

# WHN WARNS PUBLIC OF "TAX ON SOULS"

## NEW PAUL REVERE HITS AT "KING TELEPHONE"

### Gotham Station Makes Nightly, Stirring Appeals to Fans to Protect Broadcasting

NEW YORK.—Each night Station WHN puts its case before millions of listeners—puts not only its own case but that of every independent, "unlicensed" broadcaster in the United States. C. P. Caldwell, attorney for the station, takes up the story some times, at others George Schubel warns of the aims of the A. T. & T. company, "King Telephone."

One of Mr. Schubel's addresses is particularly interesting in the parallel he draws between Paul Revere and WHN. After telling of the bitter fight that Henry M. Shaw, president of the Shaw Insulator company, had with the big Radio interests and how Mr. Shaw's partner died of a broken heart after his persecutions by the "Radio octopus," he goes on:

#### Draws Paul Revere Parallel

"Oppression never changes. It simply comes to us in different form. Over a hundred and fifty years ago, men like Henry Shaw and his wife, Anna, tried to get along peacefully with the world, but the power represented in the vested interests of a king stepped in and said: 'I'm going to put a tax on your tea, on the furnishings of your simple home and on everything you use. If you resist, I'm going to enforce my vested rights by sending hirelings to shoot you down.'

"As Americans, we know what finally happened. When the first farmer was shot down in cold blood, Paul Revere jumped on his charger and through the night notified every hamlet, and every home possible to reach, and the bells rang from every countryside, and it was not long before the soul of resistance to oppression was organized.

#### How "King Telephone" Would Tax

"Today oppression again reaches out. It comes in the familiar form of money-power. It says: 'We have certain vested patent interests; we have cornered the market in patents like the other crowd corners the market in wheat; some patents we have gotten by the power of money, some Radio patents by the power of threat or coercion, and some by means we might blush to see in public print. We must protect these vested patent interests, not by putting a tax on your tea like old King George did, not on the furnishings of your little home, nor on your oil and your coal and on your bread on your table,—there is another crowd taking care of these taxes upon your material needs; we are going to put a tax, by heaven, upon your very lips and heart and soul, for under the patent laws, we claim to have a right to do this.

"If some Americans among you want to broadcast something which we approve, then, we, the vested interests in Radio are going to tax you ten dollars a minute for saying it, no matter how important your message to your fellow-countrymen may be! Yes, we are going to put a tax, not only upon your lips, but upon your ears.

#### Urges Radiophans Writing Senators

"The spirit of Paul Revere is still alive. His spirit is riding over the air tonight. The fire of righteous indignation, the consciousness of a good cause which burned in his breast, and impelled him to ride out into the night, we are sure burns in the breast of everyone of those who write to us asking how they can help in the present fight for Radio freedom, in the breast of everyone within the reach of our voice tonight.

"Write to your Congressman, write to your Senator. If you don't know who he is, address your envelope as follows: To My Congressman and to My Senator. Then put your own name and address on the upper corner. The letters will be delivered to them."

It is now possible to burn fifteen vacuum tubes with less current than it took a year ago to burn one tube.

# FATTIES FATTEN ON WLAG "DAILY DOZEN"

MINNEAPOLIS.—The fat ones are getting fatter and the thin ones thinner when they listen to Tess Cooperman of WLAG, giving her weekly Radio exercises to the tune of "Just a Girl That Men Forget." The assistant program director of WLAG, Earl R. Buell, who tips the scale at two hundred and eighty some pounds, after one lesson, added only five pounds.

# CRYSTAL SETS GET A THRILL—AND LOSE IT

WINNIPEG, MAN.—Crystal set users of this city were surprised recently to hear, "This is Station KYW, Chicago," come in as loud as their local plant, CKY, the Manitoba Telephone company. But it turned out to be CKY rebroadcasting KYW which had been received by a CKY engineer and relayed by telephone wire to the local plant's studio.

# LIKES HER "BACK STAGE" SET



Dorothy Stone is the charming daughter of Fred Stone, world famous comedian, and finds much on the air to interest her while waiting "back stage" for her cue. She is co-starring with her dad now in "Stepping Stones" and carries the diminutive single tube receiving set with her while on tour. The unusual form of the receiver is worthy of note. It can be carried in a brief case—but usually is found on Miss Stone's dressing room table. Wide World Photo

# KDKA Finds Friend's Address

PITTSBURGH.—While visiting Moissy, France, Mrs. Russell Lewis of this city recently sent an urgent cablegram to her

sister-in-law here, whose address she did not know. French Consular Agent Letevé requested KDKA to broadcast for the missing address. Two hours later the sister-in-law had the cablegram.

# HOOVER GIVES HINT OF AIR CENSORSHIP

## "HANDS OFF" POLICY ON RECEIVING SETS

### Commerce Secretary Holds Little Hope for Use of Radio in Private Communication

WASHINGTON, D. C.—Following a policy of having as little government regulation of Radio as possible, Secretary Hoover, it has become known here, feels that the Department of Commerce would better not touch the problem of receiving sets. This applies to regenerative outfits.

Mr. Hoover, it is understood, believes the Radio manufacturers will take care of the matter of regenerative sets by perfecting their manufacture. He does not consider the subject one for legislation or governmental regulation.

It is understood also that among the opinions held by the Secretary with regard to Radio is one that indicates the possibility of an air censorship should there be much broadcasting for advertising purposes. While Mr. Hoover is not in favor of such censorship, it is said, he desires to keep the air as clear as possible for desirable programs.

#### "No Private Radio"—Hoover

The use of Radio for private communication will never be realized, in the opinion of Secretary Hoover, unless there is some unexpected and seemingly impossible development in the art. It is possible that a new series of wave lengths may be discovered and a method for their utilization be perfected which will make private communication feasible, but no such development is in sight, according to Hoover. He regards the ether as already too crowded with public matter.

Declaring that the air is the inalienable possession of the people a bill introduced by Senator Howell of Nebraska was approved by the Senate interstate commerce committee. The bill would restrict to two years' duration all Radio licenses and other privileges for the use of ether, with power vested in the President to annul them in time of war or other emergencies.

WASHINGTON, D. C.—The White Radio bill is lying dormant with the Radio subcommittee of the Merchant Marine and Fisheries Committee of the House.

The fact that Representative White accepted the chairmanship of the special House Committee to investigate the Shipping Board is militating against quick action on the bill. There does not seem to be any very serious opposition to the issue, but it is possible that some pressure is being brought to bear upon members of Congress to keep it under cover for the time being, especially inasmuch as the Federal Trade Commission has before it the complaint against the American Telephone & Telegraph company, and others.

# HINTS PLOT BACKS MUSICIANS' MOVE

### Broadcast Leader Sees Effort of American Society Behind Wage Demand

NEW YORK.—Charges that the demand of the Chicago Musicians' union for \$8 for three hours or less for Radio engagements was inspired by members of the American Society of Composers, Authors, and Publishers were made in an interview given out recently by Paul Klugh, executive chairman of the National Association of Broadcasters.

Mr. Klugh, who has been conferring in New York for several days with Gene McDonald of Chicago, president of the association, declared Chicago stations have no intention of complying with the union's demands, "even though it means throwing union music out of hotels."

The question will come up before the next annual convention of the musicians.

# THE ANTENNA BROTHERS

Spir L. and Lew P.

Mrs. Partington Speaks Out



# SEVEN WAVES GIVE ONLY ONE PROGRAM

## FAN IN CUBA PICKS UP ENTIRE "CHAIN"

### Gets Same Program Simultaneously from Each Station; Seven Different Waves

NEW YORK.—When Radio engineers conceived the idea of linking together by Radio six powerful broadcasting stations to simultaneously reach an audience approaching fifty million in number with the same program, little did they realize that certain persons, favorably situated, would be able to hear all six stations in the 7,000-mile "chain."

Successful reception from the six stations is the claim of Frank H. Jones, however, owner of station 6KW in far-away Tuinuca, Cuba, the night of March 7, when the Annual alumni dinner of the "Boston Tech" society was being broadcast by Stations WJZ, at New York city, WGY, at Schenectady, and rebroadcast after the program was extricated from the air by sensitive receivers at four other stations, KDKA, Pittsburgh, Pa.; KFKX, Hastings, Neb.; KGO, Oakland, Cal., and 2AC, Manchester, England.

### Cuban Fan Hears Seven Waves

Broadcasting stations always find many interesting and revealing letters in the mail after such an unusual experiment, but the experience Mr. Jones relates in a letter is unique and extraordinary.

# SEE "TRUST" SMASH IN NEW YORK'S WAR

## "KING TELEPHONE" LOSES FIRST ROUND

### Sudden Shift of Westinghouse Attitude Arouses Hopes for Broadcast Peace

NEW YORK.—For months Commissioner Whalen of New York city has tried to get a broadcasting plant owned and operated by the city. On all sides he was informed that the only concern that could supply him was the Western Electric company. The American Telephone & Telegraph company which controls Western Electric, also owns Station WEAJ and he found the A. T. & T. officials inclined to force him to use WEAJ or stay off the air. The commissioner's battle to get a plant of his own has filled the press for some time; the Commissioner is a battler and no combine was going to stop him.

### Westinghouse to Erect Plant

Recently the attitude of the Westinghouse Electric and Manufacturing company, a member of the alleged trust whose activities in the field of manufacture of Radio sets is under fire by the Federal Trade Commission, has been reversed and Mr. Whalen got the surprise of his life when informed by Westinghouse that it would not only sell the City of New York a broadcasting outfit of 1000 watts power, but would erect it and guarantee its operation on the Municipal building at 100 percent efficiency.

Westinghouse officials further assured the commissioner that they would endeavor to make this station one of the best in the East and placed their expert Radio engineers at the service of the Department of Plant and Structures of New York City.

### Radio "Trust" Breaking up?

The Radio world gasped and read the announcement again. Close observers of the recent broadcasting war interpreted this action on the part of the Westinghouse company as the breaking up of the agreement between the five big companies. Under the terms of the agreements, the Western Electric company is the only company permitted to sell broadcasting apparatus and the Westinghouse company is confined to the manufacture of receiving apparatus which can be sold only by the Radio Corporation of America.

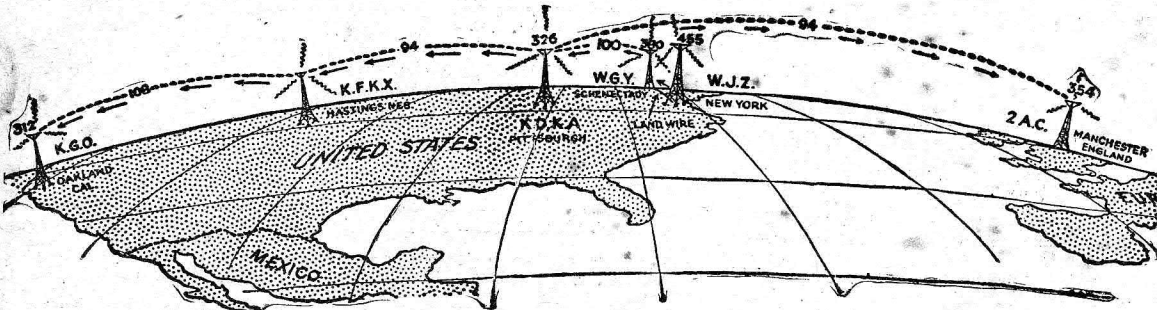
The plant which has been purchased is a high power assembly of apparatus similar to the old WJZ equipment at Newark when that station was the hub of the Radio universe, and similar to the present plant at KDKA which reaches out all over the world. It was first installed by the Westinghouse Company for the Brazilian Centennial Exposition at Rio de Janeiro and was in operation from September 7, 1922 to March 31, 1923. During the time it was in operation and known as "SPC" it had a tremendous range and was heard with great consistency in Hawaii, a distance of 7,000 miles.

### Want Big Spokane Station

SPOKANE, WASH.—The chamber of commerce here is making plans for raising money to erect a large broadcasting station comparable with the population of the city.

# SIX-STATION REBROADCAST SPANS 7,000 MILES

How six stations were recently linked by short waves for the purpose of rebroadcasting the same program. Man- chester, 2AC; New York, WJZ; Schenectady, WGY; Pittsburgh, KDKA; Hastings, KFKX, and Oakland, KGO, were the plants linked



Mr. Jones reported using two receiving sets, one for waves between 300 meters and 500 meters and a shorter wave set to receive on wave-lengths between 80 meters and 300 meters. Both are untuned Radio frequency sets, the longer wave set working on a loop, while the short wave set picks up the signals upon a thirty-foot indoor antenna.

Excerpts from the letter follow: "I was first listening in on KDKA's 100-

meter wave and heard the announcement about broadcasting the meeting of Massachusetts Institute of Technology from New York. I then checked them on their 326-meter wave. In going back to their 100-meter wave I ran into WGY at about 105 meters with the same broadcast, much to my surprise. I then checked WGY on their 380-meter wave and had the proceedings coming out of two loud speakers at the same time, one from WGY on 380 and

the other from WGY on 105 meters.

"I then did the same stunt with KDKA's two waves. Then put KFKX and KDKA together. I then got KGO, Oakland, on the loop.

"I kept both loud speakers going on all the combinations I could think of."

In the scale from 100 meters to 455 meters, Mr. Jones heard the same program on seven different wave lengths.



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

# Eleven Degrees from the North Pole

Ice—endless miles of ice, as far as the eye can see. And frozen fast in the ice, amid the deadly stillness and the unearthly lights of the Arctic, a staunch little eighty-nine foot schooner! But Donald B. MacMillan and his band of brave explorers are not alone tonight.



Under their ice-bound hatches they listen eagerly to the news of the outside world, broadcast to them from the Zenith-Edgewater Beach Hotel Broadcasting Station, Chicago—to violins in Newark, Schenectady, Los Angeles—to singers in Atlanta—to a lively orchestra in Honolulu.

Stations in all these cities—and in several hundred others—they have readily tuned in; yet the Bowdoin tonight is only eleven degrees from the North Pole!

Out of all the radio sets on the market, Dr. MacMillan selected the Zenith exclusively—because of its flawless construction, its unusual selectivity, its dependability and its tremendous REACH.

And you can do all that Dr. MacMillan does, and more, with either of the two new models described at the right. Their moderate price brings them easily within your reach. Write today for full particulars.

**Model 3R** The new Zenith 3R "Long-Distance" Receiver-Amplifier combines a specially designed distortionless three-stage amplifier with the new and different Zenith three-circuit regenerative tuner. Fine vernier adjustments—in connection with the unique Zenith aperiodic or non-resonant "selector" primary circuit—make possible extreme selectivity.

**2,000 to 3,000 Miles With Any Loud-Speaker**

The new Zenith 3R has broken all records, even those set by its famous predecessors of the Zenith line. Satisfactory reception over distances of 2,000 to 3,000 miles, and over, is readily accomplished in full volume, using any ordinary loud-speaker. No special skill is required.

The Zenith is the only set built which is capable of being used with all present-day tubes as well as with any tubes that may be brought out in the future. The Model 3R is compact, graceful in line, and built in a highly finished mahogany cabinet ..... **\$160**

**Model 4R** The new Zenith 4R "Long-Distance" Receiver-Amplifier comprises a complete three-circuit regenerative receiver of the feed-back type. It employs the new Zenith regenerative circuit in combination with an **audion detector** and **three-stage** audio-frequency amplifier, all in one cabinet.

Because of the unique Zenith "selector," unusual selectivity is accomplished without complication of adjustment.

The Zenith 4R may be connected directly to any loud-speaker without the use of other amplification for full phonograph volume, and reception may be satisfactorily accomplished over distances of more than 2,000 miles..... **\$85**

ZENITH RADIO CORPORATION, Dept. Z, 328 South Michigan Avenue, Chicago, Illinois

Gentlemen: Please send me illustrated literature on Zenith Radio.

Name.....

Address.....

# Zenith Radio Corporation

McCORMICK BUILDING, CHICAGO

# BEFORE THEY THOUGHT OF "MIKES"

Two more to guess about! Note the little gentleman (lower right) hanging onto the pop gun. He was born day after April Fool's day, 1885, and spent most of his life in a city noted for its smoke. (Which includes many cities, no doubt.) We'll call him Mr. S until next week. Now the young fellow at our right wearing skirts (he did then), has a name that is peculiar, inasmuch as it is duplicated by the name of another announcer down East. Ought to be easy to guess. Oh yes, the photo was made in 1900 when the subject was but two years old. Tell you more next issue.



The gentleman above with the specs is the almost unclothed babe of yesterweek, referred to as Mr. E. His full name is C. R. Emery, WGI. The dressed up baby last issue is represented by the gent below tickling the keys, Lester Palmer, WOAW. Read more about them below.



flapper; and he is doubly watchful this leap year. But—now don't crowd out of line ladies, and be particular about the brand you perfume your letters with!

### C. R. Emery, WGI

ORCHESTRAS are often comprised of more than one piece with more than one man playing the various instruments, but from what has been learned of C. R. Emery—announcer and recently promoted to program director of Station WGI, American Radio and Research Corporation—sometimes one man can be the whole orchestra. Mr. Emery is one of these exceptional men. He plays the piano, organ, trumpet and French horn, and sings between times.

A brief biographical sketch shows Mr. Emery to have been born August 12, 1897 at Abington, Mass. He was with the Castle Square Stock company at Boston in 1917, and was assigned to the U. S. Photographic School at Columbia university during the war period. In 1921 he was in vaudeville with a well-known male quartet which traveled extensively throughout the East. In 1922 he directed theatrical productions for a Boston department store, leaving in 1923 to assume his first duties before a "mike" as announcer at WGI. Now he is program director.

He was the founder of the Amrad Big Brothers' Club (picture on back page) which has won much mention over the country and has even had poems written and dedicated to him by ardent admirers, masculine and feminine. Next time you hear a "one man band" you may at least hazard a guess that you've tuned in C. R. E., of WGI, Medford Hill-side.

**Lester M. Palmer, WOAW**  
**L**P. MIGHT mean "look pleasant" or "likes pie." Both in fact are appropriate to this young gentleman. But when he tacks his shingle out some day to announce his advent into the legal "world" it will have graven upon it, Lester Palmer, with a luxurious Merton sandwiched between to fill up the extra space. By gazing on the smile twisted physiognomy of this diminutive midwesterner, you would not suspect that his heart was being torn in anguish by an eternal, no, not triangle; but—polygon, for

there are so many sides to the activities in which he figures that he is having a terrible time deciding to which he should devote himself exclusively.

You guessed it, the ladies are in the lead, having captured his heart. And the law college has taken his head, the piano his hands, fraternity dances his feet, and WOAW his voice, so that there seems little left for himself. However, if by any chance, he should not be fully claimed, there is golf, chess, "shooting" WOAW publicity stories and the editing of the WOAW Radio Bulletin to fill

up his spare time. Occasionally, he has brief success in meeting old man Morpheus. His favorite night is Wednesday, "silent night," to which he looks forward each week as the one night in the week to get twelve hours sleep. When it rolls around, he usually goes to a dance, etc., (you know how it is, boys and girls) and gets home in time to beat dad to the morning paper.

Palmer developed his snappy voice by wrangling with the other kids on the debating team in high school, and he got so good at it that they made him Captain of the University of Illinois debate team. Mr. Palmer is supremely modest, or subtle, and due to either one of these traits, you will hear him playing the piano under various pseudo-monikers, including Jack Stuart, Of Wahoo, John Jones and De Pachman. Concerning the latter, it is said you can't tell Palmer from the original. So far, Palmer has got by without becoming the property of some carnivorous

## CANADA'S AIR CHAIN NEARS COMPLETION

### FIVE PLANTS NOW FROM COAST TO COAST

Winripeg, Saskatoon, Regina, Edmonton, Calgary Already O.K.'d; Vancouver Also to Join

MONTREAL, QUE.—Arrangements having now been completed for the establishment of stations in five cities in western Canada, there remains only Vancouver to complete the transcontinental chain of Radio stations that will make the Canadian National Railways operator of the greatest chain of non-commercial broadcasting stations in the world.

Advices have been received at general headquarters in Montreal, from W. H. Swift, radio engineer of the National System, that he has completed all arrangements for the establishment of stations in Winnipeg, Saskatoon, Regina, Edmonton and Calgary.

These stations are not new, like CKCH in Ottawa, but are stations already existing with which the Canadian National Railways have come to agreement for the broadcasting of programs.

#### Chain of Stations and Schedules

In Winnipeg the Manitoba Government Telephone Station (CKY), 450 meters, will broadcast from the Canadian National Railways every Thursday evening; from Saskatoon, the Radio Supply station, (CFQC), will broadcast every afternoon between 3 and 4 o'clock from Regina, the Leader station, (CKCK), 420 meters, will broadcast each Tuesday evening; from Calgary, Grant station, (CFCN), 440 meters, will broadcast every Wednesday evening and the Herald station (CFAC), 430 meters, every Thursday evening; from

Edmonton, the Journal station, (CJCA), 450 meters, will broadcast every Friday evening.

The east is already well covered by station CKCH in Ottawa and stations CKAC, CFCF and CHYC in Montreal. Stations in the Maritimes and Toronto may be added later.

## LADY HARVEY TALK CAUSES COMMENTS

Station CKY, Winnipeg, Answers Critical Listeners In on Non-Censorship Policy

WINNIPEG, MAN.—Quite a sensation among listeners in was created by Lady Martin Harvey's recent address at Central Congregation Church here, broadcast by CKY. The eminent actress denounced alleged activities of the Communists among children, and made statements which were warmly contradicted by listeners who telephoned the broadcasting station.

CKY issues the following statement: "The responsibilities of broadcasters for remarks made by speakers during church services or on public platforms has not yet been defined. To make broadcasting authorities responsible for opinions expressed by speakers would surely be to impose hardships tending to restrict freedom of speed and to curtail the use of Radio.

"Many excellent sermons and addresses would never have been heard had the broadcasting director been expected to insist on their being written out in advance and censored."

The establishment of a broadcasting service at Nagoya, Japan, is being contemplated by local capitalists and business men, who anticipate the approval of the Japanese government.

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# "UNCLE BOB" HOLDS HEARTS OF KIDDIES

## STORIES AND SONGS WIN LOVE OF THOUSANDS

### Letters Prove Walter Wilson Is Idol of Many a Young Life; Parents Voice Appreciation

CHICAGO.—There is one man to-day whom thousands of kiddies will remember when they are grown up and aged, and that man is Walter Wilson.

Children throughout the west and middle west know him better as "Uncle Bob" when he tells the bedtime stories from KYW here and "Uncle Walter" when he sings his never to be forgotten songs, "Dream Daddy" and "My Daddy's Dream-time Lullaby," both on their way to record sales.

Parents, too, are voicing their appreciation of Mr. Wilson, and complimenting him on the good work which he is doing.

Clarissa and Robert Reynolds of Tiskilwa, Ill., write: "We have been listening to your bedtime stories almost every night since we got our Radio, but we wish they were a little longer. I bet you never heard of this town before. We'd like to hear you pronounce 'Tiskilwa' over the Radio."

#### Mother Says "Nice Things"

Some of the letters "Uncle Bob" receives are very humorous, while some are the other extreme.

Here is one from a little fan who writes: "My mother says a lot of nice things about you, too; but my Dad will not let me put them in the letter."

Another reads: "I had the mumps and now I have a gum boil under my lip and it made my face swell up to my eyes. I had to stay in the house three weeks. I had a temperature and hardly ate a thing."

While still another reads: "dear uncle bob my name is Violette and i wanted to write you a little letter for a long time so to night i, heard you sing that Sweet little song to us kiddies it is so nice of you. you are Just one Big kind man and until i seen your picture i thought you was a little thin man imagine my surprise."

## CHILDREN ALL LOVE UNCLE BOB OF KYW



And so it goes, hundreds of letters every day from his little admirers and friends.

#### Asks Prayer for Little Friend

Recently Mr. Wilson received a letter from a mother who wrote: "My little daughter is very ill and your bedtime stories always cheer her up, won't you say a personal word to her?" That night Mr. Wilson asked his friends in the in-

visible audience to say a prayer for this little girl. The following day, the mother wrote and said that the little girl was feeling much better.

A lot of the other daddies are going to appreciate how much it means to win the love and admiration of their own children and find that the really big thing in life is to develop that corner in their hearts which is being usurped by the "dream daddy."

Mr. Wilson is a married man who weighs in at 285 pounds, ringside, and every pound of it is good-natured. Always smiling and cheerful, with a kind word and a laugh for everyone he meets.

## Far Points Hear Debut of Ottawa's New Plant

### Applause Cards from Southern U. S. Indicate CKCH's Reach

OTTAWA, ONT.—In Ottawa, the capital city of Canada, the Canadian National Railways have erected the most powerful broadcasting station in the Dominion. This station, whose call letters are CKCH, was opened recently with a program heard from the Atlantic seaboard in Canada and the United States, as far north as civilization extends in Ontario, south to Carolina and westward to cities beyond the Mississippi in the United States. At least applause cards and letters have been received from these points and that is the only practical means of checking up on the radius of broadcast of a station at the present time.

## LEARN TO HAMMER PIANO BY AIRPHONE

### LESSONS WILL BE GIVEN FROM STATION WCAE

#### Pittsburgh Plant Inaugurates Novel Method of Instructing with Series of Nine Broadcasts

PITTSBURGH.—Attempts have been made by various broadcasting stations to include as part of their regular programs the teaching of novelty piano playing, but these have heretofore proved unsuccessful. Now the Pittsburgh Press-Kaufmann & Baer, station WCAE, of this city, has obtained a series of lessons whereby the pianist may become proficient in playing novelty, popular or "jazz" music.

Henry Reinert, pianist of the Egizi orchestra, Olympic theater, Pittsburgh, will present his entire series of nine lessons, two each week, Mondays and Wednesdays at 7:45 o'clock, Eastern time.

#### How Lessons Will Be Given

Every pianist who can read music and who has a working knowledge of the scales in all the keys will readily understand and play the lessons. They are given in simple form to enable the student to write notations and also hear each subject properly played to demonstrate the explanation.

Each student will devote practice time to each lesson as he would in individual instruction. An average of five hours' practice will be sufficient to master each lesson.

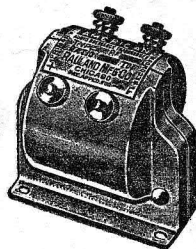
MR. BOWDEN WASHINGTON, CHIEF ENGINEER OF THE

# Cutting and Washington RADIO CORPORATION

says: "All-American Audio Frequency Transformers were adopted as standard for the Cutting and Washington Receiver after thorough tests in our laboratories demonstrated that they faithfully reproduce broadcasted music and voice with excellent volume and stand up in service better than any other transformers we have tested. We consider All-American Audio Frequency Transformers the best on the market."

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Close on the heels of the sensational successful All-American Power Amplifying Transformers for "PUSH-PULL" circuits, has come the new All-American Long Wave Radio Frequency Transformer which—although just out—is already being acclaimed as another All-American achievement.

Not only does the All-American lead with the latest! The regular audio and radio frequency models are also being continually improved.

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# MODERN MINSTREL WINS YUKON PRAISE

## ALASKA POEM HITS SOURDOUGH TWIXT EYES

W. H. F. Tenny's "When the Ice Goes Out in Spring" Draws Letter from Frozen Valley

BUFFALO.—Like the minstrels of old who used to write poems and tales and sing or recite them in the banquet halls of great leaders on festive occasions, so W. H. F. Tenny author of "Songs of the North," reads the poems of which he is the writer to the audience on the "other side of the microphone" from Station WGR here.



W. H. F. TENNY

Mr. Tenny has often spoken in the WGR studio while the red light was burning and has drawn great numbers of fan letters from all parts of the United States and Canada. He is probably the most popular reader with WGR's Canadian audience because of the fact that many of his poems concern life among the French-Canadians.

### Alaskan Poem Draws Applause

One of his poems on life in Alaska which is called "When the Ice Goes Out in Spring," drew a letter from an enthusiastic sourdough from the Yukon Valley who happened to hear Mr. Tenny when he was broadcasting one night in December.

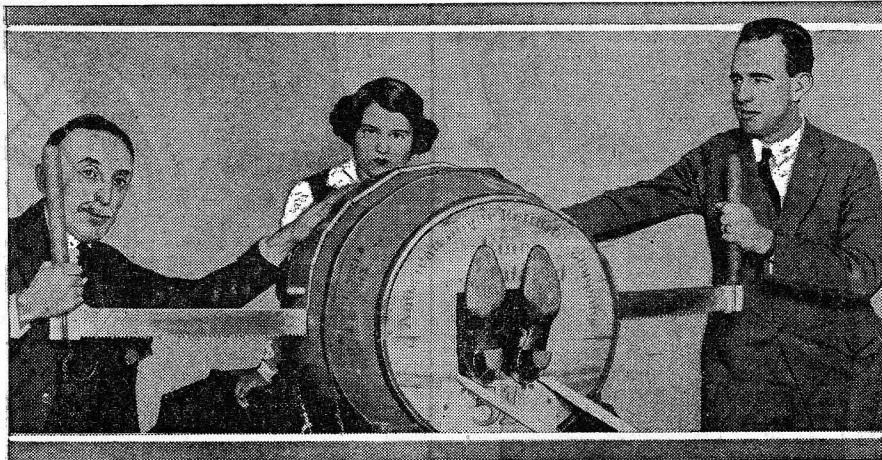
This man from Alaska said that he had watched the ice of the Yukon go out three times and would again this spring. Mr. Tenny's poem, so to speak, hit this particular sourdough right between the eyes. It was "been there" stuff and the sourdough knew it.

This is the poem by Mr. Tenny which won applause from the Alaskan sourdough after its broadcasting from WGR by the author. It is quoted with the permission of The Ryerson Press, publishers:

### When the Ice Goes Out in Spring

When you're hibernated, frozen, and you're all but casking in,

# WLW TO SAW WOMAN IN HALF



WLW listeners who tune in the Crosley Radio Corporation station Thursday night, April 10, at eleven o'clock (Central time), will "witness" black magic put on the air. George Stock, master magician (left), and Powell Crosley (right) are here showing how the stunt is to be done

And the cold has seemed to get you, and to shrivel up your skin,  
And you've sworn and cursed and damned the North until you're sick and sore,  
And you've longed for something human, someone you have known before;  
Then you'll know the satisfaction, which no other thing can bring,  
Like the breaking of the Yukon, when the ice goes out in spring.  
(Continued on page 10)

## King George Has Set Installed in Palace

### Regent's Receiver Has Unique Device for Energy Collector

LONDON.—King George has joined the army of listeners in and has had installed in his palace a receiving set said to be unique.

No aerial or ground connections are used, their places being taken by copper plates set into the top and base of the cabinet. This substitutes for the loop aerial common to most sets not having outdoor aeri-

## Clowns, Elephants Now Take the Air

### WJAX Will Bring Circus Into Radiophans' Homes; Imagination of Listeners Must Aid

CLEVELAND.—Ever have a circus in your home? No, not that kind, but a regular honest-to-goodness circus with daring bareback riders, blaring bands and mirth-provoking clowns. It will be provided by the Cleveland News-Leader, April 15, on their Tuesday evening program from WJAX, when Robinson's Circus will be broadcast from the ring-side in the Cleveland Public Auditorium.

Arrangements have been made with owners of single circuit tuners to fill the air with hair-raising shrieks and howls to stimulate the atmosphere of a menagerie and family rates on peanuts and popcorn may be secured from your nearest confectionery store. "The Wave from Lake Erie" will dash out of its new 20-story home with every one of its 770 kilocycles loaded down with old-fashioned

# MAGIC TRICKS OVER AIR AT WLW PLANT

## WILL "SAW GIRL IN HALF" VIA BROADCASTER

Cincinnati's Experiment Is Trail Blazer in Field of Radio Optical Illusions

CINCINNATI.—Broadcast Black Art will take its place on Radio programs for the first time eleven o'clock (Central time) next Thursday night, April tenth, when Station WLW, the Crosley Radio Corporation here, will perform the act of "sawing a woman in half" via the ether. This is the first time magic has ever been broadcast.

Radiophans will hear the explanatory talk by the magician, George Stock, and will then hear the saw cut through a barrel containing the young lady to be "halved." She will have been tied securely by ropes held by a committee in the WLW studio. But after the barrel has been sawed into halves, the young lady is still found unharmed and securely tied as before the saw entered the wood.

### Can Audience Appreciate Magic?

Just how well a Radio audience can appreciate an optical illusion remains to be seen, as the attempt is a trail blazer. At any rate, Mr. Stock, who claims to be originator of the "sawing a woman in half" stunt, will do his best to microphone the trick without "exposing" his hand.

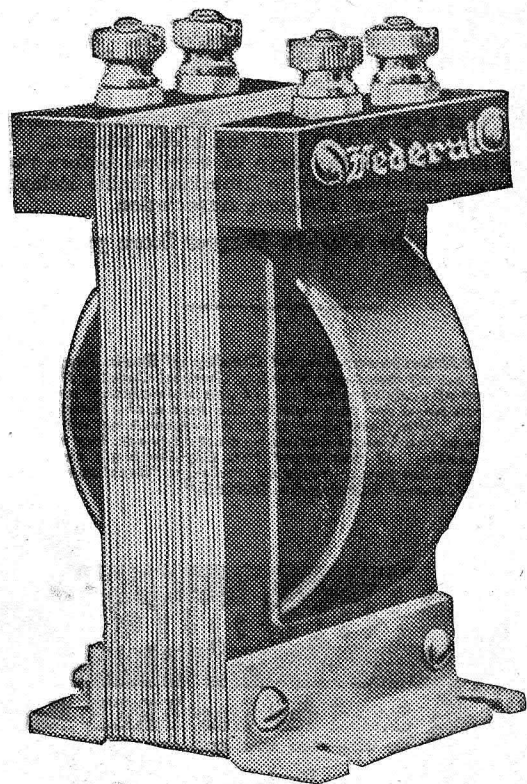
The Cincinnati master magician, president of the local magician's club of which Howard Thurston is an honorary officer, was the first to visualize the possibilities of putting "tricks" on the air, and can be thanked by the ever-restless listeners for their newest diversion.

The picture of Powell Crosley and Mr. Stock rehearsing the trick is shown elsewhere on this page.

circus music and the scintillating repartees of the clown.

If you cannot see Mlle. LaEquestrienne in her short skirts and pink tights it will be because you have no imagination and you had best give the receiver to some one who has and can. All aboard for the big top! Everyone tuned in? Let's go!

# Reproduction So Natural You Can Hardly Believe Your Ears



Federal No. 65 Audio Frequency Transformer

\$7.00



The sign of Reliable Radio Dealers

FROM the low, throbbing notes of the bass viol to the clear, sharp tones of the soprano—with an amazing fidelity never before attained by radio, Federal radio sets give you all the real thrills of radio receiving.

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# Federal

Standard RADIO Products

# KIN OF MACMILLAN HOLD GRAVE FEARS

## CHICAGO STATION TRIES VAINLY TO GET WORD

### "Is No News Good News?" Relatives Ask as They Await Message from Arctic Radio

CHICAGO.—Is no news good news? That is the question that has been in the minds of friends and relatives of Captain Donald B. MacMillan and his crew aboard the Bowdoin, eleven degrees from the North Pole. Since February 16 no message has been received from WNP (Wireless North Pole), the station aboard the Arctic explorer's ship.

Fear has grown for the safety of the Bowdoin's crew.

Among those in Chicago somewhat anxiously awaiting news of the explorer is his sister, Mrs. Letitia Fogg of the Library Plaza hotel, Evanston, Illinois. Mrs. Fogg, whose home is in Freeport, Maine, has been a resident in Chicago since last fall, together with her daughter, a teacher at the New Trier High School.

#### Sister Keeps in Close Touch

"I have kept in daily contact with the Zenith station at the Edgewater Beach hotel in the vain hope of hearing from my brother," said Mrs. Fogg last night. "This station has perhaps maintained a closer touch with Capt. MacMillan than other broadcasters.

"But I am not as yet really alarmed about my brother's safety," she continued. "I think it likely that he is absent from his ship upon a tour of the surrounding region. I know he had several such investigations planned for the early spring.

#### MacMillan May Be on Trip

"And I am considerably comforted, too, by the thought that Capt. MacMillan rigorously enforced the rule that no Radio messages be sent from the ship during his absence. This, I am confident, accounts for the long silence."

Gene McDonald, president of the National Association of Broadcasters, admitted that he was uneasy about the Bowdoin and its crew, but also thought that Capt. MacMillan's announced intention of making several sledge trips accounts for the lack of tidings. Mr. McDonald accompanied Capt. MacMillan as far as Alaska and installed the Radio plant aboard the Bowdoin.

# MACMILLAN'S SISTER BROADCASTS TO HIM



Mrs. Letitia W. Fogg, who talks to her brother, Captain Donald MacMillan, near the North Pole on his ship Bowdoin, by broadcast from 9XN, the experimental license call letters of the Zenith-Edgewater Beach station, WJAZ. Mrs. Fogg, whose home is in Freeport, Maine, is spending the winter in Chicago with her daughter, a Chicago school teacher, where she may talk to her brother occasionally. Mrs. Fogg broadcast messages to him Christmas and New Year's Eve and was rewarded by relayed code messages in response telling her of his pleasure at hearing her. She talked again March 5 and 19. Friends are anxiously awaiting response from the last messages. No word has been heard since February 15. Where is MacMillan? Has he left the ship and pushed northward? His sister is anxiously waiting word from him.

# U. of P. Now Broadcasting Through KDKA, Pittsburgh

PITTSBURGH.—With a former classroom in State hall rebuilt into a studio, the University of Pittsburgh has made its first venture on the air. The studio is connected with Westinghouse station KDKA. Educational programs will be given two or three times each week. Extension courses with credits are also planned.

**The World may now listen in on the broadcasting from The World's Biggest Store**

Station W J R, located on the tower of Sears, Roebuck and Co.'s gigantic merchandise building at Chicago, will be in operation beginning the month of April.

Just another instance that the World's Biggest Mail Order Store is FIRST in everything worth while.

Those who have radio sets will appreciate the fact that our station will be the most modern in the air; every advance made in the science of radio, every successful invention making for clearer broadcasting and improved reception has been embodied in our station.

Station W J R, located on the tower of the World's Biggest Store—will be under government supervision. It is a class B station—the highest rank in broadcasting. It will provide entertainment and education to the world.

It is fitting that Sears, Roebuck and Co. should undertake this work because we were FIRST in the radio business. We encouraged the amateurs in the days of wireless before radio was known. We were endorsed by the American Radio Relay League and the National Amateur Wireless Association.

Now, as always, the World's Biggest Store proves its claim for leadership.

*In addition to our Special Catalog of Radio Supplies you will surely want our New Big General Catalog if you have not already received it. It contains almost everything you need for the family, the home, the farm and the shop. We have sent it to one-fourth of all the families in the United States, so that they can buy most economically. If you want this Big Book all that is necessary is for you to write us and say: "Send me your New Big General Catalog No. 60R28G."*

**Magnavox Reproducer M1**

A notable addition to the famous Magnavox line of Radio Reproducers and Power Amplifiers is M1 illustrated above.

This instrument requires no battery for its operation, and is supreme in its class. Magnavox Products are for sale by good dealers everywhere.

Magnavox Reproducer M1 is designed for use with dry battery receiving sets and gives splendid results. It is as simple to connect as a headset. Price \$35.00

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# OPERATING AND TROUBLE SHOOTING

For the Owner of a



Type 52 Receiver

**"OPERATING and Trouble Shooting"** is a Radio Digest feature whose purpose is to study the late models of various standard receiving sets and to show the newly initiated broadcast listener, who has purchased such a set, how he can operate it to get the best there is in it and how he can overcome minor difficulties which may be causing some trouble. On pages 9 and 10 this week, the Sleeper Monotrol Type 52 Receiver is described. Radiophans with other sets will also find these articles worth reading particularly the notes on trouble finding.

**YOU** will find numbers on the back of the loop reading 1, 2 and 3 for the low, middle and high wires. Run the ends of these wires through the three left holes in the back of the cabinet to the three corresponding binding posts numbered 1, 2 and 3. Insert tips in the binding post and tighten them. The accessories required are one UV200 or C300 for the detector, three UV210A or C301A for amplifiers, one 6 volt storage battery, one 22½-volt and two 45 volt B batteries, one loud speaker and one set of head phones with plugs.

Connect the 6 volt storage battery (or A battery as it is called) to the respective binding posts on the set, being sure to connect the A minus terminals to the part marked A minus, and the positive or red battery terminal to the part marked A plus and B minus, as indicated in diagram.

Connect the two 45 volt B batteries "in series" as indicated. Next connect the minus terminal of the 22½-volt battery to the free minus terminal of the 45 volt B battery, which in turn is connected to the plus A battery terminal as indicated.

Run a wire from the plus 16 volt terminal of the 22½-volt battery to the binding post on the set marked plus 16, then another wire from the free plus 45 volt battery to the binding post marked plus 90.

Follow the diagram carefully in connecting batteries, and when all connections are made, check them over carefully before lighting the tubes. This is very important.

Plug in the loud speaker into the right jack hole (or should you plan to use head phones, plug them into the left jack hole). The left jack lights three tubes only, whereas the right jack automatically lights the power amplifying tube.

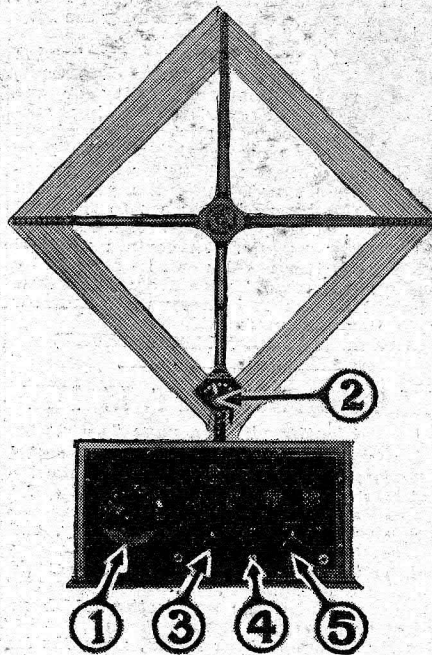
**Operating the Set**

See that the button Number 4 at the bottom of the front panel is pushed in. This opens the A battery circuit, or puts out the light in the tubes. Once the set is adjusted and in operation the tubes may be lit or put out by pushing this switch in or out.

Next turn both the detector Number 5 and amplifier, Number 3, rheostat knobs on the front panel, counter-clockwise or to the left as far as they will go. Be careful not to force these knobs too much. Set the loop switch, Number 2, on the middle of the switch point. Insert 200 detector tube in the right socket and the three 201A tubes in the other three sockets as these are amplifiers. The set is now ready for operation.

Pull the button switch, Number 4, out at the bottom of the panel. Turn the left or amplifier rheostat knob, Number 3, to the right one-half revolution. This will light amplifier tubes.

The next operation is a very important one. Turn the right-hand or detector rheostat knob, Number 5, to the right until



a roaring or swishing noise is heard. This will require one-half or three-fourths of a revolution of the knob, depending on the particular detector tube. Now turn the detector knob to the left or counter-clockwise until the swishing noise ceases. The detector tube is now adjusted to its most sensitive point. It will be noted that the detector tube burns much brighter than the amplifier tubes.

Revolve the large dial, Number 1, on the front panel slowly until the broadcasting is heard. The small knob in the center of the large dial is a vernier or fine adjustment, and should be used after the station is tuned in with the large dial, to clear up the reception. (For best results keep amplifier knob, Number 3, turned completely to the right.)

If no broadcasting is heard, turn the loop switch, Number 2, to the next point to the right, and tune again with large dial, Number 1. Try also the last loop

switch point. When leaving your set, always press the button at the bottom to turn off the current.

**Directional Effect of the Loop**

As you turn the loop you will note that the reception is louder at one time than another. The loop should be placed parallel or pointing to the broadcasting station that you desire to hear, not cross-wise. Note further that as you turn the switch, Number 2, on the loop from the left to the right you increase the intensity or volume up to a point where you overload the tubes, and distortion occurs.

When in close proximity to a broadcasting station, say twenty to twenty-five miles, it is seldom necessary to use either the last or next to the last loop switch points. For distance the last taps are required. Howling can be readily eliminated by turning loop switch to left.

**Chart of Stations**

On the Monotrol you can exactly log your stations. You will always pick up the same station at exactly the same number on the dial and you can, therefore, make a note of the numbers of each station you identify and keep a chart of them. Then when you want to listen in, look at your newspaper, see what is on the air, select your program, and turn to the number on the dial that you know means that station, press the button and there it is.

**Miscellaneous Information**

This set is capable of reception over great distances varying according to the particular location where it is used and with the season of the year. In general, Radio reception is from nine to ten times more efficient at night than during the daytime and working for distance is ever so much easier in winter than in summer.

To the novice, a Radio set is a great deal like one's first automobile. If you have never driven an automobile you cannot hop in one and drive it, immediately, through heavy traffic. With a little practice, however, having acquired the few tricks, it is a simple matter. The same applies to a Radio set. In this respect, though, the Sleeper Monotrol is a simple set to operate. Just learn its little tricks and it is "easy to drive."

All broadcasting stations operate on a certain wave length and obviously if two (Continued on page 10.)

## BRISTOL SINGLE CONTROL RADIO RECEIVER



**Most Simple to Operate**

The set for those who want results with little effort. Anyone in the family can quickly learn to operate it because technicalities and guesswork are eliminated—One Control Dial does it all.

**Does Not Interfere With Your Neighbor**

Other close by reception is not disturbed when you tune in with this non-reradiating Receiving Set. It gives you a comfortable sensation of freedom to be able to change from one station to another knowing that you will not interfere with your neighbor's receiving.

**Choice of Aerial or Loop**

Where conditions make it difficult to install an outside aerial, as in congested sections of cities, good results can usually be had by using inside Loop. In fact, the directional feature of the Loop often brings in stations not possible with a stationary aerial.

Mounted in solid mahogany case with walnut finish, the Bristol Single Control Radio Receiver is handsome in appearance. The price is \$190.00. Bulletin AY-3013 describing this set will be mailed on request.

## BRISTOL

TRADE MARK  
**AUDIOPHONE**  
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### Loud Speaker



This is known everywhere as the Loud Speaker with the quality tone. Not only is the tone natural and without mechanical distortion, but is sufficiently big in volume to be easily heard in a large room or all through the house. Comes to you ready to use—no auxiliary batteries are required.

Made in three models:

- Audiophone Senior . . . . .Price, \$30.00
- Audiophone Junior . . . . .Price, 22.50
- Baby Audiophone . . . . .Price, 12.50

**THE BRISTOL COMPANY, Waterbury, Conn.**



## The New GREBE Broadcast Receiver

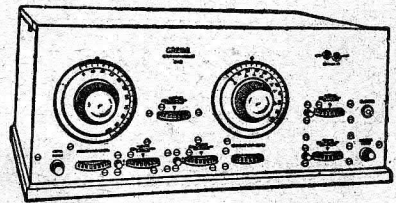


**THE** 20-foot silk-covered wire supplied with this Receiver is the only antenna required. This wire may be concealed behind the picture moulding or run along the baseboard.

Write for "Grebe Radio in the Well-Appointed Home"

Ask Your Dealer

Licensed under  
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## A. H. GREBE & CO., Inc.

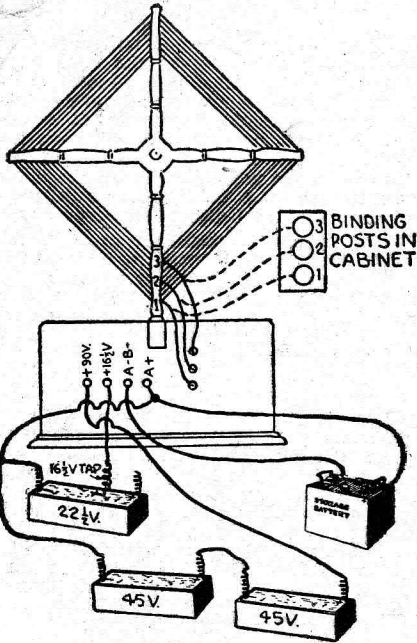
Richmond Hill, N. Y.

Western Branch—451 East 3rd St., Los Angeles, Cal.

### OPERATION, TROUBLES

(Continued from page 9)

stations are working on approximately the same wave length you will hear only the stronger or nearby one. This is one of the important reasons why long distance work is usually done late at night when



local or nearby stations have signed off. When your set does not work, the chances are one hundred to one that your storage battery has run down or perhaps that your B batteries have gone dead. It will certainly pay you to buy a simple voltmeter which need not cost over \$1. With this little instrument, in case of trouble, merely attach it to the battery and if it does not read the amount printed on the battery, the answer is recharge or renew. A batteries can be cheaply recharged at any garage or you can buy an inexpensive home charging machine to do it yourself right from your electric light socket. See that your connections are good at all times as sometimes with batteries on the floor, the industrious housewife disconnects wires with a carpet sweeper or broom. Certain noises in the Monotrol mean certain troubles. For instance: Con-

tinued howling, over the entire range of the dial means "inside" or local trouble. Probably an open or broken circuit. Howling or whistling over a limited range of the dial means that it is being caused by an outside disturbance. This is invariably caused by "spilling over" of the tubes due to too much Radio frequency. This can be eliminated by turning the loop switch to the left. No aerial or ground wires are needed with this set but if by reason of difficulties in your particular locality or the great distances from broadcasting stations you can use to advantage a single wire from twenty to thirty feet long around the picture molding or other support that does not touch the ground in through the back of your set to the post marked 1. This increases the strength of incoming signals. In certain unusual locations, better results can be secured by running a "ground" wire from the minus terminal of the A battery to a radiator or similar "ground." (ANOTHER SET NEXT WEEK)

### KLONDIKE POET IS HIT

(Continued from page 7)

When you've gone through eight months' winter with its weird, unearthly glow, And been prisoned in a cabin in a land of ice and snow; And you've fought it out with scurvy, and you've lived on beans and tea, And you've lost the very sense of time, would love a chimpanzee; Then you'll know the satisfaction which no other thing can bring, Like the breaking of the Yukon, when the ice goes out in spring. When you've stood the ghastly, ghostly glare until you're almost blind; When the very desolation seems to rob you of your mind; When there's no one else to talk to but a mangy, husky cur, And the quiet and the gloom is like a pent-up sepulchre; Then you'll know the satisfaction which no other thing can bring, Like the breaking of the Yukon, when the ice goes out in spring. And you've vowed and vowed that all the gold the Klondike can display, Will never get you back again, if once you get away. But you'll be like all other men as long as you can crawl, You'll wander back and wander back and answer Yukon's call. To know the satisfaction which no other thing can bring, Like the breaking of the Yukon, when the ice goes out in spring.

**Panel Hole Filler**  
A good hole filler for black panels may be made in the following manner: Melt some sealing wax compound and mix tar or liquid shoe blacking with it until you have obtained the desired blackness.

Place a piece of metal over the hole on the front side of the panel and pour the compound in the hole from the back with a spoon. Keep the metal in place until the compound becomes hard, which will only take a few minutes.

## The Stamp of Approval the World Over



### FRESHMAN Variable Grid Leak

The Standard Unit for Every Tube Set

EVERY tube and every circuit require a different grid leak resistance. The method employed in the Freshman Variable Grid Leak permits you to adjust your circuit to any resistance you wish, from 0 to 10 megohms in an unbroken range of 180 degrees. The Freshman Variable Grid Leak and Condenser combined, takes the place of a grid condenser, leak mounting and grid leak—and, in addition, permits an adjustment to the correct amount of resistance.

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### ORIGINAL VARIABLE GRID LEAK

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Ask your dealer or write for our free diagrams of Neutrodyne, Tri-Flex, Kaufman and other good circuits.

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## PEERLESS RADIO, 349 Fulton St. BROOKLYN, N. Y.

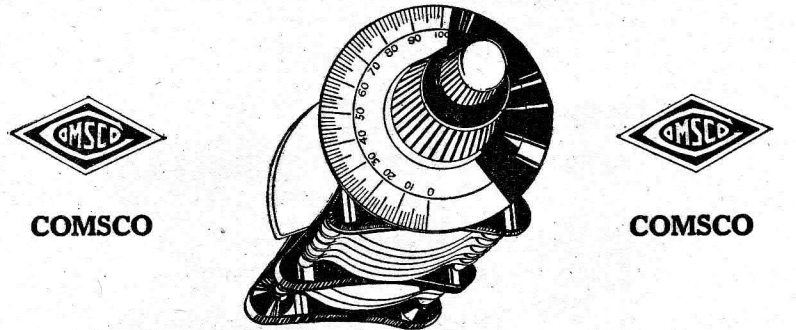
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<b>VARIABLE CONDENSERS</b> 11 Pl. Admiral or Signal.....\$1.35 17 Pl. Admiral or Signal.....1.60 23 Pl. Admiral or Signal.....1.65 43 Pl. Admiral or Signal.....1.75 11 Pl. Montrose Vernier Cond.....2.55 17 Pl. Montrose Vernier Cond.....2.75 23 Pl. Montrose Vernier Cond.....2.85 43 Pl. Montrose Vernier Cond.....3.65 11 Pl. U. S. Tool.....3.35 23 Pl. U. S. Tool.....3.65 43 Pl. U. S. Tool.....4.10	<b>VARIOMETERS</b> Fisher, large, 100 meter.....\$2.55 Shamrock.....2.65 Sleeper.....5.65 Workrite.....2.95 Giffillan, small.....4.95 Giffillan, large.....7.45 Pathé.....2.85 Columbia.....4.95	<b>VARIOCOUPERS</b> Fisher, 180°.....\$2.35 Shamrock.....2.65 Sleeper, no taps.....3.75 Workrite.....2.95 Thornton.....4.95 Giffillan, large.....7.45 Pathé.....3.25 Genuine All Wave.....5.35 Cookaday Coil.....1.85 Unxid, 180°, Bakelite.....1.95 Columbia.....5.25
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<b>MISCELLANEOUS</b> Bell Socket, Bakelite Panel Mounting.....\$.69 Amso 6 ohm Rheostat......95 Amso 20 ohm Rheostat.....1.15 Amso 30 ohm Rheostat.....1.25 Amso 400 ohm Potentiometer 1.40 Cutler-Hammer 6 ohm Rheostat, Plain......95 Cutler-Hammer 6 ohm Rheostat, Vernier.....1.20 ELECTRAHOT Solder-Iron.....2.50 New Improved Cookaday Coil.....5.50 Pathé Pulsiformer.....\$8.50 New Improved Cookaday Coils, silk wound.....5.50	Cutler-Hammer 30 ohm Rheostat, Plain.....\$1.20 Cutler-Hammer 400 ohm Potentiometer.....1.20 Filikostat.....1.85 Bradleystat or Bradleystat.....1.70 Bruno 14 Tap Inductance Sw......70 Sta-put Phone Plug......35 Phone Plug for 6 pr. Phones.....1.25 Phone Plug for 2 pr. Phones......60 Single Circuit Jacks......35 Double Circuit Jacks......45 4" Dials, Fada Type......45 3" Dials, Fada Type......30 Triple Sockets, Fada Style.....2.65 Marked Eby, Bind. Posts, Ea......17 Ambassador Coil.....5.95	Shefton Midget Vernier.....\$1.40 Freshman Grid Leak & Cond. .75 Federal Sockets......95 General Radio 10 ohm Rheo.....1.20 General Radio 30 ohm Rheo.....1.20 General Radio Potentiometer, 200 ohms.....1.25 General Radio Potentiometer, 400 ohms.....2.85
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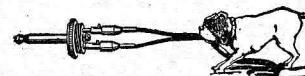
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# What's Wrong with Your Receiving Set?

## Chapter VII—Tuned Radio Frequency Amplification

By Peter J. M. Clute

UNDOUBTEDLY the most popular of all Radio circuits at the present time is that based on the so-called "neutrodyne" principle. The secret of this circuit lies in the elimination of all undesirable coupling between the different circuits in the receiver, and the reduction

of all electrical losses to an absolute minimum. Elimination of troublesome coupling is accomplished by the precise adjustment of small balancing or neutralizing condensers, by the correct regulation of the relative positions of the neutrodyne coils, and by the proper arrange-

ment and spacing of the wiring. The usual losses are reduced to a minimum by the proper choice of good construction materials. Before discussing the detailed operation of the neutrodyne receiver, it may be advisable to first consider in some degree the very appropriate subject of tuned Radio frequency amplification. The neutrodyne circuit provides a means of direct efficient cascade amplification on the

and audio frequency type make use of that characteristic of the vacuum tube which causes it to act as an amplifier of high frequency alternating current. A slight variation in the voltage impressed upon the grid causes a much larger proportionate increase in plate current. The tube detector functions as a relay in which the amount of current flowing through it from a local battery is controlled by the feeble impulses of the signal received. In a regenerative circuit, instead of applying the potential of the plate circuit to the grid of another tube, it is fed back into the grid circuit of the same tube so as to increase the grid potential. This characteristic of the tube is employed to good advantage in the amplifying circuits,

coupling between tubes, as is shown diagrammatically, in Figure 1. The resistance in the plate circuit should be at least equal to the internal plate resistance of the tube itself, while the resistance inserted in the grid circuit should be one megohm or more. The circuit shown in Figure 1 may be changed to a reactance coupling type by replacing the plate and grid resistances with choke coils having impedances at audio frequencies equal to the resistances replaced. Greater amplification is secured through reactance coupling than through resistance coupling inasmuch as the necessary potential drop across them is obtainable with much less loss of energy.

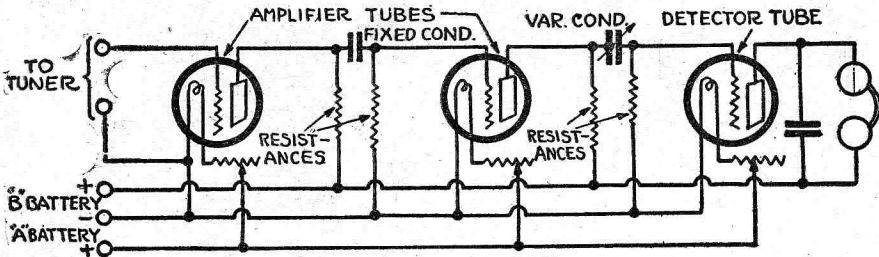


Figure 1

ment and spacing of the wiring. The usual losses are reduced to a minimum by the proper choice of good construction materials.

broadcasting wave lengths, and has been termed the perfect form of tuned Radio frequency amplification.

### Advantage of Radio Frequency

The chief advantage of Radio frequency amplification lies in the fact that it am-

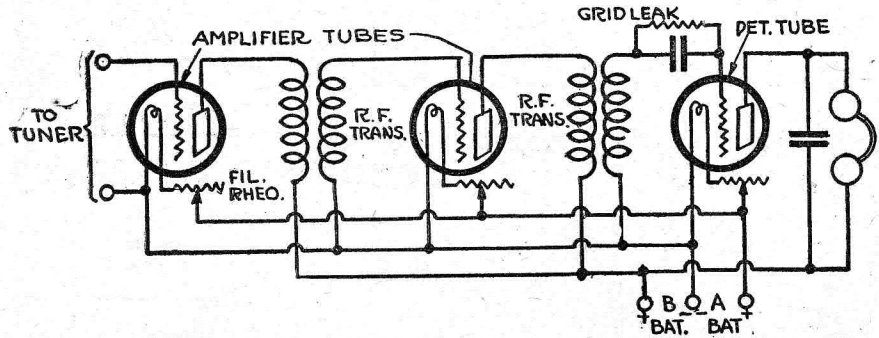


Figure 2

plifies only the wave and not the numerous slight irregularities existing in most receiving and amplifying equipment.

Amplifiers of both the Radio frequency

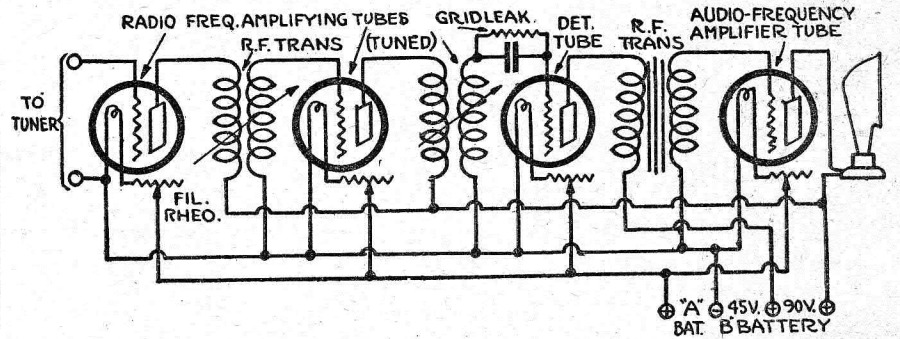


Figure 3

where the plate circuit of one tube is connected to the grid circuit of the next tube. By using one or more additional tubes, the incoming signals may be greatly increased in volume. Each tube has a certain value of potential impressed upon its grid and input circuit, and because of such relay action the potential is amplified and passed on to the next tube.

### Amplifiers

Amplifiers of the Radio frequency type are used in one, two or three stages. The simplest sort of Radio frequency amplifier is that which employs resistance

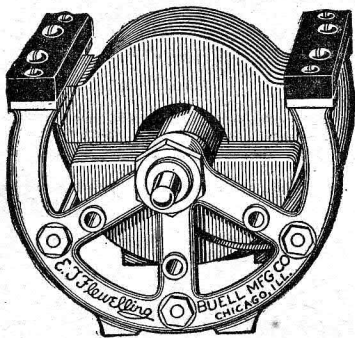
Transformer coupled Radio frequency amplification is shown in Figure 2. The Radio frequency amplifying transformer used for this purpose is designed for a particular band of wave lengths. It will not operate satisfactorily on wave lengths above or below its range. While the transformer coupling is the most common type in present use, its chief disadvantage lies in the fact that Radio frequency transformers are all definitely limited to a certain range of wave lengths. Furthermore, with such a transformer, there will be a particular point or peak at which

(Continued on page 21)

### RADIO TALKS

The use of a low resistance condenser or a low resistance tuner will so sharpen your tuning and increase your selectivity and distance ability as to make their selection a matter of vital importance.

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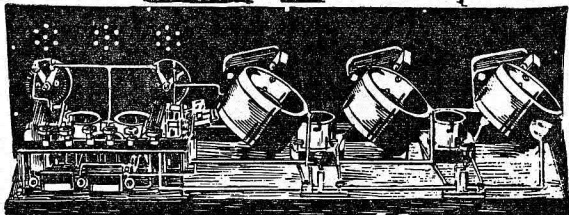
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| 3 Mahoganite Dials, 4 inch, engraved in Gold                   | 20 feet Bus-bar  |
| 2 gold plated Jacks  | 1 .00025 Freshman Grid Condenser                         |
| 3 genuine Hazeltine Neutroformers mounted on Comsco Condensers | 1 Tubular Grid Leak                                      |
| 2 Hazeltine Neutrodons   | 1 Set Engraved Binding Posts                             |
| 5 Bakelite Sockets   | 1 .002 Micon   |
| 1 6 ohm Rheostat   | 1 .006 Micon   |
| 1 30 ohm Rheostat  | All packed in an Attractive Box                          |

Additional Accessories

These accessories, added to the above list of parts, are ABSOLUTELY ALL THE PARTS NECESSARY FOR A COMPLETE SET IN OPERATING CONDITION:

- |                                      |         |
|--------------------------------------|---------|
| 5 Tubes (Type 201A).....             | \$17.25 |
| 2 45 Volt "B" Batteries.....         | 6.00    |
| 1 60 Ampere "A" Battery.....         | 10.95   |
| 1 Pair Phones, 3,000 Ohms.....       | 3.75    |
| 1 Antenna Outfit.....                | 1.50    |
| 1 7x24 Cabinet, Mahogany Finish..... | 4.95    |

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William Metzger, 623 Central Ave., Hot Springs, Ark.

"The set works fine, and picks up quite a few long distance broadcasting stations."

Elmer George, c/o Peoples State Bank, Wauseon, Ohio.

"I commend you for what you are doing to make Radio something that even the person in limited circumstances can afford."

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"I am perfectly satisfied in every respect."

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"I wish to thank you for your kind and courteous treatment, and to assure you that when I am in the market for any more Radio supplies, I will most certainly give The Radio Shack the first call, as any house that stands back of its guarantee in the manner that you do is worth doing business with."

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# 30 Minute A-B-C Lessons for Radio Beginners

## Chapter IV—What Radio Inductances Do

By P. E. Edelman

**I**N this series of articles the story of Radio will be told in so simple a manner that the uninitiated can follow theory and practice whether he knows anything about electricity or its application to broadcasting and reception or not. The series will consist of twenty-five chapters, of which the five next will be:

Chapter V—What Condensers Are Good For.  
Chapter VI—Uses of Resistance in Radio.  
Chapter VII—Essentials of Radio Electricity.  
Chapter VIII—The Key to Radio Circuits.  
Chapter IX—Radio's Cast of Characters.

**T**HE first thing noticed in most receiving sets is the coil or inductance which is used for tuning. Inductance coils are also used in amplifier transformers, headsets, and loudspeakers. Induc-

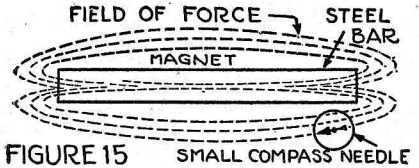
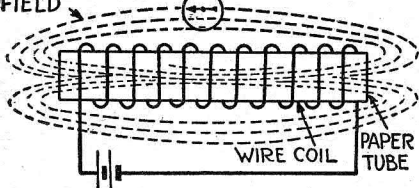


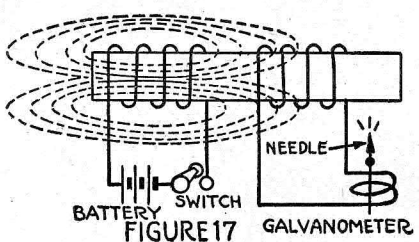
FIGURE 15 SMALL COMPASS NEEDLE



BATTERY ELECTROMAGNET  
FIGURE 16

tances serve important purposes in Radio. An inductance is like a springboard in that it can take up and throw back Radio energy.

Looking at Figure 15, an ordinary bar magnet is illustrated. A magnet, as is known, attracts or can pick up pieces of iron. One end of the magnet is called



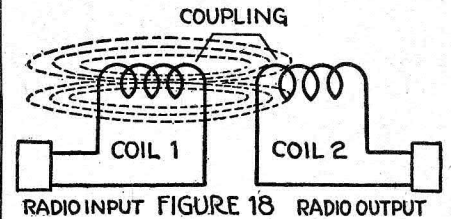
BATTERY SWITCH GALVANOMETER  
FIGURE 17

the north pole and the other the south. Invisible lines or a field of force extend from one pole of the magnet to the other. That this is so can be seen by moving a

small pocket compass needle near the magnet, for this needle will be moved and pointed by the force of these magnetic lines or field. A magnet sets up a field of force.

### Coils and Magnetism

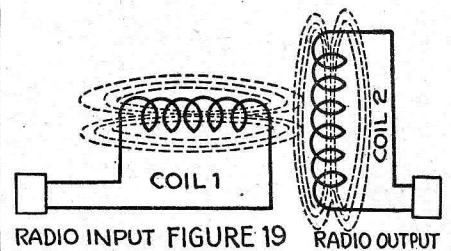
From Figure 16 it will be seen that a coil of wire wound on a paper tube can



serve as a magnet. Current from a battery through such an air core coil makes the coil act much the same as the magnet of Figure 15. A field of force is set up in and around the coil, and is called an inductance.

Now if a current of electricity through a coil makes it act like a magnet, what would happen if a magnet were thrown through a coil of wire? The reverse would occur and a momentary flow of current would be set up in the coil. Any time a magnetic field strikes through and cuts a coil of wire, a current is set up in the coil.

The various coupling coils, tuners, etc., used in Radio sets are often in the form of transformers, called couplers, vario-couplers, etc. In Figure 17, transformer action is shown. Suppose a second coil 2 is brought near coil 1, as illustrated in Figure 16. Then if a current from a battery is thrown through coil 1, a magnetic field of force is set up in and around it. Part of this field of coil 1 will, however, extend through and cut coil 2, thus

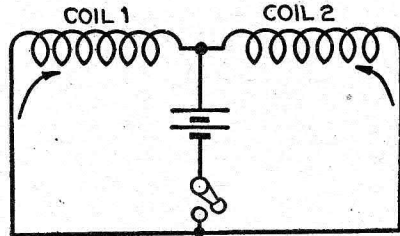


setting up a current in coil 2. The current in coil 2 will be set up according to the current set up in coil 1. If the battery current were sent through coil 1 in the opposite direction, a similar change of direction of the current set up or induced in coil 2 would occur. A galvanometer may be used to show this and comprises a

coil of wire whose field can influence a small compass needle. The induced current in the coil sets up a field and moves the needle.

### What Is Coupling?

The term coupling means in a sense the connection of a magnetic field of force between two coils. Though the two coils are electrically insulated, the field of force from one can cut the other, to induce a current in the second coil. The amount of coupling will be a maximum when the two coils are as close together as possible, and a minimum when they are widely separated or at right angles. This is shown in Figures 18 and 19. In Figure 19, two coils at right angles to each other have very small coupling so that only a weak

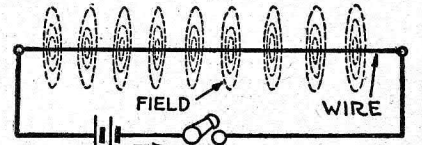


or negligible current is set up in the second coil by current through the first one.

### Transformer Action

The ratio of turns of the two coils may also be varied to affect the coupling, but usually this is done to change the ratio of the induced current and voltage. If coil 1 carries a changing current of one ampere and ten volts and has one hundred turns of wire, and coil 2 has the same dimensions, a current of one ampere, and ten volts will be induced in it when the coupling is close. But if the second coil contained two hundred turns, the current would be one-half ampere with twenty volts. In all cases, a steady direct current through one coil will not set up a current in the second coil. The current is always changing. A changing current

sets up a changing magnetic field. If the change amounts to a full reversal from one direction to another, it is called an alternating current. An alternating current or even a fluctuating current will set up a corresponding alternating or fluctuating field of force and can induce a sim-

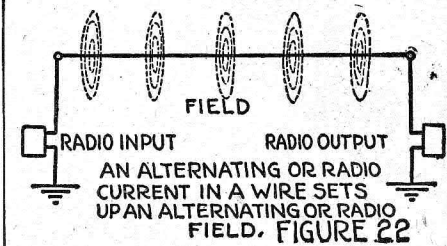


A STRAIGHT WIRE CARRYING CURRENT SETS UP A FIELD. FIGURE 21

ilar current in a second coil which is coupled to it.

If the input is Radio current, the output from the second coil will be Radio current of the same frequency. If voice current is sent through one coil, the second coil coupled to it repeats voice current.

If two coupled coils are each supplied with the same current as illustrated in Figure 20, the field of one will oppose the field of the other, and this can be arranged so that one field neutralizes the other.



A wire acts like a coil and has inductance. Inductance so far has been mentioned as in a coil. But a straight wire also has inductance. The longer the wire the more (Continued from page 22)

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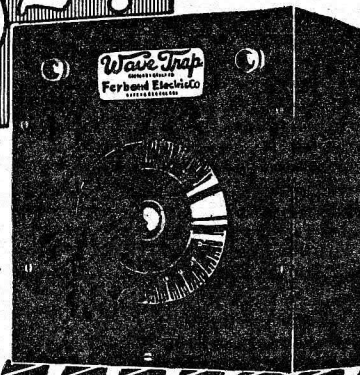
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by the St. Louis Post Dispatch in conjunction with the National Association of Broadcasters, who had charge of the tests. (See page 34, St. Louis Post Dispatch, Dec. 2, 1923.) This same hookup has been advertised extensively as the one which brings in stations 2000 miles overland on a loud speaker and one tube; and this has been demonstrated so often as to need no repetition.

Send a two-cent stamp for circular giving one, two, and three tube hookup, and price list of parts for this remarkable circuit. Address the

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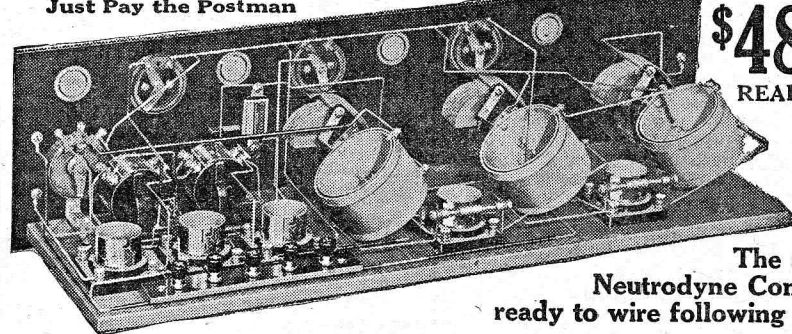
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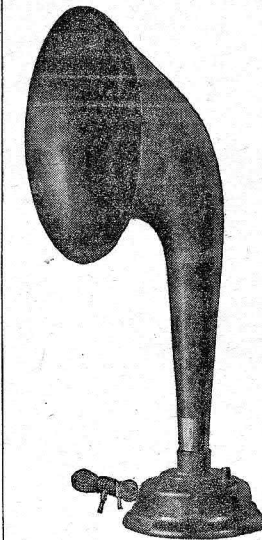
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TRIMM RADIO MFG. COMPANY Dept. 63, 24-30 S. Clinton St. CHICAGO, ILL.

62 PROGRAMS FOR EIGHT DAYS

Tuesday, April 8

CKAC, Montreal, Que., Can. (Eastern, 425), 4:30 p. m., Music; 7:00, Kiddies' stories in French and English...

Headliners of the Week

THE WORLD'S greatest trumpeter, Ernest S. Williams, will be heard Tuesday from WFI. Mr. Williams now a member of the New York Symphony orchestra...

wish it many happy returns of the day. Friday the Ostranders Plectral String Sextette will be heard via KFOA. A Plectral String Sextette is something exceedingly rare...

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:30 p. m., "Quincy," A. G. Hinrichs; 5:45, China...

Wednesday, April 9

CKAC, Montreal, Que., Can. (Eastern, 425), 1:45 p. m., Mt. Royal Hotel Concert Orchestra; 4:40 Mt. Royal Hotel Dance Orchestra...



Radiophans have a rare treat when they listen in on the Chicago Daily News Station WMAQ, on Saturday nights between 9 and 10 o'clock to hear the weekly Chicago Theater Revue...

Helen Dallam, winner of the second week of The Daily News music contest, is a member of the trio which will play her winning number, "Indian Legend," from WMAQ Thursday evening, April 10...

Mrs. Jesse Crawford (below) and the second keyboard of the Chicago Theater Mighty Twin organ. The two consoles are at opposite ends of the orchestra pit and the players in rehearsal, in order to attain the fine synchronizations required, use a private telephone line to communicate with another...

KGO, Oakland, Calif. (Pacific, 312), 8:00 p. m., II Trowatore; KGO Orchestra. KGW, Portland, Ore. (Pacific, 492), 11:15 a. m., Market basket; 12:30 p. m., Concert, Civic Music Club...

WDAP, Chicago, Ill. (Central, 360), 7:00-8:00 p. m., Drake concert Ensemble and Blackstone Quintet; 8:00-8:30, Ralph Emerson, organist; 10:00, Rosemary Hughes, voice; Wokreoy, Fred Agard, Jack Chapman's orchestra...

Bob Schaefer and His Entertainers, assisted by the Original Georgia Five; 9:30-10:00, Fletcher Henderson's Alabam Club Orchestra; 10:00-10:45, Shapiro Bernstein Music Co.; 10:45-11:15, Lorraine Society Dance Orchestra, Arnold Miller, leader...

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 6:15 p. m., Dinner concert, Pittsburgh Athletic Association Orchestra; 7:15, Address, representative Civic Club of Allegheny County; 8:00, Program, League of American Pen Women; 8:30, Concert...





Saturday, April 12

(Continued from page 17)

WEAF, New York, N. Y. (Eastern, 492), 4:00 p. m., Carolinians Orchestra; 5:00, Viola Sherwood, soprano; 7:00, Rata Present, pianist; 7:30, Janet Bush Hecht, contralto, Katherine Pitt Jones, reader, and Mr. Holland, violinist; 9:00, Program by Theta Chi Fraternity from Hotel Astor; 11:30, Vincent Lopez Orchestra.

Where to Hear Dramas

DRAMAS, humorous, serious, musical comedies and even operettas are broadcast during the week and below are the stations and dates.

Tuesday: KGO, "Il Trovatore," WGY, "HMS Pinafore," WGY, Light Opera Company. Thursday: KGO, "Kindling," KGO, Players; WGI, Radio drama, Boston Stage Society; WJY, Stockbridge Stocks, one-act play.

WAL, Northfield, Minn. (Central, 360), 11:00 a. m., Church services, St. John's Lutheran church; Nils Kleven, pastor; 8:30, Sacred program, Mrs. A. D. Stauffacher, soprano; Thonny Genevieve Felland, pianist; Mrs. A. E. Lippert, accompanist; Dean J. Jorgen Thompson, speaker.

Monday, April 14

CKAC, Montreal, Can. (Eastern, 425), 4:30 p. m., Sacred concert. KFI, Los Angeles, Calif. (Pacific, 469), 10:00-10:45 a. m., Church service by L. A. Church, Federation; 4:00-5:00 p. m., Vesper service by Federated Church Musicians; 6:45-7:30, Concert; 8:00-9:00, Concert presented by Ambassador Hotel; 9:00-10:00, Examiner concert; 10:00-11:00, Orchestra concert.

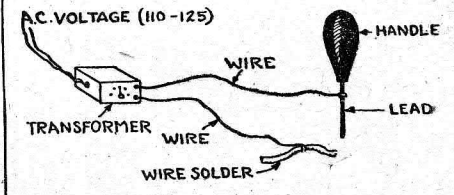
Bonnie Barnhardt's songs and bedtime story; 8:00-9:00, Paraphrase of Atlanta's 1924 Metropolitan Opera season, Signor Emil Volpi's operatic quartet, chorus, soloists; 10:45, Old Wheat Street Baptist Church colored quartet in dark spirituals.

Tuesday, April 15

KFKB, Milford, Kansas (Central, 286), 8:05 p. m., "Business Methods in Dairying," Prof. L. F. Cave; 8:05, "Marketing the Egg Crop," Prof. L. F. Payne; Mrs. William T. Miller, vocalist; Jessie Bogie, pianist; Charles Stratton, pianist; Lecture, Dr. J. R. Brindley.

Homemade Electric Soldering Iron

After borrowing my neighbor's soldering iron and blowtorch several times I decided I would not rely so much on his generosity but provide my own means of soldering connections. I procured a transformer whose output was from 14 to 25



volts, then I took a common lead pencil, some number 18 wire, some wire solder and the handle from an ice pick and constructed the soldering iron as follows: The lead was removed from the pencil and

put in the handle, then a piece of copper wire was wound around the lead, in a close coil 2 inches from the end. The other end of the wire was attached to one binding post of the transformer. Likewise a piece of copper wire was wrapped around a length of solder wire and the other end of the copper wire was attached to the other side of the transformer. Apply flux to the parts to be soldered, attach the lead from the transformer to the electric light socket and turn on either 14, 16, 20 or 25 volts, and you are ready to solder. Touch the pencil lead to the solder and allow it to heat until the solder flows. Do not touch the solder to the wire connected to the lead. A clutch pencil may be used if the wire is connected to the pencil and part of the pencil wrapped with tape for use as a handle, but the lead in such a pencil usually is small and breaks easily. —Edwin Rust, Phoebus, Va.





# Radio Digest

PROGRAMS  
EVERY WEEK  
Illustrated  
TEN CENTS  
REG. U. S. PAT. OFF. AND DOM. OF CANADA

Published by the Radio Digest Publishing Company, Inc.  
123 West Madison Street  
Telephone: State 4843, 4844, 4845  
Chicago, Illinois

E. C. RAYNER, Publisher

Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor  
H. J. Marx, Technical Editor M. W. Thompson, Associate Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square,  
New York; Telephone Bryant 4909, 10462

Member of the Audit Bureau of Circulations

58  
PUBLISHED WEEKLY

SUBSCRIPTION RATES

Yearly in U. S. and Possessions and Canada, \$5.00.  
Foreign postage, \$1.00 additional. Single copies, 10 cents.

Vol. IX Chicago, Saturday, April 12, 1924 No. 1

## About Patent Monopolies They Ask It but Do Not Claim Control

THE editor of the Record, Aledo, Illinois, has penned a few words that are touching in regard to those who would sell us the air within a few weeks if it is possible for them to corral the breeze. He says:

Aesop's fable of 2,500 years ago about the man who took the frozen serpent into his bosom to warm it to life only to be bitten by the riviving reptile is paralleled by the action of the American Telephone and Telegraph Company (the Bell monopoly) in suing under the patent laws to gain control of Radio broadcasting, and, logically, control of the entire industry as well.

Radio lay like the frozen serpent, unprofitable to monopoly, until the hundreds of thousands of Radio enthusiasts had popularized it; but, when the people have nourished the scientific wonder to vast business possibilities, a great corporation, like the serpent, would step in and sting them.

The great telephone monopoly seeks to gain control and then reduce the 500 odd broadcasting stations to 50. Its president says:

"The only body which can legally provide regulation is the congress of the United States. Whenever congress acts we shall gladly accept its regulations. We have no desire to control the air." And he goes on to say that when Radio became popular his company "arranged so that these inventions could become available to the public by purchase of apparatus at reasonable prices."

But lawyers suing for the telephone monopoly under the patent laws are quoted as saying:

"That's what patents are for—to obtain monopolies." The United States patent law was made to encourage invention, not to create monopolies. But when patents are used to breed monopolies to feed on the people that gave these very patent laws, then the servant becomes greater than the master, and it becomes the duty of congress to step in.

Monopoly needs only the entering wedge. Control of broadcasting by the American Telephone and Telegraph company logically would lead to nothing but ultimate control of the entire industry, unless the company that constantly is fighting for increased telephone rates all over the United States is sprouting angelic wings in Radio alone.

Although its president says the telephone company has no desire to control the air, even potential control under the patent laws is too vast a power to give to a corporation with a capital of \$750,000,000 and \$2,000,000,000 of assets. As the newest method of democratic expression, the people cannot afford to give to one company the virtual censorship of its broadcasting.

The whole idea of Radio control is tainted with possibilities of absolutism more vicious than rule of oriental potentate. The absolute monarch's own personality limits his capabilities for good or evil. But in the eyes of science, Radio knows no limit. And knowing no limit, the people cannot afford to see it monopolistically controlled.

## Fishing Holds More Interest

Breaking into the Unknown Is Where You Get the Thrills

ONE ardent Radiophan claims that he has but recently heard the latest in Radio—neutrodynes, superhets and all the other hyfaluten sets and claims the whole darn Radio business is becoming too perfected and certain for real enjoyment.

Radio has two classes of followers—masters and fishermen. One gets the sense of power and dominion that comes with exact, certain results. The other is a gambler, subject to the laws of chance, as surely as the angler casting a fly or plug into unknown waters.

Fishing would be a dull pastime if we got a strike every time we tossed a baited hook into the river or lake. There is no fishing thrill like the strike that comes after hours without any results at all. What the sportsman wants to know, in advance, is the size of the fish he has hooked. Land him first, then learn.

Often all of us wish we could know the future—rend the mysterious veil and learn what is in store for us. But how drab and unexciting life would be if the future were not unknown, uncertain and mysterious in its possibilities.

## RADIO INDI-GEST

### "G-Bye"

Oh Radio! My Radio!  
You gotta go. I told you so.  
The wimmen just won't lissen where  
They can't talk back, so have a care;  
The hand that smashed the demijohn  
And plucked the apple at the dawn  
Now turns "thumbs down" on you and so  
You gotta go. You gotta go.  
Oh Radio! My Radio!

CACTUS JACK.

### Yes, if You Jump off the Woolworth Building

Dear Indi: Being a jeweler, I have noticed that my tweezers often become magnetic. When I throw them to the floor so that their points stick in the wood floor, the magnetism disappears.

Having noted this, I, as a Radiophan wonder why it wouldn't be a good thing for Radio if the idea I am about to propose would work. I am often troubled by body capacity. Now, what I wonder is, if I were to jump on the floor from some height, hitting the floor with my feet first, whether or not this scheme would knock the body capacity out of me?

I. D. CLAIRE.

### Dedicated to Doc Marx, Tech. Ed.

Dear Indi: There's Harry Marx, the Radio fiend. In fact he's the worst I've ever seen. Why, he'll take a wire or two you bet, and make a box he calls a Radio set. He'll sit up all night till break of day, listening to what the birdies say.

SIMPSON JINX.

### Mrs. Partington Says

Dear Indi: Mrs. Partington says she listens to lots of places none of the Radio maps shows, and the pronouncers are not all Static and Clear like K. D. and K. A. at Mr. Westings House, or Mr. Wm. C. at Memphis, who is alright only too close to the wharf so steamboat whistles bother some.

She heard one pronouncer say he was in Cuba with some twin Cuckoos, and specs if they would own it they had some Cane Juice too. Another one says he is where all the Rivers meets all the Railroads, and one says he is in WATCH-AR State, and he's from Missouri, but she can't show him; others are where the West begins, while another keeps on waving from Lake Erie someplace.

Several places talk in Dago, and there's one foreign place sounds like J-a-w-g-h-y-u-h-h, and she would love to know where it is at. She wants you should have Ran & McNulty get out a newer and correcter map of Radio so listeners can tell who they are listening at.

SIGNING OFF.

### The Radiophan's Lament

Since Radio has come to stay, I think I'll buy a set. There are so many kinds I really don't know what to get. Now Brown just bought a Souperdyne, he says it can't be beat. And Jones who has a flookerdyne lives just across the street. The Sockadyne and Bulladyne are two that I could buy. So how in heck am I to know just which one I should try.

Now the Floozee circuit just came out, they say it is a dream. While Cockadoodle claims that he employs the better scheme. There is a circuit called the Flew, still it's not a disease. The man who made it claims that it's the best one if you please. As long as I have got the bug, I will not try to stall. But buy enough accessories to make and try them all.

I hope some day inventors will relieve me of my plight, And not change over circuits in just a single night, These hook-ups drive me nutty, I think and then I purr, I feel just like a squirrel, and believe I'm growing fur. So if they don't stop changing these circuits every day, I'll land right in the "Booby Hatch" and that's where I will stay.

BURT B. BARSOOK.

### Puzzle: Find the Customary License

Dear Indi: I submit a problem for Indi-Gest readers: Mr. A bought a dog from Mr. B, paying a dollar for it. Mr. B sold the dog to Mr. A because he (the dog) howls.

Now since the transaction Mr. B has been trying to make Mr. A pay him another dollar because other people (C, D, E, etc.) hear the dog howl.

Problem: Find out if Mr. B is related to the American Sissity of Composers, Ink-Slingers and Tin Pan Alleyites, or might it be that he is the secret agent of the Amer-Ash-Can Telefunny company. If not, why don't he join?

INS. U. LATON.

### We Award You the Porcelain Switch Point

Dear Indi: Have heard enough of these long distance records from these "armature" braggers. I've a real one. I just let the waves keep wasting their way encircling the globe until I get ready to pick them up, probably a month or two later. Then I tune in and get any program I want to hear for that time back. Do I win?

BLEW A. BOTTLE.

### How'll Soozzee Do, Noa?

Indi, darling: "Can I cook?" You bet I can! Strawberry shortcake and everything, Yum, yum! The important question is not, "Can I cook?" but "WILL I COOK?" I simply MUST see Noa's photograph before answering. Isn't it dear of Noa to offer the EXCLUSIVE use of his receiving set on Sunday nights? Of course the other six nights I wouldn't want it *exclusively*. An hour or two each evening while he washed the dishes and vacuum cleaned the ark would be enough for

UNSELFISH SOOZZEE.

P. S. Confidential. Indi, be a dear, and tell me if Mama H. is my only rival. Pleeze, Indi. (No, Soozzee, we've received tons of mail for him in feminine handwriting.—Indi.) S.

## "King Telephone" Holds Court



## Condensed

By DIELECTRIC

Whenever we suffer a severe snow or sleet storm the blessings of Radiophony are emphasized. With telephone wires down and the telegraph lines unable to function, trade and traffic are paralyzed—unless we have access to a broadcasting plant. In case of another serious winter storm in the vicinity of Chicago local broadcasters are organized to transmit train dispatchers' orders, so as to facilitate the movement of all railway carriers. Outside news may reach isolated sections and they in turn broadcast conditions, by the aid of Radiophony.

It begins to look as if the plan to have a "few" broadcasting stations serve the entire Radio public in this country was on the way to realization. At least, this may happen unless something can be done about it. With the recent move on the part of the A. T. & T. Co. in mind, we listeners should begin to sit up and take notice. Are all set owners satisfied to tune only to a limited few stations and accept what they may choose to offer? Requests for financial support of the Music Fund have already started some to thinking. Pay as you hear. Yes?

The subject of a universal language for use in broadcasting has occupied the attention of many interested in international communication by Radiophony. It is still being discussed. Just now I believe Esperanto to be the only language actually employed in this manner. A recent adoption of Esperanto for conveying speech intelligible to other nationals was that by the Czechoslovakian Radio service, when M. Pitlik, Minister of Commerce, spoke in the language. Perhaps we will have reports on the number of listeners in who understood him.

In New York city, as nowhere else in the world, the public school system is being brought to the attention of its citizens through Radio broadcasting. Station WJZ is employed in giving to all listeners opportunities of hearing pupils go through their class room work, which educates the public to appreciate what is being undertaken for the welfare of their children. Superintendents of the various departments of the Board of Education take this means of acquainting the public with their aims and methods. It is a timely and commendable innovation.

Mr. Sarnoff, vice-president of the R. C. A., while addressing the conference in Washington on Radio control, suggested that the day was coming when all radiating receiving sets would be under a ban. No set capable of creating interference could be sold. Why wait? Many manufacturers have recognized the sales value of non-radiating sets with the result that this feature stands out in their advertising. You, the public, are coming to demand that your set shall not be a public nuisance, nor the one your neighbor buys. The thing will right itself.

Pathologists have affirmed the usefulness of Radio in certain forms of disease, such as tuberculosis, neurasthenia and some others, but nowhere have I seen prescribed the proper form of Radio entertainment for those suffering a nerve breakdown due to spending too many late night sessions at the dials. A United States army captain wandered from Fort Omaha to Fort Ontario while suffering from aphasia, and his wife explains the case by attributing to him such a passion for Radio as caused him to neglect sleep. When will the million others collapse?

# What's Wrong with Your Receiving Set?

(Continued from page 11)

it will work best. In other words, the transformer will be more efficient at the frequency to which it is nearest in resonance than it will at any of the other frequencies it passes. Hence, there will be a gradual decrease in signal strength as soon as station wave lengths on either side of this resonance point are tuned in. Using taps on the transformer windings to regulate the peak will not remedy matters to any great extent, because the resulting dead end losses may be disadvantageous to DX reception.

### Tuned Radio Frequency Amplification

This leads to the most satisfactory method of accomplishing these results, namely, "tuned" Radio frequency amplification, a typical hook-up being given in Figure 3. With such a system, each of the circuits can be tuned into resonance with the wave being received. Thus there is obtained not only the maximum possible amount of amplification, but also the maximum energy transfer between stages, and

at first be supposed. If the receiver will not work exactly as desired, it is only necessary to do a little tuning with the transformers to bring them up to the proper position of resonance.

### Weak Signals Strengthened

It will be well to remember that unless the incoming signals are strong enough to work the detector alone, no amount of audio frequency amplification will enable the listener in to hear them. If, however, Radio frequency amplification is applied, weak signals will be amplified to sufficient strength before reaching the detector tube. Thus, the Radio frequency transformer and amplifier perform their functions before the detector tube gets to work. The signals conducted to the detector are at Radio frequency, and by doing this it is possible to tune in a station whose signal may be so weak that it would not work the detector alone. By passing such a signal through several stages of Radio amplification, it may be possible to make it sufficiently strong for the detector to perform its function so that the audio

In the preliminary tuning, the dials are adjusted so as to bring in certain stations operating on definite wave lengths. The readings of the dials are then recorded for future reference, or the settings for a number of stations are plotted on a curve sheet, with the dial setting as abscissa and the wave length as ordinate. This so-called "graphical selectivity" makes the operation of a tuned Radio frequency receiver almost an automatic procedure, once the calibration charts for the various tuning dials have been made. It is only necessary in most cases to set the coupling dials in their recorded positions and effect the requisite fine tuning in the antenna circuit.

This discussion of tuned Radio amplification and its method of tuning leads us directly to the so-called neutrodyne circuit, which is simply a refined adaptation of that type of Radio frequency amplification. The succeeding article will take up in more detail, Professor Hazeltine's remarkable development.

(TO BE CONTINUED.)

In most cases it is not practical to use three stages of audio frequency amplification.

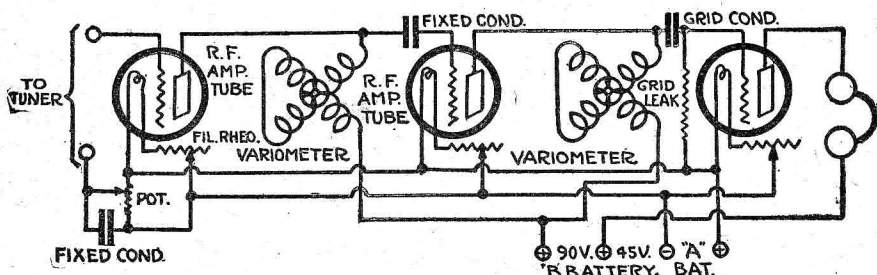


Figure 4

the greatest selectivity. By tuning these transformers, signals can be obtained at the height of their intensity, which is more than can be secured with the straight transformer coupled type. Tuning in this way also eliminates the dead end loss present in the tapped variety of transformer.

Transformers used for tuned Radio amplification may be made from a regular variometer with its rotor and stator windings separate. There is thus supplied a regular transformer with the rotor as primary and the stator as secondary. By revolving the rotor within the stator, the characteristics of the transformer are so changed that it may be tuned as desired. A small variable condenser connected across the rotor or primary winding will be found of great assistance in tuning and will make possible the fine variations in adjustment, which it is difficult to secure with the straight tuning of the Radio frequency transformer.

Employment of tuned Radio amplification, in which each stage will have to be tuned separately, results in more controls to manipulate. However, this control complication is compensated in some degree by the good results obtained with this type of amplification. A little experience with the various controls will demonstrate that the operations involved are not as complex or difficult as would

amplifiers will be able to perform their duties.

The addition of fixed Radio frequency amplification, while making the weak signals louder, also brings with them a multitude of whistles and squeals. Whenever the antenna tuning dial is moved such noises will be heard, each representing some station whose carrier wave has been amplified until it is of sufficient strength to cause the detector to function. Stations which are normally beyond range can thus easily be brought in by using Radio frequency amplification. With the tuned variety of Radio amplification most of these bothersome whistling noises may be eliminated, because the circuits are tuned into resonance with only the wave it is desired to receive. It is in this way that maximum selectivity is obtained. Each stage is so tuned as to allow only those waves to pass through that are in exact resonance.

### Control Adjustments

The interstage coupling of a Radio frequency amplifier may be made simple or complicated as best suits the fancy of the builder. Obviously, the more control adjustments employed in tuning between stages, the more accurate it will be, although such fine adjustments call for very delicate manipulation. Figure 4 illustrates a tuned Radio amplification hook-up, employing ordinary variometers for coupling between stages. Variometers de-

signed to cover the range of broadcasting wave lengths should be used for this purpose.

Referring to Figure 4, it will be observed that the plate battery is connected to one coil of the variometer and not directly to the grid terminal of the vacuum tube. If the latter connection were made, the entire potential of the B battery would be impressed across the filament and grid of the succeeding vacuum tube. With such a connection, the tube would cease to function. A fixed bypass condenser connected in the grid circuit as shown in the illustration, will allow the Radio frequency currents to pass and will prevent the current from the plate battery from reaching the grid circuit.

Perhaps, the greatest advantage offered by tuned Radio frequency amplification lies in the fact that each dial used for interstage coupling can be calibrated for wave length settings. This holds true, not only for the modified variometer coupling shown in Figure 3, but also for the straight variometer interstage coupling illustrated in Figure 4. Obviously the relative position of the dial on the shaft and the rotor of the device must remain unchanged.

## Steinite Gives Distance On Crystal Sets!

Steinite Laboratories, Kansas City, Kans., Jan. 22, 1924.

My Sister-in-law, Leavenworth, Kans., wrote me:

"My nephew was listening on Radio when the announcer said this is WDAP, Chicago. The kid nearly had a fit. While listening to the second selection another voice was heard and we tuned that station, KDKA, Pittsburgh. The next night we received KFKY, Hastings, Neb., and WQAW, Omaha. The next night we picked up WAAD, Cincinnati, and WLAZ, Warren, Ohio."

For those who doubt reception of long distance, this set was located about two miles from center of town and there isn't any kind of a Radio within a radius of one mile of this set.

J. J. Appleton

Manufacturers of the Famous Stein \$10 Tube Sets, Long Distance Crystal Sets \$5, Stein Wave Trap \$5, and Stein Two Stage Amplifier \$12.50. FREE descriptive literature on request.

These two big Atchison banks will testify to my reliability: Exchange National Bank, Atchison Savings Bank. Don't delay the radio treat in store for you. Order Three STEINITE crystals today—NOW. None genuine without letter S stamped on side.

**STEINITE LABORATORIES** Dept. 9; Radio Bldg., ATCHISON, KANSAS.

RESULTS truly amazing. Every-

one astonished by STEINITE. R. A. Cozard, Jr., K. C., Mo., says: "I Got Dallas, Chicago, Schenectady, Pittsburgh and Cleveland. H. Harryman, Opdyke, Ill., says: "I have heard 26 stations; most distant KDKA—WSB—WQAW—WQAF and WGY, Schenectady, 825 mi." A. C. Daly, Memphis, Tenn., says: "I tuned in on Omaha, Dallas, Jefferson City, Mo." H. Lapsley, Council Bluffs, Ia., says: "The second night I got KDKA, E. Pittsburgh."

You can't doubt your own ears. Listen in on STEINITE at my risk. Read my guarantee and offer—then act.

### Introductory Price

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STEINITE is no ordinary crystal. It's an entirely new discovery. Opens up new possibilities for crystal set receivers. STEINITE CRYSTALS are being imitated. None Genuine Unless Stamped

### My Money-Back GUARANTEE

I unreservedly guarantee STEINITE to give you better results than you ever thought possible on your crystal set, and if you are not surprised and more than pleased I will send back your money without any question.

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<b>A New Simple Way to Build a Neutrodyne Set</b>		
We give you the entire set completely wired in a Genuine Mahogany Cabinet, with the exception of the Neutroformers and Neutrodrons, which we supply and you mount yourself, for the <b>\$55.00</b> low price of.....		
<b>ABSOLUTELY GUARANTEED</b>		
<b>\$80 Freed-Eisemann Parts for 5 Tube Neutrodyne Set. K. D. 50..... \$65.00</b> None Shipped C. O. D.	<b>A 5 TUBE NEUTRODYNE Set, wired complete in a Mahogany Cabinet with Genuine Fada Parts..... \$85.00</b>	<b>EXTRA SPECIAL!!!</b> <b>\$120 Fada 4 Tube Neutrodyne Set No. 160... \$95.00</b> None Shipped C. O. D.
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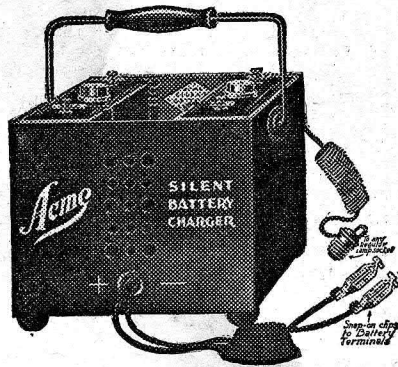
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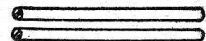
**THIRTY MINUTE A-B-C**

(Continued from page 13)

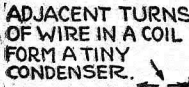
inductance it has, so you will see that in a sense inductance is a length dimension. When current is sent through a wire as illustrated in Figure 21, a circular field of force is set up around the



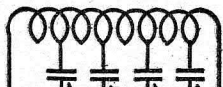
TWO SEPARATE PIECES OF METAL FORM A CONDENSER. FIGURE 23



TWO SEPARATE WIRES FORM A SMALL CONDENSER. FIGURE 24



ADJACENT TURNS OF WIRE IN A COIL FORM A TINY CONDENSER. FIGURE 25



TINY CONDENSER EFFECTS FIGURE 26

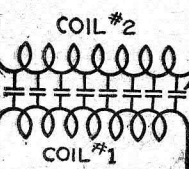
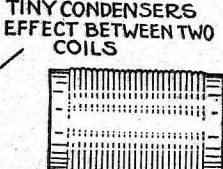
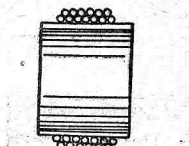


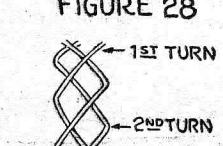
FIGURE 27



A SINGLE LAYER COIL FIGURE 28



DOUBLE LAYER COIL FIGURE 29



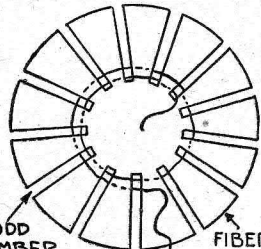
REDUCING COIL CAPACITY FIGURE 30

wire. If a fluctuating or alternating current supply is used, a similar field is set up. The distance at which such a field can be detected depends on the power used. The field set up by an ordinary low frequency power line can be detected vigorously up to, say 100 feet from the wire, but if the wire were carrying high or Radio frequency current, the field set up could be detected much further.

If a Radio current, Figure 22, is carried by a wire, a rapid Radio field is set up around the wire. If the wire is ar-

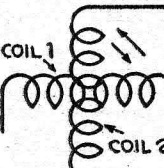


HONEY COMB COIL FIGURE 31

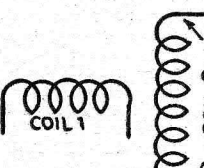


SPIDER WEB COIL FIGURE 32

ranged as an aerial, part of this field will be thrown off as waves. Inductance is practically never found

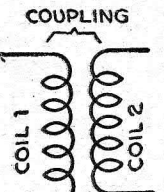


VARIOMETER FIGURE 33

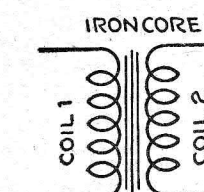


VARIOCOUPLER FIGURE 34

without a condenser effect termed capacity. Two pieces of metal separated, form a condenser, as illustrated by figure 23. These two pieces of metal could be two



TRANSFORMER AIR CORE FIGURE 35



TRANSFORMER IRON CORE FIGURE 36

wires as in Figure 24. The two wires might even be two successive turns of a coil, to form a very tiny condenser. Any

such condenser acts as a temporary storage package or little tank for electrons.

**Condenser Effects in Coils**

A coil, as in Figure 26, acts at Radio frequencies as though it had a number of tiny condensers connected. This is spoken of as the capacity effect of the coil. In Radio apparatus using coupling coils there is also a capacity effect between coils. This is shown in Figure 27. For instance, there is a marked capacity effect between the primary and secondary windings of most transformers used in Radio sets.

The single layer coil, Figure 28, is popular in Radio receivers because it is simple

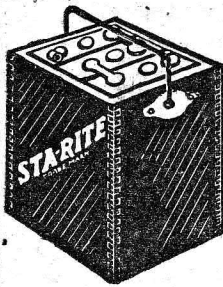
to make. It has a very small capacity effect. When two or more layers are wound, Figure 29, there is a large jump in the capacity effect. Capacity effects are usually not wanted in Radio inductances so various special forms are made to reduce capacity. Thus, Figure 30, one turn is wound on so that it will not be in direct contact with the next turn. There are various windings called honeycomb, basket ball, sine, curkoid, etc., designed to minimize capacity effects.

Figure 35 shows a honeycomb coil. A similar coil called D. L. or duo-lateral, alternates the spacing of successive lay-

(Continued on page 24)

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# Re-Radiation Interference with Radio Reception

## Single-Circuit as Well as Two-Circuit Sets Offenders

By S. M. Kinter

**I**NTERFERENCE, its causes and results, is now a most popular topic of conversation among Radiophans. Interference from one cause or another has been experienced by every Radiophan, but few of them know the real reason for this trouble and how to take measures that will assist in reducing it.

These interferences are caused by: Another broadcast transmitting station so close or so powerful as to make it difficult to "tune out"; another transmitting station operating on a wave length so near to the one being received as to cause interfering beats at a beat frequency which is sufficiently low to bring it within the audible range; a nearby amateur transmitting station operating on a spark set, or an A. C. tube set; atmospheric disturbances, called "static" and particularly apt to be present during the summer months, and the interference caused by "birdies" so-called on account of their supposedly bird character of sound. While there are times when quick "tweet" sounds may be heard, I have always thought that the "howling of winter winds" or the "wail of lost souls" was more truly descriptive of the sensations produced by this type of interference.

### Tuning Interference

As "birdies" is the interference produced by one listener with another I will direct your attention to it in order that you may better understand the cause of it and adopt a plan of tuning which will cause you to interfere with your neighbor as little as possible. Remember that a Radio listener tuning in late on a program can be just as much of an annoyance to those near him as can one arriving late at the theater in the middle of an act, carelessly stumbling over things and making a lot of unnecessary noises while finding his seat.

An antenna at a receiving station re-

radiates a certain part of what it picks up. This is true, in varying degrees, of all such antenna. When, however, one permits their detecting tube to oscillate, which is done by too much tickler, the radiating tendencies of their antenna are increased many fold. When the tube is oscillating the receiving station becomes a transmitting station, sending out waves of frequency at which the tube is oscillating.

### Tube Oscillation

As the tube oscillation frequency is controlled by the tuning of the set, it is apparent that when the tuning of the set is changed while the tube is oscillating, the radiations sweep over that band of waves just like the note of a siren is changed as its speed is altered.

This sweeping across a wave to which someone else may be listening causes this kind of interference with them, if they are within about a mile of the offending party. In the majority of instances the operator of such a set is unaware that he or she is causing such disturbance.

It is hard to believe that anyone would knowingly drag across the various wave bands to find the beat of the carrier wave of the desired station any more than one would drag their arm over the heads of the occupants of seats in a theater in order to more easily find an empty one. Each act is equally rude, although the Radio tuner may for a time be excused on the score of ignorance.

The care that need be exercised in tuning to avoid annoying your neighbors depends upon where you live. If you are in the country where Radio receiving sets are miles apart, little or no thought need be given to this as a possible cause of interference with some one else. If, however, you are in a city where there are many Radio receiving sets near you, you should, as an act of courtesy and consid-

eration, use every care against tuning while your tube is oscillating.

### Two Things Necessary in Tuning

You will want to know two things in your efforts to carry out such a plan of tuning: How to know when your tube is oscillating and how to find the distant station. This whole practice is associated only with hunting such, without the tube oscillating.

You can always tell when your tube is oscillating by a peculiar change that takes place at the beginning of oscillations. There is a slight swish or rustle as the tickler reaches the oscillation position, and it should be backed slightly below this point.

Your search for the distant station should always be made with the tube near to, but always below, the oscillating point and the tuning can then be done with no inconvenience to anyone. You will recognize the distant station by the sounds of the music or speech, if in operation, or by a slight noise of the transmitter if you chance to hunt it during a quiet period but with the normal antenna radiations unmodulated going out.

### Two-Circuit Sets Not Immune

There is a mistaken popular impression that the single-circuit sets are the real offenders in this trouble and that sets having two circuits are immune from it. Such is not the case, as repeated tests have shown. A two-circuit receiving set with the tube oscillating in the second circuit, when properly adjusted to receive the maximum strength of signals, will act as a radiator of signals to just the

same extent as the single-circuit set. That such a condition should be expected, is apparent when we remember that the largest and most powerful transmitting sets are constructed with two circuits arranged in exactly that manner.

The advantage of regeneration in the antenna is very great in attaining distance and, if kept below the oscillating point of the tube, causes no disadvantage to others.

The British broadcasting service was started with a strict prohibition of regeneration, but it was soon found that this imposed a hardship that was unnecessary and at present regeneration below the oscillating point is permitted.

The particular point that I desire to make, is that the practice of hunting a distant station with the tube oscillating is impolite and that there is no difference in this respect, between a single and a two-circuit set.

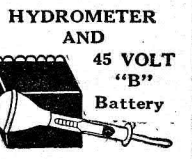
### Inefficient Tube Sockets

Beware of the tube socket with no name on it. With some of the low price receptacles, the resistance between the grid and the filament connection posts has been measured and found to be as low as .5 megohm. The leakage through such a socket quite often makes a set inoperative.

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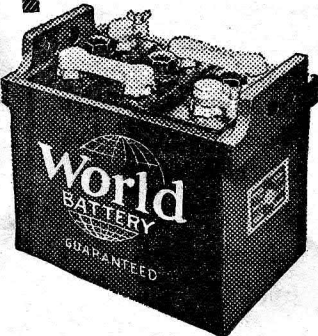
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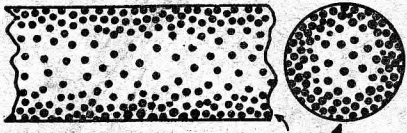
**THIRTY MINUTE A-B-C**

(Continued from page 22)

ers. An easily constructed coil is the spiderweb, Figure 32. It is wound on a disc with an odd number of slots. Successive turns come on opposite sides of the disc.

**Variometer and Variocoupler**

A variometer is a name for two coupled



CROSS SECTION OF WIRE. HIGH FREQUENCY CURRENT CROWDS TO OUTSIDE OF WIRE. FIGURE 37

coils which are connected together. The inductance is varied by turning one coil with respect to the other so that the fields of each coil aid or oppose. Variometers find much use in so-called regenerative sets which require a variable inductance. A variocoupler is much the same but has the two windings separate for use in different circuits. Such circuits are said to be coupled magnetically, and dials are arranged to adjust the position of one coil with respect to another. A split variometer is simply one in which a tap is taken out between the two coils.

The coupled coils, Figure 35, form an air core transformer. Such transformers

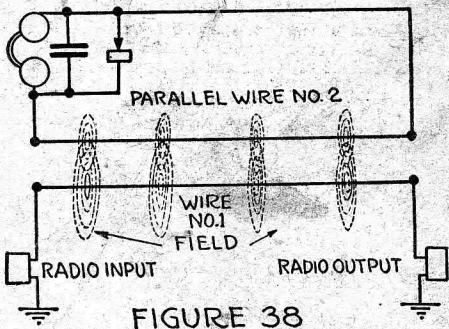


FIGURE 38

are used for connecting Radio amplifiers. The coupling is said to be close or tight if the two coils are close together, and loose or weak if the fields of the two coils are much separated. Transformers for audio frequency currents usually are wound on iron cores. This is done to in-

crease the inductance as the presence of iron increases the magnetic field concentration set up by the current in the windings. This increase is very considerable. In order that the iron itself may not act as a coil of wire and absorb current by induction, the iron used is made up in thin sheets or laminations which are cut as little as possible by the field, and alloys such as silicon steel are much employed to further reduce the current which can be set up in the core itself. In Radio transformers, powdered iron or tissue thin sheets must be used if iron is to have any effect at Radio frequencies, as desired.

**High Frequency Current on a Wire**

Whereas direct or low frequency current goes through a wire by pushing the electrons instantly, a high or Radio frequency current does not go through the whole wire but only the outside shell of it. As fast as the high frequency starts through the wire it is pushed out again,

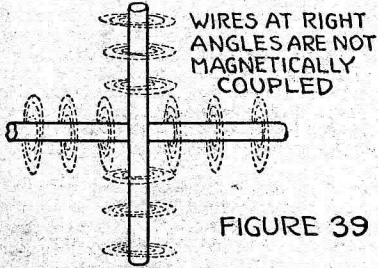


FIGURE 39

so must flow at the surface layer. This is clearly shown in Figure 37.

Parallel wires act much like coupled coils, in that a current in one wire, Figure 38, sets up a current in the other. Sometimes nearby electric wires induce steady or momentary interference or transient currents in Radio apparatus, and that is why listeners can hear power line hum, signal buzzers, elevators motors, etc., in some localities. When the two wires cross at right angles as in Figure 30, the effect is minimized and that is why it is well to locate an aerial on this principle where possible in a locality where a nearby power line may induce such current on an adjacent aerial wire.

**Self Inductance, Impedance**

If a coil can induce current in another coil near it, it is reasonable to expect that a coil can in a sense induce current in itself. In circuits, a single inductance coil often has such an effect, which is called "self inductance." In such cases a coil is used as an impedance for temporary storage of Radio energy much as one stores mechanical energy in a clockspring.

When the current goes through the coil, a field is set up, but when the field collapses back on reversal of the current, a counter current is sent back on the coil.

The practical unit used to express values of inductances in Radio, is the microhenry, or MH.

"What Condensers Are For" will next be taken up in this series.

(TO BE CONTINUED.)

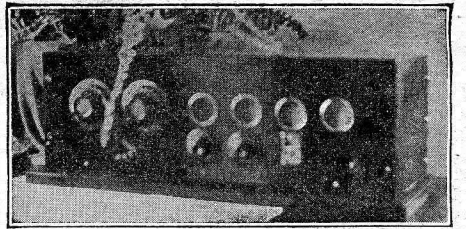
**Proper Connections**

If capacity effects are noticed in tuning with an antenna condenser, try reversing the leads from this condenser. If a condenser is used in the ground circuit, the rotor (movable plates) should always be connected to the ground wire.

**Reverse Tickler Leads**

In any type of regenerative set, where proper regeneration does not seem to take place, it is frequently advisable to reverse the wires that run to the tickler coil.

**Biltmore Reflex**



THREE THOUSAND miles on the loud speaker, without outdoor antenna, or loop. This is what the Biltmore Reflex is capable of. But a few feet of concealed wire and a ground connection are all that is required. Actually, the results are better than those obtained on the eight-tube super-heterodyne.

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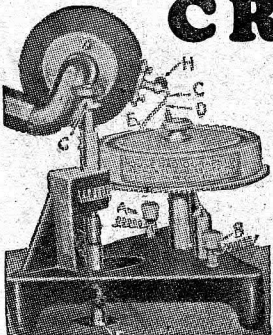
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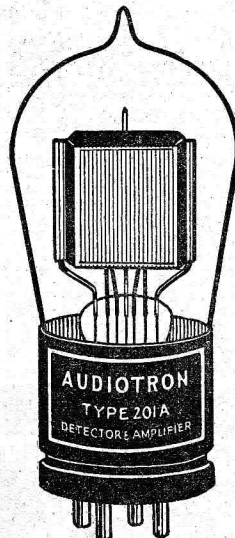
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# Selection of Sets Having Desirable Hook-Up

## Part I—The Fallacy of Trick Circuits

By Thomas W. Benson

IT IS customary to start an article by stating the reason for its being written and this is a very logical start. I have hundreds of reasons for writing it and they are the seemingly endless stream of trick circuits published in the Radio magazines at the present time. My purpose is to prove the fallacy of these circuits and point out a higher and better aim for the misguided enthusiasts who swallow these circuits, hook, line and sinker.

Now get this straight. There are two forms of trick circuits, the regenerative circuit and the super-regenerative. Of the latter we have the basic Armstrong circuits which include the Flivver, two-tube and three-tube circuits as well as the Autoplex, there are the Flewelling modifications and the little known Logwood. We have no argument with them but with the trick straight regenerative circuits that are daily appearing we will deal and show the fallacy of testing every change that man's mind can conceive.

### Regenerative Circuit

The principle of regeneration is fairly well understood, basically it means feeding some of the energy from the plate circuit back into the grid to be reamplified. All well and good, we also know that this process carried to excess results in the tubes breaking into oscillations and destroying the signal. Therefore, we can carry regeneration only so far and when that limit is reached the tube will do no more. Briefly, then, you can get so much regeneration, and when it is exceeded, the circuits act as an oscillator instead of detector-amplifier. Then why bother trying this and that circuit, searching for the wonder circuit, when any old regenerative circuit, the simpler the better, will give you all the amplification you can get out of a tube if proper attention is paid to the design and arrangement of the apparatus?

### Design and Arrangement of Apparatus

And there is the whole secret of DX reception, proper attention to the design and arrangement of the apparatus. Has anyone heard of trick circuits taking any prizes in listening in contests? Hardly, it is the old-time circuits, tried and true, used by the old school amateurs, that

hang up the records day after day. And in this article I will attempt to show, how by proper analysis of your present receiver you can bring it to that high pitch of efficiency that will beat every trick circuit known and give you consistent, reliable operation under all conditions and at all times.

We can list the requirements of the ideal receiver from the present Radio viewpoint as follows: A high degree of selectivity; sensitive to weak signals; ease of operation, and fair volume.

Selectivity is but a relative term at best. A set that proves selective in the country falls down bad when used in the city with several broadcasters. To obtain real selectivity we must use a loose-coupled circuit. This eliminates the single circuit tuner. Wait, I know they have seemed selective—I have a little one myself that seems selective—but just tie a single tuned circuit into a really efficient receiver and see how selective it is. Furthermore, the fact that the entire resistance of the aerial circuit is included in the tuned circuit, effectively prevents really sharp tuning. A coupled circuit tuner will give louder signals than a single circuit because it is resonant at one point for a given frequency, whereas a single circuit tuner is resonant at two points a slight distance apart. Notice I have not mentioned particularly the burning question of re-radiation, but that enters later on.

### Sensitive to Weak Signals

To obtain the greatest signal strength in our receiver we must conserve every particle of energy that reaches the tuned grid circuit. When one fully realizes the infinitely small amount of energy picked up from a distant Radio station then one begins to wonder how half the receivers function at all. We must eliminate every chance or possibility of energy loss from our receiver. At high frequencies the greatest energy thief is capacity. For high efficiency keep down the capacities between different parts of the set. Every time the capacity across the secondary of a tuned circuit receiver is increased, the voltage applied to the grid is reduced and the vacuum tube works on the voltage applied to the grid. Keep that voltage as high as possible and the stuff is bound to pound in.

With the idea of reducing capacities across the secondary, we first of all decide upon inductance tuning which implies a variometer. But full inductance tuning is not the best thing for sharp tuning, so we compromise a little and use a small 3-plate vernier condenser across a portion of the secondary to obtain selectivity. Bear in mind the difference: Full inductance tuning in the secondary gives louder signals, but a little capacity under proper control gives selectivity.

To reduce capacity we do not shellac the windings of the coils and eliminate the shielding. The latter brings up the question of body capacity, which we will consider a little later. Having reduced capacities and obtained maximum grid voltage between the grid condenser terminals and the filament, we will consider the most efficient method of applying the voltage to the grid.

### Grid Leaks and Condensers

For some reason it has become almost universal practice to employ a fixed grid condenser with an adjustable leak across it. There may be some good reliable leaks on the market that can be adjusted and will stay there, but I have never been lucky enough to obtain one. On the other hand the fixed leaks are reliable and cheap. The leak and condenser have to be balanced against each other, that is, the condenser must be of such size that the maximum voltage is applied to the grid by the rectifying action of the tube, while the leak must drain the energy just fast enough to prevent the grid from loading and becoming so negative as to shut off the plate current entirely. There is a certain best value for both, and for best results we make use of a small variable condenser in the grid circuit with a fixed grid leak. This arrangement will permit closer adjustment of applied grid voltages and obtain maximum results from the detector tube.

### Adjusting Current on Filament

We find furthermore that the filament of a soft detector tube is critical in adjustment. By all means use a vernier rheostat but use a good one; there are a number of good vernier rheostats that may be used, but select one that has as few parts as possible and one in which nothing can go wrong.

Likewise the plate voltage is critical. A potentiometer is the logical device for controlling the plate voltage and will be included in the circuit for efficient operation. The dry cell tubes, being hard, are not so critical to either filament current or plate voltage, and the latter refinements are not a necessity with these tubes.

The next chapter will cover regeneration control and general assembly of the ideal set.

(TO BE CONTINUED.)

### Care of Storage Battery

Proper care of the battery will double the usual reception of the set. Always remove the acid or water from the top of the battery, as the moisture will sometimes cause unnecessary noises. Never place the battery near window curtains, as the fumes will ruin them. Do not set the battery on or next to a rug as the acid might leak and ruin it. If battery is in good condition it will not freeze. The care of the Radio battery is more important in the summer time than in the winter, because many people are not inclined to use their sets in summer. If the battery is not used for a long time and is left in a discharged condition, sulphation will result. This condition can sometimes be remedied by a prolonged charge. Many times it is necessary to dismantle and repair.

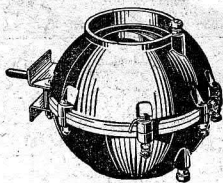
Those who have charging rectifiers should be careful not to use too high a charge rate, as it may cause buckling, shedding and overheated plates. Occasionally a complete cycle of charge and discharge will increase the capacity of your battery. Sometimes it is advisable to take it to a battery station and have it given the water cure.

### Avoid Oscillation

The main difficulty with homemade Radio frequency amplifiers is that the tubes go into oscillation, and in such condition the only thing received will be howls and squeaks. The same applies to a neutrodyne set, unless the neutralizing condensers are properly adjusted. In this latter type of set the squeals and whistles are supposed to be neutralized out.



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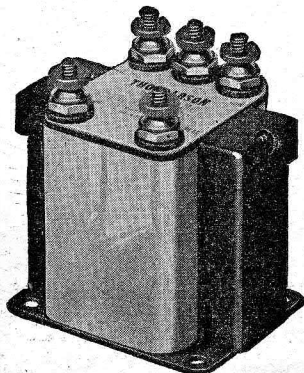
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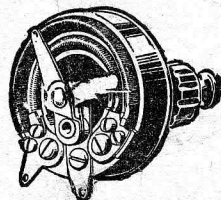
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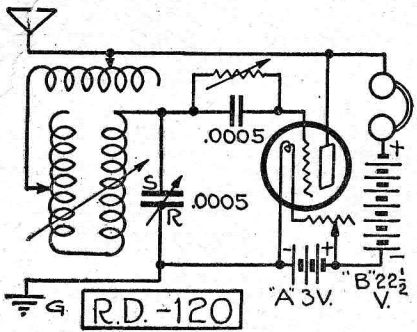
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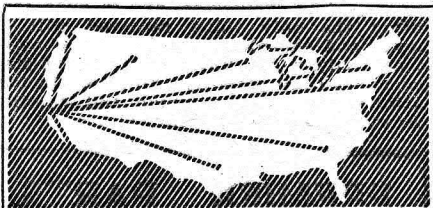
Mr. R. S. Seeley, of 323 North White St., New Orleans, sends us a hook-up, R. D.-120, that might interest some fans. He says, "I have had wonderful results with this hook-up. The separate coil is wound on a 3 1/2-inch tube with 56 turns of number 24 dcc. wire, bringing out a tap at every seven turns.

"The variocoupler is home made, using a 4-inch tube for the stator, wound with number 22 dcc. wire, using 56 turns tapped every seventh turn. The rotor is wound on a 3 1/2-inch tube with number 24 dcc. wire, making 42 turns, connecting the bottom leads of the stator and rotor together. The upper lead of rotor is connected to the grid leak.

"Herein is given a list of stations that I can pick up most every night: KDKA, WHB, CYB, KHJ, KSD, KYW, PWX, WBAP, WCAP, WCB, WDAF, WDAF, WDAF, WFI, WEAF, WFAA, WGR, WGY, WHAS, WHK, WJAX, WJAZ, WLAG, WLW, WMAQ, WMC, WOAI, WOA, WOC, WOR, WOS, WRM, WSAI, WSB, WSY, WTAM, WWJ.

"I am using a single wire antenna about 120 feet long, 35 feet from the ground with 2 3/4-foot lead-in.

"To operate the set, place the rotor at right angles to the stator for best results. Turn the rheostat up all the way and use the condenser until you get the whistle, then retard the rheostat until station comes in clear. A UV-199 tube is used."



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EAST—Am more than pleased with the parts ordered from you. The first night I hooked it up and received Omaha. Since then Minneapolis and Los Angeles. It works better without amplification than most sets with two stages.—Donals, S. C. WEST—I am sending you a list of some of the stations heard on one tube: WSB, WGY, KDKA every night, PWX, WWJ, WTAM, WLW every night, CFAC, CHCB. Not long ago I purchased another set of parts from you and first night got WGR, Buffalo, and KDKA. Ione, Calif. NORTH—Received coils O. K. If I have same results with these that I had with last will be wanting more. I am 1,500 miles from nearest station and have picked 56 to date. Chicago, Havana, Mobile, New Orleans and TWO IN ENGLAND Lunenburg, Canada.

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**COMPACT RECEIVING SET**  
(Continued from page 19)

type. A single 20 ohm rheostat is used for the two amplifier tubes while the two-element tube necessitates a 6-ohm resistance. The jack is the three-spring type with a make contact for connecting in the filament circuit when the phones or loud speaker are plugged in. The panel used is 7 by 12 inches. The sub-panel 7 by 8 inches. The standard size panel is 7 by 9 inches so this will have to be used for the sub-panel and 1 inch cut off from the long end. Two small brass angles are necessary for mounting the sub-panel onto the main panel.

The air core transformers can be purchased or constructed as desired. They require two pieces of mica or hard rubber tubing as desired, 2 1/2 inches in diameter and 2 inches long, and 1/4-pound spool of number 24 ssc. wire is necessary for the windings.

The cabinet should conform to the main panel size and should be slightly over 8 inches deep in order to permit proper clearance for the sub-panel.

(TO BE CONTINUED)

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Radiotron UV-199 for detection or amplification \$5.00  
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# Selective Circuit Employing Ultra-Audion Parts

## Pet Circuit the Best in the Author's View

Did you ever ride with anyone who owned a flivver, especially an old one? It was always the best car in the world. Never knew a man in my life who owned

### WORKSHOP KINKS? EARN A DOLLAR—

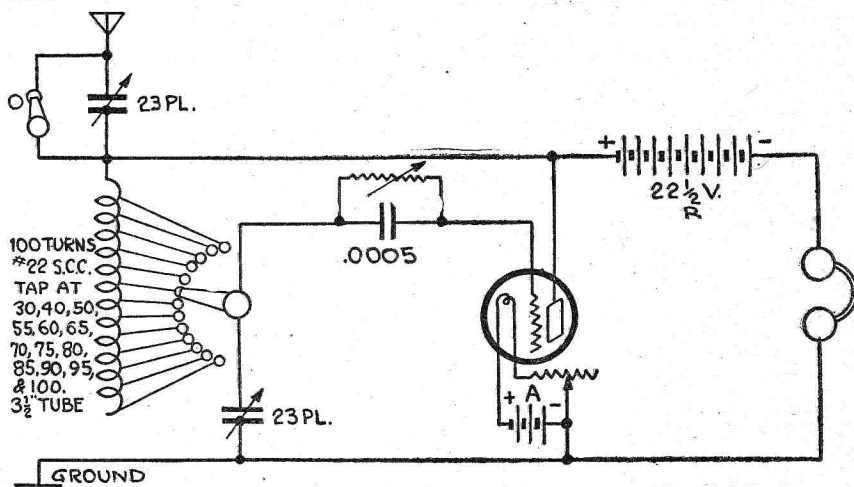
**T**HERE are many little kinks worked out at home that would aid your fellow Radio worker if only he knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in obtaining such material. Send them in with full details, including stamped envelope, so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,  
Radio Digest,  
123 W. Madison St., Chicago

a flivver who did not have the best one there ever was.

Same way with Radiophans. Everybody has a pet hook-up and it is always the best in the world. Got 'em all skinned. Well, I am no exception. Yep, I have a "hook-up," that I am submitting herewith, and some time when you have a little spare time and have the old soldering iron hot and a few extra parts lying around, just put it together and give it a trial. You'll get a surprise and a real kick and you will undoubtedly agree with me that it is a regular old "He" receiving set that will go out and get 'em and bring 'em in and is simple and easy to tune. And volume. Well, just get it going good and hang the headphone on the

## SELECTIVE AND DISTANCE HOOK-UP



wall; then back off 20 or 30 feet and hear each word of a program, clear as a bell. Or hook this little one-tube boy on to a loud speaker on local stations and see what you get. Yes! Or try it on a loud speaker on any station within, say, 150 or 200 miles. Or put on two stages of audio and on local or nearby stuff you will want to plug her back to the first step. 'Cause there will be too much volume for good modulation, or whatever you call it.

Then go after the long distance stuff. I live in Denver. My aerial is about 30 feet high, right in the middle of a net

of electric light and telephone wires and a bunch of dot-and-dash amateurs all around me, and I have had both KHJ and KFI, Los Angeles, on the loud speaker—  
(Continued on page 28)

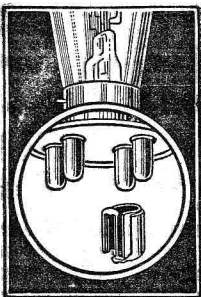
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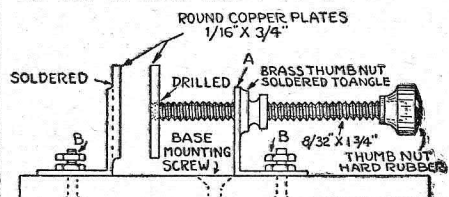
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## Homemade Neutrodyne for Neutrodyne Set

Having a great deal of trouble in neutralizing my neutrodyne grid circuit, I made a set of neutrodyne, as shown in the illustration, with good results. It can be seen that the adjustment is

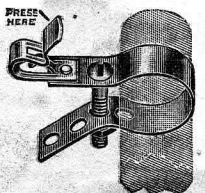


very easy and with the hard rubber thumbnuts it is not necessary to remove the hand after adjustment.—J. M. Wood, Flint, Mich.

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to hear concerts from out of town. If you want to get new stations ON YOUR CRYSTAL SET write me today. I get new records every day from people using my plans who hear programs on Crystal from stations 400 TO 1000 MILES AWAY  
No tubes, batteries or amplifying apparatus necessary. I hear KDKA (Pittsburgh Pa.) on Galena. You may already have everything you need and just have it connected up wrong. Send self-addressed envelope for picture of my set, and reasons why you need my plans.  
LEON LAMBERT  
501 South Volusia, Wichita, Kan.

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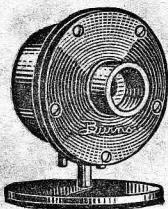
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### ULTRA-AUDION CIRCUIT

(Continued from page 27)

and a homemade one at that, with one tube—loud enough to be heard all over the room. Have also had two Kansas City stations on the loud speaker with the one tube.

With this hook-up I can tune right through the local stations and go outside like a top, with the exception of KLZ, which is only located a block or two away from my home. The only way I could get rid of them would be to take the set out in the yard and bury it.

I can get any of the local stations with both aerial and ground disconnected and have received both San Francisco and Los Angeles with no aerial. Just the ground connected.

I have just built the Miloplex circuits. Have tried out both the King and the Wizard, and I cannot see that they have anything on this little fellow. You get as much volume, I believe more; it is simpler and easier to build, easier to tune, is just as selective and it has absolutely no body capacity. Static bothers it very little. Last summer, when static was very bad and a dozen of my friends who have good sets were not able to get anything, I could bring in Los Angeles, San Francisco, Kansas City, Calgary, Chicago and Fort Worth right along every night, and when I say get 'em, I mean get 'em good enough to enjoy their stuff.

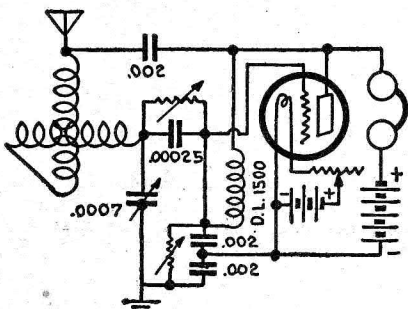
You will note this circuit is built along the lines of the ultra-audion, but with a few changes, and I think these changes are what does the work. Observe that there is a two-point switch shunted around the variable condenser in the aerial. I generally use it with this switch closed, cutting out the condenser except for fine tuning or to tune out a local station. I have a hunch it might work a little better with the feedback wire connected ahead of the condenser instead of behind it, but have not tried it out that way so far.

Also some day I am going to try it with a variometer in place of the tapped coil and see what it will do. But for the present it has been good enough and does the work, and that's all anybody wants, but I would appreciate your giving it a trial and letting me know the result.

The coil is wound on a 3/4-inch cardboard tube, 100 turns of 22 scc. wire, tapped at 30, 40, 50, and then every 5 turns. Condenser values are shown in the diagram. I get best results with 16 to 18 volts on the plate. Use a 6 volt tube and 6 volt storage battery.—U. G. Tuttle, Denver, Colo.

### Circuit Mixture

As will be seen by the accompanying illustration, there is a mixture of the Flewelling, ultra-audion and the Kaufman, and it seems to have the good characteristics of all of them. How or why it



works I do not know, but it does. The volume is great. The first station heard was Hastings, Nebraska, which is about 1200 miles from here. Sixteen other stations ranging from 100 to 900 miles away were picked up on the same night.

It is very easy to tune, there being only two main controls, the variometer and condenser. Although the values given are the ones I found to work best, there is much room for experimenting on the circuit. I am passing the circuit along

for other Radiophans and hope they will get as good results as I have.—Douglas Withington, Toronto, Can.

### Radio Ear

The "Radio ear" is a new affection of some fans who sit for long periods at their receiving sets. It is accompanied by noticeable pains in the head, near the ears, which cause thoughts of possible abscess or other serious trouble. This can be overcome by loosening up the spring in the headphones which press on some of the nerves of the head.

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# Windshield Glass Makes Good Panel Material

## Drilling Done With File Ends

By Charles U. Read

**I**N a recent issue of Radio Digest, I read with interest the splendid article on glass panel drilling, and thought perhaps I might offer an acceptable hint or two on the subject. With a little care and no attempt to rush matters, glass drilling will be found but a trifle more difficult than ordinary cutting. I have drilled 30 holes up to 1/2 inch in diameter in a panel in a couple of evenings.

Auto windshield glass makes excellent material, and because of numerous broken windshields, pieces large enough can often be obtained at garages at little or no cost. A glazier will cut the glass to the proper size for a few cents. I use three rat-tail files of different sizes, a small one to drill through the glass, a second with the end a little smaller than the largest part of the first, and the third with the small end a trifle smaller than the largest part of the second. I sharpen a point on the small file, front and side views of which are given, and keep it sharp with an emery wheel.

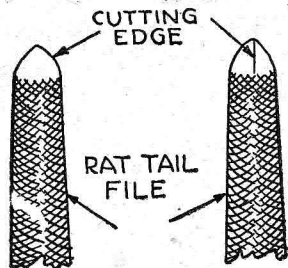
### Work Table

A table of medium height with a smooth top makes an excellent drilling place. I have never found it necessary to put pads under the glass, and sometimes when it is not fastened down I put my foot on it to hold it steady when reaming. I have never yet broken a piece.

Put the small rat-tail file in a brace and be sure to turn the brace from left to right instead of from right to left as in ordinary drilling, that is, when the handle is nearest the body it should be going left to right. This is important, especially in reaming, as a slight turn in the wrong direction will generally chip the glass. Use a little turpentine and the way up the

drill, letting it run down, rather than on the glass itself, as in this way it feeds better into the hole.

Bore the hole about two-thirds through from one side, then turn the panel over and finish from the other side. In order to



keep the brace steady and apply needed pressure, I generally keep my forehead against my hand on top of the brace. This will also enable one to keep the hole straight. Whenever the grinding sound ceases it is time to resharpen the point. A little practice will enable one to grind the drill so that a small hole may be drilled in two or three minutes. For this the drill may be turned quite rapidly and pressure applied; but for reaming, the drill

should be turned slowly and the weight of the brace will feed it through. If a 3/4-inch hole is bored through the table top the hole in the panel may be placed over this for reaming.

### Reaming the Hole

Ream with the small file, frequently turning the panel over. If the first file does not make a large enough hole, use the second after the largest portion of the first has been reached, and the same with the third to make a still larger hole. Start at one end of the panel and work toward the other end, holding down by the end not weakened by drilling. Fit each piece of apparatus as the holes are drilled for it, and in this way it will not be necessary to work back over the glass after holes are drilled.

### Panel Layout

I generally make a chart of the panel on white paper, place it on panel over car-

bon paper and with some sharp instrument, such as a stylus, mark the holes. The carbon will make slight black marks on the glass. Then if the chart is placed under the glass and the marks showing through the glass coincide with the carbon marks, the center of all the holes may be permanently marked by a few turns of the small drill.

A glass panel in a wooden case is more attractive than an entire glass case.

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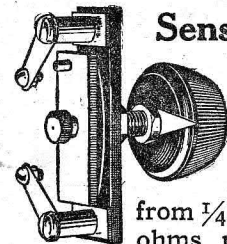
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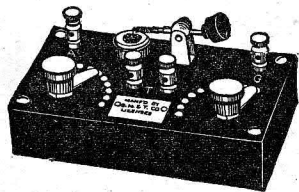
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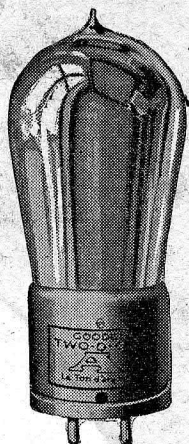
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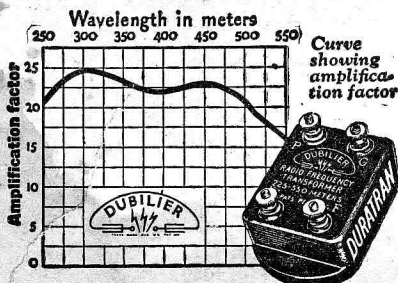
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### SETS

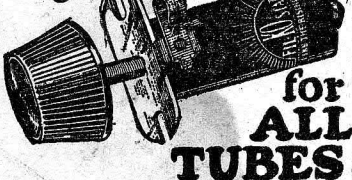
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# Questions and Answers

**Job and Miloplex**  
(07272) HRS, Baltimore, Md.

Job did not commit suicide, the last straw was lacking, the King X was not developed during his sojourn on earth.

We have built the King X in accordance with your hook-up, January 19 of Radio Digest. The first try out brought in Omaha and Davenport.

The signals when right are wonderfully clear and distance seems to make little difference in signal strength.

I now must add a stage of audio frequency. How can it be done?

A.—Job may, at that, be reincarnated in the Mystery Man. Did he not have that same proverbial patience which is exemplified in our latter day Saint?

King X can further demonstrate by adding audio frequency as shown on page eleven of the November 7 issue of Radio Digest, which we trust you have conveniently at hand.

**Split Variometer**  
(07211) CAL, Harvey, Ill.

I have recently built a regenerative Simplex set that was shown in the January 26 issue of Radio Digest. I tried it out last night and could not get it to work.

I bought two variometers and was told that they could be split. In the center between the windings the wires were joined together, the stators and the rotors. I separated these wires. Should I have done this? Does it make any difference whether the connections are made to the movable or stationary plates of the variable condensers?

A.—We are advising in your inquiry that from your description we are of the opinion that you have not split variometers correctly. This is accomplished

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in a way to permit of the use of stator and rotor each as separate coils.

Connection of rotor plates of condenser to the ground reduces any body capacity effect that might be encountered and the method is advisable on that score, otherwise it is immaterial which sides of plates are connected in position in circuit.

**July 28th Simplex**  
(05593) JNS, Windsor, Ont.

I would like to ask you a few questions regarding your one-stage R.F. detector, one-stage A.F. Simplex diagram on page 14 of the July 28 issue.

If I use WD-11, or WD-12 tubes, would the B battery voltage remain the same as suggested in your hook-up?

Of what resistance should the potentiometer be? Also the rheostats, when using these tubes.

What ratio transformers would you suggest?

Would you advise the use of a jack between the detector and stage of A.F. amplification? If so, how should it be connected up?

Are vernier adjustments necessary with this hook-up?

A.—The plate potential will be the same when employing WD-11 and 12 tubes as indicated.

The potentiometer and rheostat are to be of 400 and 6 ohms' resistance, respectively.

Any standard Radio frequency and audio frequency transformers will serve.

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Audio frequency should be of 10 to 1 ratio on first, and 3 or 4 to 1 ratio on second stage.

It is quite likely that you will desire to use the one stage of audio frequency whenever circuit is in operation, in which case it will not be necessary to employ a jack.

A vernier variable condenser is recommended.

**Measuring Grid Leaks**  
(05918) CCH, Joplin, Mo.

Would like to be able to test and determine the values of variable grid leaks.

Is there any publication that will give the desired information? Also is there an instrument, say like a voltmeter, manufactured that is used for this purpose?

Will appreciate any information you can give on the subject.

A.—The value of variable grid leaks can be determined with a very sensitive Wheatstone bridge or resistance box. Generally, aside from properly equipped laboratory research there is no demand for the value as the best for use can be determined with a little experimentation. The grid leak usually does not require sufficiently critical adjustment to neces-

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itate obtaining exact resistance value. For rough readings megohmmeters are now being made.

**Wave Trap**  
(07306) HSE, Charles City, Iowa.

Will a wave trap eliminate re-radiation from a set using the ultra audion circuit?

A.—A wave trap will not reduce re-radiation in a regenerative circuit, but will minimize interference of that nature caused by improperly tuned circuit.

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