are located in apartment houses or in other locations where an efficient antenna cannot be erected, or when extremely weak stations are to be received. The loud speaking receiver with three stages of radio frequency amplification usually has at least six vacuum tubes. The expense of maintaining the tubes and batteries is, of course, greater in proportion to the number of tubes used.

During the summer months there is a greater freedom from atmospheric disturbances when small antenna or coils are used with the radio frequency amplification. This is due to the fact that the small antenna is less affected by atmospheric disturbances, than is the large antenna, in proportion to the energy received from the transmitting station.

The development of tubes requiring a small amount of filament energy and operating on dry cells should give a considerable impetus to the development of multistage radio frequency amplifiers.

The elimination of the storage battery for those who desire to operate a radio receiver in a well furnished room, to do so without danger of injuring the floor coverings and woodwork. The entire equipment using dry cells may be enclosed in an attractive cabinet and requires no attention except an occasional renewal of dry cells.

## Milwaukee Radio Men Honored

**T**HE Milwaukee Radio Amateurs' Club, Inc., has been especially honored by having two of its members selected by the American Radio Relay League to fill high positions in the league's operating department for Wisconsin. Clarence N. Crapo, 9VD, for some time past a local operating department officer, was appointed assistant division manager in charge of the state, and Mark H. Doll, 9ALR, former West Allis city manager, was selected as district superintendent for Milwaukee County, the smallest league traffic section in the state but probably the most active one.

Meetings continue to be held weekly at 8 p. m., Thursdays, in the trustees' room of the Milwaukee Public Museum, and technical committee reports as usual are principal features on the program. G. Forest Metcalf, 9CKW, well-known Wauwatosa amateur, is now chairman of that committee, and his own reports, having such themes as a description of the transmitter at 1QP and 1XAM and the construction of plate voltage transformers, are of the greatest interest. Reports by other members of this committee are frequent and include such topics as a description of 9ELV given by J. W. Blauert and accompanied with stereopticon slides, the prevention of regeneration in radio frequency amplification circuits given by M. F. Szukalski, Jr., 9AAP, and lastly a very important paper describing a new method of measuring antenna resistance given by Edward T. Howell, Sc. M., 9CVI, who has taken a well-known method for measuring the resistance of closed oscillatory circuits and perfected and adapted it for use with amateur aeri-als.

The program committee arranged for a very instructive talk entitled, "100 Meter Amateur Radio Transmission" which was given by Ben J. Chromy, 9CJO, a Minneapolis amateur who did some pioneer work in this field. Push-pull amplifying circuits were the subject

of a report by J. A. Rose, publications committee chairman, and one meeting was entirely devoted to discussion of improvised apparatus members had pressed into service at various times.

In the last membership drive, which brought the total number of members well over a hundred, all individual records were broken by Business Manager L. S. Hillegas-Baird, who brought in sixteen and for each five was awarded an A. R. R. L. emblem. E. G. Nickle, 9ATO, and F. W. Catel, 9DTK, were also awarded pins for getting five members each.

All local complaints of amateur interference reaching the supervisor of radio, Chicago, are being turned over to the club, and B. C. L.s are requested to send them direct to the club's office, 601 Enterprise Building, Milwaukee, Wis., where they will be given attention by the city manager and the traffic committee. The local electric light and power company has promised co-operation in the matter of interference from defective power equipment.

## Seek Cause for Fading

**W**HEN radio first was used for long distance communication it was noticed that signals were not transmitted as far during the day as during the night time. It has also been observed that at night radio signals on the higher radio frequencies or shorter wavelengths vary greatly in intensity from minute to minute. Persons who receive broadcast concerts from distant stations have occasion to notice this variation in intensity of received signals since loud signals may be received from a given distant station at one moment only to disappear entirely for a few minutes and then recover their original intensity.

This and related phenomena have been recorded from time to time and various hypotheses have been brought forward in an attempt to explain them. The phenomena are dependent upon a large number of variable quantities such as the weather conditions, the nature of the country over which transmission occurs, the surroundings of the transmitting and receiving stations, and the method of handling the receiving apparatus. Only by a statistical study in which the results obtained simultaneously at a large number of receiving sta-

tions are collected and tabulated, may reliable averages be obtained.

In an attempt to secure some worth while statistics of this kind, a comparative study of radio signal fading was made by the Bureau of Standards and the American Radio Relay League during 1920 and 1921. In these tests from five to ten radio stations transmitted signals in succession on certain nights, according to prearranged schedules. The signals were received simultaneously by about one hundred receiving stations whose operators were provided with forms for recording the variations in the intensity of the signals as received.

The paper gives summary tables pointing out possible relationships between weather conditions and the fading and intensity of radio signals and the prevalence of strays or atmospheric disturbances. On account of the limited number of observations and the large number of factors which influence transmission, the statistical results can be considered as only tentative.

The general result of these tests, however, substantiates the theory that the sources or causes of fading are intimately associated with the conditions at the Heaviside surface, which is a conducting surface some sixty miles above the earth. Daytime transmission is largely carried on by means of waves moving along the ground, while night transmission, especially for great distances and short waves, is by means of waves transmitted along the Heaviside surface. Waves at night are thus free from the absorption encountered in the daytime but are subject to great variations caused by irregularities of the ionized air at or near the Heaviside surface. These variations probably account for fading.

The results of these tests are embodied in Scientific Paper No. 476 of the Bureau of Standards. Copies can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C. The price is ten cents, cash.

## Want the Eggs

In a recent radio contest from WLW, the broadcasting station of the Crosley Radio Corporation, a number of hams were given away. Several letters have been received asking when the eggs will be offered in a contest.

# New and Novel Radio Patents

## DETECTOR STAND

(Patent No. 1,477,826, issued to Robert J. Heitzman, of Union Hill, N. J., under date of December 18, 1923.)

The invention relates to a novel form of detector for wireless telegraph and telephone circuits of the crystal type, and has for its object to provide a relatively simple, strong and durable device that is capable of very delicate adjustment, but which nevertheless is not subject to displacement or derangement of its parts or the relative adjustment thereof, due to shocks and jars, or the passage of relatively heavy currents or sparks, so that, when the apparatus has been properly adjusted, any accidental change in such adjustment is precluded.

The invention is illustrated in the accompanying drawings, in which,

- Fig. 1 is a side elevation of the device;
- Fig. 2 is a plan view thereof;
- Fig. 3 is an end elevation;
- Fig. 4 is a section on line 4-4 of Fig. 1.

Referring to the drawings, 1 indicates the base or support of the instrument, which is made of suitable insulating material, and which may be secured by any appropriate means to the cabinet or other receptacle in which the radio apparatus is contained. Mounted on the upper surface of the support 1 is a bracket 2, preferably formed of a metal stamping having a rectangularly

at right angles to the body thereof to receive the upper looped end of a helical tension spring 15, the lower looped end of which is hooked over an integral projection 9 extending at right angles to the body of the bracket 2.

Mounted in the arm 6 of the bracket 2 is a pintle 21 having a knurled head 22, between which and the face of the bracket is interposed a tension spring 23. Secured to the outer end of the pintle 21 is a circular cam 20, so disposed that its axis is eccentric and its peripheral edge is in engagement with the flange 12 on the lever 10, these parts being held in constant engagement by the tension spring 15.

Secured in the eye or loop 13 on the forward end of the bracket 10 is a contact needle or cat whisker 16, which is additionally secured to the lever by looping the upper end thereof over the top of the lever. The needle or cat whisker is preferably made of relatively fine spring wire bent in the form of a double loop or figure 8 below its attachment to the lever, and having its lower end extending downwardly in a line substantially normal to the longitudinal axis of the lever 10.

The needle 16 is adapted to co-operate with a crystal of the character usually employed in instruments of this type, the crystal mass, which may consist either of a block of appropriate mineral, or a small mass of the mineral enclosed in a suitable casing open at the top, is adjustably secured to the base 1 by means of a Z-shaped spring clip 18, which is attached to the top of the base and is provided in its upper horizontal with an opening 19 overlying the crystal. Secured to the base are suitable binding posts 30 and 31 to which the circuit leads are attached.

## TERMINAL CONNECTION FOR CONDENSER

(Patent No. 1,480,604, issued to William Dubilier, of New York City, under date of January 15, 1924.)

The invention has for an object to provide terminal connections for the sections of a high potential condenser which will minimize the occurrence of brush discharge or arcs between terminals and other adjacent metallic bodies.

Another object of the invention is to provide a connection which will afford adequate electrical conductivity and be of such character as not to be readily injured or dislocated during handling or use of the condenser.

Fig. 1 is a top view of a condenser section provided with a terminal connection made in accordance with the invention.

Fig. 2 shows the perspective two condenser sections having a similar terminal connection.

Fig. 3 is a side view of a condenser stack in which the several sections are connected in series, also by means of a similar connection.

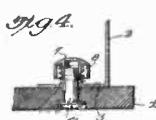
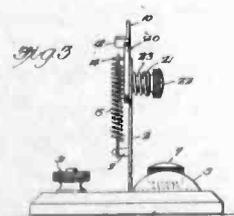
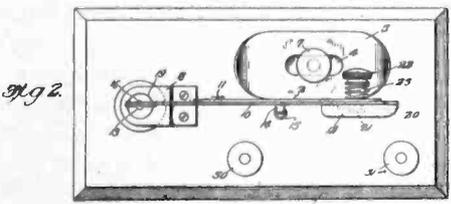
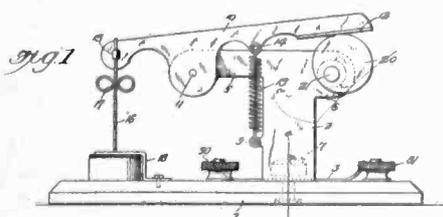
The invention is disclosed as applied to condenser sections consisting of rectangular dielectric sheets 1, for example of mica, interleaved with groups of conducting plates of opposite polarity 2 and 3, terminals 4 being provided for each of the above-mentioned groups of conducting plates in the present instance merely by extending portions of the plates of the groups beyond the side edges of the dielectric sheets. The conducting plates ordinarily will be made of a soft metal such as tin foil.

As shown in Fig. 3, a plurality of sections 5, 6 and 7 of the character above described may be assembled into a stack and connected in series by joining the terminals 4 of a group of conducting plates in section 6 to the terminals 4 of a group in section 5 on one side of the stack, while the terminals 4 of the opposite group of plates of section 6 are joined to similar terminals of a group in section 7 next beneath, on another side of the stack, thus adapting the condenser for use with high potential.

When a condenser of the above character is subjected to a high voltage, there will be a substantial difference in potential between the different section terminals 4 which are

located along the sides of the stack, and also between some of the terminals and adjacent metallic bodies, such as an enclosing metallic casing 8 for the condenser, as shown in Fig. 3. Thus brush discharges or even arcs are liable to be formed between adjacent terminals, or from the terminals to adjacent metallic bodies, particularly from sharp corners or other irregular surfaces existing in the terminals.

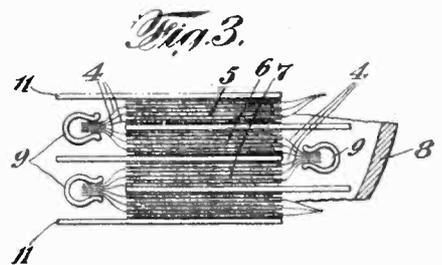
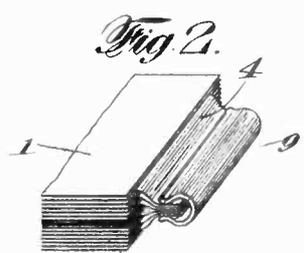
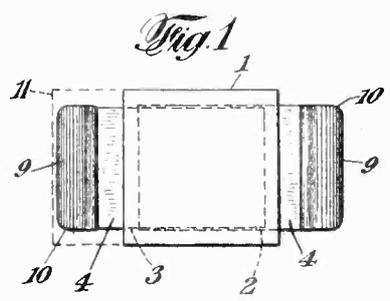
According to the present invention, the terminals are enclosed by metallic members 9 having a smooth rounded contour surrounding the outer extremities of the terminals in such manner as to insure that no irregular surfaces will be presented by the terminals, tending to concentration of the electric field. Thus the electric stresses upon the terminals will be evenly distributed over their surfaces so as to minimize the occurrence of brush discharge or arcs. If desired, the corners 10 of the members 9 may be rounded for the same purpose. Also insulating separator plates 11 may be interposed between sections to form barriers between adjacent terminal connections, such separators preferably overlapping the members 9 both laterally and longitudinally, as shown by the dotted line at the left of Fig. 1.



Unique Detector Stand

disposed foot-piece 3 provided with upturned ends and an elongated slot or perforation 4, through which passes a set-screw 6' extending from the bottom of the support 1 through a perforation in the latter, and having a hollow cap-nut 7 engaging the threaded end thereof, enclosing a helical tension spring 8, the parts being so constructed and arranged as to admit of a wide range of adjustment of the bracket 2 in the plane of the upper surface of the support 1, the bracket nevertheless being held firmly in its adjusted position on the base 1 by the tension imposed on the spring 8 by the cap-nut 7.

The upper portion of the bracket is provided with lateral extensions 5 and 6, on the former of which is mounted a pivot pin 11 carrying a lever 10, preferably stamped out of sheet metal, having a flange 12 extending at right angles to its rear end, and provided at its forward end with an eye or loop 13 stamped from the body of the metal. Between the pivot 11 and the flange 12, said lever is provided with an integral lug 14 bent



Terminal Connection for Condensers

## ELECTRICAL AIR CONDENSER

(Patent No. 1,478,342, issued to Ralph C. Lewis, of Providence, R. I., under date of December 18, 1923.)

This invention relates to electrical air-condensers of the variable type and consists in improvements in the mechanical design and construction of the same.

The principal object of the improvement is to simplify the structure and cheapen the cost of manufacture of the device while

rendering it highly efficient for the purpose designed.

Fig. 1 is a plan view of improved air-condenser;

Fig. 2, a vertical sectional elevation of the same taken on the line 2-2 of Fig. 1; and

Fig. 3, a detail plan view showing the arrangement of the condenser plates.

The improved air-condenser is of a well-known type as used with radio apparatus and comprises in general a series of spaced-apart plates arranged in fixed relation, with a second set of movable plates adapted to be swung between the fixed plates, in alternate relation thereto, and with a variable degree of overlap to regulate the capacitive effect. The invention relates particularly to the mechanical structure of the apparatus and consists in an improved mounting for the

lar hubs 10 are fitted to the bottom of the bosses 5 and with the upper hubs 7 form a continuation or extension thereof. The hubs 7 and 10 are constructed of hard rubber, vulcanite, bakelite or similar dielectric material and are provided with axial bores for receiving rods 14 which hold the fixed condenser plates 15 on the spider or mounting 2. The hubs 7 and 10 are preferably counterbored at 16 and with the bores 9 of the bosses 5 provide air spaces surrounding the rods 14 to insulate them from the metal of the spider 2. At the upper ends of the hubs 7 are counterbores 17 adapted to receive nuts 18 screwed onto the threaded ends of the rods 14. The rods 14 project down through the lower hubs 10 to adapt them to be inserted through holes in the fixed condenser-plates 15 which are arranged in superimposed relation and held spaced-apart by a series of washers or collars 19.

VACUUM TUBE

(Patent No. 1,478,072, issued to Hendrik J. Van Der Bijl, of New York City, under date of December 18, 1923.)

This invention relates to vacuum tubes and more particularly it relates to tubes of the audion type, an object being to increase the working range of such tubes.

In a vacuum tube of the audion type there are usually enclosed a cathode or filament, an anode, usually in the form of a plate, and a third electrode, usually called a grid. The usual method of employing such a tube is to vary the potential of the grid in accordance with the currents to be amplified, whereby the space current flowing between the cathode and anode will be varied accordingly, which variations being in amplified form, may be impressed on the desired receiving apparatus.

The amount of current flowing between the cathode and anode depends in general upon the rate the electrons are being emitted from the cathode and the value of the potential applied between the cathode and anode. For high-power output tubes, it is advantageous of course to make the space current as large as possible in value in order to get a high-powered output of the tube, but it has been found that the amount of space current is limited in value by the fact that the plate electrode for large currents buckles under the heat of the electron bombardment from the cathode, thereby distorting the space relation of the electrodes and in some cases destroying the action of the tube by the plate coming in contact with another one of the electrodes. It has also been found preferable to reinforce the grid or control electrode, since the grid becomes heated to a considerable extent during the process of evacuation of the tube when it is being manufactured.

In accordance with this invention this buckling of the anode and the grid for large

currents is prevented by providing strengthening means such as ridges in the two electrodes, whereby a very much larger working range of the tube is assured.

For the better understanding of this invention, reference is made to the following detailed description taken in connection with the accompanying drawings in which Fig. 1 represents a vacuum tube embodying this invention, and Fig. 2 shows how such a tube may be applied for the repeating or amplifying of alternating currents.

Referring to Fig. 1, 5 is a vacuum tube having a double plate anode 6, a cathode 7 and a double grid 8. These electrodes are supported by suitable supporting wires attached to the glass arbor 10, which in turn is attached to the press 11 of the tube at a point preferably below the flattened portion 12. 15 to 18 inclusive are leading-in wires for the various electrodes.

In order to strengthen the plate 6, each is provided with ridges or turned-up portions 21 which prevent the plates from buckling when heated, for instance to yellow heat, by the electron bombardment from the cathode. The grid 8 also is provided with ridges 24 to prevent it from warping. These ridges may consist of the turned-up edges of the vertical strips of the grid, which edges may be turned outwardly toward the plate as shown, or they may be turned inwardly towards the filament in any suitable manner. The tube will therefore have a higher power output than it would otherwise have, so that when the tube 5 is connected up in an electric system such as the one shown in Fig. 2, the currents repeated from line 30 to line 32 will be of far greater intensity than it would be possible to have with the strengthening means omitted.

Amrad Was First

WHEN two-way communication by voice was established for the first time in the history of radio, Friday evening, November 30, between AMRAD WGI, Medford Hillside, Mass., and Station 2-LO, London, England, it was a remarkable coincidence that the first American station to participate successfully in this two-way communication was AMRAD WGI, the world's oldest broadcasting station operating today, erected in 1915. It was a further significant coincidence that H. J. Power, founder and active head of AMRAD, who conducted the early broadcasting in 1915 and '16 and now known as the Father of Broadcasting, was at the microphone when the successful broadcast was made.

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

Again on Saturday two-way communication was maintained between AMRAD WGI and 2-LO London and complete confirmation followed after an exchange of cablegrams. The achievement was all the more remarkable as the American station used only 15 watts in the antenna.

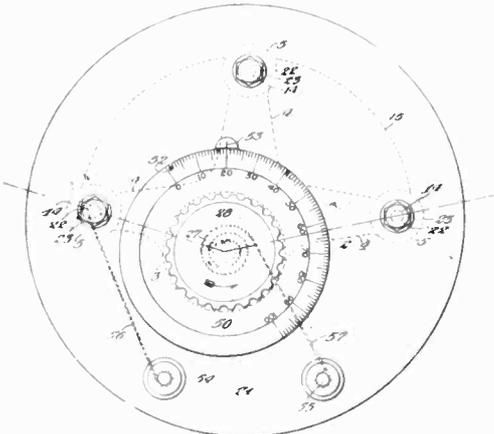


Fig. 1.

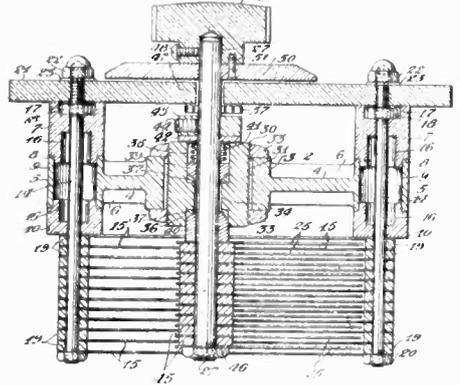


Fig. 2.

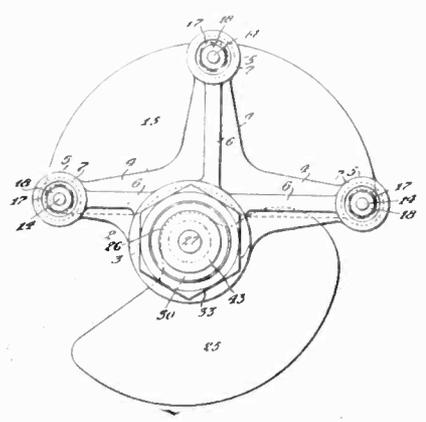


Fig. 3.

Electrical Air Condenser

plates and a simplified method of assembling them thereon.

Referring to the drawings, the mounting for the condenser-plates consists essentially of a metal, spider-like member 2 comprising a hub or bearing 3 with arms 4 radiating from an axis in offset relation to the center of the hub. At the outer ends of the arms 4 are ring-like bosses 5 with ribs 6 extending longitudinally of the arms between the bosses and the hub 3 to reinforce the structure, see Figs. 2 and 3. On the top of the bosses 5 are cylindrical hubs 7 which are shouldered at 8 to adapt them to fit into the ends of the bores 9 of the bosses. Simi-

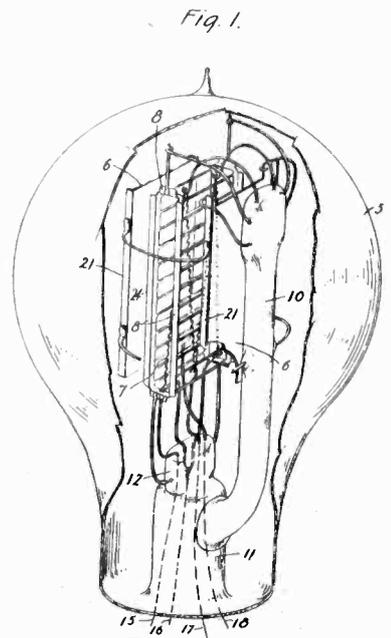


Fig. 1.

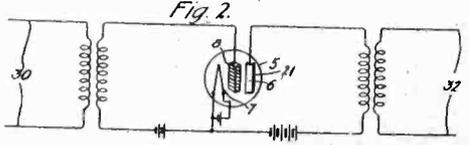


Fig. 2.

New Vacuum Tube

# Crosley Buys Large Factory

**I**N ORDER to meet the demand for Crosley-made radio receiving sets, Powel Crosley, Jr., president of the Crosley Manufacturing Company, has purchased the factory building now occupied by the Thomas J. Corcoran Lamp Company, on Colerain avenue at Sassafra street, in Camp Washington, Cincinnati.

This real estate transaction, involving more than \$150,000, meets the question of whether the radio industry is an established business or a passing fad, for preparations are being made to manufacture nearly 5,000 radio receiving sets every day in this new plant, which will be ready for occupancy by early spring.

The large building will house, in addition to the general offices, manufacturing and assembling departments of the Crosley radio products, the radio broadcasting station WLW, which will have all of the latest improvements of this particular field in the radio world, making the station one of the finest in the world.

There is a floor space of over 100,000 square feet in this new four-story building, as compared with 30,000 in the present Crosley factory, at Alfred and Colerain, and this large space will be fully utilized with the manufacture of radio receiving apparatus. It is the intention of Mr. Crosley to manufacture radio parts in the present building and to use the new one for the making of the complete outfits. There is a B. & O. and Southwestern R. R. Company siding which goes to the plant, facilitating the shipping of the raw and finished products.

## Large New Factory

The new factory is four stories high, with plenty of daylight on all floors, supplied by hundreds of windows, which will make the place ideal for ventilation and working conditions. New machinery will be installed which will aid the rapid but careful production of the radio sets. It is this study of production methods and the great number of receiving sets manufactured that has gained for Mr. Crosley the title of "The Henry Ford of Radio."

The history of Powel Crosley, Jr., is most romantic. About eight years ago he conceived the idea that a mail order business would be profitable and he organized the American Automobile Accessories Company, a corporation of which the Crosley Manufacturing Company is now a branch. Within a few years his automobile accessories business amounted to more than \$1,000,000 annually. However, during the winter months the automobile mail order business was somewhat dull, and, in order to stimulate his trade, Mr. Crosley entered the phonograph field, at first simply buying and selling his instruments. Later, he purchased a woodworking plant and made his own phonographs. Then as his mail order business grew he found it necessary to purchase a large printing plant to handle the tremendous amount of printed matter he mailed to the trade. Thus, Mr. Crosley was operating an automobile accessory, phonograph and printing business to great financial advantage. A short time later he started the manufacture of a toy, or rather a utility, for children from six months to two years old. This is known as the Go-bi-bi, and hundreds of thousands are in use now throughout the United States.

But three years ago, when the demand for radio receiving sets became noticeable, Mr. Crosley decided to enter this new field, carrying on at the same time the other huge tasks he had undertaken.

## Crystal Set Was First

The radio business was operated, as everyone knows, under the name of the Crosley Manufacturing Company. A crystal set was first made; then came vacuum tube outfits. Extensive advertising soon resulted in the organization taking a leading place in the radio field, but until May, 1922, the business was conducted in the plant of the American Automobile Accessories Company.

One corner of the factory had been set aside for the manufacture of radio equipment. In May, 1922, however, the business had grown so extensively that larger quarters were required, and the plant at the corner of Colerain and Alfred streets was acquired.

The radio broadcasting station the company had operated at the automobile plant was replaced by a larger and more powerful station, WLW, when the company moved into the new quarters, and within a short time even this new broadcasting station was replaced by a still more powerful Western Electric plant. On January 6,



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COPLEY LAST  
Just one of many smart styles

1923, Mr. Crosley bought the Precision Equipment Company, Walnut Hills at Peebles Corner.

Since the Crosley Manufacturing Company has been housed in its present place and the demand for radio has increased so rapidly it became evident that the present quarters were not large enough to take care of the business which has grown from a hundred sets a

week to nearly a thousand a day. In the new building the organization will be able to increase the output to nearly five thousand a day.

### WGY Heard in Cape Town

The General Electric radio broadcast station WGY in Schenectady, N. Y., has been heard in Cape Town, South Africa, an air-line distance of 7,880 miles. This establishes a record for this station, the previous mark being 5,210 miles.

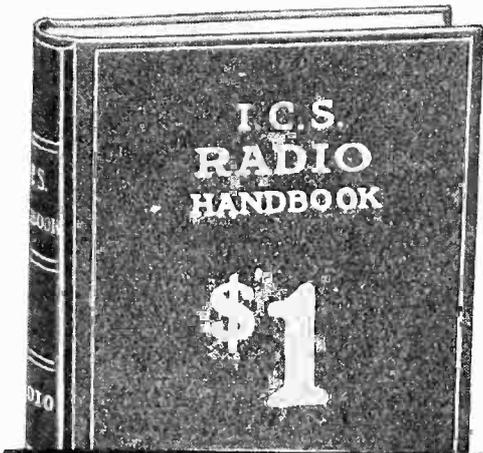
F. Davis, on board a ship outside the harbor of Cape Town, writes that at 5:30 o'clock in the morning, South African time, of January 5, he listened in to a program from WGY being broadcast at 10:30 o'clock the night before on Eastern Standard time and for a half hour heard every number distinctly. In fact he gives a complete log, including a list of every number, which has been checked by WGY and found to be correct.

Davis said he used a home made set, consisting of four tubes, one radio amplifier, one detector, two audio amplifiers, and a 150 foot aerial.

"Atmospheric conditions are very bad in the tropics and this part of the world during the hours of darkness," Davis writes, "and long distance reception is practically impossible. But at dawn the atmospheric conditions are better and for a half or three-quarters of an hour it is possible to tune in for distance.

"At 5:20 African time, when it is still dark, I heard WGY, but through considerable static. From 5:20 until 5:30 conditions improved and from 5:30 until 6 o'clock WGY came in clear. During the following 20 minutes your signals gradually faded until at 6:20 only the high notes of your musical numbers were audible."

Haste has ruined many an otherwise excellent receiver. Do not be in too big a hurry to hook up the various parts, but do the job right, and you will find it pays in the end.



## Every Radio Fan Should Have This Book

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LIKE a little radio encyclopedia, this I. C. S. Radio Handbook is packed with concise, sound information useful to everybody from beginner to veteran hard-boiled owl. It starts with simple explanations of radio phenomena and leads you along gently until you can understand the most technical diagram.

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## We Hear From the South

**H**ERE'S an interesting letter RADIO TOPICS has just received from "3BMN" away down in Ol' Virginia, where peanuts and tobacco and cotton are far more plentiful than bell wire, binding posts and bakelite. It's from Petersburg, Va., a little town of 40,000 souls, as BMN says, but the largest trunk center in the world:

Following close on the trail of the advancement of radio and a mania for that faint, musical sound of that far distant station carries the following six fellows in quickstep, march:

3AUU, the fellow that was heard in England and France, eight of ten nights during the last "Trans-Atlantic tests." 100 watts with a motor generator kicking every one of them. A measley five amperes was the results of all the fireworks that were fired at these English and French stations. But while firing one way, the dinged thing back-fired and a report was received from Hawaii. Mr. Lamb, the operator, has followed the art of Marconi since 1910 and now holds his own in one of the best experimental radio laboratories in Virginia.

3ATB hurls a left hand monkey wrench at the black cat when DX fails to respond to one twist of a Grebe CR-13. Bakelite was not made in a bakery, so it is with a 100-watt percolator that stands on four angle brackets in the corner and stands for something besides itself; when the ole brass pump handle is stepped upon. The antenna is of the sky hook variety, hanging to the tune of 70 feet in the clouds. Ambition was exhausted after this pole was assisted in its flight upward so naturally the other pole only received a small bit of ambition; it stands 50 feet. The result of burning midnight oil has awarded its operator, Mr. Cooper, DX too: 40 states, four provinces of Canada, Panama and Cuba.

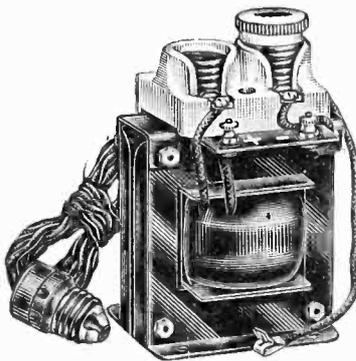
3SG has a mania for chasing tubes west; although whenever there is not a power tube handy, a UV-201 serves the purpose just the same. Mr. Decker is a real relay man and having worked many stations over 1,000 miles. Boring holes in bakelite is his chief occupation with fair competition of the fair sex. The counterpoise being between two buildings is a great hindrance to DX. So the operator has for the summer been contented with working stations up to 1,500 miles.

3BCH sets a phonograph in front of his microphone when a mania for CQ'ing seives him and if any one is heard calling him; he immediately

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This battery charger operates on 110 volt, 60 cycle, A. C. circuit, charging a 6 volt battery at a 2 ampere rate. Standard 2 ampere charging tube is used. The T-100 is the lowest priced first-class charger on the market. Large numbers now in use have proved entirely satisfactory. No vibrating parts to get out of order. Absolutely noiseless in operation. Furnished with plug and cord for lamp socket. Battery leads marked. Fuse protects charger from accidental short circuit of 110 volt leads. Fully guaranteed.

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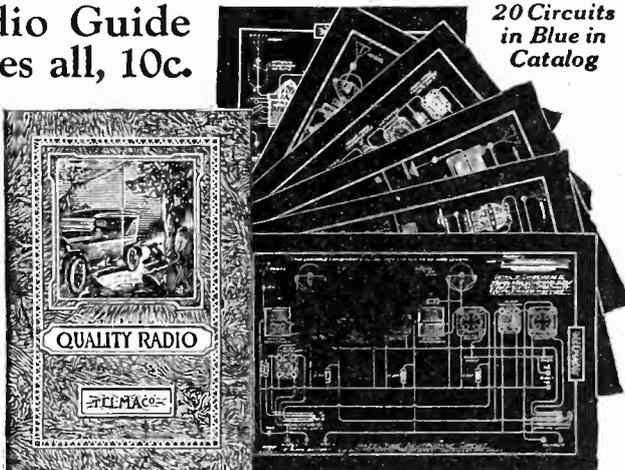
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starts his automatic recorder. One throw of a switch connects his transmitter to his antenna, one twist of a knob starts the motor generator, and a twist of the reverse will charge the storage batteries. Nice and cozy and don't have to worry about over exertion in this station. Due to bad location Mr. Birdsong, the owner, has just got the hang of reaching out and so far the result in distance is 1,000 miles.

3ABS is pounding ten watts fast as the dots will follow the dashes without making a Chinese puzzle. The trials and tribulations of the chemical rectifier is a daily problem of big importance. The summer DX has only

been fair considering Mr. Schwartz, the owner, hasn't been on much.

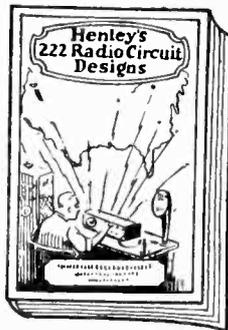
3BMN thinks more of a wooden panel than bakelite. The first night a sixth district station fails to appear above the horizon; a receiver goes to pieces for repairs. Logging DX; pounding brass with the boiled owls and relaying citizen messages are the chief interests of Mr. Carr, the operator. fifty watts have seen its best days when nearly 4,000 messages have been handled during four months. The same fifty watts that handled these 4,000 messages were heard in 35 states, three provinces in Canada, Panama and Hawaii.

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## RADIO TOPICS

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## Radio Develops New Talent

**R**ADIO is developing an entirely new type of vocal artists with voices surpassing in sweetness and technique those of concert and theatrical stage stars, according to Miss Eleanor Poehler, music educational leader of the northwest, and one of the few woman executive directors in complete charge of a large radio broadcasting station.

Miss Poehler, as director of the Cutting & Washington Radio Corporation's station, WLAG, popularly known as the Twin City (Minneapolis and St. Paul, Minn.) Radio Central, has for some time been experimenting with these "radio voices" and developing them.

This extraordinary invention—radio—is opening a field that is epochal for new artists and giving the public the benefit," said Miss Poehler.

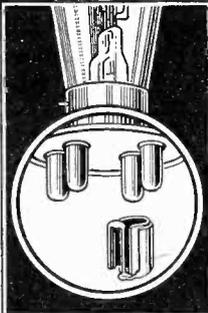
"There are thousands of 'radio voices' in this country alone which are of surpassing sweetness, but because they have not the volume required to fill even small halls have not heretofore been heard outside of small circles of friends. The professional stage, the concert platform and operatic companies have all been forced to choose only the voices of the greatest power, and in so doing they have been forced to sacrifice that quality of sweetness which was most appealing. The singer on the stage must have a voice that will carry out over the audience and into the third and fourth balcony.

"The 'acoustics of the air'—the system of sound amplification which has made possible the present development of radio broadcasting—has supplied the volume and power necessary to these sweeter voices. Although they would not be heard distinctly across the footlights, radio waves carry them hundreds and thousands of miles to millions of listeners. WLAG has drawn largely from this new group of voices for its programs and the hundreds of letters received bespeak their popularity.

"New voices are also popularizing new songs or old ones. Fa-

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

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Do not delay. Order now. Specify type of tube used.

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Manufacturers and Distributors of Standard Radio Equipment  
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avorites develop as they do from the stage. Again and again, requests have come in for such numbers as 'By the Waters of Minnetonka,' 'One Fleeting Hour,' 'Lindy Lou,' and 'I Passed By Your Window.'

"The war between jazz and studio music is waging hotter and hotter among radio fans. The time is coming when an armistice will have to be declared or a peace treaty signed between the two factions. The cry for music of the jazz type sounds with louder volume, but the voices rising above it constantly demand the ambitious offerings."

Before taking charge of WLAG, Miss Poehler was prominent in western musical circles as a soprano soloist, and took a leading part, as she still does, in musical educational work of Minnesota.

See Offer on Page 36

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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.

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You will be amazed at the low prices Ward's quote. A complete tube set having a range of 500 miles and more, including tube, head set, batteries, and antenna equipment, as low as \$23.50.

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### Broadcasters Defy Music Men

(Concluded from page 8)

of such "unauthorized" rendition. The motion picture theatre owners have been paying tribute to the music publishers for several years and according to Nate Ascher of the Ascher Bros. circuit, Chicago "it is the hardest money we have to pay." The Exhibitors' Herald, one of the leading trade journals in the motion picture field, has been aiding the exhibitors throughout the country in their fight on the so-called "music trust."

The meeting of February 15, was addressed by many prominent theatremen and hotelmen. William Dewey of the Edgewater Beach Hotel, spoke on the question and W. A. Strong of the Chicago Daily News, which operates WMAQ on the Hotel LaSalle. E. F. McDonald of the Zenith-Edgewater Beach station WJAZ said:

"We early became convinced of the fact that the demands now made upon us were merely in the nature of preliminaries. If the A. S. C. A. P. can collect \$2,500 from us now what reason have we to believe that it won't be \$25,000 five years from now and perhaps \$50,000 in ten years? As a matter of fact, if the demands were anywhere within reason, and we could be assured that they would remain so, I think all of us would now be at our homes or offices attending to the regular routine of business and this meeting would never have been called.

"The fact remains, however, that there is nothing in their license contracts or general attitude which might reassure us as to their future demands, in fact, quite the contrary. When such strong arm methods are employed as were used in forcing Mr. Dewey of the Edgewater Beach Hotel to take out a broadcasting license for his dining room orchestra when he has no intention of using it, it is easily seen that some immediate action must be taken.

"For the past year the association has consistently refused to use the music of that organization and we early established our own music release bureau for publication of independent compositions. We have received over 3,000 songs to date and have only published something over 260 of them, so it can be seen that great care is used in selecting song hits.

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"And neither are we in the publishing business in any way, shape or manner. We are concerned only with seeing that we do not have taxes levied and litigation directed against us for the numbers we play. When we receive a number and pass on its merit we have the composer sign an irrevocable agreement allowing the public performances of his number tax free. This is duly registered in Washington and following that he may sell it, publish it himself, or throw it away. We are no longer concerned with it.

"There has been indisputable proof that broadcasting is of inestimable value in advertising musical numbers. The popular song hit, 'Marcheta,' was one of our releases and it has made a small fortune for its owner. And on the other hand, it is a well known fact that you can 'kill' the finest song ever written with silence. It is easily imagined what will happen to the releases of the A. S. C. A. P. if they are barred from hotels, motion picture houses, dance floors and the broadcasting stations.

"What we want from the interests now gathered together is a concerted action along these lines with enough financial support to enable us to enlarge our music release bureau to a size sufficient to care for the increased demand. We will release our songs as formerly and copies will be sent to everyone co-operating with us in this effort.

**The Boys on the Cover**  
**T**HIS month's RADIO TOPICS cover has a photo of Boy Scouts operating Station WJZ, New York. It is said this was the first time in the history of radio broadcasting that a high-powered station was operated by Boy Scouts. The boys did their own announcing and managed the station for the night.

Miss Ruth Keenan, radio expert, is shown instructing the boys on



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Fully Equipped for Loud Speaker—No additional amplification is necessary—the patented Bristol One-Stage Power Amplifier is incorporated as the last stage of amplification.

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Solid Mahogany Case with walnut finish encloses the complete Receiving Set. It is a beautiful piece of furniture, fully in keeping with the most luxurious room.

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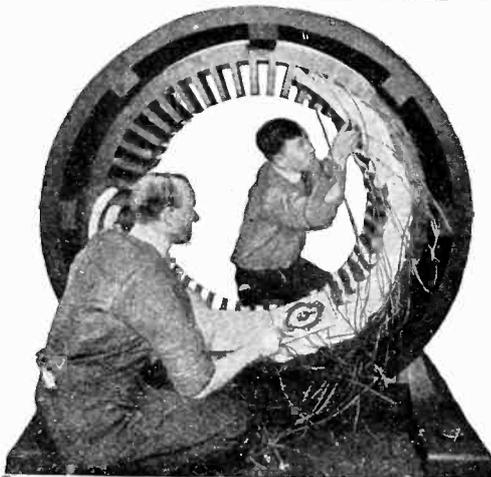
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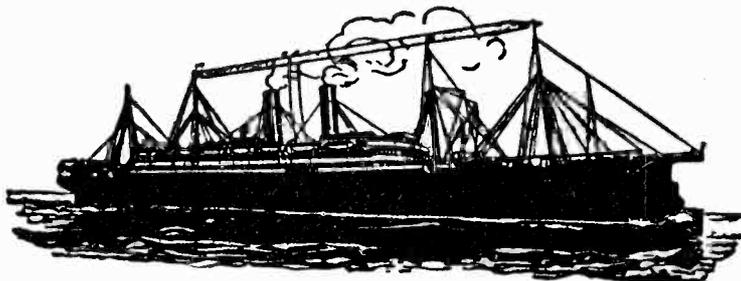
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In am interested in becoming part owner in the Great Northern Steamship Company.

Please send me proposition and full particulars.

Name .....

Street or R.f.d. ....

City or Town .....

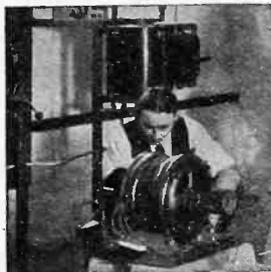
State .....

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



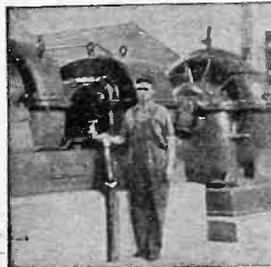
## 20 Years Old— Makes Almost \$500 a Month

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, Chehalis, 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

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The Cooke  
Trained Man  
is the Big  
Pay Man



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

**Blairco**  
Radio

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

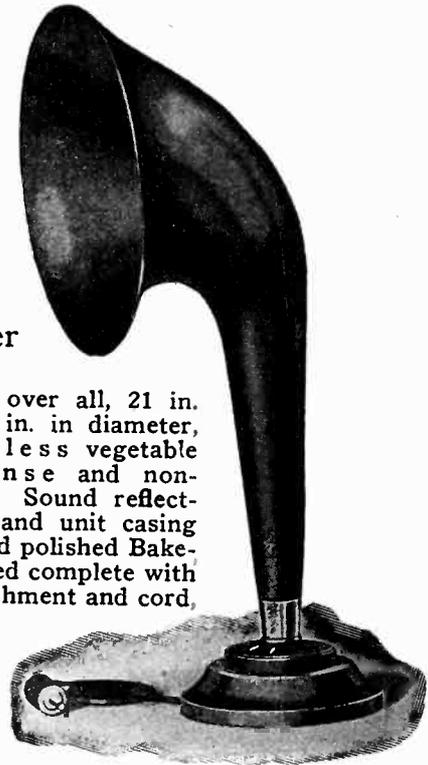


### ATLAS HEAD PHONES

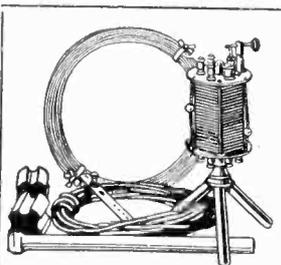
The only high-grade receiver set offered at a reasonable price. Sensitiveness and adaptability positively is unequalled. Price \$9.00.

### 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 nicked steel 9 in. high. Price only \$7.50.

Complete with copper clad aerial, waterproof 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

# 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. Price .....75c

**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

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 180° Super Variocoupler

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. Price .....60c

**WorkRite Hydrometer**  
You need one for your storage "A" battery. Full instructions with each instrument. Price .....75c

**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. Price .....50c

**"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.

# The AFRICAN "Drum talk" of TODAY

**BOOM! - BOOM! - BOOM! - BOOM!**

THUS the drum talk of the natives of Africa broadcasts to a radius of fifty or sixty miles the departure of white men leaving one village for another. To the weird Boom! Boom! of the huge drum, the travelers with their porters commence the perilous journey, knowing that their arrival is expected at the next village.

What a far cry this crude method of sending messages is from our modern, useful, pleasure-giving radio! and how very backward it seems when we consider the rapid strides made in the radio industry in just a few years' time as exemplified by the Crosley story.

Three years ago Crosley Radio Receivers were unknown. Today, the Crosley Radio Corporation is the largest manufacturer of radio receivers in the world. In every part of the United States, happy users are enjoying the beautiful concerts, useful lectures and valuable news that Crosley instruments unfailingly bring from the distant points desired.

Real Merit at moderate prices has brought about this Crosley popularity. Crosley engineers have continually kept abreast and perhaps a little ahead of the rapid advancement that radio has made.

We firmly believe that Crosley Radio Receivers are the best that have ever been offered to the public.

## Insist upon CROSLEY RADIO APPARATUS

For Sale by Good Dealers Everywhere



### Following Is a List of the Most Popular Crosley Receiving Sets With Their Prices

Crosley Type V (formerly Ace) one-tube regenerative .....	\$16.00
Crosley Type 3 B (formerly Ace) three-tube regenerative .....	\$42.00
Crosley Type 3 C (formerly Ace) console model .....	\$110.00
Crosley Model VI, two-tube incorporating radio frequency.....	\$24.00
Crosley Model X-J, four-tube incorporating radio frequency.....	\$55.00
Crosley Model X-L, four-tube console .....	\$120.00

*The Crosley regenerative receivers, formerly called Ace, listed above are licensed under the Armstrong U. S. Patent No. 1,113,149.*

## CROSLEY Better - Cost Less Radio Products



### Crosley Model X-J, Price \$55

A 4-tube radio frequency set combining one stage of Tuned Radio Frequency Amplification, a Detector, and two stages of Audio Frequency Amplification. A jack to plug in on three tubes for head phones, the four tubes being otherwise connected to the loud speaker, new Crosley multistat, universal rheostats for all makes of tubes for dry cells or storage batteries, new condenser with molded plates, filament switch and other refinements add to its performance and beauty.

We believe that for bringing in distant stations it cannot be equalled.

Cost of necessary accessories from \$40.00 up

MAIL THIS COUPON TODAY

The Crosley Radio Corporation,  
323 Alfred Street, Cincinnati, Ohio

Gentlemen:—Please mail me free of charge your complete catalog of Crosley instruments and parts.

NAME.....

ADDRESS.....

The Crosley Radio Corporation owns and operates Broadcasting Station WLW.

## The Crosley Radio Corporation

POWEL CROSLEY, Jr., President.

Formerly

The Precision Equipment Company and Crosley Manufacturing Company

323 Alfred St.

Cincinnati, Ohio