

Radio Digest

EVERY
WEEK

Illustrated

TEN
CENTS

REG. U. S. PAT. OFF. & DOM. OF CANADA

Vol. VII

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SATURDAY, DECEMBER 1, 1923

No. 8

LISTEN IN FOR ENGLAND

CROSS-OCEAN TRIALS GO ON DURING WEEK

Eight British Stations and Selected American Group Attempt Trans-Atlantics

Goal Is Two-Way Talk

NEW YORK.—Tests of trans-Atlantic broadcasting are under way with a boom this week, as a feature of National Radio Week, November 25 to December 1, inclusive. The object of the tests is to attempt to receive English broadcasting stations on evenings of the odd dates, and for American broadcasters to attempt to be heard in England on evenings of the even dates.

The first test was planned for the evening of Sunday, November 25, at 3 a. m. London time, or 10 p. m. Eastern Standard Time, when a selected list of eight British stations were to attempt transmission to America. The results of the tests are not known at the time of going to press.

On the following evening, Monday, November 26, American broadcasters selected by the National Association of Broadcasters were to attempt to stretch their ef-

(Continued on page 8)

Kathryn Meisle is a new American contralto with the Chicago Civic Opera Company this year. Her voice will soon be heard by Radiophans tuning in Station KYW for the opera broadcasts, made direct from the Auditorium Theater



WWJ PRAISED ON EVEN FREQUENCY

Standards Bureau Applauds Adherence to Wave Length

DETROIT.—George K. Burgess, director of the bureau of standards of the Department of Commerce, has sent a letter of commendation to WWJ, the Detroit News broadcasting station, for the constant radio frequency maintained in broadcasting.

"We have found in measurements upon the transmitted waves of various transmitting stations, that the frequency of your Station WWJ investigated over a considerable period of time, varies but little. If this condition can be maintained, your transmission will be made of use to the public as a standard of frequency.

"It is our intention to publish a list of stations which maintain highly constant frequency with a statement of the frequency assigned to each and the degree of constancy that has been observed. Such information would then be of use to persons who desire to calibrate their own wavemeters to other apparatus. This could be done simply by the aid of your signals, in the same way as our standard frequency signals are utilized."



Anna Ludmila is the premiere danseuse of the Chicago Civic Opera. Her dancing can only be appreciated by Radiophans attending the opera



Nan Halperin—or "Little Jessie James," if you will—who participated in the broadcasting of the entire performance of that farce from WJZ

TRAPPERS "THANK STARS" FOR RADIO

NEW YORK.—A letter recently received by Station WHN, Loew's Theater here, from two trappers frozen in for the winter, thirty miles north of Moose Head Lake in Maine, reports how they receive the program every night. The letter had to be taken South for mailing by a guide.

OCEAN CROSSED BY DOT EIGHTY TIMES

336,000-MILE TRIP TRAVELED IN 25 SECONDS

Revolutionary Experiment by R. C. A. Engineers Enables Check of Messages and World-Wide Radio

NEW YORK.—Proving a revolutionary step in the development of Radiotelegraphy, a single Radio code dot was made recently to race for forty round trips across the Atlantic ocean from Radio Central at Rocky Point, L. I., to Warsaw, Poland, and back again. The entire operation consumed but 25 seconds, time enough for the dot to travel 4,500,000 miles, and was performed without the assistance of an operator at either end of the New York to Warsaw circuit, which spans a distance airline of 4,200 miles.

The experiment, conducted by the Radio Corporation of America, was not revealed to the Warsaw operator. He was simply directed to close the circuit at his end and join the receiving set there with a control line to the Warsaw transmitter through a sensitive relay. The directions complied with, the Radio Central control key was pressed for a dot. The receiving recording relay was put in operation at the New York office, and the receiver was connected to the Rocky Point transmitter in the same fashion as at Warsaw.

Dot Returned before Its Completion
Instantly the same dot as the operator had formed on the control key before him, was repeated in his ears and recorded on the tape. Simultaneously the dot actuated the Rocky Point transmitter for a repetition of the operation. So rapid was the action that before the operator's skillful hand was raised from the telegraph key, the partially completed dot he was forming had been repeated in his ears.

Again and again the dot raced on its round trip without interference from man. After making forty laps of the course, passing through twenty-five vacuum tubes, ten relays, changing its wave length eighty times—first a feeble line current, then a mighty Radio wave, and then back again—the first flow of energy weakened, became exhausted and withdrew from the race. All that had happened in twenty-five seconds.

Double Check on Messages Now Possible
We have thus achieved a double check on our messages. The experiment means that we know in an instant the condition of our circuits. The accomplishment means that messages can be checked as to proof of their receipt and accuracy almost simultaneously with their sending. In fact, by this arrangement we are able to know as much about the condition of the Warsaw station as the engineer there.

"Second, world-wide Radio transmission is easily possible by such automatic relaying. By having several high power stations scattered over the world equipped to receive the original message from one another and transmit it automatically to the next, a complete circuit of the globe is assured with accuracy and using only the present powers of the plants now in operation."

"Gadders" Desert Kelly Pool Table for Radio

Traveling Men Find Another Way to Pass Idle Hours

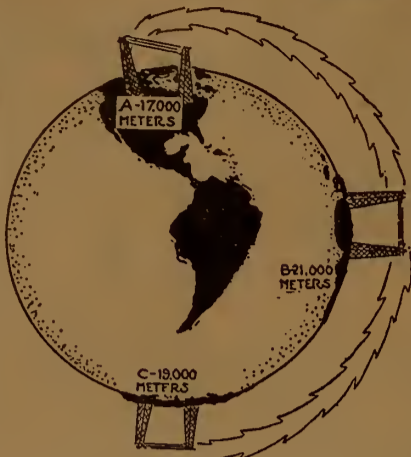
SCHENECTADY, N. Y.—The traveling salesman of yesterday was pictured by cartoonist and story writer as an ardent Kelly pool fan. The impression was created that he passed the lonesome evening hours draped over a pool table. Since the advent of broadcasting, however, a new interest has been created for those who spend so many hours going some place on railway trains or stopping in hotels.

A salesman stopping at the Hotel Woodruff at Watertown, N. Y., recently wrote WGY, the station of the General Electric Company here, expressing his "appreciation of the wonderful benefit derived from your broadcasting, particularly these Sunday morning services."

He explained that he carries a Radio set about with him and installs it in his hotel room. "When I rose this morning," he wrote, "the sixth Sunday since I have had word from my home, and realized it was to be just another lonesome day minus the usual work of weekdays, you can well imagine the sincere feeling of gratitude I felt for Station WGY when I was able to listen in to hymns that were all familiar to me and to enjoy the service so vividly that the feeling was created that I was part of the church congregation instead of many miles away."

Complications sometimes arise when Radio frequency is added to a set.

STUNT MAKES ABLE WORLD-WIDE RADIO



How the instantaneous check and world-wide Radiotelegraph transmission are possible: Station A sends message on 17,000 meters to Station B. Station B splits the energy received from Station A, part of it going to the recording relay or operator's headset and the second part to the control relay operating the transmitter of B working on 21,000 meters. The message is therefore sent out by Station B again, and is picked up by Station A for checking purposes, and by Station C for retransmission on 19,000 meters. Station C would act similarly to Station B in that C would retransmit part of the energy to other high power stations on the globe for the globe encircling circuit, and in which operation Station B would be able to check Station C for accuracy.

WILL TAKE CENSUS OF LISTENERS IN

Two Washington Plants to Make Experiment with Count of Receivers

WASHINGTON.—The question, "How many receiving sets are there in the United States?" may soon be answered, if a scheme under consideration by officials of the Department of Commerce works out satisfactorily.

As an experiment, the Radio section of the Bureau of Navigation permitted the two Class B broadcasters here, WCAP and WRC, to request all residents of the District of Columbia who have receiving sets to report to the Department of Commerce by dropping a postal card. This self-taken census will give an accurate return, it is believed, as well as save the Government considerable time and money by eliminating the need for enumerators.

Those possessing receiving sets have a certain pride which should hasten the reports. The Radio section will classify and enumerate the cards, but that will be enough, it is pointed out, considering that no added personnel is available.

If the test Radio census of the District proves accurate, the plan will be extended through all the states, in an effort to learn just how many sets there are in operation, and what percentages are tube and crystal sets.

The sole purpose of the census is to ascertain the number of receiving sets in the country and to gain an idea of the popularity, value and extent of broadcasting. There is absolutely no intention to levy a tax on receiving sets, as is done abroad, officials declare.

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Looking Ahead

The New Super-Triplex as Developed by H. J. Marx, will be started as a serial constructional article next issue. This important hook-up is a really new and worthy development of the three-circuit receiver and has exceptional selectivity for the purpose of long distance reception. Four-circuit receiver fans will be surprised at the wonderful difference between the old four-circuit and the new Super-Triplex. While there is no relation between the two circuits, the Super-Triplex overcomes all the weaknesses but has all the good points in favor of the four-circuit tuner.

David Grimes Will Tell Us Soon How to Analyze Detector Tubes and Crystals—Continuing his series on the Inverse Duplex Circuit, his invention, the famous Mr. Grimes has an important and weighty message for Radiophans next week.

Marvin W. Thompson Will Continue His Story of the Vacuum Tube Next Week—Mr. Thompson's beginner's explanations of Radio are going over! A reader on the west coast recently wrote in a perfect testimonial for Mr. Thompson's writings. The reader named over enough Radio magazines and books to make a good sized library, and capped the climax by saying that none could compare with Thompson's series. And that is but one of thousands of such letters.

The Mystery Man Announces "The Heart of a Radio Circuit," as his subject next week. Mysterious as the writer, isn't it?

Edleman's Multitone Circuit Works a Loud Speaker on Two Tubes—At least he's able to make his two tubes talk. He hails from St. Paul where WLAG's towers cast their shadow and will pass his hook-up on to Digest readers next issue.

R. D.-106 Is a Phantom Circuit Using No Aerial, just a ground. A dandy set for the apartment dweller who unfortunately rents from a grouchy landlord with no esthetic appreciation of the beauty of outdoor aerials.

Newsstands Don't Always Have One Left

WHEN YOU WANT

Radio Digest

YOU WANT IT!

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Very true!

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Now when it comes to condensers real radio bugs can appreciate this: heavy aluminum plates securely bolted across to assure uniform air space between the plates; a five-plate vernier gives "clean cut" tuning; heavy Bakelite end pieces make a rigid mounting; no "shorts" because it is impossible for plates to touch.

Here is a condenser that will be true to you. The price, which is always standard, is \$3.75 for 43 plate and vernier but that does not prevent the real radio rascal from having it wrapped up to take home—this very night. Another thing, this price includes dial and vernier knob.

Use—Is the Test

KELLOGG SWITCHBOARD & SUPPLY COMPANY CHICAGO

You Don't Need to Be an Expert



RADIODYNE

"The Voice of a Nation"

The RADIODYNE is operated by simply grounding to a water pipe or radiator and throw a few feet of wire on the floor. No outside antenna or loops necessary. You don't have to be an expert to install and operate it effectively.

For use in apartments, boats, automobiles, railroad trains, etc., the RADIODYNE is enjoyable where other types of receiving sets would not be practical.

Stations within a radius of 2000 miles can be picked up on the loud speaker; any wavelength from 200 to 700 meters. The RADIODYNE is so sensitive that it picks up Radio telephone speech and music when other types of equipment fail.

Write for illustrated folder which describes the RADIODYNE in detail. Every radio fan will be interested in this new type (antennaless) receiving set.

Western Coil & Electrical Co. 312 5th St. Racine, Wisconsin

EXPOSE OF MUSIC TRUST PRINCIPLES

PUBLISHERS EXPECTED TO GET MORE REVENUE

Contention That Radio Hurt Melody Market Declared Un-supported

(The following article is one of a series which is being published with the express purpose of explaining to the Radio public the situation existing between the broadcasting stations and the American Society of Composers, Authors and Publishers. The series tells in detail the reasons why the National Association of Broadcasters was organized, and why certain popular songs, the copyrights for which are controlled by the "music trust," are not being broadcast.—The Editor.)

PART III

PLUGGING costs the publisher a large sum of money. The manager of one large publishing house has stated that at the beginning of each year they regularly budget \$10,000 for plugging each song brought out, and if it shows signs of becoming a hit of major proportions, then there is no reasonable limit on the money they will put behind it.

It would seem that publishers would welcome any method by which they could produce the same results with less expense; that they would welcome Radio broadcasting as a method by which they would be delivered from great promotion expense and the iniquitous practices in which some of them indulge.

A. S. C. A. P. vs. Broadcasters

Unfortunately and unwisely, the American Society of Composers, Authors and Publishers apparently jumped at the conclusion that Radio broadcasting was destined to provide another big source of revenue, and the more they surveyed the situation, the more anxious they became to force this revenue into their treasury. Their "survey" however, must have been limited to estimating how many Radio stations were in existence; how many were likely to be added; how much and upon what basis each one could be taxed and what the total revenue would be.

As proof of this statement, notice must be taken of an article appearing in the Billboard of August 18, 1923, a theatrical magazine patronized freely by members of the American Society, wherein the decision of Judge Lynch is reported in the contest between Station WOR and the American Society. The article concludes as follows:

"The decision has been hailed with considerable interest throughout the music industry, as well as the ranks of composers and authors, for it means that additional revenue amounting to half a million dollars a year will roll into the American Society of Composers, Authors and Publishers, within a short time."

There has never been any indication from any statements made by the American Society of Composers, Authors and Publishers that they ever made an investigation of the facts. They have relied entirely upon unsupported statements. Even their eminent and eloquent counsel, ex-Judge Haight before Federal Judge Lynch in Newark, in arguing their case against station WOR failed to put into the record any data which would prove their unsupported statement "that Radio broadcasting hurts the sale of sheet music, records and rolls."

Facts Favor Radio

On the other hand broadcasters went systematically about the gathering of detailed information on this subject and found that the position taken by the American Society of Composers, Authors and Publishers was totally wrong. Tests were made in various ways and finally a concrete opinion was founded upon actual facts. These may be summarized as follows:

1. A copyright, popular song, of good quality, controlled by a member of the American Society of Composers, Authors and Publishers, was selected, but which had never been a hit, irrespective of the fact that a leading talking machine company (Continued on page 4)

HISTORIC BELL WILL TOLL FOR INVENTOR

ALBANY, N. Y.—The 124th anniversary of the birth of Joseph Henry, who in 1831 invented the electromagnet, will be observed here the night of December 17. The bell used in the early experiments by Prof. Henry will again be sounded and its appeal will be broadcast from Station WHAZ and WGY, at Troy and Schenectady respectively.

FAN IN GUATEMALA PICKS UP CLEVELAND

CLEVELAND.—W. E. Godman of Puerto Barrios, Guatemala, Central America, has reported clear reception of Station WTAM, the Willard Storage Battery Company here. Mr. Godman had WTAM on his loud speaker, despite the fact that the broadcaster in Mexico City was on almost the same wave. The distance spanned is approximately 1,500 miles.

VOICES CHEER HIS ARCTIC NIGHT



Darkness, distance and cold combine to make imagination's picture of the Arctic explorer's life the very acme of isolation. No more is it so. Radio has conquered them all. Here we see Captain Donald MacMillan on board the good ship Bowdoin, frozen in with his fellow adventurers in Refuge Harbor, near Etah, on the north-west coast of Greenland, looking quite comfortable and cheerful. No doubt this condition

is in large measure due to his frequent contact with far-away civilization via the ether. By some freak of transmission, Jack Barnsley, amateur operator at Prince Rupert, B. C., has been for some time the only one to pick up messages from WNP, the Bowdoin, and relay them to the world at large. WNP reports receiving the world news regularly from WJAZ, Zenith-Edgewater Beach Hotel, Chicago

Keystone View Photo

Cuba Mails Its Applause to WJAZ at Cleveland

CLEVELAND.—Concerts and other programs broadcast by WJAX, the Union Trust Company station, have been hitting the mark if the Radio applause mailed in to the Radio Editor is any criterion.

Recent letters from California, British West Indies, Cuba and other DX points

tell of unusual clearness of signals, due to the efficient transmitting of James Thorburn, engineer in charge. The same and other letters praise the quality of The News' Tuesday programs and other concerts broadcast by the station.

A letter received recently from Russel Dean, of Redlands, Cal., told how he used a homemade single tube set and heard a concert given by Hughie Thow's Synco-pators at WJAX.

CHICAGO TALKS TO MACMILLAN'S CREW

ICEBOUND BOWDOIN NOW HEARS FROM HOME

Station WJAZ Succeeds in Giving Explorer and Party World News Every Wednesday Night

CHICAGO.—His ship hemmed in by ice at Winter quarters, Refuge Harbor, and surrounded by the gloom of the long Arctic night that is now approaching, Donald B. MacMillan now listens to a voice from civilization, addressed to him personally every Wednesday night since the management of WJAZ, Zenith station at the Edgewater Beach Hotel here, inaugurated its plan of giving the Bowdoin the latest news of the world.

Until recently all communication with the explorer's Radio station, Wireless North Pole, has been in code through various amateur stations. Though broadcasting stations all over the country have been heard by those on board the Arctic vessel Bowdoin, no effort has been made to talk direct with the explorer by voice.

Bowdoin Reports Back in Code

Owing to its inability to carry long distances on low power there is no Radiophone equipment on the Bowdoin, all communication being carried on by means of code transmitter. In order to test the sending range of the Edgewater Beach station and at the same time cheer the icebound explorers by word from home, enhanced by the quality that only the human voice can give, Station WJAZ now calls WNP at midnight C. S. T., Wednesday weekly.

For this purpose WJAZ operates under the license 9XN. MacMillan has replied with his code transmitter that he gets the 9XN messages regularly.

The first amateur to receive code signals from Operator Mix, aboard the Bowdoin, after the ship had not been heard from for several weeks, was Jack Barnsley, Prince Rupert, British Columbia. Barnsley, since the first message from Mix, has been able to keep up regular nightly communication.

Wins Zenith Set Prize

For his work in communicating with the Bowdoin, Barnsley has been awarded the prize offered some time ago by the Chicago Radio Laboratory, a complete Zenith receiver and amplifier. The receiving set is a duplicate of the one used on MacMillan's vessel.

Operator Mix of WNP reports through Barnsley that the Bowdoin has picked up the signals of Station 6CFU in the Hawaiian Islands. The Hawaiian amateur was in communication with another amateur, 6ARB, when Mix heard the former.

And so, based on the report, is the conclusion that the Arctic seas, swept by icebergs, and the sunny shores of the tropical Pacific isles, while far apart and opposite in season, are closely knit together through the ether.

NEWS VIA ETHER FOR ARMY POSTS ABROAD

Service Is Planned for Benefit of Out-of-the-Way Stations

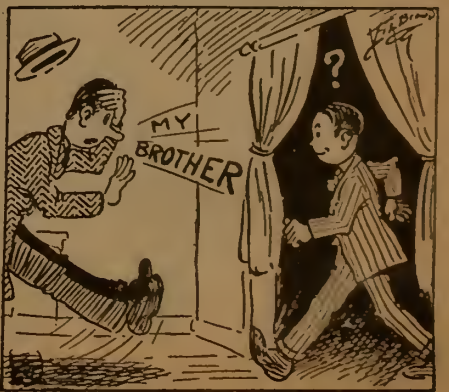
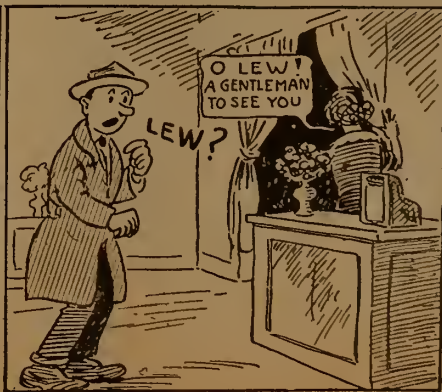
WASHINGTON.—For several years the ships of the navy and outlying naval stations have been able to get the news daily from what is known as navy press, which goes out by Radio from NAA at Arlington each night. A similar scheme is now under consideration by the war department for sending news, especially army news, to its forces stationed at foreign ports and posts out of the regular news channels.

If the present plan goes through, army posts at Hawaii and the Philippines will receive news bulletins at least once a week from a high-powered Pacific Coast station. These Radio bulletins would also be sent to army forces stationed at Alaska, Panama, Porto Rico and Cuba.

THE ANTENNA BROTHERS

Spir L. and Lew P.

Blood Will Tell



EXPOSE OF MUSIC TRUST PRINCIPLES

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Contention That Radio Hurt Melody Market Declared Un-supported

(Continued from page 3)

Many had made a record of it. At the time it was about two years old. Record sales had long since ceased. A canvas was made of the number of records in stock in a given group of stores. The song was then broadcast by a good singer, after which a check was made of the records on hand in the same group of stores, whereupon it was found that eighty percent of the stores had sold out their stock entirely, although in many instances not one record of this song had been sold in months.

2. An unknown song of much merit, written by a little known composer was broadcast in one locality. No other publicity was given the song. Ten thousand copies were sold in forty days' time, and the song is now listed by certain phonograph and player roll companies.

3. A well-known and independent publisher of New York states that he placed a song with one broadcasting station, and as a result sold 25,000 copies in a short time. He is a thorough convert to advertising songs by Radio, and releases every one of his songs to our association.

4. One small, unknown publisher, far out in Nebraska, writes us that he is getting twenty requests a day for his song released by us, and as he has no other plugging or advertising he knows it is from our broadcasting.

5. Statements on file from dealers in sheet music, records and rolls, setting forth that broadcasting does not hurt sales, but on the contrary is a definite force in creating and sustaining a demand.

Here then we have an irreconcilable difference of opinion, because of the claims made by the American Society of Composers, Authors and Publishers.

(TO BE CONTINUED.)

It is more difficult to eliminate interference when using a large aerial than it is with a small one.

"MIKE" PETRIFIES "HANDSOME DICK"



NEWARK, N. J. — Every town has its motion picture theaters and every town its devoted followers of Richard Barthelmess. Handsome "Dick," the chinaman of "Broken Blossoms," the two-fisted sailor of "Fury," the Seventeenth Century Dutch youth of "The Fighting Blade," recently spoke from Station WOR and seemingly

all the world and his wife listened in to hear him.

Though taking chances in his work every day and willing to risk life or injury to make a dramatic, thrilling portrayal of a part, yet he was somewhat daunted by little "Mike" and the fact that probably 50,000 people were listening in.

Like Chaplin, he would far rather have a battery of lamps on him and an imposing array of cameras recording his every move than have to talk to the silent, stolid little black disc. While he was being introduced to the great, unseen audience, he confided to Mr. Barnett, director of the station, that "although this is my fourth time before the microphone, I'm petrified." Once under way, though, his confidence returned. "Dick" Barthelmess is boyish in appearance, actions and speech and his appeal to the public to tell him what they wanted most had all the charm and frankness of youth.

Rule Radio Needed in Homes

NEW ORLEANS, LA.—Proof that no model home is genuinely modern without Radio is offered in the "Selective Electrical Home" opened here recently. The home features a complete Radio set as one of the outstanding items of domestic equipment. Among other electrical devices shown in the home are master switches, luminous glow-tips, an exhaust fan to carry out all cooking odors from the kitchen, an electric refrigerator and an electric piano.

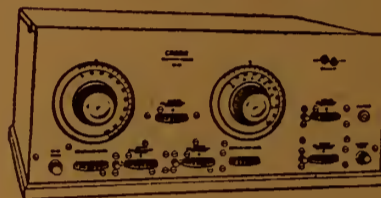


The New GREBE Broadcast Receiver



USING his Grebe Broadcast Receiver, R. H. Stewart, 57 Main St. East, Battle Creek, Mich., reports hearing stations in Los Angeles and San Francisco with a loud speaker, on the nights of Oct. 19, 20, 21 and 22. Stations in New York, Dallas, Fort Worth, and many other cities were received easily and with no interference.

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



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The Federal Head Set is a rugged instrument capable of standing hard, daily use, yet unusually sensitive. Every Receiving Set should have one.

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Quality of reproduction such as only the original itself can equal. Speech that is so distinct that the voice heard is the actual voice of the speaker. Music that requires no tolerant imagination to be recognized as music of the finest type.



Bristol's Single Stage Power Amplifier



gives additional VOLUME with any two stage amplifier. No C batteries required. It provides the additional volume necessary to bring in very distant stations on the loud speaker.

Write for bulletin and address of the nearest dealer handling our instruments

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DANCE INSTRUCTION MAKES A HIT ON AIR

FAMOUS MURRAY COURSE
BEING BROADCAST

Third Lesson's Charts Herewith—Save
Them as Many Stations Are
Now Giving Feature

Learn to dance by listening to *Radio Digest* has perfected an arrangement with Arthur Murray, nationally known teacher of ballroom dancing, whereby Mr. Murray is broadcasting dancing lessons from WOR, L. Bamberger and Company, Newark, N. J., and a score of other prominent stations. *Radio Digest* exclusively will give the charts and instructions which apply to the lessons broadcast by Mr. Murray personally at WOR and by the other stations. WOC, WBAP, WNAC, WLW, WLAG, WHAS, KFI, WFI, KPO, CKAC, WSAD and KYW have recently started the series of lessons. The third lesson with charts is given below. These may be used in conjunction with the broadcast lessons. The complete course will occupy six lessons, one of which will be given each week. Save the lessons to use with the broadcasts.—The Editor.

LESSON II—THE WALTZ

By Arthur Murray

IT IS a recognized fact that people who learn to waltz correctly are the most graceful dancers and can learn other dances more readily than people who have not had the advantage of the Waltz.

KLITZEN KNOCKS HAT OFF R. C. A. IN COURT

CHICAGO.—Word has been received that the United States District Court of Appeals has granted a supersedeas order staying the effect and superseding the order of the district court for the preliminary injunction granted the Radio Corporation of America some time ago in its suit with the Klitzen Radio Corporation, an Armstrong licensee. The meaning of the court order is that the former ruling in the case not only was reversed in whole, but that the Klitzen organization can go ahead and manufacture Armstrong regenerative sets in the fashion it has previously done, and also can sell these sets through jobbers and dealers, two points which were contested by the Radio Corporation of America.

ARTHUR MURRAY SHOWS HOW TO DO THE WALTZ

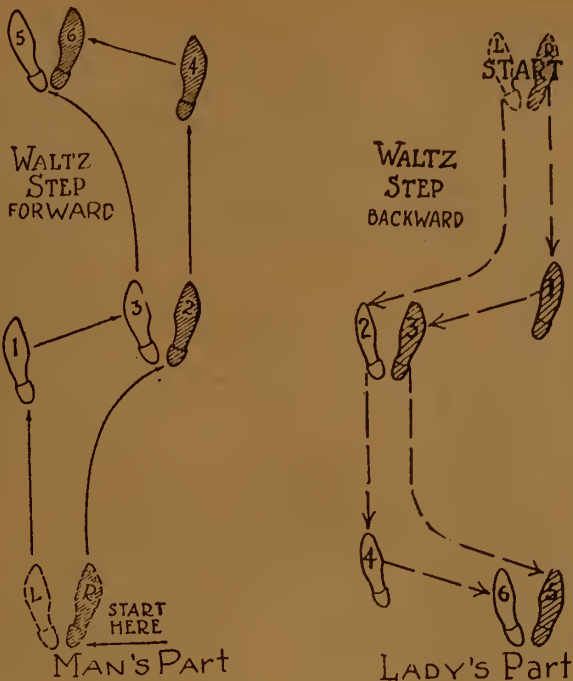


Figure 7

Figure 8

For people who have danced the Waltz before, it is essential that they learn the Waltz as here given as these same steps are used in various ways in the Fox Trot and other dances.

It is safe to say that more than half the people dance the Two-Step in the belief that they are dancing the Waltz. This is due to the fact that a great many of the teachers of a few years ago did not really know the Waltz and taught the Two-Step instead. This they called the Two-Step-Waltz. Also, a great many people who learned by themselves—those who "picked up" dancing—picked up the Two-Step, thinking that they were learning the Waltz.

The real Waltz is a smooth round movement. The Two-Step is a straight movement and the turns are made sharply. However, we shall not discuss in this lesson the difference between the Waltz and the Two-Step. After you have learned both, they will be very plain to you and you will have no difficulty in telling one from the other.



Arthur Murray and Ann Forrest, motion picture star illustrating the first step in the waltz

Waltz Is Foundation Step

The Waltz is recognized as the foundation of all ballroom dancing. It is, therefore, essential to go very slowly and practice faithfully while learning this most important dance. Build a good foundation and you will always be a good dancer.

Do not be content with simply learning how to do the steps; each movement should be practiced until you can do it very rapidly and almost mechanically. Practice each step until you have perfected it to such an extent that you do not need to count or even think of your feet. When you waltz with a partner you will not have sufficient time to think of the step.

The Waltz steps here described may also be done to Fox Trot and One-Step music.

First and Second Part of Forward Waltz Step Combined

Here is the count for the complete Forward Waltz Step:

1. Step forward on left foot;
2. Step diagonally forward to right;
3. Draw left foot up to right, weight on left;
4. Step directly forward with right;
5. Step diagonally forward to left;
6. Draw right foot up to left, weight on right.

Practice this step around the room going in the line of direction. Study Fig-

ure 7 carefully and follow the foot-steps which are numbered. The right foot is shaded.

How to Waltz to Music

Dance the Forward Waltz step beginning with the left foot forward. As you go through the steps, sing or hum, counting ONE—two—three. Remember that the first of every three beats is counted louder. Count: ONE—two—three—FOUR—five—six.

Lady's Part of Waltz Movement Backward

The Backward Waltz movement is just the opposite of the Forward Waltz movement. When the man does the forward movement, the lady does the backward Waltz.

1. Step backward with right foot;
2. Step back, slightly to left, with left foot;
3. Draw right foot up to left; weight on right (see diagram);
4. Step directly backward with left foot;
5. Step back, slightly to right, with right;
6. Draw left foot up to right, weight on left.

That's all. Study Figure 8 carefully. Practice the Backward Waltz movement around the room. Start with the right foot backward. At first go very slowly and try to do the six steps without a mistake. Gradually do the movement faster and faster. Spend a few hours in practice to acquire ease and grace.

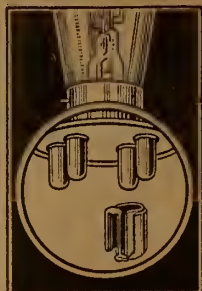
AN EVENING AT HOME WITH THE LISTENER IN (SEE INSTRUCTIONS FOR USE BELOW)

| Station and City | Met | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|----------------------------|-----|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| CFCN, Calgary, Alta. | 440 | 12:00-1:00 | Silent | 11:00-2:00 | Silent | Silent | 11:00-1:00 | Silent |
| CKAC, Montreal, Que. | 430 | Silent | 6:00-8:30 | Silent | 6:00-8:30 | Silent | 6:00-8:30 | 3:30-4:30 |
| KDKA, E. Pittsburgh, Pa. | 328 | 5:00-9:00 | 4:00-8:00 | 5:00-9:00 | 5:00-9:00 | 6:00-9:00 | 5:00-9:00 | 6:30-7:30 |
| KDZE, Seattle, Wash. | 455 | 10:30-12:30 | Silent | 10:30-12:30 | Silent | 10:30-12:30 | Silent | Silent |
| KFAF, Denver, Colo. | 360 | 9:00-10:00 | 9:00-10:00 | Silent | 8:30-9:00 | 9:00-10:00 | 9:00-10:00 | Silent |
| KFI, Los Angeles, Calif. | 460 | 8:45-1:00 | 8:45-1:00 | 8:45-2:00 | 8:45-1:00 | 8:45-2:00 | 8:45-2:00 | 10:00-1:00 |
| KGW, Portland, Ore. | 492 | 10:00-12:30 | 10:00-1:00 | 10:00-1:00 | 10:00-1:00 | 10:00-1:30 | 10:00-1:00 | 8:00-10:00 |
| KHJ, Los Angeles, Calif. | 395 | 8:45-12:00 | 8:45-12:00 | 8:45-12:00 | 8:45-12:00 | 8:45-12:00 | 8:45-12:00 | 10:00-12:00 |
| KPO, San Francisco, Calif. | 423 | 10:00-12:00 | 10:00-12:00 | Silent | 10:00-12:00 | Silent | 10:00-2:00 | 10:00-12:00 |
| KSD, St. Louis, Mo. | 546 | 8:00-10:00 | 8:00-1:00 | 8:00-1:00 | Silent | 8:00-10:00 | 8:00-10:00 | Silent |
| KYW, Chicago, Ill. | 536 | Silent | 8:00-9:00 | 8:00-9:00 | 8:00-9:00 | 8:00-9:00 | 8:00-9:00 | Silent |
| NAA, Radio, Va. | 435 | 5:45-7:20 | 6:05-7:20 | 6:25-7:40 | 5:45-7:40 | 7:05-7:40 | Silent | Silent |
| PWX, Havana, Cuba | 400 | Silent | Silent | 7:30-10:00 | Silent | Silent | 7:30-10:00 | Silent |
| WBAP, Fort Worth, Texas | 476 | 7:30-10:45 | 7:30-10:45 | 7:30-10:45 | 7:30-10:45 | 7:30-10:45 | 7:00-7:30 | 5:00-6:00 |
| WBVA, Columbus, O. | 390 | 8:00-10:00 | Silent | Silent | Silent | Silent | Silent | Silent |
| WBZ, Springfield, Mass. | 337 | 5:00-8:00 | 6:30-8:00 | 5:00-11:00 | 6:30-8:00 | 5:00-11:00 | 6:30-8:00 | 5:45-8:30 |
| WCAP, Washington, D. C. | 460 | Silent | 6:30-7:30 | Silent | 9:00-11:00 | Silent | 6:30-11:00 | 6:20-7:20 |
| WCBD, Zion, Ill. | 345 | 8:00-10:00 | Silent | Silent | Silent | 8:00-10:00 | Silent | 2:30-5:30 |
| WCX, Detroit, Mich. | 517 | 7:30-9:00 | 7:30-11:00 | 7:30-9:00 | 7:30-9:00 | 7:30-9:00 | Silent | 6:15-7:15 |
| WDAF, Kansas City, Mo. | 411 | 8:00-1:00 | 11:45-1:00 | 8:00-1:00 | 11:45-1:00 | 8:00-1:00 | 11:45-1:00 | Silent |
| WDAP, Chicago, Ill. | 360 | Silent | 7:00-1:00 | 7:00-1:00 | 7:00-1:00 | 7:00-1:00 | 7:00-1:00 | 9:15-11:15 |
| WDAR, Philadelphia, Pa. | 395 | 6:30-9:55 | 6:30-7:00 | 6:30-10:00 | 6:30-7:00 | 6:30-12:00 | 6:30-7:00 | Silent |
| WEAF, New York, N. Y. | 492 | 6:30-9:00 | 6:30-9:00 | 6:30-9:00 | 6:30-9:00 | 6:30-9:00 | 6:30-10:00 | 6:30-9:00 |
| WFAA, Dallas, Tex. | 476 | 8:30-9:30 | 8:30-12:00 | Silent | 8:30-9:30 | 8:30-9:30 | 8:30-12:00 | 9:30-11:00 |
| WFI, Philadelphia, Pa. | 395 | 6:00-6:30 | 6:00-8:00 | 6:00-6:30 | 6:00-8:00 | 6:00-8:00 | 6:00-8:00 | 6:30-7:30 |
| WGI, Medford, Mass. | 360 | Silent | 6:00-7:30 | 6:30-8:00 | 6:00-7:30 | 6:30-8:00 | 6:30-8:00 | 7:30-10:00 |
| WGR, Buffalo, N. Y. | 310 | 5:30-11:00 | 5:30-7:45 | 5:30-11:00 | 5:30-7:45 | 5:30-11:00 | 5:30-7:45 | 2:00-3:00 |
| WGY, Schenectady, N. Y. | 380 | 6:45-9:00 | 6:45-9:00 | Silent | 6:45-9:00 | 6:45-10:30 | Silent | 5:30-6:30 |
| WHA, Madison, Wis. | 360 | 7:30-8:30 | Silent | 7:30-8:30 | Silent | 7:30-8:30 | Silent | Silent |
| WHAS, Louisville, Ky. | 400 | Silent | 7:30-9:00 | 7:30-9:00 | 7:30-9:00 | 7:30-9:00 | 7:30-9:00 | 4:00-5:00 |
| WHAZ, Troy, N. Y. | 380 | 8:00-9:30 | Silent | Silent | Silent | Silent | Silent | Silent |
| WHB, Kansas City, Mo. | 411 | Silent | 8:00-10:00 | Silent | 8:00-10:00 | Silent | Silent | 8:00-10:00 |
| WHK, Cleveland, O. | 283 | 5:00-5:30 | 5:00-5:30 | 5:00-5:30 | 5:00-5:30 | 5:00-5:30 | 5:00-5:30 | 7:00-8:30 |
| WHN, New York, N. Y. | 360 | 6:30-11:00 | 8:30-11:00 | 6:30-11:00 | 8:30-11:00 | 6:30-11:00 | 6:30-11:00 | 8:30-11:00 |
| WIP, Philadelphia, Pa. | 500 | 5:00-6:30 | 5:00-11:00 | 5:00-6:30 | 5:00-11:00 | 5:00-6:30 | 5:00-11:00 | Silent |
| WJAR, Providence, R. I. | 360 | Silent | 6:20-7:00 | 6:20-11:00 | Silent | 6:20-9:20 | Silent | Silent |
| WJAX, Cleveland, O. | 390 | Silent | 6:30-8:30 | Silent | 7:00-9:30 | Silent | Silent | Silent |
| WJAZ, Chicago, Ill. | 448 | Silent | 10:00-2:00 | 10:00-2:00 | 10:00-2:00 | 10:00-2:00 | 10:00-2:00 | 6:00-9:00 |
| WJZ, New York, N. Y. | 455 | 6:30-10:30 | 6:30-10:30 | 6:30-10:30 | 6:30-10:30 | 6:30-10:30 | 6:30-10:30 | 7:00-9:30 |
| WKAQ, San Juan, P. R. | 360 | Silent | 7:00-8:30 | 6:00-7:00 | Silent | Silent | 7:00-8:30 | Silent |
| WLAG, Minneapolis, Minn. | 417 | 7:30-10:00 | 7:30-10:00 | 7:30-12:30 | 7:30-10:00 | 7:30-10:00 | 7:30-12:30 | 7:45-8:45 |
| WLW, Cincinnati, O. | 309 | 8:00-10:00 | 10:00-12:00 | 8:00-10:00 | 10:00-12:00 | Silent | Silent | Silent |
| WMAO, Chicago, Ill. | 448 | Silent | 7:00-10:00 | 7:00-10:00 | 7:00-10:00 | 7:00-10:00 | 7:00-10:00 | Silent |
| WMC, Memphis, Tenn. | 500 | 8:30-9:30 | 8:30-12:00 | Silent | 8:30-9:30 | 8:30-12:00 | 8:30-9:30 | Silent |
| WNAC, Boston, Mass. | 278 | Silent | 7:00-9:00 | 8:00-10:00 | 7:00-9:00 | 7:00-9:00 | 8:00-10:00 | 5:30-7:30 |
| WOAL, San Antonio, Texas | 385 | Silent | 9:30-10:30 | Silent | 7:30-8:30 | Silent | Silent | 9:30-10:30 |
| WOAW, Omaha, Neb. | 526 | 9:00-10:00 | 9:00-10:00 | Silent | 0:00-10:00 | 0:00-10:00 | 0:00-10:00 | 9:00-10:00 |
| WOC, Davenport, Ia. | 484 | 8:00-9:00 | Silent | 8:00-11:00 | 8:00-9:00 | 8:00-9:00 | 9:00-10:00 | 7:00-11:00 |
| WOO, Philadelphia, Pa. | 509 | 6:30-10:00 | Silent | 6:30-10:00 | Silent | 0:30-10:00 | Silent | Silent |
| WOR, Newark, N. J. | 405 | 5:15-10:00 | 5:15-8:30 | 5:15-10:00 | 5:15-8:30 | 5:15-6:30 | 5:15-10:00 | Silent |
| WOS, Jefferson City, Mo. | 441 | 8:00-9:30 | Silent | 8:00-9:30 | Silent | 8:00-9:30 | Silent | Silent |
| WRC, Washington, D. C. | 460 | 7:00-9:00 | Silent | 7:00-9:00 | Silent | 7:00-9:00 | Silent | Silent |
| WSAI, Cincinnati, O. | 309 | Silent | 8:00-10:00 | Silent | 8:00-10:00 | Silent | 10:00-12:00 | Silent |
| WSB, Atlanta, Ga. | 420 | 8:00-12:00 | 8:00-12:00 | 10:45-12:00 | 8:00-12:00 | 8:00-12:00 | 8:00-12:00 | 7:30-9:15 |
| WSY, Birmingham, Ala. | 360 | 8:00-8:45 | Silent | 8:00-8:45 | Silent | 8:00-8:45 | Silent | 8:00-9:00 |
| WTAM, Cleveland, Ohio. | 390 | Silent | Silent | 7:00-9:30 | Silent | Silent | 8:00-10:00 | Silent |
| WWJ, Detroit, Mich. | 517 | 7:30-9:00 | 7:30-9:00 | 7:30-9:00 | 7:30-11:00 | 7:30-9:00 | Silent | 4:30-5:30 |

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. This table includes only the evening broadcasts, and on Sunday, the late afternoon program.

SAVE MONEY Radeco Safety Fuses

"The biggest little thing in radio"



Price 50 cents each postpaid

RADIO experts recognize that some means of protecting the delicate filament of vacuum tubes is necessary. Thousands of tubes are needlessly burnt out each year. Radeco Safety Fuses have been developed to prevent this waste. They are endorsed by the leading radio publications. You can now absolutely protect the tubes of your set by slipping a Radeco Fuse on one of the filament terminals of each of your tubes.

Guaranteed not to interfere with the efficiency of your set. Save money by ordering today one fuse for each of your tubes. Mention type of tube.

READ WHAT ONE MAN SAYS

939 Dunlop Avenue
Forest Park, Illinois
Radio Equipment Company,
Gentlemen: About last January I purchased some of your Radeco Safety Fuses. I have never had cause to regret this purchase, because I believe it has saved me many dollars. So I am writing to thank you and will recommend them to my Radio friends. The fuses have not interfered in any way with the operation of my set, and you are entirely at liberty to use this letter as an "ad" for your product, if you should so desire. Wishing you success in your present enterprise, I am,
Yours truly,
Mr. Harvey F. Reese.

RADIO EQUIPMENT COMPANY

20 Stuart Street, Boston, Mass.
New England's Oldest Exclusive Radio House

Distributors of many other successful radio specialties
DEALERS: We are going to appoint live distributors
Write for our proposition and full details

PROGRAMS CHEER MAIMED CANUCKS

EASE SUFFERING OF VETS IN HOSPITAL

Five Sets in Institution Are Used 24
Hours Every Day by
Patients

TORONTO, CANADA.—That the sufferings of the soldiers and sailors who served in the world war are greatly alleviated by the advent of Radio is borne out in a striking manner in Christie Street Hospital here, which is the main hospital in Canada for British soldiers and sailors.

There is still a large number of wounded and maimed veterans who will be required to spend many months in the hospital and there are several who will be required to remain in the hospital for many years. During the past few months with the use of Radio their long hours have been made happy ones, and, according to reports received from the surgeons in charge, there is a considerable improvement in their spirits and general health. At present there are five large sets placed in different wards of the hospital and the sets are in operation twenty-four hours every day.

Speaks Well for Radio

Alexander Lindsay, one of the officials at the hospital, is one of the most enthusiastic Radiophans. Mr. Lindsay, being one of the staff as well as a veteran of the war, is well informed on activities both inside and outside of the military institutions.

"If it was not for Radio and the concerts the boys are able to hear, life would be very dull," said Mr. Lindsay. "It would do your heart good to see how they bear their pains and suffering with a happy smile and consider the whole world is at their feet as long as they are with the sets. The use of Radio has gone through the institution at Christie Street Hospital like an epidemic. Even the doctors and nurses are not immune.

"Outside of the five large sets there are many smaller sets and the veterans who are day patients follow the concerts at their homes at night. The doctors and nurses also have sets at their homes. In short, Radio is going to be the saving grace in Christie Street Hospital. It has brought sunshine and happiness to the wounded and maimed boys when there ap-

'OUR MARY' THRILLS KHJ LISTENERS IN

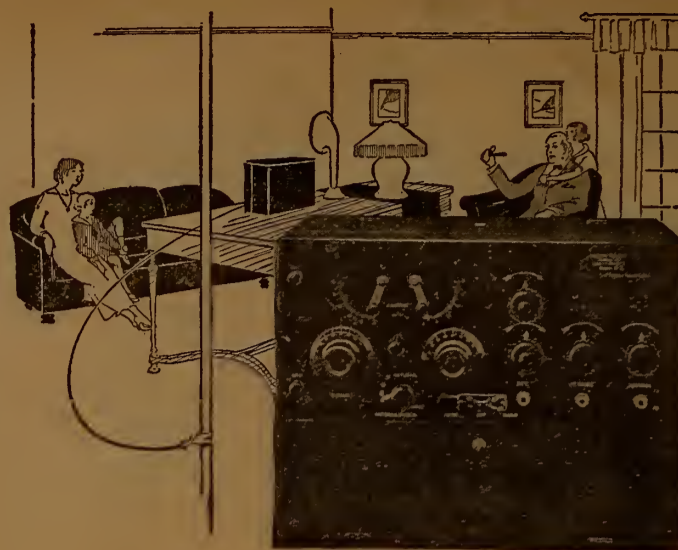


Mary Garden's is a name to conjure with in the music world and it's no wonder that her recent broadcasting from KHJ, Los Angeles, of selected numbers from her repertoire, gave thousands of fans throughout the Southwest a treat they will not soon forget. That her appearance is as charming as her personality and her voice, the above photograph bears witness

peared nothing but dull and drab days ahead."

Musical "Jack" Rejoins KYW

CHICAGO.—Wendell Hall, "musical jack of all trades" as he has been dubbed, and popular song composer, recently returned to Station KYW, the Westinghouse Company here, to delight Chicago listeners in once more with his numbers.



—hook it to the waterpipe

Moon "Satterlee Antennaless" Radio will produce wonderful results simply connected to a waterpipe. No antenna, loop or indoor wire is necessary.

Stations within a conservative 1,000 mile radius are regularly received with a non power loud speaker on this set.

It is the ideal set for use in apartments, automobiles, yachts or railroad trains where an antenna is not practical. Extremely sensitive, unusually selective, yet simple to operate.

Write today for our folder
"California or Newark."

MOON RADIO CORPORATION

501 Steinway Ave., Long Island City, N. Y.

In Canada, Continental Equipment Co., Ltd., New Birks Bldg., Montreal, Quebec.



**NATIONAL
MONODYNE**
TRADE MARK
TUBE SET
MODEL GT-1

Enjoy that Thanksgiving Feast
with Sweet Music from the Air
on the

\$10.00
WITHOUT
TUBE

greatest wonder
of the Radio age
Surprise your family!
—Take the Mono-
dyne home with you
today.

Remember, too, that Thanksgiving day falls in the middle of National Radio Week—the time when every broadcasting station will be vying with all others for the finest and most costly program ever offered.

The Monodyne brings in local and distant stations equally well and frequently better than sets costing hundreds of dollars. There is just one control and one tube. So simple a child can operate it.

**NATIONAL
AIRPHONE
CORPORATION**
REG. U.S. PAT. OFF.

16-22 HUDSON ST.

NEW YORK

Clear
Reception
at a
Thousand
Miles

RADIO TALKS

If you want to cut out the local station in favor of a distant one, remember that the length of your antenna is one of the controlling factors so far as selectivity is concerned. Best results are often obtained with antennae that are only 25 to 50 feet long. There really is not much need for the 150 to 250 feet affairs.

E. J. Flewelling

E. J. Flewelling Sockets

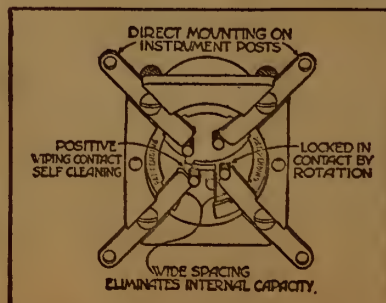
Several Radio Engineers responsible for the design of the highest class Super Hetrodyne, Neutrodyne and Radio Frequency sets have enthusiastically accepted the Flewelling Socket as the only socket meeting their exacting requirements.

The wide spacing of the contacts eliminates capacity losses between terminals. Its firm contact against the side of tube terminals, instead of the lead end, insures perfect electrical connections. Solid Bakelite casting properly reinforced gives strength and neatness of appearance. Extension contacts enable quick assembly and efficient wiring. These and numerous other features place this socket so high in the estimation of those who know that its popularity is assured.

Order now or you will have to wait.

BUELL MANUFACTURING COMPANY

2977 COTTAGE GROVE AVE.
CHICAGO



\$10.00
At your
dealers
or post
paid.

KGU PUTS STATES PROGRAMS ON AIR

RE-BROADCAST OF WHB IS HEARD IN NEW YORK

Honolulu Advertiser Picks Up Kansas City Station—Relays It across Pacific and Continent

HONOLULU, HAWAII.—Re-broadcasts of programs from stations in the states have been successfully occupying the attention of Station KGU, the Honolulu Advertiser here, and have been so well done that many Radiophans in the states have been confused, believing that the program they heard was the original one from the home station. Stations KHJ and KFI, Los Angeles, have been re-broadcast numerous times, but the crowning achievement came recently when Station WHB, the Sweeney Automobile and Tractor School, Kansas City, Mo., was put on the air by KGU.

A listener in New York City heard KGU's relay of WHB's program. He was confused so wrote both stations to solve the puzzle. He was amazed when he learned that the program he heard had been put on the air at Kansas City, picked up by KGU at Honolulu, and re-broadcast by the Hawaiian station whose waves he had tuned in.

How Re-Broadcasting Is Done

The accomplishment of the stunt, while seemingly difficult, is not as hard as it looks. The plan in use by the Honolulu Advertiser is this:

At the Koko Head station, twelve miles from Honolulu, is a receiver consisting of three stages of Radio frequency amplification and a standard short wave set, fed from a combination of a Beverage and horizontal antenna. The signals of the stations in the states are then amplified with one stage of audio frequency and one stage power amplification, and passed through twelve miles of telephone line to the City of Honolulu, where the programs are put into the modulating circuit of the Honolulu Advertiser's transmitter, KGU. The distant signal thus actuates the local station and provides programs from the states to the enthusiasts in the Islands of the Hawaiian group. When first proposed, it was not believed that the signals would cross the Pacific and back to the states, but the New York fan's letter has added a new laurel to KGU.

To Print Antenna Rules

WASHINGTON, D. C.—It is intended to include in the next edition of the National Electrical Safety Code some regulations for the construction of outdoor antennae. A subcommittee to deal with this subject held its first meeting at the Bureau of Standards recently under the chairmanship of L. E. Whittemore of the Department of Commerce.

"GET THEM BACK," SAYS POLLOCK

Channing Pollock, author of "The Fool," when speaking at WJAR, the new 500-watt station of the Outlet Company, Providence, R. I., declared that the only way to get the best people back into the habit of attending the theater was to give them plays of real merit, and that the people would come back then of their own accord



LISTENING IN FROM WAY UP NORTH

By Vera Brady Shipman

I AM sitting by the grate fire, watching the flames as they shoot chimneyward, the logs crackling as the November wind howls outside. I sit in a comfy armchair with my head set securely on my ears. In the north woods I am listening in. I finger the tuner and hear Radio voices—distance is forgotten. I am a traveler in Antenna Land.

A voice from Davenport, WOC: It is "The Man in Overalls" telling young America of the six I's—Industry, Integrity, Intelligence, Initiative, Intensity, Inspiration. The Little Symphony from KDKA, Pittsburgh, plays operatic numbers such as "The Dagger Dance" from Natoma and "The Good Ship Pinafore."

"This is WWJ, the Detroit News,"—that's the lovely Rodolfo and Mimi duet from La Boheme. A mellow horn plays "A Dream of Paradise" from Fort Worth Star-Telegram and a bit later the "Hired Hand" (that's what he calls himself), from the same station talks about aerials too high which dust the clouds or too low which make a fellow hear too much about his hereafter. Awful insinuations, don't you think?

Wouldn't you like to dance a bit? No, not tonight? Well just as you say. I tune in on WEAJ, New York City, to Vin-

cent Lopez' Pennsylvania Hotel orchestra making the very waves fox-trot.

Ah-h-h, Dr. Watson, that's what's the matter with the Radio for a few minutes. It was trying to accommodate WDAP and WJAZ, both on in Chicago—with Jack Chapman playing a different jazz rhythm from the Oriole Orchestra—and the air can't serve two jazz masters. Then too, you have to watch your step when you tune in on WLW, Cincinnati, for they can play a wicked undulation.

It is way past midnight. I turn the tuner away up in the fo'c's'le and hear WTAS of Elgin, Charles Erbstein's own station, coming on with jazz just after the Chicago hotel broadcasters have said their goodnight prayers. And I turn on around the tuner. Nothing else is on the air save the familiar Kansas City Night Hawk folks, "Are you Ready Professor? Let's Go."—And for all I know they are going yet.

RADIO GUIDES GIANT LINER OUT OF FOG

REACHES FRANCE AFTER 4 DAYS IN MIST

Radio Direction Finder on Majestic in Constant Use to Avoid Crashes

By L. M. Lamm

WASHINGTON, D. C.—The navigating and Radio officers of the White Star liner Majestic have given interesting information as to the use of the Radio compass or direction finder aboard that ship, one of the largest vessels afloat, with a displacement of nearly 60,000 tons.

The Majestic on a recent voyage from New York to Boston and return was in a fog nearly the entire time and was navigated almost wholly by bearings taken from the ship, using the Radio beacons of the Lighthouse Service and Radio communication stations on shore. Nantucket Lightship was made so exactly that the Majestic passed between the lightship and the nearby marking buoy.

Radio Guides through Fog

On a recent voyage to Europe the Majestic was in fog for four days before reaching Cherbourg and was navigated by Radio bearings in approaching the French coast and made the entrance to Cherbourg Harbor exactly by this means.

The Radio direction finder is continuously used on the Majestic in locating, approaching and passing vessels in fog for the purpose of avoiding collision. The commander of the Majestic, Commodore Sir Bertram Hayes, has become an enthusiastic believer in the value of this instrument in navigation.

Tests Convince Cunard Line

The direction finding work on board the Majestic is given preference over any other work of the Radio on that vessel.

It was stated that the Radio beacons established by the Lighthouse Service are found to be very valuable in navigation, and much more convenient to use in Radio bearings than ordinary communication stations.

The Cunard Line, which has not heretofore used this instrument, is now installing direction finders on a number of its vessels.

How Lively Is Your "B" Battery?

THIS IS NUMBER THREE OF A SERIES. Some people buy Eveready "B" Batteries oftener than other people. This is because each user has different tastes and desires in radio receiving. Those that demand maximum volume—and to get it use many tubes, forcing them to the limit with high voltages on the plates—are eager and frequent buyers of these batteries.

Others renew them less often. They are the ones that are content with smaller volume and employ fewer tubes at lower plate voltages.

Furthermore, every radio user, regardless of the tubes he uses, has his own ideas as to when it is time to strengthen the signals with fresh "B" Batteries. Some will long enjoy concerts that others would not consider loud enough. Just what is "too weak" is purely a matter of personal opinion.

These, then, are the things that determine how long you use your "B" Batteries—

1. The number and kind of tubes. The more tubes you use and the greater their power, the more current flows from the "B" Battery and the shorter is its life.
2. The "B" Battery voltage. The higher it is, the more current flows from the battery.
3. The amount of negative grid bias ("C" Battery voltage) on amplifiers. The greater the bias, the smaller the "B" Battery current.
4. The life put into the battery in the first place by the manufacturer, and the freshness of the battery when you buy it.
5. The signal strength you wish. The smaller the volume of sound you can enjoy, the longer you can use your "B" Batteries.

The life of any "B" Battery you can buy is affected by the above factors. Subsequent advertisements will set forth each factor in detail.

Eveready "B" Batteries predominate. There is more life in them—they last longer! Blocks of large cells, packed with energy, made especially for radio use, delivered fresh to your dealer, give you the most power for your money—power you can use loudly and swiftly, or softly and slowly as you wish—Eveready for Everybody.

Thrills from Radio

No. 5 of a Series Featuring Experiences of "ALL-AMERICAN" Users

They Surely Give Fine Service

By E. Laurence Coble, Newton, Mass.

"All-American" Transformers will be regular equipment on any sets I make or have any part in making.

"I have surely received fine service from your transformers. Used them all through last winter and this summer."

Thrill your best friend this Christmas. Make him a present of a distance-getting "All-American." Largest selling transformers in the world. They faithfully reproduce

music and speech with volume and tone qualities exactly as broadcasted by the stations. Over 300,000 users just as enthusiastic as Mr. Coble.

"All-American" Transformers are standard equipment on the better sets. They defeat interference and abolish foreign noises. Without distortion you get volume and distance that means genuine thrills.

Suitable for all circuits. Various types to fit your particular needs. Coming! "All-American" Power Amplifying Transformers. Watch for them at your dealers!

FREE!

"All-American" diagram and circular describing Power Amplifiers; a 150 page book of hook-ups containing 22 tested circuits. Send 4c in stamps for postage.



All-American Audio Frequency Transformers come in three ratios: 3:1, 5:1, 10:1.

All the better dealers sell "ALL-AMERICAN"

RAULAND MFG. CO., 200 N. Jefferson St., CHICAGO

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AUDIO AND RADIO FREQUENCY



POWER AMPLIFYING INPUT AND OUTPUT

ALL-AMERICAN

AMPLIFYING TRANSFORMERS

Largest selling Transformers in the world

"the life of your radio"



The Metal Case Eveready "B" Battery, No. 766. The popular 22½-volt Eveready Battery

in a new, handsome, durable, waterproof metal case. At all dealers, \$3.00.

Eveready "B" Battery No. 767. Contains 30 large size cells, as used in the popular No. 766. Voltage, 45. Made especially for sets using detector and one or more stages of amplification. The most economical "B" Battery where 45 volts are required. At all dealers, \$5.50.



Eveready Radio Battery No. 771. The Eveready "Three," the ideal "C" Battery. Voltage, 4½—three terminals permitting the use of 1½, 3, or 4½ volts. The correct use of this battery greatly prolongs the life of the "B" Battery. At all dealers, 70 cents.

Manufactured and guaranteed by

NATIONAL CARBON COMPANY, Inc.
Long Island City, N. Y.

EVEREADY

Radio Batteries

—they last longer

Note: This is Number 3 of a series of informative advertisements, printed to enable users to know how to get the most out of their receivers and batteries. If you have any battery problem, write to G. C. Furness, Manager Radio Division, National Carbon Company, Inc., Thompson Ave. & Orton St., Long Island City, N. Y. Write for special booklets on "A," "B," and "C" Batteries.

**RAYMOND HITCHCOCK
LIKES GOING ON AIR**



Raymond Hitchcock, the popular comedian, one of his famous curtain speeches before the joys visiting broadcasting stations and delivering microphone. His visits are usually unheralded, as was the one to Station WGY, at which plant the above picture was taken. He also spoke not long ago from WEAJ via the Capitol Theater, New York

TRANS-ATLANTIC TESTS
(Continued from page 1)

fective transmitting radius to reach Europe. The American broadcasts are also scheduled for 10 p. m. Eastern Standard Time. The tests will proceed all week, with the American and English stations making their tests on alternate nights.

List of English Stations

The eight English stations taking part in the tests are as follows:

| | Wave Length | Watts in Antenna | Call Signal |
|-------------|-------------|------------------|-------------|
| London | 369 | 1,000 | 2LO |
| Birmingham | 420 | 500 | 5IT |
| Manchester | 385 | 1,000 | 2ZY |
| Newcastle | 400 | 1,000 | 5NO |
| Glasgow | 415 | 1,000 | 5SC |
| Aberdeen | — | 1,000 | — |
| Bournemouth | — | 1,000 | — |
| Cardiff | 353 | 1,000 | 5WA |

A number of American Radiophans have reported hearing English stations, particularly 2LO of London, but no accurate record of English trans-Atlantic transmission has been kept. It was the idea of obtaining such a record that caused the National Association of Broadcasters to plan the series of tests that are being made this week.

Eight English Plants Linked

In the beginning of each night's tests, all eight English stations are to be linked together to transmit the same program simultaneously. After an hour of the simultaneous program, it is planned to have each British plant transmit in turn, giving its call signal and location. By the end of the week it is believed that the best received English broadcaster will have been picked, and that this station can attempt a two-way talk with the American station which proves to be best received in England during the tests.

Saturday night, December 1, has been reserved for the two-way trans-Atlantic broadcast attempt.

Although at the time of going to press the list of American broadcasters was incomplete, the stations selected already by the National Association of Broadcasters were: WJAZ, Zenith-Edgewater Beach Hotel, Chicago; WOC, Palmer School of Chiropractic, Davenport, Ia.; WLW, Crosley Manufacturing Company, Cincinnati; WNAC, The Shepard Stores, Boston; WLAC, Cutting and Washington Radio Corporation, Minneapolis, Minn.

Radiophans hearing English stations on the nights of the tests are requested to

write to the National Association of Broadcasters, 1265 Broadway, New York City. Full information as to the local time the broadcast was heard, and a description of what was heard, should be included in such letters.

**A. S. C. A. P. LICENSED
PLANT SHUTS DOWN**

**Station WDT Goes Off Air When
Contract Between Supporting
Companies Ends**

NEW YORK.—Station WDT, formerly owned and operated by the Ship Owners' Radio Service and the Premier Grand Piano Corporation, recently closed down and went off the air with a sparkling closing program. The closing was a result of the termination of the contract of the two companies financing the project, but present plans contemplate WDT going on the air again soon.

The final numbers on the program were played by Vaughn De Leath's Merry Makers Orchestra, and were "Goodbye, Good Luck, and God Bless You," and "The End of a Perfect Day."

Station WDT was one of the few stations that ever bought a license to broadcast songs the copyrights for which are controlled by the American Society of Composers, Authors and Publishers.

New B. of S. Circular

WASHINGTON, D. C.—The Bureau of Standards has prepared Letter Circular No. 103, "Description of a Series of Single Layer Inductance Coils Suitable for Radio Frequency Standards." The series consists of seventeen coils having a constant ratio between the successive values of inductance, and the coils are designed to cover the inductance range from 8 to 5,000 microhenries.

**FREE
Your Choice**

of one bound volume with each annual subscription

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Greatest Collection of Radio Information Ever Published
Reinartz Long Distance Circuit
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Flewelling "Flivver" Circuit
Grimes "Inverse Duplex" Circuit
Single Tube Reflex Circuit
Armstrong "Super-Heterodyne" Circuit
Two, Three and Four Tube Reflex Circuits

A. B. C. Lessons for Radio Beginners

In addition to these features these volumes contain many instructive articles, receiving set diagrams, how to make articles, new apparatus, pictures and illustrations, hook-up diagrams, broadcasting stations, technical articles and book reviews.

**65
Numbers**

13 Numbers in the Bound Volume; 52 Numbers in Year's Subscription. Volumes 2, 3, 4, and 5 Now Ready.

Your choice of one Bound Volume is free and postpaid with your one year's subscription or renewal.

This offer good only in the U. S. and possessions. One dollar additional for Canadian or foreign countries.

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Remittance must be by check, money order or draft. (Stamps not accepted.)

CDUPDN 12-1
Radio Digest, 123 W. Madison, Chicago
CHECK OFFER DESIRED

- One year's subscription and choice of one volume. Send Vol. Check or M. O. enclosed..... \$5.00
- One year's subscription and choice of two volumes. Send Vols. Check or M. O. enclosed..... \$7.00
- One year's subscription and additional Volumes Nos.

Be sure to write plainly your name and address, giving city and state.

**Now They're Renting Out
Sets by Day, Week, Month**

**New Wrinkle in Boston Is Scheme
to Promote Radio**

BOSTON, MASS.—A plan to increase the popularity of Radio is being promoted by an organization formed here. The idea is to rent Radio sets to responsible people. The instalment plan of selling Radio sets has placed many thousands of the higher-priced sets in the homes, especially of those who hadn't the inclination or the mechanical ability to build sets of their own, but the renting organization confidently hopes to bring Radio to a far larger multitude, and besides to increase the instalment sales.

The plan, in brief, is to rent by the day, week, month or year as may be de-

sired—a first-class Radio receiving set at a nominal figure, with service guaranteed. The greater the distance the prospective renter wishes to cover and the larger the number of stations he wants to hear, the higher will be the charge. In case of a breakdown, whether from defects in wiring or accidental burning out of the tubes, the company plans to make liberal adjustments, and expects to win its customers' good will.

Hungarian Night at WLW

CINCINNATI.—"Liliom" by Franz Molnar has been made into a Radario by Fred Smith, director of Station WLW here, from which studio it will be presented December 6. The Radarians (WLW players) are under the direction of Helen Schuster Martin and will be surrounded by appropriate music by Kreisler. A new number will be played by the Cincinnati Conservatory String Quartet.

Coto Special Audio Frequency Transformer \$2.50

Type 4500

A MARVEL of manufacturing economy brings this remarkable audio transformer to you at a popular price.

Turn ratio is 3 to 1. Gives you ample volume and full, rich tone. Finest of materials. Coto quality throughout.

If your Dealer cannot supply you write us giving his Name

COTO - COIL CO.
87 Willard Ave., Providence, R. I.

BRANCHES
Los Angeles:
329 Union League Building
Minneapolis: Geo. F. Darling,
705 Plymouth Building
Atlanta: C. P. Atkinson,
Atlanta Trust Co. Building

Build a set where the numbers on the dials have a real meaning—

H - A - Z - E - L - T - I - N - E NEUTRODYNE

A UNIQUE method of tuning radio frequency amplification is employed in the Hazeltine Neutrodyne Receiver. This not only prevents tubes from oscillating, whistling and howling, but the tuning becomes so sharp that when once a station has been tuned-in, and the position of the numbers on the dial recorded, this identical position will again tune-in that particular station.

Complete parts for 3-tube set consist of—

- 1 7x21x $\frac{1}{2}$ Drilled Formica Panel
- 1 Howard Rheostat
- 3 4" Radion Dials
- 3 John Firth Bakelite Sockets
- 8 Binding Posts
- 3 23 Plate Variable Condensers
- 1 Wave Control Neutroformer
- 2 Radio Frequency Amplifying Neutroformers
- 2 Grid Neutralizing Condensers
- 1 .00025 Micon Condenser
- 1 Marco Variable Grid Leak
- 1 Base Board for mounting, 25 feet tinned copper bus bar wire and complete instructions for assembling and wiring.

With FREED-EISEMAN or FADA Licensed Parts

| | | |
|------------------------------------|------------------------------------|------------------------------------|
| 3 TUBE \$28⁶⁰ | 4 TUBE \$44⁶⁵ | 5 TUBE \$46²⁵ |
|------------------------------------|------------------------------------|------------------------------------|

All merchandise GUARANTEED by us to be of BEST QUALITY All mail orders shipped to you PROMPTLY

"The largest Radio Store in America"
509 S. State St.
Dept. RD-6
Chicago, Ill.

U. S. RADIO REARS TOWERS IN CHINA

\$13,000,000 PLANTS TO LINK NATIONS

Stations to Be Completed in Two Years; Orient Welcomes American Aid

NEW YORK.—Preliminary construction work on a group of Radio stations in China which will be the most powerful group in the world, has begun, it was announced recently, coincident with the departure for China of R. P. Schwerin, president of the Federal Telegraph Company of Delaware.

The cost of the Chinese stations will be \$13,000,000, and the program calls for their completion within two years. The stations are to be spread over five provinces, with the central station at Shanghai. This will be a 1,000-kilowatt station, with seven steel towers 1,000 feet high. They are the tallest structures ever designed, eclipsing in height the Eiffel tower and the Woolworth building.

Shanghai to Frisco Link
The Shanghai station will engage in direct communication with the Radio corporation stations at Hawaii and San Francisco. Shanghai will also operate a station of lesser power for communication with similar smaller stations at Peking, Canton and Harbin. The lesser stations will be used for interprovince communication.

Mr. Schwerin, before his departure, said the Chinese welcomed America's participation in providing a new and powerful communication link, which, together with the other high power Radio circuits operating, will encircle the earth.

U. S. Beats Other Countries
"These stations mean that American and Chinese business men may communicate directly without having their messages pass through foreign hands," said Mr. Schwerin. "It means that the American people may get truthful news about China. The British, Japanese, and Danes tried to obtain a monopoly of Radio in China without success."

The Shuangchos transmitting station at Peking, belonging to the Mitsui company of Japan, is the only large station in China at present.

AIRWAVES FIND MAN IN LESS THAN HOUR

Elyria, O., Tourist, Wanted at Home, Located in Georgia

CLEVELAND.—Thousands of fans listening in on a recent Saturday night were treated to a bit of real drama not listed on the program of any station, an absolutely unpremeditated bit of a thrill.

WTAM, the recently opened broadcasting station of the Willard Storage Battery Company here, was putting its usual program on the air when the announcer cut in to tell the audience that he had been asked to request that Radiophans in the South watch out for a business man of Elyria, Ohio, who was touring the South with his family en route to Florida. The Elyria man was wanted home immediately, because of the sudden death of his father. WTAM further requested that Station WSB at Atlanta repeat the announcement, as the tourist was believed to be somewhere in the state of Georgia. A description of the car and its license number was given.

No sooner had WTAM finished than WSB cut in with an acknowledgement of the receipt of the request and a promise to repeat the broadcast. About forty-five

APPRECIATE WEDDING BROADCAST



Thousands of letters, telegrams and postcards were received by Rev. F. N. McMillan of the First Presbyterian Church of Walnut Hills, Cincinnati, from Radiophans all over the country who had listened in to the wedding service broadcast by WLW, the Crosley Manufacturing Company, at the Fall Festival. Rev. McMillan, Sam Heed, vice-president of the Cincinnati Electrical Club, and A. R. Plough, who formed the Radio committee of the celebration, are seen here sorting the missives

minutes after the broadcasting of the original request by the Cleveland station, the Atlanta Journal station again cut in with the report that it had located the man wanted, and that he was leaving for home on the midnight train.

SHIPS WRECK EAST COAST BROADCASTS

Programs Are Blotted Out by Code Messages on Same Length

BRIDGEPORT, CONN.—Commercial code stations, and more particularly ships at sea, sending on the same wave length, continue to wreck broadcasting programs along the eastern coast. Some nights programs from New York stations are ruined and parts of them entirely obliterated in New England. Radio Supervisor Kolster says that interference by commercial code is even worse in Waterbury than it is around Boston, whole programs being blotted out on code messages on wave lengths of from 400 to 500 meters.

Deputy Inspector Butterworth found similar conditions in this city and New Haven, while complaints have been pouring in to Inspector Kolster's office in Boston from hundreds of fans around that city. Detailed reports have been filed with Commissioner Carson at Washington, and with them the strong recommendation that all commercial codes be immediately prohibited on 450 meters. The recommendations also suggest that every commercial coastal station be immediately advised that they must refuse to accept any future traffic from any ship at sea on that wave length.

"Give" Plant to Villages

TARRYTOWN, N. Y.—Station WRW has recently inaugurated a new feature of giving the station every Friday evening to the different villages and cities in Westchester county. The Community clubs, Rotary and Lions clubs, and schools of these cities can then boost their community. The evenings will be called Peek-skill night, Yonkers night, Portchester night, etc.

WHITE SAYS HE WILL INTRODUCE NEW BILL

WASHINGTON, D. C. (Special to Radio Digest)—In an interview with Representative White of Maine here recently, Mr. White, who is known as the father of the Radio Bill in the last Congress, said that he will introduce a new bill shortly after Congress convenes on December 3. It is understood that he will introduce the bill fostered by the Department of Commerce and which is much simpler in form than the bill which passed only the House at the last session. Mr. White has already had a conference with the heads of the department but will have a further conference before Congress convenes.

Broadcast Listeners' Voices on Phone Wire

Fans, Praising WPAL Program, Hear Own Words Reproduced

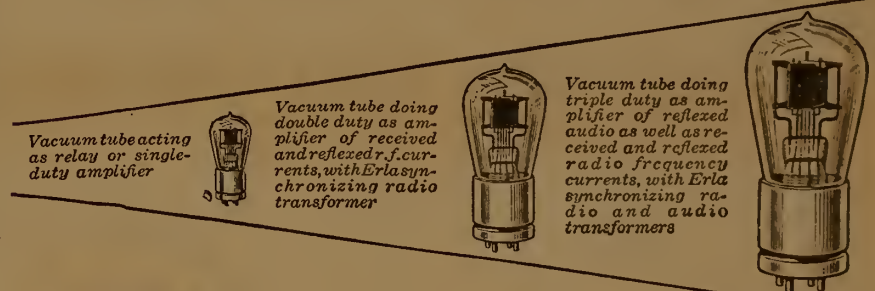
COLUMBUS.—In addition to the regular program at Station WPAL, Superior Radio and Telephone Equipment Company here, a unique experiment was attempted recently. Beginning promptly at 8 p. m., Central time, and continuing for ten minutes, all telephone calls from listeners commenting on the music were put directly on the air, thus enabling the Radio audience to know first hand how the program was being received. The experiment was performed successfully for the first time in Columbus, thirty-five calls being broadcast during the ten-minute period.

Never load the primary of the variocoupler without doing the same with the secondary.

Milwaukee Amateurs Meet

MILWAUKEE, WIS.—Delegates' reports on the Second National American Radio Relay League Convention, held in Chicago, were the principal feature at the recent season's opening meeting of the Milwaukee Radio Amateurs' Club, Inc. The officers are E. T. Howell, president; M. F. Szukalski, Jr., vice president; C. S. Polachek, secretary; E. W. Ruppenthal, treasurer; and L. S. Hillegas-Baird, business manager.

Tube Efficiency Is Trebled With Erla Synchronizing Transformers



Responsible for the unduplicated efficiency of Erla reflex circuits is a basic Erla discovery of vital and far reaching importance.

Discordance and instability in reflex circuits, it has been ascertained, are due directly to failure of transformers properly to synchronize received and reflexed currents having the same phase characteristics, in their simultaneous passage through amplifying tubes.

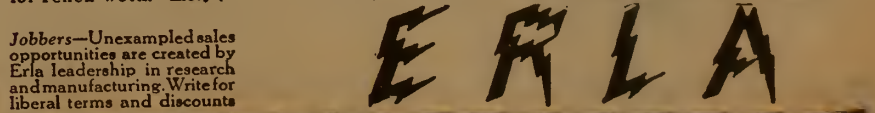
Obviously, if the lag between such currents were as much as 180°, the net result of their opposing forces would be zero, resulting in an absolute canceling of signal strength. Any intermediate lag, on the other hand, results inevitably in the generation of amplified distortion.

Erla scientists solved this problem by designing radio and audio transformers of an entirely new and special type, positively assuring perfect synchronization of received and reflexed radio frequency, as well as rectified radio and reflexed audio frequency currents.

This achievement, enabling vacuum tubes successfully to do triple duty, as simultaneous amplifiers of radio frequency, reflexed radio frequency and reflexed audio frequency currents, marks one of the most important advancements of recent years.

For complete details, ask your dealer for Erla Bulletin No. 14, describing and illustrating perfected Erla one, two and three-tube reflex circuits. Or write us, giving your dealer's name.

Electrical Research Laboratories
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Jobs—Unexampled sales opportunities are created by Erla leadership in research and manufacturing. Write for liberal terms and discounts



Radiotron UV-199

A Small Tube That's a Big Performer

Radiotron UV-199 for detection or amplification \$6.50

The new UV-199 is proving a mighty popular member of the Radiotron family, particularly for portable sets.

For quiet operation—great ruggedness—uniform operation Radiotron UV-199 is unsurpassed. Each new Radiotron has marked a big step in radio advancement. The R C A mark is the foundation of radio growth—and your protection when you buy. Ask for Radiotrons—and look for the mark.

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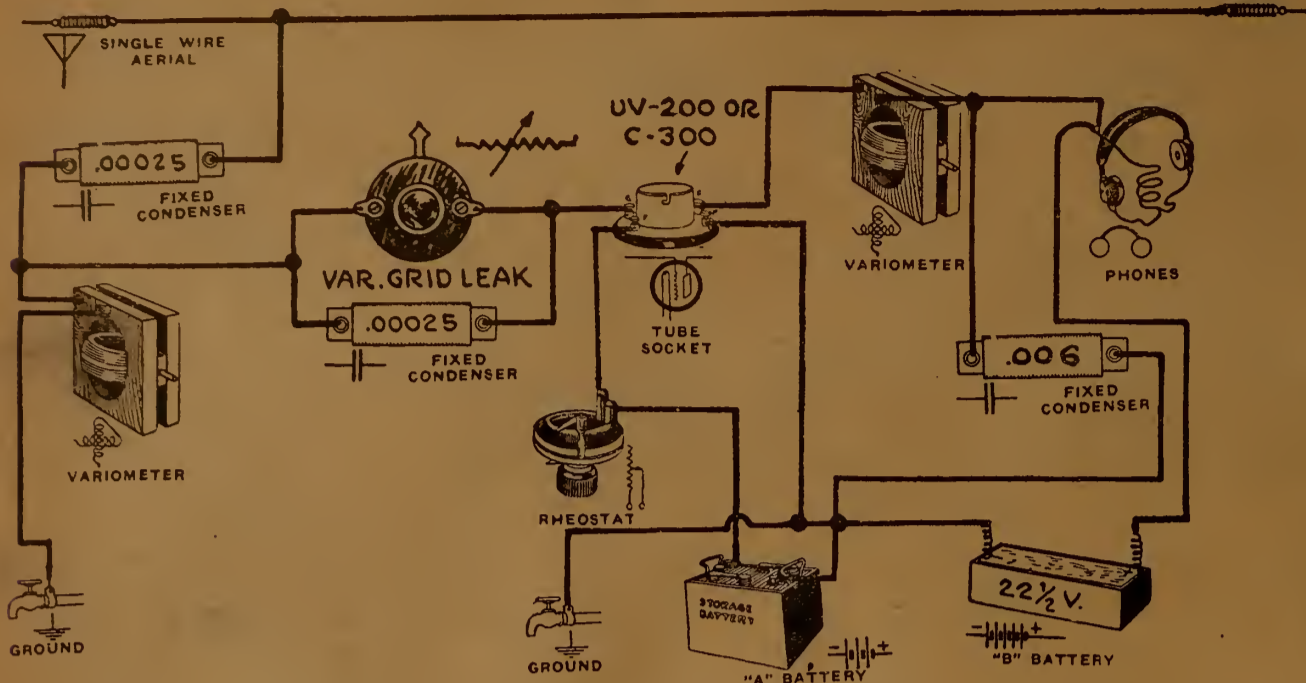
Radiotrons

REG. U. S. PAT. OFF.



This symbol of quality is your protection

SIMPLEX HOOK-UP USING TWO VARIOMETERS



HEREWITH is shown a diagram of a very good Radio receiving hook-up, which consists of two variometers, one variable grid leak, two .00025-mfd. condensers (fixed), one .006 mfd. condenser, one rheostat (6-ohm) and one socket.

The tube used may be either hard or soft. If a soft tube is used, a 22½-volt B battery will work sufficiently well.

Use 45 volts or more with a hard tube. UV-199 tubes may be used in this circuit.

Employing two stages of amplification in this circuit, you can lay the phones down on the table and hear stations at a distance of 700 miles 20 feet away from the phones.

This hook-up is especially good for the person who is without a variocoupler and has two variometers that are not in use.

A vernier is necessary on both variometers. I have been asked several times for this hook-up by Radiophans who have heard this circuit work. The fans to whom I have given it are very much satisfied with the results they are getting.

I have worked Los Angeles about every night for the last month or so, and also stations in thirty-one states with this circuit.—Paul Ransom, Tonkawa, Okla.

FLEWELLING ANSWERS

By E. T. Flewelling

(Editor's Note.—This department is written by Mr. Flewelling, the inventor of the famous super circuit. From the questions sent him each week care of Radio Digest, he picks the one considered most informative for all and answers it in this column.)

Best Form of Flewelling Circuit

(Submitted by L. S., Dallas, Tex.)

Question. As I have been a constant reader of the Radio Digest for over a year and have not missed a single copy since the Flewelling circuit appeared, I am naturally a very enthusiastic booster, and would like to ask a few questions through the Question and Answer column:

Can the Flewelling principle, i.e., the .006-mfd. fixed condenser in the filament lead and the special plate lead be applied, with the same results as when using movable tickler coil, to the miniature regenerative set by Mr. Roslyn V. Russell, which appeared in the June 23 issue (1923) of the Radio Digest using only one and the same coil, providing the circuit was modified to that of the Flewelling?

Answer. It could be done, but I feel that your adjustments would be so critical that you would not have much success with it.

(Continued on page 14)

Improved Ground Clamp



Equipped with Fahnestock Patent Wire Connectors

Easily Attached

No Soldering. For Radio Use Only

At Your Dealers

Fahnestock Electric Co.

Long Island City, N. Y.

Headset with Voltmeter Makes B Battery Test

Many Radiophans have an A battery voltmeter and often want to test the B battery voltage.

An easy way is to use the headset as a multiplier. Connect the headset in series with the voltmeter and apply it to the A battery to get the multiplying value of the headset, which will ordinarily be about three. This will make a voltmeter graduated to 10 volts read to thirty.

I have a 10-volt voltmeter mounted on an empty cigar box with a Resist-o-meter and a single-pole knife switch. By varying the Resist-o-meter I can make the multiplier almost anything desired up to

25. The switch simply short-circuits the Resist-o-meter when not wanted, so as to keep any adjustment of the multiplier



which has been made and which it is desired to retain.—H. Letord, El Paso, Tex.

For each step of amplification an amplifying tube, transformer, rheostat and a socket are required.

Fixed Condensers

A fixed condenser is one of the most important parts of a Radio set. Sometimes these instruments are all that keep a high voltage B battery from passing its current directly through the head phones and the rest of the circuit. An operator cannot be too careful about this part of the set, and if paper condensers are used, they should be watched closely to see that they do not get damaged.

"3,000 mile"

RADIO "B" BATTERY

DIRECT FROM FACTORY TO YOU

Greatest radio B battery on market. Absolutely fresh, full voltage, seamless cells, noiseless—will bring in Concerts LOUDER and STRONGER! Built correctly—full number of voltage taps—will work any tube or loud speaker. Real service GUARANTEED. Sold direct from our factories to you at lowest prices. Shipped prepaid to your door. ORDER TODAY. Send money order, check or pay C. O. D. Order By Number

No. 22B—22½ volt variable—regularly \$2.25—our price \$1.98
 No. 22A—22½ volt variable—regularly \$3.00—our price \$2.65
 No. 345A—45 volt—8 taps—regularly \$6.00—our price \$4.98

AYRES BATTERY CORPORATION, Cincinnati, Ohio

RADIO FANS

Tune in on station
WEAF (New York)

every Thursday at 8.50 P. M. and listen to a story or article selected from

HEARST'S INTERNATIONAL

This is one of the most popular weekly features "on the air"

FREE

Write for Free Copy of the Latest Radio Reprint F. It contains a complete story from Hearst's International Magazine. Address Radio Editor, Hearst's International Magazine, 119 West 40th Street, New York City.

Super Values

| Flewelling Circuit Complete | | Reinartz Circuit Complete | |
|---|-----------|--|-----------|
| List Price | Our Price | List Price | Our Price |
| 7 x 9 Radion Panel..... | \$ 1.15 | Genuine Reinartz Coil endorsed by John L. Reinartz and bearing his signature. The only genuine coil for this circuit on the market. All others are imitations..... | \$ 2.50 |
| 23 Plate Var Condensers..... | 3.00 | National Bakelite Socket..... | 1.25 |
| 3 .006 Mica Condensers..... | 3.00 | Knobor Vernier Rheostat with dial..... | 1.00 |
| C. R. L. Var Grid Leak..... | 1.85 | Two 23 Plate variable condensers at \$3.00 each..... | 6.00 |
| Two Coil Honeycomb mount adjustable with knobs..... | 4.00 | Switch Points and Nuts..... | .40 |
| 50 Turn Honeycomb Coil..... | 1.54 | Six Switch Stop Points and Nuts..... | .40 |
| 75 Turn Honeycomb Coil..... | 1.54 | Pushman Grid Leak and Condenser..... | 1.00 |
| One tube socket..... | 1.00 | Seven Binding Posts..... | .70 |
| Knobor vernier rheostat with dial..... | 1.50 | 25 ft. Tinned Bus Bar..... | .50 |
| One three inch Dial (Taper Knob)..... | 1.06 | 3 Switch Levers with knobs..... | .75 |
| 8 Binding Posts..... | .80 | One Baseboard for mounting..... | .75 |
| Baseboard for mounting..... | .75 | One Fixed Phone Condenser..... | .40 |
| Complete Instructions for Assembly and Wiring..... | .50 | One Single Jack..... | 1.00 |
| | | Blue Prints with complete instructions for assembly and mounting..... | .50 |
| Regular Price..... | \$21.63 | Regular Price..... | \$19.05 |

OUR PRICE \$13.20

OUR PRICE \$11.05

All the necessary screws, nuts and miscellaneous small parts which are necessary to complete the set are included in the above prices. Any part in either of these circuits may be purchased independently at the advertised cut price.

TRIGGER OF NEW YORK RADIO

EVERYTHING SOLD ON MONEY-BACK GUARANTEE. WE HANDLE NO BOOTLEG MERCHANDISE.

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| <p>COCKADAY COMPLETE PARTS GUARANTEED</p> <p style="text-align: center; font-size: large;">\$12.50</p> <p>ASSEMBLED</p> <p style="text-align: center; font-size: large;">\$17.50</p> <p>Add \$2.50 to each for Cabinet</p> | <p>ERLA REFLEX 3 TUBE BEST OF PARTS</p> <p style="text-align: center; font-size: large;">\$45.00</p> <p>ASSEMBLED</p> <p style="text-align: center; font-size: large;">\$67.50</p> | <p>COCKADAY 3 TUBE Unassembled</p> <p style="text-align: center; font-size: large;">\$32.50</p> <p>INCLUDE CABINET ASSEMBLED</p> <p style="text-align: center; font-size: large;">\$42.50</p> <p>DISTANCE VOLUME SELECTIVITY</p> | <p>LOUD SPEAKER</p> <p>Bristol 20.00</p> <p>Atlas 18.00</p> <p>Magnavox 30.00</p> <p>Mercury 6.00</p> <p>Music Master 26.00</p> |
|---|---|---|---|

| | | | |
|--------------------------------------|--------|----------------------------|--------|
| Indoor Aerial..... | \$1.75 | Baldwin's Original..... | \$8.50 |
| Hydrometer..... | .50 | Jefferson Transformer..... | 2.75 |
| Voltmeter, 50 Volts..... | 1.65 | Amertran Transformer..... | 5.50 |
| Freelham Variable Grid and Leak..... | .70 | Aeme Transformer..... | 3.75 |
| Remler Moulded Variometer..... | 4.00 | Wave Trap..... | 7.00 |
| Freed-Elecmann 180° Coupler..... | 2.00 | D. C. Charger..... | 5.75 |

We carry a complete line—from screws to sets.

You can purchase with an absolute guarantee. We carry no factory seconds or salvage merchandise. Goods shipped immediately. Please be sure to include postage on orders under \$10.00.

TRIGGER OF NEW YORK

160 EAST 59TH STREET, NEAR THIRD AVENUE, NEW YORK CITY

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| <p>FADA NEUTRODYNE</p> <p>All parts for 5 Tube Set, complete (Genuine Fada Parts)..... \$50.15</p> <p>Solid Mahogany Cabinet, \$6.75 Extra</p> | <p>COCKADAY 3 TUBE SET</p> <p>All Parts..... \$32.00</p> <p>Cabinet, \$5.00</p> |
|--|---|

LOUD SPEAKERS

| List Price | Our Price | List Price | Our Price |
|-------------------------------------|-----------|----------------------------|-----------|
| \$161.00 Western Electric 10-A..... | \$125.75 | \$30.00 Music Master..... | \$24.50 |
| 55.00 Western Electric 10-D..... | 44.00 | 25.00 Atlas Amplitone..... | 19.50 |
| 60.00 Magnavox Type R-3..... | 51.00 | 25.00 Trinity Type A..... | 19.50 |
| 35.00 Magnavox Type R-2..... | 29.50 | 22.50 Belcauto..... | 18.00 |
| | | 28.50 Dictogrand..... | 23.50 |

PHONES

| List Price | Our Price |
|-----------------------------|---------------|
| \$7.00 FEDERAL | \$5.50 |
| \$6.00 BRANDES..... | \$5.25 |
| 8.00 N&K GERMAN..... | 5.75 |

TUBES

| List Price | Our Price |
|---------------------------------|-----------|
| \$5.00 RADIOTRON U. V. 200..... | \$3.95 |
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HANES-ZENER

3 WEST 29TH STREET, NEW YORK CITY

Further Details of the Famous Miloplex Hook-Up

Part IX—The Improvement on the King Disclosed

By the Mystery Man

NOW let me introduce the man who made the King better.

Twelve years ago, Clarence H. West, of Stapleton, N. Y., told Uncle Sam that Radio would be a howling failure unless they gave him a commercial license, and Sam being mindful of the exigencies

"Condenser number 1 chokes out all of those frequent mutterings, and faint whistles caused by single circuit set radiating energy. Though it would seem that this condenser only adds capacity to the grid condenser, this is not so, because it is coupled to the aerial at a point close

Good, neutralizing condensers are now on the market, but Mr. West built his own, and if you wish to do the same here is the way he did it.

He selected a piece of straight bus bar wire, 3 inches long exclusive of amount used as terminal. Over this a glass tube, 6 inches long, and a close fit, was slipped. This tube should not be over 1/4 inch in diameter. Over the glass tube a 3 inch long brass tube was fitted so that it slid easily. The whole was mounted on a base of hard rubber (or any other good insulating material would do). It should be borne in mind that the smaller the tubes the better. A vernier condenser of the single type will not answer the purpose of these condensers, even though it forms a gradual capacity. (See Figure 2.)

While on the subject of neutralizing capacities, somebody should get busy and explain to us thousands of fans just what neutralizing means. This I know: The principle involved is identical with that governing the Wheatstone bridge.

And now that you are going to do some neutralizing, don't forget that the biggest factor in the whole operation of the circuit is the variable grid leaks. On this Mr. West and I agree that it is the one final stunt for bringing in real DX. He says:

"Owing to lack of time, at the present, I have been unable to put the King to any great tests. However, I have received both Chicago stations, Schenectady, Lavenport, Pittsburgh and Montreal, out of the loud speaker in immense volume. The spark from ship, amateur, etc., are absolutely tunable."

You know while hundreds like the King still it is sort of nip and tuck between it and the Wizard Miloplex.

Most everyone liked its bearcat volume, simplicity, and DX work, so here's a promise: In December I'll slip you a circuit that in application is somewhat unusual. It will be more easy to build than the Wizard; it will DX around the country and put local on a loud speaker on one tube.

(TO BE CONTINUED.)

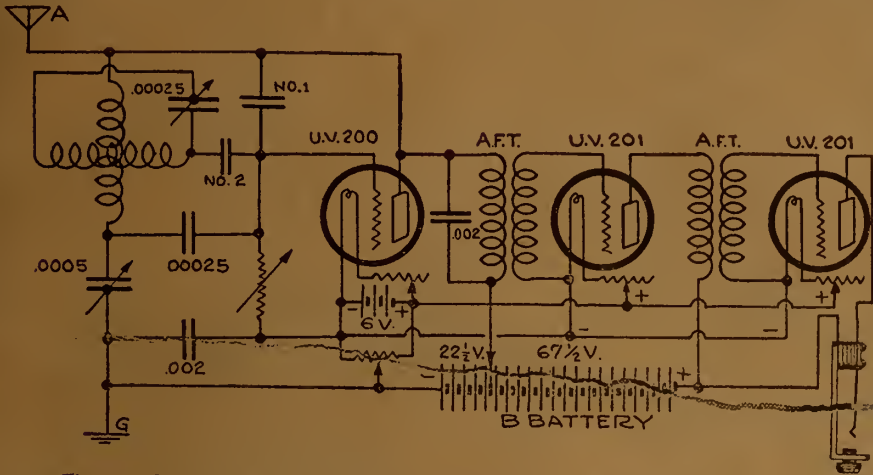


Figure 1—Hook-up showing Mr. West's improvement on the King Miloplex circuit

of the situation forthwith signed, sealed and delivered said insurance for its future activities.

One day a new Radio circuit wrapped up in a Digest found its way to him. It was the Miloplex, and two weeks later to the day in came a letter from Mr. West telling me in plain English that after trying out the circuit he had not much faith in it. Later on, however, he informed me he had developed a decided improvement in the King—one I realize each of you will want to try, and one you will enjoy very much. It's up to me to give you his story, as I promised in my last article.

Before describing the improvement itself, I shall, however, locate Stapleton with reference to some well-known broadcasting stations in the East and let Mr. West relate his receiving results with these stations.

The distances are, from Stapleton to WNY three-fourths mile; to NAH, five miles; to WOR, eighteen miles, and to WEAF, twelve miles.

Mr. West makes the following statement, as to his experiences:

"WNY is absolutely controllable, while NAH is very seldom heard, and then only when tuned for. WOR differs from WEAF in a wide margin of about 50°, variometer being at right angles. The condenser across the rotor becomes valuable in picking out long distance stations, and when thus located, these are broadened out clearly by the adjustment of condenser number 2. The condensers (1 and 2) are adjustable, and their effect on the spark is very noticeable. On Radio phone it is not necessary to use them, for tuning results may be obtained with the variable condensers, rotor, etc.

to the plate. If moved to another point (say, the coil starting point) not much difference would be noticed. These two condensers have to date been shifted every place possible, and they now belong where they are shown (see Figure 1). Condenser number 2 should be connected to the fixed plates of the rotor variable."

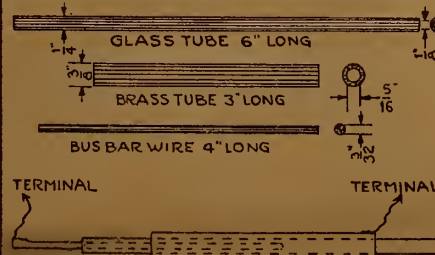


Figure 2—Details of home-made neutralizing condenser

Not bad, but supposing we investigate. By referring to Figure 1, showing amplification, points 1 and 2 indicate just where he places the neutralizing condensers. To follow the circuits neutralized is not essential.

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A beautifully hand-colored photograph, enlarged to approximately 8 x 10 inches and ready for framing, can be made from any of your kodak films at the very low price of \$1.00.
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Our price complete with panel drawing \$30.25 TOTAL \$39.25
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NATIONAL RADIO WEEK ADDS SPECIAL

Story of "Rigoletto" on KYW Saturday

IMAGINE you are back in Mantua during the sixteenth century and listen to the pathetic story of a hunchback jester, Rigoletto, who aids his master, the Duke of Mantua, a Don Juan of wickedness, in his love affairs. Although this ugly hunchback has carefully hidden away his beautiful daughter Gilda, the Duke has already been following her. Believing her to be the mistress of Rigoletto, the Duke's courtiers kidnap Gilda and trick Rigoletto into helping them. This ends the first act.

ACT II

When Rigoletto tries to save his daughter, the courtiers bar the door and make sport of him, even when he tells them Gilda is his daughter. At last the door opens and Gilda comes out. Rigoletto comforts his ruined child and vows vengeance.

ACT III

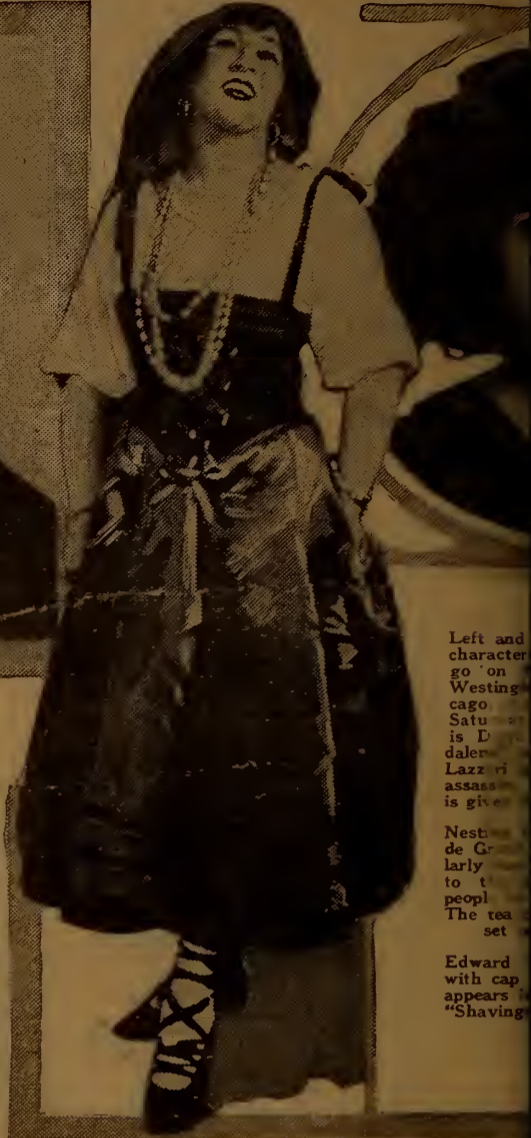
The last act takes place around and in the ruined inn of Sparafucile, the assassin, whom Rigoletto has hired to kill the Duke. Gilda and Rigoletto per in at the Duke making love to Maddalena, the assassin's sister. During this act he sings the famous song, "Woman Is Fickle." The famous quartet, "Fairest Daughter of the Graces," is also sung by these four. Maddalena persuades her father to give Rigoletto another's body. Giving a terrific storm Gilda returns to the inn and hearing the strange agreement, receives the assassin's blows. Rigoletto, therefore, receives the body of his own child. As he is about to throw her into the river, he hears the Duke making love to Maddalena. Opening the bag he discovers the crumpled body of his daughter. She revives sufficiently in the night air to sing a beautiful duet with Rigoletto, "In Heaven Above."

—THE PROGRAM LADY.

Lena Holland Fielder, lyric-coloratura soprano, will be in recital from Station WFAA on the evening of November 27. She is a popular Dallas musical entertainer.



Jean Goldkette, the Isham Jones of Michigan, whose orchestra, although only a year old, is considered far better than any other in Detroit. Hear it play from WWJ, Thanksgiving eve, November 28



Left and character go on Westinghouse Saturday is Daler Lazzari assassins give Nestor Grady larly to the people The tea set Edward with cap appears "Shaving"

Tuesday, November 27

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 6:15 p. m. Grand Symphony Orchestra; 7:45, Children's period; 8:15, A Memory of Old Canterbury; Dr. John R. Ewers; 8:30, Anna Hagmeier Woodschoff, contralto; J. M. Thompson, tenor; James Younger, cellist; Mariella Kobay, accompanist.
KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Concert through courtesy of Emma M. Bartlett, chairman, Public School Music, State Federation of Clubs; 10:00-11:00, Concert, Henry Robinson; Tri-chamber music.
KGW, Portland, Ore. (Pacific, 492), 8:30 p. m., Jeanette P. Cramer; 8:00, Talk for farmers, Paul V. Maris; 10:00, George Olsen's Metropolitan Orchestra.
KHJ, Los Angeles, Calif. (Pacific, 395), 6:45-7:30 p. m., Children's program, "The Sandman"; 8:00-10:00, Long Beach Band; 10:00-12:00, Art Hickman's Orchestra.
KYW, Chicago, Ill. (Central, 536), 6:50 p. m., Children's bedtime story; 9:30, Herbie Mintz, pianist; Wendell W. Hall, music maker; Chicago Musical College.
KPO, San Francisco, Calif. (Pacific, 423), 8:00-10:00 p. m., Program, Walter H. Bundy, director; Members of Sunset "4"; Sonoro Singers; 6:00-7:00, Chester N. Weaver Royal Hawaiian Orchestra.
KSO, St. Louis, Mo. (Central, 546), 8:00 p. m., Mrs. Frank Howard, mezzo-soprano; Sylvia Waldon, violinist; Mrs. Louis Maginnis, pianist; Address, Dr. T. R. Ball.
WBAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Wylbert Brokan, violinist; 9:30-10:45, Concert, Dot Echols McCutchan, director.
WBZ, Springfield, Mass. (Eastern, 337), 7:30 p. m., Twilight tales for Kiddies; "Service in the Home"; Agnes H. Craig; 8:00, Concert, Leo Fenway; 9:00, Bedtime story for Grown-ups, Orison S. Marden; 10:00, Dance music, New Departure Orchestra.
WDAP, Chicago, Ill. (Central, 360), 10:00 p. m., Frederick W. Agard, tenor; Bob Cougle, pianist; Alden Dornay, pianist; Jack Chapman's Orchestra.
WDAR, Philadelphia, Pa. (Eastern, 395), 12:00 p. m., Stanley Theater organ; Arcadia Cafe Concert Orchestra; 2:00-3:00 p. m., Concert, Arcadia Cafe Concert Orchestra; 7:30, Bedtime stories, Dream Daddy; 7:45, Radio dramatic review, Walter Greenough.
WEAF, New York, N. Y. (Eastern, 492), 11:00-11:50 a. m., Talk from Town Hall, Louis Kaufman Anspacher; 4:00-4:30 p. m., Doris J. Taylor, soprano; 4:30-5:00, Stanley R. Hampton, baritone; 5:00-5:30, Russian Kavkaz Trio; 6:30-7:30, Eva LaGallienne & Co., in the Broadway success "The Swan"; 7:30-7:40, United Sports Review, Thornton Fisher; 8:30-9:00, Current Events; 9:00-9:30, Esther Nelson, soprano; 9:30-10:00, Francis Moore, pianist.
WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., Address, DeWitt McMurray; 8:30-9:30, Mrs. Albert L. Scales, musician; 11:00-12:00, Mrs. Lena Holland Fielder, singer.
WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Dinner music, Meyer Davis Orchestra; 3:00, Piano recital, Loretta Kerk; 6:30, Meyer Davis Bellevue Stratford Orchestra; 7:00, Message from "Snowball" in Santa Claus Land; 8:00, One-act play, Strawbridge and Clothier Players.
WGI, Medford Hillsdale, Mass. (Eastern, 360), 3:30 p. m., Amrad Women's Club Program; "Hospitality Talk"; Ida Bailey Allen; Descriptive music, Chickering & Sons; 7:00, Musicales, DX contest.
WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., George Albert Bouchard, organist; 4:00, Martha Gomph, harpist; Elise de Grood, violinist; 6:30-7:30, Vincent Lopez Dance Orchestra.
WGY, Schenectady, N. Y. (Eastern, 380), 2:00 p. m., "The First Thanksgiving," Katharine V. D. Steers; 7:45, Music, Practice Club of Saratoga Springs, Mrs. A. W. Ahlberg, pianist; Mrs. J. Elaine Tynno, soprano; Mrs. Horace J. Howk, contralto; Mrs. Morgan, violinist; Mrs. Henry W. Benton, pianist; Mrs. Marjorie K. Walte, contralto; Mrs. Charles B. Andrus; Mrs. J. A. P. Ketchum, pianist; Outdoor talks, Jud London; Folk Songs of Eastern Europe, Margaret Walbridge.
WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Strand Theater Orchestra; "Just Among Home Folks"; Gus Edward's Orchestra; Barney Rapp's Orchestra; Walnut Theater Orchestra; Mrs. Myrtle Pulks Zahn, organist; 7:30-9:00, Henry M. Schilling and his orchestra.
WHN, New York, N. Y. (Eastern, 360), 4:30-5:30 p. m., The Hollywood Serenaders of "Tangoland," Martin

leader; 9:30-9:45, Nina Welsman; 11:00-11:30, Sapiro Bernstein Music Co.; 11:45-12:00, Nicholas Pirogo and his Orchestra.
WIP, Philadelphia, Pa. (Eastern, 509), 1:00 p. m., Organ recital, Karl Donawitz; 3:00, Record Recording Orchestra; 6:30, Dick Regan and his Little Symphony Orchestra; 7:00, Uncle Wip's bedtime stories; 8:00, Dramatic Review, Elliot Lester; 10:10, Dance music by Charlie Kerr and his Orchestra from St. James Hotel.
WJAZ, Chicago, Ill. (Central, 447.7), 10:00 p. m.-2:00 a. m., Max Williams, pianist and soprano; Tony Corcoran, baritone; Margaret Garrity, pianist; Kenneth Fiske, violinist; Hugo Tulen, violinist; Oriole Orchestra.
WJAX, Cleveland, Ohio (Eastern, 930), 7:30 p. m., Bedtime story E. G. Johnson; final meeting of the Cleveland Community Fund Campaign.
WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Stories and Poems for Children, T. C. O'Donnell, Editor of Writers' Digest; 10:00, "Radio and the Government," A. L. Behymer, postmaster; "Radio" concert, pupils of the Walnut Hills Music School; "Our Governmental Radio Service," George Lewis; 11:00, Northside K. of C. Quartet; Circle Orchestra.
WMAQ, Chicago, Ill. (Central, 447.5), 4:30 p. m., Program, Glenn Dillard Gunn School of Music; 7:00, Talk, American Chemical Society; 7:30, Program, Chicago Consulate of Hungary; 9:30, Hotel LaSalle Trio; 9:15, Program, Lyon and Healy.
WNAAC, Boston, Mass. (Eastern, 278), 12:15-12:45 p. m., Church Service from King's Chapel; 4:00-4:45, Dance music; 4:45-5:15, Vaudeville Specialty from Leon's Orpheum Theater; 8:00-9:45, Band Concert-Malden Cadet Band.
WOAW, Omaha, Neb. (Central, 526), 9:00-11:00 p. m., Murray Community Orchestra; Mrs. Mae Longbridge Smith, soprano; Will Lindner, cornetist; Ralph Kennedy, pianist; Uncle Sam Latta (age 85), soloist; Mrs. Olga Minford, flutist; Elizabeth McCracken, violinist; Grace Lindner, violinist; Elsie Patterson, reader.
WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:30 p. m., "Enlarged Tonsils," A. G. Hinrichs; 5:45, Chimes.
WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Talk, Detroit, Mich. (Eastern, 517), 9:30 a. m., Wanamaker Crystal Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt.
WOR, Newark, N. J. (Eastern, 405), 6:15-6:30 p. m., "Music While You Dine," the Melody Boys; 6:30-7:00, "Man in the Moon," story for Children; 7:00-7:30, "Music While You Dine," Melody Boys.
WSB, Atlanta, Ga. (Central, 429), 12:00 m., Government Day, message, Governor Clifford M. Walker; 8:00-9:00 p. m., Vick Meyers Melody Orchestra, Message, Mayor Walter A. Sims; 10:45, "Uncle Sam Program," Edwin K. Large, Atlanta postmaster.
WWJ, Detroit, Mich. (Eastern, 517), 9:30 a. m., "Tonight's Dinner," Woman's Editor; 9:45, "Ironing Day," Fred Shaw, Margery Richmond; 3:00 p. m., 7:00 p. m., Detroit News Orchestra.

Wednesday, November 28

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 6:15 p. m., Grand Symphony Orchestra; 7:30, Literary program; 7:45, Children's period; 8:30, KDKA Little Symphony Orchestra; Ruth E. Ross, coloratura soprano; Clyde Dunn, tenor; Mrs. Pearl Van Orsdale, accompanist.
KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Detective Stories, Detective Hick Harris; 10:00-11:00, Concert, Dr. Marian Tract Whitling Concert Co.
KGW, Portland, Ore. (Pacific, 492), 3:30 p. m., Music by children, story by Aunt Nell; 8:00, Columbia Theater All-Artists Orchestra; 10:00, George Olsen's Metropolitan Orchestra; Inoz Chamber, violinist.
KHJ, Los Angeles, Calif. (Pacific, 395), 6:45-7:30 p. m., Children's program, Priscilla Moran, screen juvenile; Barbara Jane Mitchell, singer, 5 years of age; Frank Johnson Hoppe, 5 years of age; 8:00-10:00, "Uncle" Remus and Company, "Day on the Plantation"; 10:00-12:00, Art Hickman's Orchestra.
KYW, Chicago, Ill. (Central, 536), 6:50 p. m., Children's bedtime story; 8:00-8:58, Mrs. Kate Zelezny, soprano; Sallie Menkes, pianist; Pennsylvania R. R. Chicago Terminal Band; A. G. Howbecker, baritone; A. Fernbach, clarinet; G. Clithero, cornetist; 9:05, Reviews of the latest books, Llewellyn Jones.
KPO, San Francisco, Calif. (Pacific, 423), 8:00 p. m.-1 a. m., Dance music, Palace Hotel Rose Room Bowl.
KSO, St. Louis, Mo. (Central, 546), 7:00 p. m., Aberg's Concert Ensemble; Arne Arneson, violinist; 11:00, Rodemich's Orchestra.
PWX, Havana, Cuba (Eastern, 400), 8:30-11:00 p. m., National and Foreign music, General Staff Band of the Cuban Army.
WBAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Concert, Broadway Pennsylvania Men's Bible Class; 9:30-10:45, George Freeman's Souper Serenaders.
WBZ, Springfield, Mass. (Eastern, 337), 6:00 p. m., WBZ Quintette; "Amplification of Speech and Music," Edward H. Goodrich; 7:30, Twilight tales for the Kiddies; "The Farmer's Job—Feeding New England," Samuel C. Hood; Story for Grown-ups, Orison S. Marden; 11:00, WBZ Quintette; William L. Spittal, tenor; Mrs. Dorothy Birchard Mulroney, accompanist.
WDAP, Chicago, Ill. (Central, 360), 10:00 p. m., Jack Chapman's Orchestra.
WEAF, New York, N. Y. (Eastern, 492), 11:00-11:20 a. m., Talk, Columbia University; 12:00-12:20 p. m.,

Chap Service, Columbia University; 4:00-4:30, Eduard P. Telle, basso; 5:50-5:50, Annadele Hastings, pianist; 7:30-7:30, United Synagogue of Detroit; Weekly Service; 7:30-7:40, United Sports Review, Thornton Fisher; 7:40-8:00, Carolyn Trowell, soprano; 8:10-4:40, James Haupt, tenor; 8:40-8:50, John V. L. Hogan, consulting radio engineer; 8:50-9:20, Harriette Cady, pianist; 9:20-9:30, N. Y. City Board of Education.
WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., "The story of American Colonies," W. A. Philpott.
WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Orchestra; 3:00, Strawbridge and Clothier Quartet; 6:30, Meyer Davis Bellevue Stratford Orchestra; 7:00, Message from "Snowball" in Santa Claus Land.
WGI, Medford Hillsdale, Mass. (Eastern, 360), 6:50 p. m., Message to Camp Fire Girls, Charles W. Casson, "Big Smoke," 7:15, "This Week's Judge," 7:20, "Science Up to Date," Scientific American; 7:30, "Self-Cultivation in Reading," David M. Cheney; Concert Players.
WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., George Albert Bouchard, organist; 4:00, Martha Gomph, harpist; Elise de Grood, violinist; 6:30-11:00, Vincent Lopez Dance Orchestra; 9:30, Erlendbach's Orchestra; Festivities of annual hall, Troop 1 Post, American Legion.
WGY, Schenectady, N. Y. (Eastern, 380), 6:30 p. m., "Adventure Story," The Youth's Companion.
WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Strand Theater Orchestra; "Just Among Home Folks"; Walnut Theater Orchestra; Alamo Theater Organ; Four-minute talk on household economies; 7:30-9:00, Catherine E. Goodman, soprano; Gus Edward's Orchestra; Barney Rapp's Orchestra; Francis B. Wallace, soprano; Walnut Theater Orchestra; Strand Theater Orchestra.
WHN, New York, N. Y. (Eastern, 360), 4:00-5:00 p. m., "The Washingtonians" from the Hollywood; 7:30-8:00, Clover Gardens Orchestra; 8:15-8:30, Agnes Macpeake, soprano; 8:30-8:45, Blanche Hoff, contralto; 8:45-9:15, The White Way Entertainers; 8:15-10:00, Edw. B. Marks Music Co.; 10:00-10:30, The Red and Gray Melody Boys; 11:30-11:40, "Plays and Art," S. Jay Kaufman.
WIP, Philadelphia, Pa. (Eastern, 509), 6:05 p. m., Bedtime stories and roll-call; 7:00, Uncle Wip's bedtime stories and roll-call.
WJAZ, Chicago, Ill. (Central, 447.7), 10:00 p. m.-2 a. m., Mollie Wiggins, mezzo-soprano; Olga Gates, soprano; Phyllis Burnton, violinist; Stella Feigen, cellist; Alice V. Johnson, pianist; Jack Crampton, baritone; Oriole Orchestra.
WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Concert, Wurlitzer Concert Company; 8:00, Concert, 10th U. S. Infantry Band; Louise Koetter, contralto; Edwin Weidinger, baritone; "Radio and Music," Walter Aiken, Radario; "Kitchen Koltn," Crosley Radiarians.
WMAQ, Chicago, Ill. (Central, 447.5), 1:00 p. m., Speeches, Chicago Ass'n of Commerce Luncheon; 4:30, Cosmopolitan School of Music and Dramatic Art; 7:00, Stories for Children, Georgene Faulkner, story leader; 7:30, Weekly lecture from Northwestern University; 9:00, Hotel LaSalle Trio.
WNAAC, Boston, Mass. (Eastern, 278), 12:15-12:45 p. m., Church Service from King's Chapel; 4:00-4:15, Dance music; 4:15-4:30, Organ Recital from Modern Theater; 6:00-6:15, Bedtime stories.
WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:30 p. m., Lecture, Clyde G. Kern; 6:30, Sandman's visit; 7:00, "The Farmers' Thanksgiving," F. D. Steen; 8:00, Mrs. Frank W. Elliott, organist; Mrs. F. C. Hinton, soprano; Virginia Smith, pianist; 9:00-11:00, Special Thanksgiving program, Schmidt Music Co.; Amalia S. Goble, soprano; Maud M. Bond, reader; Mrs. E. H. Hippe, saxophonist; Earl Schmitt, xylophonist; Henry Soontag, violinist; Carl C. Schmidt, violinist; Herman Schmidt, Jr., melo-phonist; Edwards Congregational Male Quartette.
WOR, Newark, N. J. (Eastern, 405), 2:30-3:00 p. m., Billy Cripp's Entertainers, popular songs; 6:15-6:30, Zither Duets, F. G. Schamback and C. M. Stuehler; 6:30-6:45, "Radio for the Layman," A. E. Soren; 6:45-7:00, Zither Duets, F. G. Schamback and C. M. Stuehler; 8:45-9:15, Arthur Murray Dancing Lesson, assisted by Halsey Miller and His Orchestra; 9:15-10:00, Program, direction of H. Emerson Yorke.
WOS, Jefferson City, Mo. (Central, 440.9), 8:00 p. m., "How to Start and Develop a Dairy Herd," Prof. E. M. Harmon.
WSB, Atlanta, Ga. (Central, 429), 12:00 m., Kimo Kalech's Hawaiian troubadours; 8:00-9:00 p. m., Simo Nu Concert, 10:45, University of Georgia glee club; Bulldog Jazz Band, classic symphonists.
WWJ, Detroit, Mich. (Eastern, 517), 12:00 m., Jean Goldkette's Orchestra; 7:30 p. m., Detroit News Orchestra; Program, Mrs. Heleu Fitzgerald.

Thursday, November 29

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 2:30 p. m., Pitt-State Football game; 6:30, Pittsburgh Athletic Association Orchestra; 7:45, Children's period; 8:00, Thanksgiving Day program; 11:30, Special late concert.
KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., concert, courtesy of George J. Brikel Co.
KGW, Portland, Ore. (Pacific, 492), 8:00 p. m., Dramatic program, Doris Smith, director; 10:00, George Olsen's Metropolitan Orchestra; Jeanette B. Xanten, soprano.
KHJ, Los Angeles, Calif. (Pacific, 395), 10:00 a. m., Union Thanksgiving services, First Methodist Epis-

copal Church Sermon, Rev. Elmer E. Helms, pastor; 2:30-3:30 p. m., Football game; 6:45-7:30, Children's program, Dickie Brandon, 4 years of age; Emerson School of Self-Expression; 8:00-10:00, "Thanksgiving Night at the Old Farmhouse"; 10:00-12:00, Art Hickman's Orchestra.
KYW, Chicago, Ill. (Central, 536), 6:50 p. m., Children's bedtime story; 8:00-8:20, Twenty minutes of Good Reading, Rev. C. J. Perlin; 8:20-8:58, Herbie Mintz, pianist; "San" Kaney, specialty act.
KPO, San Francisco, Calif. (Pacific, 423), 8:00-9:00 p. m., Fernin Cardona, pianist; Victor Vogel, bass; 9:00-11:00, Palace Hotel Dance Orchestra.
KSD, St. Louis, Mo. (Central, 546), 8:00 p. m., St. Louis Symphony Orchestra; Francis MacMillen, violinist.
WBAP, Fort Worth, Texas (Central, 476), 3:00-5:30 p. m., Texas University vs. Texas A. & M. College, football game; 7:30-8:30, Rialto Theater; 9:30-10:45, Hilo Five Hawaiian Serenaders Orchestra.
WBZ, Springfield, Mass. (Eastern, 337), 10:00 a. m., Churches services, Springfield Auditorium; 7:00 p. m., "The Marked Basket," Mrs. Anna H. Scott; 7:30 p. m., "Twilight Tales for the Kiddies"; 8:00, Fred Gardner, tenor; Marion Tryon, pianist; 9:00, Bedtime story for Grown-ups, Orison S. Marden.
WCBD, Zion, Ill. (Central, 345), 8:00 p. m., Zion Band, Zion White-robed Choir, McElroy Saxophone Quintet; Herman Becker, cellist; Richard P. Hire, violinist; Arthur Rendell, clarinetist; John Studebaker, clarinetist.
WOAP, Chicago, Ill. (Central, 360), 10:00 p. m., Jack Chapman's Orchestra.
WDAR, Philadelphia, Pa. (Eastern, 395), 12:00 m., Organ recital, Stanley Theater, Arcadia Cafe Concert Orchestra; 2:00-3:00, Arcadia Cafe Concert Orchestra; "The Marked Basket," Mrs. Anna H. Scott; 7:30 p. m., Bedtime stories, Dream Daddy.
WEAF, New York, N. Y. (Eastern, 492), 11:00-12:00 a. m., Special program for women; 1:45-4:00 p. m., Penn-Cornell Football Game; 4:00-5:30, The Carolinians Orchestra; 7:00-7:30, New York Federation of Churches' Midweek Service; 7:30-7:40, United Sports Review, Thornton Fisher; 7:40-8:40, Happy Harry Hayden, humorist and singer; 8:40-8:50, Story from Hearst's International Magazine; 9:00-10:00, Brooklyn Orchestral Society and their string quartet; 10:00-10:30, Scott Blakey, Scotch humorist; 10:30-11:00, Harry Reser, banjoist; 11:00-12:00, Vincent Lopez Dance Orchestra.
WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., "The Marked Basket," Mrs. Anna H. Harper; 8:30-9:30, Gussie Montgomery's Harmony Six.
WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Orchestra; 3:00, Tenor solo, John Owens; 6:30, Meyer Davis Bellevue Stratford Orchestra; 7:00, Message from "Snowball" in Santa Claus Land; 8:00, Meeting of Radio Boy Scouts; 8:45, Dance music, Meyer Davis Bellevue Stratford Orchestra.
WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., George Albert Bouchard, organist; 4:00, Tea time music, Martha Gomph, harpist; Elise de Grood, violinist; 6:30-7:30, Vincent Lopez Dance Orchestra; 7:30, Digest of the day's news, Boy Scout Radio-gram; Story, "The American Boy" magazine.
WGY, Schenectady, N. Y. (Eastern, 380), 11:30 a. m., Thanksgiving Day service, St. George's Church; 7:45 p. m., "A Few Moments with New Books," William F. Jacob; WGY Orchestra; Rose Mountain, contralto.
WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Strand Theater Orchestra; Walnut Theater Orchestra; Alamo Theater Organ; Four-minute talk on household economies; 7:30-9:00, Frances M. Brandtley, reader; Helen Eichenberger, pianist; Theodore Reichburg, pianist; Barney Rapp's Orchestra; Ellen Bachus, contralto; Lucile Stillwell, reader; Gus Edward's Orchestra; Floyd Crutchfield, reader; L. V. Davidson's Orchestra.
WHN, New York, N. Y. (Eastern, 360), 2:15-3:00 p. m., Shapiro Bernstein Music Co.; 9:30-9:45, Belle Bari, astrologist; 9:45-10:30, Avon Society Orchestra, 10:30-11:00, Fred Fischer Music Co.; 11:00-12:00, Marsh-land Dance Orchestra, Marsh McCurdy, leader.
WIP, Philadelphia, Pa. (Eastern, 509), 7:00 p. m., Uncle Wip's bedtime stories; 8:00, Organ recital, Karl Bonawitz.
WJAX, Cleveland, Ohio (Eastern, 930), 11:00 p. m., Dance program, the Vernon Owen-Hotel Winton Orchestra.
WJAZ, Chicago, Ill. (Central, 447.7), 10:00 p. m.-2 a. m., The Rosette Park Quartette, Cambridge, Sister, Oriole Orchestra.

AL FEATURES TO



Above: George Brinton Beal; editor, critic and philosopher, is the contributor of "Bits of Wisdom" to the Thursday night programs of WGI

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Saturday, December 1

WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Adelaide Apfel, pianist; 10:00, American Indian Program; Pearl Besuner, soprano; Helman Weinstein, violinist; "Little Scar Face," radio, Crosley Radiarians; Marjory Carrigus, pianist; 11:00, St. Xavier Orchestra; Mary Sullivan, violinist; Eugene Perazzo, pianist; Margie Bland, pianist.

WNAC, Boston, Mass. (Eastern, 278), 11:00-12:00 p. m., Thanksgiving Service from St. Paul's Cathedral; 8:15-9:30 p. m., Concert and dance music.

WOAW, Neb. (Central, 526), 10:00-11:30 a. m., Service, Rev. R. R. Brown, minister; 9:00-11:00 p. m., Program, Peru, Neb., auspices Woodmen of the World; Mary J. Plaehn, reader; Emily Burton, flutist; "The Early Days of Old Peru," Thomas W. Blackburn; violinist, Philip Hoyt, Bernice Brockensieck, Ella Teich; Mary McVay, pianist; "Our Alumni," W. G. Brooks, Esther E. Blankenship, vocalist; V. H. Jindra, violinist; "Our Traditions," Dean W. N. Delzell; Mark Crandel, cornetist; "Our Future," Pres. W. R. Pate.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 5:45 p. m., Chimes; 7:00, Thanksgiving Service, Rev. J. L. Vance, pastor, Oak Grove Second Presbyterian Church; 8:00, P. S. C. Orchestra; V. B. Roehle, baritone.

WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt; 12:00-12:55 p. m., Wanamaker Crystal Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt.

WOR, Newark, N. J. (Eastern, 405), 6:30-7:30 p. m., "Music While You Dine," Tom Cooper's Country Club Orchestra.

WOS, Jefferson City, Mo. (Central, 440.9), 8:00 p. m., Musical program, Mrs. August Weigel, director.

WSB, Atlanta, Ga. (Central, 429), m., Ritz Harmony Boys' Orchestra; Captain Walter Van Norstrand, U. S. supervisor of radio, Fourth district; 2:20-5:09 p. m., Georgia Tech-Alabama Polytechnic football game; 8:00-9:00, "Turkey Day," Twenty-Second U. S. Infantry orchestra; Army Four quartet; Col. W. D. Terrell, radio supervisor for the United States; 10:45, Thanksgiving music, Virginia Entertainers Orchestra; Georgia Four.

WTAM, Cleveland, Ohio (Eastern, 390), 8:00 p. m., The Oberlin Conservatory Trio; Mrs. Enid Lloyd, soprano.

Friday, November 30

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 6:15 p. m., Organ recital, Lucile Hale; 7:30, "The Power of the Early Church," Dr. R. Lanning; 7:45, "A Trip with Santa," Santa Claus; 8:15, Radio Boy Scout meeting; 8:45, Blue Ridge Division Quartet, Charles L. Billeter, tenor; Hamer Gardner, second tenor; J. A. Rogers, first bass; Willard Hamilton, second bass; Raymond Band, violinist.

KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Concert, through courtesy of Baisden's Venice Orchestra; 10:00-11:00, Popular concert of vocal and instrumental music.

KGW, Portland, Ore. (Pacific, 492), 3:30 p. m., "Do Your Dollars Spend Well?" Jessie D. McComb; 8:15, George Olsen's Metropolitan Orchestra; 9:00, "Oregon Resources," Alfred L. Lomax; 10:30, Hoot Owl with Fantagus frolic.

KHJ, Los Angeles, Calif. (Pacific, 395), 6:45-7:00 p. m., Children's program, Richard Headrick, concert juvenile; 7:00-7:30, Arthur Blakeley, organist; 8:00-10:00, Men's Glee Club; "Biology and Evolution," Mable Plerson; 10:00-12:00, Art Hickman's Orchestra.

KYW, Chicago, Ill. (Central, 536), 6:50 p. m., Children's bedtime story; 10:00-11:30, Late Show; McVicker's Theater; Herbie Mintz, pianist; Wendell Hall, music maker; Walter Wilson, singer.

KPO, San Francisco, Calif. (Pacific, 423), 8:00 p. m., 1:00 a. m., Max Bradford's Palace Hotel Orchestra; Bertha Andre, soprano; Marie Bovo, pianist; R. Nash, violinist.

KSD, St. Louis, Mo. (Central, 546), 8:00 p. m., Mrs. Katherine Covan, soprano; Mrs. Charles H. Austin, contralto; Waldo Finke, tenor; Frank Ingalls, bass; Mrs. Frank A. Neal, accompanist.

WBAP, Fort Worth, Texas (Central, 476), 7:00-8:30 p. m., Special banquet program, annual dinner of the North Texas State Teacher's College of Denton; 9:30-10:45, Concert, Sam Houston State Teacher's College of Huntsville.

WBZ, Springfield, Mass. (Eastern, 337), 6:00 p. m., WBZ Quintette; 7:00, "The Challenge," from the Youth's Companion; 7:30, Twilight Tales for the Radio; Current Book Review, R. A. MacDonald; Reading and Distributing the Farmers' Raw Materials; Howard W. Selby; 11:00, WBZ Quintette; Mrs. Harry G. Kitson, soprano; Mrs. Miriam Munyan Thompson, accompanist.

WCBD, Zion, Ill. (Central, 345), 8:00 p. m., "Old Favorite" concert, Mixed Quartet, Male Quartet, organ, Cathedral Chimes, Song Bells.

WDAP, Chicago, Ill. (Central, 360), 10:00 p. m., George R. Hill, Jr., Jack Chapman's Orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 12:00 m., Organ recital, Stanley Theater, Arcadia Cafe Concert Orchestra; 2:00-3:00 p. m., Arcadia Cafe Concert Orchestra; 4:30, Piano recital, Edna Finestone; 7:00, Bedtime stories, Dream Daddy; 7:45, Book review, Doria Hyde; Radio play by the Walter Greenough Players; 10:10, Dance music, Howard Lanalin's Arcadia Cafe Orchestra; songs by Harry Glyn and Al Benson; special "Morning Glory Club" features.

WEAF, New York, N. Y. (Eastern, 492), 11:00-11:15 a. m., Musical program; 11:15-11:50, Charlea B. Scully of Boy Scout Foundation; 4:00-4:15 p. m., Edusud Weber, pianist; 4:15-4:45, Elsie Steger, soprano; 4:50-7:40, United Sports Talk, Thornton Fisher; 7:40-8:00, Emma Gilbert, contralto; 8:00-8:30, Abraham & Straus Choral Society; 8:30-8:40, Talk to boys; 8:50-9:00, Dudley J. Fowler of the Bank of Commerce; 9:00-10:00, Astor Coffee Dance Orchestra.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., "Power of the Early Church," Dr. Robert Stewart Hyer; 8:30-9:30, Musical Faculty of North Texas State Teachers College.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Orchestra; 3:00, Piano recital, Loretta Kerk; 6:30, Meyer Davis Bellevue Stratford Orchestra; 7:00, Message from "Snowball" from Santa Claus Land.

WGI, Medford Hillside, Mass. (Eastern, 360), 3:00 p. m., "How Aeroplane Photography Would Aid New England Farmers," Dorothy H. Goodwin; 7:15, "You and Your Hunting Ground," John J. Rowlands, editor of "National Sportsman Magazine"; 7:30, Charles L. H. Wagner, radio poet; Cambridge Salvation Army Band; Red Cross Health Talk, Henry Copley Greene.

WGY, Schenectady, N. Y. (Eastern, 380), 2:00 p. m., "House Economy," Mrs. Charles A. Simon; 6:30, Children's program; 7:45, WGY Orchestra; Comedy Drama, "Shavings," 10:30, Union College program; WGY Orchestra; "Student Government and Student Meetings," Prof. H. M. Hallenbeck; David Brockway, baritone; "Special Features of College Curriculum," Prof. Edward Ellery; "Athletic Policies," Lieut. Elmer G. Oliphant; "The History of a College," Prof. C. N. Waldron.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Strand Theater Orchestra; "Just Among Home Folks," Walnut Theater Orchestra; Alamo Theater Organ; 7:30-9:40, Harry Swan's Orchestra; Five-minute Near-East Pictures, Alice Hogan Rice.

WHK, Cleveland, Ohio (Eastern, 283), 9:00 p. m., Concert, Cleveland Radio Dealers' Association.

WHN, New York, N. Y. (Eastern, 360), 2:15-3:15 p. m., Indiana Five Orchestra; 4:30-5:30, Crescent Club Dance Orchestra; 10:15-10:30, Fred Whitehouse Review; 10:30-11:15, Original Melody Eight; 11:15-12:00, Ernest E. Graepel's Castle House Orchestra from the Punch and Judy Theater.

WIP, Philadelphia, Pa. (Eastern, 509), 3:00 p. m., Popular program by artists from Remick studio; 6:05, George Thomas and his Little Club Orchestra; 7:00, Uncle Wip's bedtime stories and rollick.

WJAZ, Chicago, Ill. (Central, 447.7), 10:00 p. m., 2:00 a. m., Janet McIlwain, contralto; Evan Chesterton, tenor; Edward Best, violinist; Grace Northrup, pianist; Oriole Orchestra.

WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Special Matinee, Margaret Spaulding, director.

WMAQ, Chicago, Ill. (Central, 447.5), 4:30 p. m., Bush Conservatory; 7:00, "Wide Awake Club," Mrs. Frances M. Ford; 7:30, Weekly musical lecture, Mrs. Marx E. Oberndorfer.

WNAC, Boston, Mass. (Eastern, 278), 12:15-12:45 p. m., Church Service from King's Chapel; 4:00-4:15, Dance music; 4:15-4:30, Vaudeville Specialty from Leon's Orpheum Theater; 4:30-5:00, Dance music; 6:00-6:15, Bedtime stories; 8:15-10:00, Concert by New England Conservatory of Music Orchestra of 90 pieces.

WOAW, Omaha, Neb. (Central, 526), 9:00-10:00 p. m., Grils' Order of Muses; 10:00-11:30, Wow! Dance, Randall's Royal Orchestra.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:30 p. m., "Body Heat and Fever," C. A. Russell; 5:45, Chimes; 6:30, Sandman's visit; 8:00, Kable Brothers Company; L. M. DeArville, cornetist.

WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt; 12:00-12:55 p. m., Wanamaker Crystal Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:45, Dinner music; Adelphia Hotel Orchestra; 8:00, WOO Orchestra; 10:10, Hotel Adelphia Orchestra.

WOR, Newark, N. J. (Eastern, 405), 3:15-3:30 p. m., Health Hints, Dr. Hsriet Van Buren Peckham; 6:15-6:30, Whitehouse Song Review; 6:30-7:00, "Man in the Moon" story for children; 7:00-7:30, Whitehouse Song Review.

WSB, Atlanta, Ga. (Central, 429), 12 m., Concert by Atlanta public schools; Willis A. Sutton, superintendent of schools; 8:00-9:00 p. m., "Georgia Opportunities" concert; 10:45, "Musical Guessing Contest"; Conn Rainbow Orchestra.

WJW, Detroit, Mich. (Eastern, 517), 12:00 m., Jean Goldkette's Orchestra; 7:00 p. m., Detroit News Orchestra; Maxwell-Chalmers Co. Quartet; Maria Arata, pianist; Mrs. Columbo Arato, soprano.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 1:30 p. m., Dougherty's Orchestra; 6:15, Westinghouse Band; 7:45, Children's period; 8:00, Westinghouse Band; Mrs. W. H. Bell, soprano; Elizabeth C. Bell, contralto; Mrs. John Esler, accompanist.

KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Concert, Carl Edward Hatch, violinist; 8:00-9:00, Instrumental music by Filipino String Orchestra; 10:00-11:00, Special vocal concert.

KGW, Portland, Ore. (Pacific, 492), 3:30 p. m., Children's program, music, piano pupils of Lucille Cummings; Story by Aunt Nell; 10:00, George Olsen's Metropolitan Orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 6:45-7:30 p. m., Children's program; 8:00-10:00, Children's de luxe program; 10:00-12:00, Art Hickman's Orchestra.

KYW, Chicago, Ill. (Central, 536), 6:50 p. m., Children's bedtime story; 7:45, "Rigoletto" opera at Auditorium Theater by Chicago Civic Opera Company, opera in Italian, music by Verdi, libretto after Victor Hugo by Piave, three acts; cast: Duke of Mantua, Angelo Minghetti; Rigoletto, Giacomo Rimini; Gilda, Florence Macbeth; Nurse to Gilda, Anna Correnti; Sparafucile, a hired assassin, Virgilio Lazzari; Madalena, Doria Ferrando; Count Monterone, William Beck; Marullo, Gildo Morelato; Borsa, courtier, Lodovico Oliviero; Conut Ceprano, Kathryn Brown; Page, Loila Barr; Usher, Max Teff; Director, Pietro Cimini.

KPO, San Francisco, Calif. (Pacific, 423), 8:00-12:00 p. m., Art Weidner's Fairmont Hotel Dance Orchestra.

KSD, St. Louis, Mo. (Central, 546), 8:00 p. m., Missouri Theater program.

WBAP, Fort Worth, Texas (Central, 476), 7:00-7:30 p. m., "Radio Bible Class, Mrs. W. F. Barnum.

WBZ, Springfield, Mass. (Eastern, 337), 7:00 p. m., Hotel Kimball Trio; Jan Geerts, violinist; Angela G. Longman, cellist; Paul Lawrence, pianist; 7:30, Twilight tales for the Kiddies; 8:00, Hazel L. Childs, entertainer; 9:00, Bedtime story for grown-ups, Orson S. Marden.

WDAP, Chicago, Ill. (Central, 360), 10:00 p. m., Popular Music; Jack Chapman's Orchestra.

WFAR, Philadelphia, Pa. (Eastern, 395), 12:00 m., Organ recital, Stanley Theater, Arcadia Cafe Concert Orchestra; 2:00-3:00 p. m., Concert, Arcadia Cafe Concert Orchestra; 7:30, Bedtime stories by Dream Daddy.

WEAF, New York, N. Y. (Eastern, 492), 11:00-12:00 m., Talk from the Town Hall by Prof. William Lyon Phelps; 4:00-5:00 p. m., Bob Fridkins Orchestra; 5:00-5:30, Philip A. Braver, baritone; 7:30-7:50, Best Perry, soprano; 7:50-8:10, Chev. E. F. Corradetti, baritone; 8:10-8:40, Karla Kleibe, violinist; 9:00-9:10, Auction Bridge, Raymond F. Rode; 9:10-10:00, Gordon Malo Quartet; 10:00-11:00, Lucky Strike Dance Orchestra; 11:00-12:00, Vincent Lopez Dance Orchestra.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., "The Art of Reading," J. P. Comer; 8:30-9:30, Leonard Johnson, pianist; 11:00-12:00 midnight, La Rue Nelson, singer; Grace Hudgins, pianist.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Orchestra; 3:00, Song recital, John Vandierst; 5:30, Meyer Davis Bellevue Stratford Orchestra; 7:00, Message from "Snowball" in Santa Claus Land; 10:10, Meyer Davis Bellevue Stratford Orchestra.

WGI, Medford Hillside, Mass. (Eastern, 360), 7:30 p. m., New England Business Problems, Arthur R. Curmick.

WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., George Albert Bouchard, organist; 4:00, Martha Gomph, harpist; Elise de Grood, violinist; 6:30, Vincent Lopez Dance Orchestra.

WGY, Schenectady, N. Y. (Eastern, 380), 9:30 p. m., Phil Romano's Rain-bo Orchestra.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Strand Theater Orchestra; "Just Among Home Folks"; Walnut Theater Orchestra; Alamo Theater Organ; 7:30-9:00, Concert, Daughters of Isabella.

WHN, New York, N. Y. (Eastern, 360), 2:15-3:15 p. m., Fred Whitehouse Review; 3:45-4:45, Eddio DiLalla's Ideal Novelty Orchestra; 5:00-5:30, Harry Reise's and His Carolin Melody Boys; 7:30-8:00, Melody Belles, the Clover Gardens Girl Orchestra; 9:00-9:45, William C. Noll, pianist and composer.

WIP, Philadelphia, Pa. (Eastern, 509), 1:00 p. m., organ recital by Karl Bonawitz; 6:05, Greenwch Village Serenaders; 7:00, Uncle Wip's bedtime stories and roll call; 8:00, Talk on Chemistry, Professor Fry; Charlie Kerr and his Orchestra.

WJAZ, Chicago, Ill. (Central, 447.7), 10:00 p. m., 2:00 a. m., Helen L. Shaffer, soprano; George Jones, baritone; F. McElroy Westcott, pianist; Oriole Orchestra.

WMAQ, Chicago, Ill. (Central, 447.5), 8:00 p. m., Pennsylvania R. R. Orchestra; 9:00, Weekly musical revue, Chicago Theater.

WNAC, Boston, Mass. (Eastern, 278), 3:45-4:15 p. m., Dance Music; 9:00-11:00, Dance music from Copley-Plaza Hotel.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; "Chemistry of Aluminum," C. C. Hall; 5:45 p. m., Chimes; 6:30, Sandman's visit; 9:00, P. S. C. Orchestra; V. B. Roehle, baritone.

WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt; 12:00-12:55 p. m., Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; Band Concert, J. W. C. I. Band.

WOR, Newark, N. J. (Eastern, 405), 3:00-3:15 p. m., James Haupt, tenor; 3:45-4:00, James Haupt, tenor; 8:15-7:30, "Music While You Dine," Hillside Orchestra; 8:00-9:00, Eugene Ingraham and his Or-

Church, Rev. Dr. Charles W. Welch, cert, auspices of Joseph Ulmer; Mrs. Joseph, Margaret Hammersta, etc.

WLN, New York, N. Y. (Eastern, 283), 8:00 p. m., WHK Trio and favorite entertainers; 9:30, Chapel service, Glenville Presbyterian Church, Rev. A. H. Limouze, pastor.

WNN, New York, N. Y. (Eastern, 360), 2:45-4:30 p. m., Christian Endeavor program; 4:45-6:00, "Radio Five" Dance Orchestra.

WIP, Philadelphia, Pa. (Eastern, 509), 4:30 p. m., Sixth talk of a series, Germantown Y. M. C. A.

WJAZ, Chicago, Ill. (Central, 447.7), 6:00-9:00 p. m., Silvio Scionti, pianist; Rudolph Magnus, baritone; Muenzer Trio; Oriole Orchestra.

WLW, Cincinnati, Ohio (Central, 309), 9:30 a. m., Sunday school program, Editorial staff of the Methodist Book Concern; 11:00, Service, Church of the Covenant, Rev. Frank Stevenson, minister.

WNAC, Boston, Mass. (Eastern, 278), 11:00-12:00 m., Church service from St. Paul's Cathedral; 6:45-8:15 p. m., Church service from Tremont Temple; 8:30-9:30, Concert by Copley-Plaza Orchestra, assisted by artists from Copley-Plaza Hotel.

WSB, Atlanta, Ga. (Central, 429), 11:00-12:00 m., First Presbyterian Church service; 3:30 p. m., Atlanta Symphony Orchestra; 5:00-6:00, sacred concert, Elk Band; 7:30-9:00, Wesley Memorial.

WJW, Detroit, Mich. (Eastern, 517), 7:30 p. m., Service, St. Paul's Episcopal Cathedral; 2:00 p. m., Detroit News Orchestra.

Monday, December 3

WDAR, Philadelphia, Pa. (Eastern, 395), 12:00 m., Organ recital, Stanley Theater; Arcadia Cafe Concert Orchestra; 2:00-3:00 p. m., Concert, Arcadia Cafe Concert Orchestra; Piano solos, Edna Finestone; 7:30, Bedtime stories, Dream Daddy; 7:45, Moving Picture Review, James A. Nassau; 10:10, Dance music, Howard Lanlin's Arcadia Cafe Orchestra.

WEAF, New York, N. Y. (Eastern, 492), 4:00-5:30 p. m., musical program; 7:30-7:40, United Sports Review by Thornton Fisher; 7:40-8:00, Anna Elstner, reader; 8:00-8:20, Hoxie N. Fairchild will give lecture from Columbia University Extension course, 8:20-10:00, Concert from the Philharmonic Symphony Orchestra at Carnegie Hall.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Orchestra; 8:30, Meyer Davis Bellevue Stratford Orchestra; 7:00, Message from "Snowball" in Santa Claus Land.

WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., George Albert Bouchard, organist; 4:00, Martha Gomph, harpist; Elise de Grood, violinist; 6:30-11:00, Vincent Lopez Dance Orchestra; 9:00, Scottish Concert program, direction of McLean Gardner.

WGY, Schenectady, N. Y. (Eastern, 380), 2:00 p. m., "What Science Has Done for Kitchens"; 7:45, Eddies Melody Boys.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Strand Theater Orchestra; Walnut Theater Orchestra; Mrs. Myrtle F. Zahn, organist.

WHN, New York, N. Y. (Eastern, 360), 4:00-4:30 p. m., Fred Fisher Music Co.; 7:30-8:00, San Lannin's Roseland Dance Orchestra; 9:30-10:30, The Oriental Ramblers, John Raso, leader; 10:30-11:15, M. Witmark Music Co.

WIP, Philadelphia, Pa. (Eastern, 509), 3:00 p. m., Popular program by Al Burt and his Record Recording Orchestra; 6:05-6:45, Potts Orchestra; 7:30, Bedtime stories, Uncle Wip.

WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Piano selections Jennie Kehrt; 8:00, Program, Editorial Staff of Sunday School Publications of the Methodist Book Concern; Cincinnati String Quartet; 9:30, Crosley Theatrical Review, Roger Hill Dance Orchestra; 9:30, LaVergne Sims, soprano; 9:45, Roger Hill Dance Orchestra.

WNAC, Boston, Mass. (Eastern, 278), 12:15-12:45 p. m., Musical Service from King's Chapel; 4:30-5:00, Dance music; 6:00-6:30, Bed time stories.

WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt; 12:00-12:55 p. m., Dinner music, Wanamaker Crystal Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt.

WOR, Newark, N. J. (Eastern, 405), 6:15-7:30 p. m., "Music While You Dine," Harry Cox and his Orchestra; 8:00-8:15, "Current Motion Pictures, Alfred J. McCoker; 8:15-8:30, Program, H. Emerson Yorke, director; 8:30-8:45, "Radio Cartooning," Jolly Bill Strenko; 8:45-9:00, Program, H. Emerson Yorke, director; 9:00-10:00, Program, Charles Tamme; 10:00-11:00, Frank Rielly's Country Club Orchestra.

WSB, Atlanta, Ga. (Central, 429), 12 m., Concert; 8:00-9:00 p. m., the Mueller Trio in "An Hour of the Classics"; 10:45, Radiow! skitark.

Lawn Party in Wales Is Entertained by WJAX

CLEVELAND.—WJAX, "The Wave From Lake Erie," the broadcasting station of the Union Trust Company here, is in receipt of a letter from R. F. Loomis, Stony Cross, Neath Road, Maesteg, Wales, announcing excellent reception of the musical offering of Joe Smith's Martha Lee Club Orchestra, featured on the Cleveland News-Leader's program recently.

NATIONAL RADIO AIDERS SPECIAL FEATURES TO

Story of "Rigoletto" on KYW Saturday

IMAGINE you are back in Mantua during the sixteenth century and a luncheon to the pathetic story of a hunchback master, Rigoletto, who aids his master, the Duke of Mantua, in Don Juan of wickedness, in his love affairs. Although this ugly hunchback has carefully hidden away his beautiful daughter Gilda, the Duke has already been following her. Believing her to be the mistress of Rigoletto, the Duke's courtiers kidnap Gilda and trick Rigoletto into helping them. This ends the first act.

ACT II
When Rigoletto tries to save his daughter, the courtiers bar the door and make sport of him, even when he tells them Gilda is his daughter. At last the poor man and Gilda come out. Rigoletto comforts his ruined child and vows vengeance.

ACT III
The last act takes place around and in the ruined inn of Sparafucile, the assassin, whom Rigoletto has hired to kill the Duke. Gilda and Rigoletto peer in at the Duke making love to Maddalena, the assassin's sister. During this act he sings the famous song "Woman Is Fickle." The famous quartet, "Finest Daughter of the Graces," is sung by these four young women and Gilda persuades her body to give Rigoletto another look. He receives the storm Gilda returns to the inn and hearing the strange agreement, receives the assassin's blows. Rigoletto, therefore, receives the body of his own child. As he is about to throw her into the river, he hears the Duke unking love to Maddalena. She discovers the crumpled body of his daughter. She revives sufficiently in the night air to sing a beautiful duet with Rigoletto, "In Heaven Above."

—THE PROGRAM LADY.



Jean Goldkette, the Isham Jones of Michigan, is considered far better than any other in Detroit. Hear it play from WVA's Thanksgiving eve, November 28.

Left and right are two of the characters in "Rigoletto," to go on the air from KYW, Westinghouse Company, Chicago, Saturday, December 1. Left is Donna Fernandez as "Maddalena" and right is Virgilio Lazzeri as "the Duke." The assassin, who set the opera in given place on this page.

Nesting in the back is Elise de Grand, who regularly turns on the live music to the delight of her time people. Hear it from WGR.

Edward H. Smith (at right with cap and cigarette), as he appears in a character part in "Shavings," at WGY Friday evening.

Above: George Brinton, editor, critic and philosopher, is the contributor of "Bits of Wisdom" to the Thursday night programs of WGI.

Tuesday, November 27

KDKA, E. Pittsburgh, Pa. (Eastern, 320), 8:15 p. m. Grand Symphony Orchestra. Program: "A Memory of Old Canterbury," Dr. John R. Ewing; "A Memory of Old Canterbury," Dr. John R. Ewing; "A Memory of Old Canterbury," Dr. John R. Ewing.

WIP, Philadelphia, Pa. (Eastern, 300), 1:00 p. m. Organ recital, Karl Danavitz; 3:30, Recital of the Organ; 7:30, Organ recital, Karl Danavitz; 9:30, Organ recital, Karl Danavitz.

WABC, New York, N. Y. (Eastern, 380), 6:30 p. m. Organ recital, Karl Danavitz; 9:30, Organ recital, Karl Danavitz.

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Wednesday, November 28

KDKA, E. Pittsburgh, Pa. (Eastern, 320), 8:15 p. m. Grand Symphony Orchestra. Program: "A Memory of Old Canterbury," Dr. John R. Ewing; "A Memory of Old Canterbury," Dr. John R. Ewing.

WIP, Philadelphia, Pa. (Eastern, 300), 1:00 p. m. Organ recital, Karl Danavitz; 3:30, Recital of the Organ; 7:30, Organ recital, Karl Danavitz.

WABC, New York, N. Y. (Eastern, 380), 6:30 p. m. Organ recital, Karl Danavitz; 9:30, Organ recital, Karl Danavitz.

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WABC, New York, N. Y. (Eastern, 380), 6:30 p. m. Organ recital, Karl Danavitz; 9:30, Organ recital, Karl Danavitz.

Thursday, November 29

KDKA, E. Pittsburgh, Pa. (Eastern, 320), 8:15 p. m. Grand Symphony Orchestra. Program: "A Memory of Old Canterbury," Dr. John R. Ewing; "A Memory of Old Canterbury," Dr. John R. Ewing.

WIP, Philadelphia, Pa. (Eastern, 300), 1:00 p. m. Organ recital, Karl Danavitz; 3:30, Recital of the Organ; 7:30, Organ recital, Karl Danavitz.

WABC, New York, N. Y. (Eastern, 380), 6:30 p. m. Organ recital, Karl Danavitz; 9:30, Organ recital, Karl Danavitz.

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Saturday, December 1

KDKA, E. Pittsburgh, Pa. (Eastern, 320), 8:15 p. m. Grand Symphony Orchestra. Program: "A Memory of Old Canterbury," Dr. John R. Ewing; "A Memory of Old Canterbury," Dr. John R. Ewing.

WIP, Philadelphia, Pa. (Eastern, 300), 1:00 p. m. Organ recital, Karl Danavitz; 3:30, Recital of the Organ; 7:30, Organ recital, Karl Danavitz.

WABC, New York, N. Y. (Eastern, 380), 6:30 p. m. Organ recital, Karl Danavitz; 9:30, Organ recital, Karl Danavitz.

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Monday, December 3

KDKA, E. Pittsburgh, Pa. (Eastern, 320), 8:15 p. m. Grand Symphony Orchestra. Program: "A Memory of Old Canterbury," Dr. John R. Ewing; "A Memory of Old Canterbury," Dr. John R. Ewing.

WIP, Philadelphia, Pa. (Eastern, 300), 1:00 p. m. Organ recital, Karl Danavitz; 3:30, Recital of the Organ; 7:30, Organ recital, Karl Danavitz.

WABC, New York, N. Y. (Eastern, 380), 6:30 p. m. Organ recital, Karl Danavitz; 9:30, Organ recital, Karl Danavitz.

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Lawn Party in Wales Is Entertained by WJAX

CLEVELAND.—WJAX, "The Wave from Lake Erie," the broadcasting station of the Union Trust Company here, is in receipt of a letter from R. E. Loomis, Stony Creek, N. Y., who has been elected president of the lawn party of the WJAX Club. The letter is a glowing endorsement of the station's program and the club's activities.

AL FEATURES TO

Everybody

Charles W. Weich,
of Joseph Ulmer;
et Hammerstad, or-

8:30 p. m., WHK
30, Chapel service,
ev. A. H. Limouze,

60, 2:45-4:30 p. m.,
6:00, "Radio Five"

509, 4:30 p. m.,
n Y. M. C. A.
7), 6:00-9:00 p. m.,
Magnus, baritone;

309, 9:30 a. m.,
staff of the Metho-
dico, Church of the
minister.

76), 11:00-12:00 m.,
Cathedral; 6:45-8:15
at Temple; 8:30-9:30,
a, assisted by artists

11:00-12:00 m., First
30 p. m., Atlanta
sacred concert, Lik
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7:30 p. m., Serv-
ral; 2:00 p. m., De-

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395), 12:30 m., Or-
readia Cafe Concert
ncert, Arcadia Cafe
dna Finestone; 7:30,
7:45, Moving Picture
Dance music, How-
ra.

492), 4:00-5:30 p.
United Sports Ho-
8:00, Anna Elstner,
child will give lecture
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ndic Symphony Or-

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Hall, music maker; Walter Wilson, songster

KPO, San Francisco, Calif. (Pacific, 423), 6:00 p. m.-
1:00 a. m., Max Bradfield's Palace Hotel Orchestra;
Bertha Andre, soprano; Mario Bovo, pianist; R. Nash,
violinist.

KSD, St. Louis, Mo. (Central, 546), 8:00 p. m., Mrs.
Katherine Covan; soprano; Mrs. Charles H. Austin,
contralto; Waldo Finke, tenor; Frank Ingalls, bass;
Mrs. Frank A. Neal, accompanist.

WBAP, Fort Worth, Texas (Central, 476), 7:00-8:30
p. m., Special banquet program, annual dinner of the
North Texas State Teacher's College of Denton, 9:30-
10:45, Concert, Sam Houston State Teacher's College
of Huntsville.

WOR, Newark, N. J. (Eastern, 405), 3:15-3:30 p. m.,
Health Hints, Dr. Harriet Van Buren Peckham; 6:15-
6:30, Whitehouse Song Review; 6:30-7:00, "Man in
the Moon" story for children; 7:00-7:30, Whitehouse
Song Review.

WSB, Atlanta, Ga. (Central, 429), 12 m., Concert by
Atlanta public schools; Willis A. Sutton, superin-
tendent of schools; 8:00-9:00 p. m., "Georgia Op-
portunities" concert; 10:45, "Musice Guessing Con-
test"; Conn Rainbow Orchestra.

WWJ, Detroit, Mich. (Eastern, 517), 12:00 m., Joan
Goldkette's Orchestra; 7:00 p. m., Detroit News Or-
chestra; Maxwell-Chalmers Co. Quartet; Maria Arata,
pianist; Mrs. Columbo Arato, soprano.

Plaza Hotel.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes;
"Chemistry of Aluminum," C. C. Hall; 5:45 p. m.,
Chimes; 6:30, Sandman's visit; 9:00, P. S. C. Or-
chestra; V. H. Rochte, baritone.

WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m.,
Organ recital, Mary E. Vogt; 12:00-12:55 p. m.,
Wanamaker Tea Room Orchestra; 4:45-5:00, Organ
recital, Mary E. Vogt; Band Concert, J. W. C. I.
Band.

WOR, Newark, N. J. (Eastern, 405), 3:00-3:15 p. m.,
James Haupt, tenor; 3:45-4:00, James Haupt, tenor;
6:15-7:30, "Music While You Dine," Hillside Or-
chestra; 8:00-9:00, Eugene Ingraham and his Or-

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Entertained by WJAX

CLEVELAND.—WJAX, "The Wave From
Lake Erie," the broadcasting station of
the Union Trust Company here, is in re-
ceipt of a letter from R. F. Loomis, Stony
Cross, Neath Road, Maesteg, Wales, an-
nouncing excellent reception of the mu-
sical offering of Joe Smith's Martha Lee
Club Orchestra, featured on the Cleve-
land News-Leader's program recently.

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LADY

FLEWELLING Q & A

(Continued from page 10)

The circuit would probably tend to run away, or in other words, be entirely beyond your control.

Question. Will a C-299 or a UV-199 give as good results as the WD-11 tube on the Flewelling circuit?

Answer. Yes, if the 199 tube is used with-out a detector in a regular 199 socket, it is really preferable to the WD-11 tube and its use enables one to build a very compact little set. The writer has had the pleasure of seeing several very successful miniature sets using this tube.

Question. Can the Flewelling principle be applied to the Ultra-Audion Circuit provided the inside half of the spider-web coil is used as a fixed tickler coil and the outside half (50 turns) as a tuning coil. If so, would a few taps on the fixed tickler coil aid in tuning or help a set to oscillate?

Answer. I believe that you will find this combination quite impossible; there are too many factors entering into it to make it practical. Incidentally, it seems that where so many different combinations have been tried, it would be a good idea to recommend to you that you might find the straight Flewelling super-circuit as shown to be about the best form of this circuit.

Things That Cause Trouble

With so many constantly varying items in and around a Radio set, it is amazing that more trouble is not traced to them immediately. There is the A battery, which tapers off as it is used; there is the detector tube, that gradually loses its sensitiveness; there is the outside grid leak, that is changed by atmospheric conditions, and finally there are the four contact prongs on the vacuum tube, that attract dust and dirt and are continually subjected to corrosion.

When an A battery reaches a certain point in its discharge, its deterioration as a suitable source is rapid. Thus a battery which gave full satisfaction last night may be an absolute failure after half an hour's use tonight. Yet the tube seems to be lighted as brilliantly.

LOUDEST AND MOST POWERFUL RADIO CRYSTAL

DX-ALENA, the Sensational, Synthetic, Guaranteed Radio Crystal. Each Crystal tested on Broadcasting 50 miles distant. Fifty cents postpaid. Dealers should get our attractive proposition.

EVERETT RADIO COMPANY

DISTRIBUTORS CHICAGO
5207 Dorchester Avenue

B batteries deteriorate less rapidly, and the operator is not fully cognizant of the condition until he suddenly realizes that he is not getting the distance from his set that he used to get.

Amplifier tubes become soft with use. This means that they lose their original vacuum and as such become less effective as amplifiers. Detectors that are already soft absorb air and lose their natural sensitiveness. But these changes come about gradually.

The four contact prongs on the base of the vacuum tube should be brushed occasionally with fine sandpaper. The same effect can be produced by twisting the sockets while they are in position. This movement sweeps the prongs back and forth on the spring clips and wears away the corrosive film.

A long aerial, clear of everything, will pick up more energy, but almost any kind of outdoor aerial will bring in nearby signals.

POST CARDS

A neatly printed post card for acknowledgment to broadcasting stations your reception of their entertainments. 2 dozen, 25 cents, postpaid. D. J. Spangler, Elkhart, Ind.

Radio Call Cards printed to order. Red call, black printing, 100, \$1.75; 200, \$2.75, prepaid. Color changes, 35c extra. Government postals 1c extra each card. Letterheads, 8 1/2 x 5 1/2, and envelopes, 100 each, \$2.25; 200 each, \$3.50. ARRL emblem used on cards or stationery if requested. Send today. Department 48 C. Radio Printers, Mendota, Illinois.

Fifty assorted flathead solid brass machine screws, nuts, washers, copper lugs, 50c. Eight initialed binding posts, set, 60c. Twelve nickle binding posts, 50c. All three items \$1.50. RADIO LIST for stamp. All prepaid. Stamps accepted. Kladag Radio Laboratories, Kent, O.

Make \$120 Weekly in Spare Time—Sell what the public wants—long distance radio receiving sets. Two sales weekly pays \$120 profit. No big investment, no canvassing. Sharpe of Colorado made \$955 in one month. Representatives wanted at once. This plan is sweeping the country—write today, giving name of your county. Ozarka, 857 Washington Blvd., Chicago.

GENUINE EDISON ELEMENTS (new) for making "B" Batteries, obtained from U. S. Government. A positive and negative element—6c; glass tube—3c; all other parts at reasonable prices. Postage, etc., 50c extra per order. Free instructions. **TODD ELECTRIC COMPANY**, 109 West 23rd Street, New York.

PATENT ATTORNEYS

PATENTS. Booklet free. Highest references. Best results. **WATSON E. COLEMAN**, Patent Lawyer, 644 G Street, Washington, D. C.

Mutual Conductance

The mutual conductance of the vacuum tube is a factor that expresses very accurately its efficiency as an amplifier. The unit of conductance is the mho. This unit is to large for convenient use in connection with vacuum tubes, so the term micromho is generally used.

One million micromhos equal one mho. The mutual conductance in micromhos of any of the various vacuum tubes is expressed by the formula:

$$\text{Mutual conductance} = \frac{\text{Amplification constant} \times 1,000,000}{\text{Plate Impedance}}$$

Plate Impedance

By this it is easy to see that the term

YOU DON'T NEED TUBES

to hear concerts from distant cities. **YOUR CRYSTAL SET** will bring them in if you buy my plans and follow them. **PEOPLE USING MY METHODS** hear programs clearly from stations 400 TO 1000 MILES AWAY. No tubes, batteries or amplifying apparatus required. It may cost **LESS THAN A DOLLAR** to perfect **YOUR** set. **EVERYTHING CLEARLY EXPLAINED** in my copyrighted instructions selling for \$1.00. **SATISFACTION GUARANTEED.** Picture of my set and circular matter **FREE.** **WRITE ME TODAY.**

LEON LAMBERT

501 South Volusia Wichita, Kansas

"mutual conductance" expresses the amplification of the electrical energy actually used to produce the signal. If a tube has a low amplification constant and relatively high mutual conductance it will give a greater volume of amplification than a tube having a considerably higher amplification constant and a low value of mutual conductance.

In connecting up the loose coupler, bear in mind there is no electrical connection between the primary and secondary coils.

What About It?

Isn't it about time to stop experimenting with multiple control circuits and build one that, combining ease of assembly and operation, loudness, clarity and selectivity of signals, as well as beautiful appearance, is excelled by none?

THE ELGIN SUPER-REINARTZ RADIO RECEIVING SET

Embodies all the advantages of the well known Elgin Reinartz (the set which was largely responsible for the popularity of this wonderful circuit) and many others. It is much louder, more selective, requires no storage battery, and can be used with excellent results on a short or loop aerial.

It has brought in California stations two thousand miles from Elgin, clearly and without interference on a loud speaker with only one tube, and that while our powerful local station was broadcasting three miles away.

Could you ask for more? Write for circular giving one, two and three bulb hook-ups of this remarkable circuit. **IT IS FREE.**

ELGIN RADIO SUPPLY CO.
207 East Chicago Street ELGIN, ILLINOIS

—WILLARD—
WILLARD RADIO COMPANY
291 BROADWAY,
New York City
"THE BEST FOR LESS"

FLEWELLING CIRCUIT EVERY PART COMPLETE
2 honeycomb coils, 1 2-coil mounting, 2 coil plugs, 3 .005 condensers, 1 variable grid leak, 1 grid leak, 1 23-plate .0005 MFD. variable condenser, 1 Vernier rheostat, 1 tube socket, 8 binding posts, 20 feet bus bar wire, 1 3" dial and 1 high grade panel **ALREADY DRILLED** as per Diagram in Booklet of instructions sent free. **\$11.95**
Two-Stage Audio Frequency Amplifier—Parts complete in every detail for this Circuit—\$11.00
Specify type of tubes you intend using

CONDENSERS

| | | |
|----------------------------------|-------|--------|
| 3 Plate Variable; value, \$1.75 | ..... | \$1.05 |
| 11 Plate Variable; value, \$2.50 | ..... | 1.20 |
| 13 Plate Variable; value, \$2.50 | ..... | 1.20 |
| 17 Plate Variable; value, \$3.50 | ..... | 1.35 |
| 23 Plate Variable; value, \$3.50 | ..... | 1.35 |
| 43 Plate Variable; value, \$4.50 | ..... | 1.95 |
| 13 Plate VERNIER; value, \$5.50 | ..... | \$3.75 |
| 23 Plate VERNIER; value, \$6.00 | ..... | 4.00 |
| 43 Plate VERNIER; value, \$6.50 | ..... | 4.25 |

| | | |
|---------------------------|-------|-----|
| Filament Rheostat, 6 ohm | ..... | .65 |
| Filament Rheostat, 20 ohm | ..... | .80 |
| Filament Rheostat, 50 ohm | ..... | .90 |
| With 2" Dial, 15c extra. | | |

AUDIO FREQUENCY TRANSFORMER—Designed for use with W. D. 11 **\$2.75**
Tubes, list, \$4.50; price.....

BALL BEARING INDUCTANCE SWITCH—value, 75c; special.....\$.25

V. T. SOCKETS—Nickel, brass sleeve, composition base; value, \$1.00; special at..... .40

EXTRA SPECIAL—Telephone 3000 Ohms Headsets; \$9.00 value; reduced to..... 3.50

Vernier Dial Adjuster. List, 35c; special..... .25

REINARTZ CIRCUIT EVERY PART COMPLETE
1 Reinartz wound coil, 1 tube socket, 1 rheostat, 1 23-plate .0005 MFD. variable condenser, 1 13-plate .00025 MFD. variable condenser, 3 inductance switches, 23 switch points and nuts, 6 switch stops and nuts, 8 binding posts, 2 3" dials, 1 variable grid leak, 1 .002 MFD. phone condenser, 23 feet bus bar wire, 1 high-grade panel **ALREADY DRILLED AS PER DIAGRAM** and complete instructions. **\$10.95**
Two-Stage Audio Frequency Amplifier—Parts complete in every detail for this Circuit—\$11.00
Specify type of tubes you intend using

BEST QUALITY JACKS, Single Circuit; value, 65c; special at.....\$.30
Double Circuit; value, 90c; special at..... .45

MULTIPLE POINT INDUCTANCE SWITCH with Knob and Dial (15 Switch Points).....\$1.25

LIGHTNING ARRESTERS approved by underwriters..... .90

THREE-INCH OIALS—Unbreakable—heat resisting composition—high finish; special..... .30

TWO-INCH OIALS—Same design—for rheostats and potentiometer; special at.....\$.25

TELEPHONE PLUGS..... .60

FRESHMAN VARIABLE RESISTANCE LEAK and MICA CONDENSER Combined..... .75

A Radio Set for Christmas—what other gift can offer you half the enjoyment and lasting pleasure? By building a set yourself you save considerable money. And besides, it's lots of fun and not a bit hard. Our service department will be glad to give you any information you need. Just drop us a line.

Every article advertised above is guaranteed by the manufacturer and by us—Mail orders filled immediately—transportation **PREPAID** on orders of \$5.00 or over east of the Mississippi River. Send cash, check or money order—no late! no goods sent C. O. D.

Natural Re-PRODUCTION



Atlas AMPLITONE
LOUD SPEAKER

Every voice inflection faithfully reborn in the Atlas re-Production. Distortion made impossible by the marvelous patented "double diaphragm." Ask your dealer **\$25** for a demonstration.

Write for Booklet "R."
What have you accomplished with your Atlas Amplitone? Tell us about it.

Multiple Electric Products Co. Inc.
ORANGE ST. RADIO DIVISION NEWARK, N. J.

Simple Explanation of Radio for Everybody

Chapter VI, Part I—Vacuum Tubes

By M. W. Thompson

THE following article is the tenth of a series for Radio beginners, written by Marvin W. Thompson, well known in air-phone circles for his understandable style of approaching his subject, and his ability as a Radio engineer. Mr. Thompson is now an associate editor on the staff of Radio Digest. A preliminary outline of the Chapters to follow is:

- Chapter VI—Vacuum Tubes.
- Chapter VII—Antennas and Grounds.
- Chapter VIII—Regeneration.
- Chapter IX—Audio Frequency Amplification.
- Chapter X—Loud Speakers.

WE MUST go back to 1883 for the beginning of the history of the vacuum tube. It was then Edison was experimenting with his carbon lamp, the forerunner of the powerful yet economical lamps of today. For it was Edison who first discovered the basic phenomenon of vacuum tubes. It was while developing the electric lamp that Edison tried, among many others, an experiment that produced what was later called the "Edison effect." Within the bulb of one of his lamps, and close to the filament already inserted, he mounted a small plate of metal with wire leading out for connection. To this he connected one side of a delicate galvanometer, an instrument which indicates the flow of infinitesimal currents, and the other side of the galvanometer he connected to the filament. (See Figure 44.)

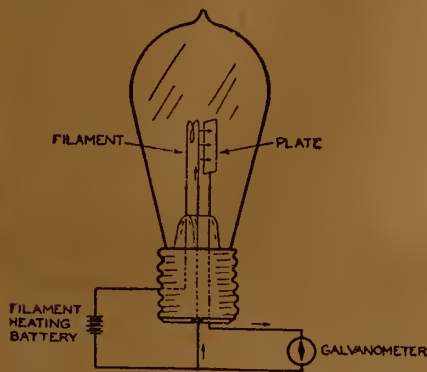


Figure 44—Arrangement by which the so-called "Edison effect" was discovered. Arrows between filament and plate indicate direction of flow of the current

Edison Effect

He then turned on the current to the filament and it became incandescent as usual, but when he looked at the indicat-

ing needle of the galvanometer he found that it was far out of its neutral position. A current was flowing in the circuit composed of plate, galvanometer and filament, and it must be streaming across the gap between filament and plate. The direction in which the galvanometer needle had swung indicated that the current was flowing from the filament to the plate. Edison, being heart and soul in the development of his lamp, made no effort to explore this new field very far, but he did prove that the currents always jumped from the hot filament to the cool plate and that he could never make it flow the other way.

It was Sir William Preece, noted English physicist and delver into Radio science, that gave this phenomenon the name Edison effect. For over twenty years this phenomenon baffled the leading scientists in all countries. The explanation evaded them simply because they had not a sufficient knowledge of the nature of electricity. It was not until Sir J. J. Thomson gave the world the startling results of his research work, and the conclusions and theories he had evolved therefrom, that it was possible to explain exactly why the current flowed in one direction—from filament to plate but never back. Thomson told the world that electricity is a matter of flowing "electrons" and that electrons are infinitesimal particles of negative electricity. They are always negative, never positive. Electrons are manifest only when a body is in an abnormal condition—when it has too many or not enough ions. When a body contains just the number it should have, it is in a state of equilibrium electrically, and electrons do not make themselves apparent. They emanate from hot metal, from every burning thing, in fact, by the billion, and as the glowing filament of a lamp is slowly burning, or oxidizing, they are thrown off in all directions.

B Battery Is Added

After Thomson had explained that these little electrons were all negative, it was soon found that charging the plate positive increased the current flow tremendously. Electrons only move from a body that has too many to one that has

not enough, and as a positively charged plate has not nearly enough negative electrons to be in a state of equilibrium, the electrons thrown off by the filament rush over to the plate to neutralize the positive charge. If the plate is charged negatively, by connecting it to the negative side of a battery and the positive side of the battery to the filament, the electrons are repelled because a condition exists in which there are already too many negative electrons on the plate.

Fleming's Work

About twenty years ago Professor A. J. Fleming, one of Marconi's head engineers, was looking for a detector that would prove more sensitive than those then in use. As explained in a preceding chapter, Radio communication is carried on by means of other waves produced at the rate of from 15,000 to several million per second, which cause minute currents to alternate back and forth in receiving sets at corresponding frequencies. Since such high frequencies do not produce audible sounds in telephone receivers, an instrument had to be devised that would change them into impulses of direct current traveling in one direction only and varying at audible frequencies. This device was termed a detector and years ago the methods employed to accomplish this change were crude and not very sensitive. Only powerful stations at limited distances would actuate them and Radio development was at a standstill until a better means could be devised. Fleming believed that the Edison effect could be utilized to change the high frequency Radio oscillations into direct current impulses and so serve as a detector.

It is the function of a detector to cut off the alternations going in one direction—the electrons in the Edison tube streamed across the gap only from the hot filament to the comparatively cooler plate. Fleming believed that if an evacuated tube containing a filament and a plate formed part of the apparatus which received Radio waves it would suppress half of the alternations. Those going in one direction could pass freely on the electron stream; when an alternation came in the opposite direction, it would be choked off. In this way, the bulb con-

verted waves at Radio frequency into spurts of direct current electricity, all traveling the same direction.

This action of a valve may be compared with that of a valve in a pipe which permits water to flow freely in one direction but closes tightly if the water attempts to flow in the opposite direction. Fleming called his tube, as applied to Radio reception, an "oscillation valve," and the tremendously greater sensitivity of Fleming's valve soon brought it into general use. That was during the period 1900-1905. In 1902, in another laboratory, the experiments began which made the vacuum tube the wonderful little Aladdin's Lamp that it is today.

Lee DeForest's Experiments

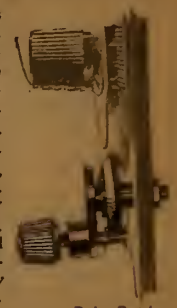
It was on a hot summer night in Chicago that Dr. Lee De Forest, pioneer and experimenter in the Radio field, was working in a small gas-lighted laboratory on an electrolytic detector which, as its name implies, employs an electrolyte of

(Continued on page 18)

TINY-TURN

A New and Superior Vernier Control

TINY-TURN makes possible an exactness in tuning never before attained. It has a 30 to 1 gear ratio. No lost motion! The vernier turns in the same direction as dial; can be instantly disengaged, leaving dial free. INSTALLED ON ANY SET IN 3 MINUTES. Handsome nickel and black finish. We furnish counter display demonstrating boards.

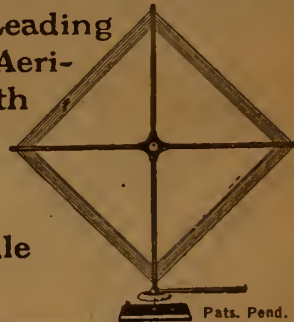


75c Each

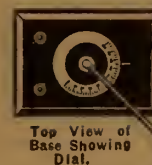
Pat. Pend. Side View showing friction drive against dial.

DUO-SPIRAL

The Leading Loop Aerial with New Dial and Handle



Pat. Pend.



Top View of Base Showing Dial.

The DUO-SPIRAL loop reaches from coast to coast on the loud speaker. Careful tests by radio engineers have proved its superiority. Used exclusively by the largest manufacturers of radio frequency sets. It is trim and neat in appearance and handsomely finished. It rotates freely on its base. Adjustment is made easy by handsome dial and a long handle, which eliminates all body capacity effects. The green double silk covered wire is kept always taut by hidden springs. The DUO-SPIRAL loop completely replaces roof antenna and ground and practically eliminates static.

24" Size \$8.50 - 12" Size \$7.50 (These prices include NEW Dial and Handle.)

LOOX-RITE

The Distinctive Binding Post

This handsome black and nickel finish Binding Post adds wonderfully to the appearance of your panel. LOOX-RITE is strong and sturdy throughout. Its concave metal base will stand tightening and prevents slippage. It fits any thickness of panel. Packed in cartons of fifty.

10c EACH

The above products (folders on request) are sold through dealers and jobbers. If your dealer cannot supply you, write us direct.

RADIO UNITS INC

842 Webster Bldg., Chicago, Ill. Factory: Maywood, Ill.

RADIO AT N.Y. PRICES
via Daily-Parcel Post

The Prices Quoted Below Deliver Goods to Your Door

HOW TO ORDER—Write your order plainly; state number, description and price of items wanted. Send Post Office or Express Money Order, personal check or bank draft.

WOOD CABINETS

- Highest grade Mahogany finish Cabinets, hinged top. These cabinets are being sold at less than one-half regular value.
- C57 Wood Cabinet; panel size 8"x10". Each.....\$2.50
 - C58 Wood Cabinet; panel size 7"x12". Each..... 2.75
 - C59 Wood Cabinet; panel size 7"x14". Each..... 3.00
 - C60 Wood Cabinet; panel size 7"x18". Each..... 3.50
 - C61 Wood Cabinet; panel size 7"x21". Each..... 3.75
 - C62 Wood Cabinet; panel size 7"x24". Each..... 4.00

LOOP AERIAL

- C76 Can be assembled by anyone in five minutes, all wood parts, wire and binding posts included, complete89c

JACKS AND PLUGS

- Jacks are polished nickel constructed with pure silver contacts.
- C118 One Spring Open Circuit.....\$.39
 - C119 Two Spring Closed Circuit..... .49
 - C120 Round Plug as illustrated..... .49

MISCELLANEOUS

- C163 Spaghetti Tubing, per yard.....\$.09
- C164 Synthetic Crystal30
- C165 Ground Clamps17
- C166 Black Rubber Binding Posts, 2 for..... .05
- C167 Nickel Plated Binding Posts, 2 for..... .05
- C168 No. 18 Annunciator Wire, half pound coil..... .39
- C169 6 ft. Phone Cord with Tips..... .79
- C170 20 ft. Extension Cord with Tips..... 1.95
- C171 Wall Insulators, porcelain..... .05
- C172 Tubular Porcelain Lead-in Insulators, 8 in..... 1.45
- C173 Balnzatz Coil 2.45
- C175 2 in. Dial and Knob..... .25
- C176 3 in. Dial and Knob..... .35
- C177 4 in. Dial and Knob..... .49

WAVE TRAP

- Simplifies tuning. Eliminates interfering stations, thereby improving the selectivity of your set. Selects between conflicting stations. Special while quantity lasts.
- C131 Each \$4.95

HARD RUBBER PANELS

- The highest grade panel on the market. Highly polished finish; cut in the following sizes:
- C88—7x10 \$.95
 - C89—7x12 1.15
 - C90—7x14 1.25
 - C91—7x18 1.65
 - C92—7x21 1.95
 - C93—7x24 2.20

1 1/2 VOLT DIETZEN TUBE

- Two-element Fleming valve effect; operates on one dry cell with or without "B" Battery; wiring diagram free with each tube.
- C95 Dietzen Tube\$1.00
 - C96 Socket for Dietzen Tube.... .40

VARIOCOUPLER

- C77 High Grade 180 Degree Coupler, made of Bakelite tubing wound with green silk wire. Special.....\$2.45
- C78 Variometer, same specifications 2.45

PLATE CIRCUIT "B" BATTERIES

- The highest grade of battery made at prices lower than they ever were sold before.
- C80—2 1/2 Volt Small.....\$1.15
 - C81—2 1/2 Volt Medium..... 1.45
 - C82—2 1/2 Volt Large..... 1.95
 - C83—4 1/2 Volt Medium 1.95
 - C84—4 1/2 Volt Large 2.50
 - C85—15 Volt Extra Large..... 3.50
 - C86—360 hr. 1 1/2 Volt Twin Double Duty "A" Battery75

UNCONTROL

\$ 11.90

\$ 11.90

RECEIVER A Real One Tube Set

made of best material throughout. Mounted in high-grade mahogany-finished hinged-top Cabinet (as shown above).

FULLY GUARANTEED
Wonderful Distance reported by Enthusiastic Owners
Will Ship C. O. D.; postage paid east of Rocky Mountains

AGENTS WANTED
To the Man Who Builds His Own: Write for our "BULLETIN OF RADIO PARTS AT BARGAIN PRICES." Standard Goods Only.

Abalene Radio 105 Audubon Ave. New York, N. Y.

WE REPAIR YOUR VACUUM TUBES

- WD-11-12, UV-199, UV-201-A\$3.50 each
- C-301-A 2.75 each
- UV-200, C-300 3.00 each
- UV-201, C-301 3.50 each
- DV-6, DV-6-A 3.50 each

ALL WORK FULLY GUARANTEED
Quick Service—Repaired Tubes shipped C. O. D.

- NEW TUBES
- A-399 (Type UV-199).....\$4.10
 - A-401-A (Type UV-201-A)..... 4 EACH
 - A-12 (Type WD-12).....
- All the above Tubes guaranteed amplifiers and detectors. Shipped C. O. D., postage prepaid.

Abalene Radio 14 Vesey Street NEW YORK CITY

Modell's
ESTABLISHED 1889

71 Cortlandt Street NEW YORK, N. Y.

America's Greatest Radio Mail Order House ELEVEN NEW YORK STORES

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Radio Aids School Campaign

A Call Sent Out Brings a Large Attendance

VARIOUS means have been used by the different educational institutions to place their college appeal directly in the hands of the alumnus family. Radio has demonstrated its adaptability in bringing the multitudes of people in widely scattered places within hearing of a speaker's voice, but only recently has it been used to unite an entire body of alumni numbering thousands into one audience for the purpose of discussing the needs of their Alma Mater.

Farmers Aid in the Science

Country Dwellers Big Factor in Future Radio

IN ALL probability the biggest development in Radio in the immediate future will be among the farmers and those who live in villages and towns. Putting these families in daily touch with what Radio has to offer will enrich and expand rural life even more than the automobile or telephone have done.

Every family in the land contains potential Radiophans, and two factors point especially to the possibilities of a Radio development which may eventually result in something approximating an average of a set per family in the United States. One is the fact that amateurs need not buy expensive sets, since when aided by a little ingenuity and the practical aid offered by progressive Radio companies they may build their own sets. They usually get good results, save money and have a lot more fun building their own than by buying them. Their chief requirement is to purchase reliable apparatus, especially transformers, which form the heart of the set.

The second factor on which the fullest use of Radio in the homes of America depends is the elimination of interference, and the progress made in this direction of late indicates that this problem will not retard the expected development.

Hook-Ups Galore

Super upon Super but the Crystal Set Holds Its Own

THERE are circuits everywhere. There are so many that a good Radio electrician may wander into a store to buy a switch knob and actually hasten away in blushing ignorance. There are so many new kinks appearing on the shelves with catchy new names that a man who speaks plain English has a decided foreign accent when he goes to order a screwdriver. But under it all is the sound, steady current which has made American Radio great and which is steadily making it greater, not with leaps, but in a patient, ever-increasing flow.

The new hook-ups that appear in the most unexpected places are founded upon old-time discoveries, if not taken complete from textbooks of years ago. There is practically no receiving set on the market which embodies fundamental principles that were not known during the War, when Radio received its first great impetus. Few really new principles have been discovered lately. Progress has been due largely to improvement in manufactured apparatus.

There are a number of inventors now at work making the super-heterodyne practical for broadcast reception. Already it is working with but two or three main controls, and it is picking up most of the stations in the United States with the use of six tubes.

The principle of regeneration, however, which is now used in the majority of Radio sets, was not placed upon the market until over two years after it was developed. The good things in Radio are produced slowly, and it is quite likely that when the super-heterodyne appears in so simple a form that anyone can tune it, so many tubes will be used that the price will be high and the instrument will probably not compete directly with any now on the market.

The little crystal set still holds its own in spite of the vast improvements which enable other sets to reach out about ten times as far, and it will probably be even more popular next year than it is now. Its larger brothers will also hold their own if future development is to be judged by the past.

RADIO INDI-GEST

Polly Does a Reincarnation



I know a young man whose name is Clance,
Once a week he'd take me out to dance,
But now when he comes, Alack and Woe!!
He sez,

"Soozzee, let's sit by the Radio!"

On Wednesday nights we'd go to the movie,
Me and my friend who comes from St. Louie,
But now I never get to the show!!
He sez,

"Soozzee, let's sit by the Radio!!"

I have a highbrow playmate just for variation,
(Why he likes me is cause for speculation.)
To a concert or lecture we'd often go,
But now he sez,

"SOOZZEE, LET'S SIT BY THE RADIO!!!"

My friend Angus and I like to skate,
Every winter we have many a date,
But soon when we get some ice and snow,
I s'pose he'll say,

"SOOZZEE, LET'S SIT BY THE RADIO!!!!"

L'Envoi

Of "Polly-Sit-by-the-Fire" you've heard,
But in a steam-heated flat she's highly absurd,
So out of the picture she has to go
To make room for

"SOOZZEE-SIT-BY-THE-RADIO!"

SOOZZEE.

Even Money That Jack's Been There

Dear Indi: It takes experience in the hoosegow to appreciate this old, time-tried rib tickler:

Sez she: "John, were you very uncomfortable in jail?"
Sez John: "It wasn't so bad. I had a dry cell."

JACK THE ADV. MAN.

A-B-C Lessons for Indigest Beginners

Chapter XXIV—How Well We Know!

BY GOSH

X

IS for 'ceptions

The fans most always take

To other folks ideas about

How best a set to make.

George Phair, columnist in the Chicago Herald Examiner, pauses to remark that Radio is recommended as a cure for flop ears, but that up to the time of going to press, nobody had discovered a cure for Radio. This shows that George isn't up on his stuff. If he had only tried out the Stebbins Souper Degenerative set he would have known that it was a sure cure for Radio.

Indi.

There's Some Bite to This

I

There was a fan
Who had a set
But not a station
Could he get.

III

When at night
He went to bed
He placed a chair
Nearby his head—

II

He had the set
Adjusted right
So it would fit
Snug and tight.

IV

And on the chair
He placed the set
But not a station
Could he get.

V

For the prime dumb-bell
We grant him the wreath—
For his set was but
A set of false teeth.

ROTOR E. GAPP.

The Force of Habit

An old man was listening to a band concert from WOS. Presently he fell asleep with the receivers still on his ears. In a few moments, however, he half opened his eyes and said, "Gosh, I wish that darned band would stop playin' so I could go to sleep."

SUN DIAL.

"Maggie" Miloplex Must Be a Good Cook

They have a 'Phan in Chicago town,
Whose circuit is hard to beat.
But some one kindly tell me, please,
Why he always wants to eat.

H. K. C.

Attention, Radio Entomologists!

Dear Indi: After allowing my Stebbins Snoopers Degenerator to remain idle all summer, I found I could not get anything with it. Looking the set over carefully I discovered it to be full of Radio bugs. To put my set in as good condition as ever I used the following:

Take two Radio nuts and dry them thoroughly, when dry pulverize in a mortar and mix in thoroughly one part of liquid intensifier (liquid intensifier is made by using equal parts of Radio, and Audio Amplification and Liquid Indigest). Apply the mixture with a camel's hair brush to all parts, especially the silent ones. When dry, cover with a coat of good varnish; this will bring out the luster and the bugs. Your set may now function as good as ever [I doubt it.—Indi.] and will bring any station you ever got before perhaps.

A MYSTERY STUDENT.



Condensed

By DIELECTRIC

At times it is impossible to get the set in action for receiving the time signals from Arlington as relayed by various broadcasting stations; when such is the case, you would appreciate your local station following the example of WDAP which produced time ticks of its own the other evening. Another much valued service is the broadcasting of news in an area cut off from ordinary communication through the damaging effects of a severe sleet storm. Station 9CE at Sudbury, Can., announced news of the day, stock reports, etc., for the benefit of all those having receiving sets, when telephone lines were broken recently.

There was another matter of interest to Radiophans, who may travel by train, discussed at the electrical engineers' gathering. It concerned Radio equipment for passenger trains. One phase of the subject has to do with automatic train control utilizing Radio and one division of forty-nine first-class roads will be using this system by 1925. The other, and more interesting one to us listeners in, was the possibility of not only hearing broadcasting while en route but being able to pick up a phone in your car to tell your wife about some item you forgot, or advising the office force of some detail.

There seems to be considerable QRM between Japanese and American Radio companies and the Chinese government. The Federal Telegraph & Telephone Company of America has a ratified contract with the Pekin cabinet for the erection of five Radio stations in China, but due to alleged Japanese machinations it will be impossible to establish them. Sites are at present not available. China, despite its immense population and territory, has a difficult time of it to progress in the face of outside influences. Without question Radio stations would be a decided advantage to the country and to all those having commercial relations with it, yet greed or pride (or both) are at work to frustrate plans to this end.

Privacy between two Radio operating stations seems at last assured, judging from demonstrations made before the Association of Railway Electrical Engineers at a meeting in Chicago. Using what is known as the Dunmore system, messages were received on a ticker which were wholly unintelligible to other than co-ordinated apparatus. If we assume typewritten news may be sent by Radio, newspapers in small towns will greatly benefit, and all of them in case of failure of land wire communication. An appeal is being made for kilocycle allocation.

Simplicity of operation is a desirable feature to incorporate in most any mechanical device—electrical or otherwise—wherever it is possible to do so. Particularly is this true where it applies to Radio reception and transmission in the air service. A test was recently made of a specially designed set for use by airplane pilots when a mail pilot conversed with Postmaster-General New while flying over the city of Washington. With the receiver under the pilot's helmet and transmitter on his breast, it becomes unnecessary for a Radio operator to accompany the airplane. Each day brings forth a new, practical, simplified adjunct to Radio operation—and the end is not yet.

It would appear to an observer as though the city of Warsaw, Poland, was getting a good deal of Radio publicity, indeed more than any other foreign city. Much of the credit for this is due the R. C. A., whose chief engineer, Mr. Alexanderson, tries out his experiments on that 9,000-mile circuit. The other day a Radio impulse raced around the circuit until it "died" at the end of a 4,000,000-mile sprint. More recently photographs and drawings were successfully transmitted through alternately changing Radio and light waves. Time may bring to this New York-Warsaw division fame that will be outstanding in the annals of Radio history. None of us will complain of that.

Latest Development in Grimes' Inverse Duplex

Part III—How Howling Was Eliminated

By David Grimes

WHEN the new tubes, known as the A-type, came on the market, it didn't take long to realize that, in general, they were much better amplifiers than the old 201 variety. In many circuits the gain in amplification was very noticeable. In others, this increase in efficiency was sufficient to cause insta-

results which far surpassed anything which I had hoped for the circuit. Others, in turn, told me in plain English just what they thought of me.

A glance at Figure 4 will show the reader the value and location of this trouble-making capacity. It will probably be a surprise to find that it some-

the second via the Radio circuit, they will be re-amplified by the second tube and again sent back to the first tube. This constitutes an audio feedback, which, as we know, causes howling.

Diagnosis of the Fault

For the sake of a more thorough understanding of this action, let us trace the audio currents in this howling circuit, starting with the plate of the second tube. Here the audio currents pass through the primary winding of the second audio transformer. As a result, an audio current is generated in the secondary of this transformer and from here passes on to the grid of the first tube, through the loop. From the grid, it is amplified through the first tube, and when in the plate circuit of this first tube, divides, part flowing down through the phones, via the Radio transformer, and part through the capacity of the Radio transformer onto the grid of the second tube. Here it is amplified and placed back on the plate of the second tube, where it started.

Now, of course, many ideas occur to us, any one of which would correct the situation. It is always fairly easy to remedy a trouble when once that trouble has been located and properly classified. Most any physician can prescribe a remedy when an expert has diagnosed the case. But in this case, so many things come to mind that surely one of them must be better than all the rest. First, a transformer could be so designed as to reduce to an absolute minimum the capacity between primary and secondary windings. This would solve the difficulty, but would force

everyone to purchase this particular transformer. Many would be money out of pocket on account of apparatus already purchased. This scheme was accordingly dropped.

Remedies

A method which is perhaps the simplest and cheapest to employ is the following, which consists in interchanging the relative positions in the circuit of the Radio transformer and the telephones. Then, by the time the audio currents have passed through the phones and into the Radio transformer, their pressure will have become so depleted as not to pass through the small capacity between the windings of the transformer, and will not, therefore, reach the grid of the second tube. This prevents the feedback and resulting instability. It is necessary to

(Continued on page 18)

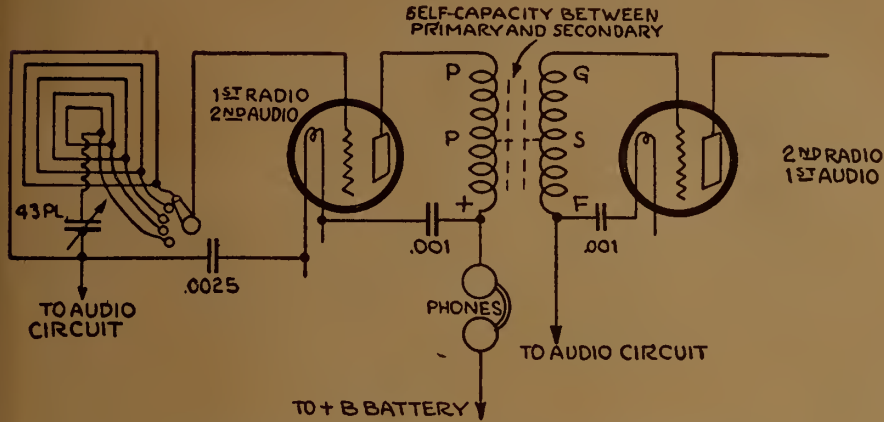


Figure 4—Self-capacity in Radio transformer causing howling

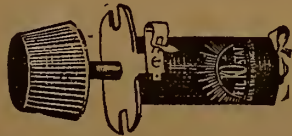
bility and howling. This was particularly true of Radio frequency circuits and especially of the inverse duplex.

In the latter, however, this was due to two causes and, therefore, difficult for the amateur to correct. Many of them succeeded in stabilizing the Radio part of the circuit but dropped the duplex system in despair when they found that this was only a part of the story. The real source of most of the trouble was this latter elusive difficulty. With certain apparatus in the circuit, it would entirely disappear; and again, a slight variation of the battery potential would either reduce or magnify it. It also depended somewhat on the resistance of the receivers or loud speaker.

Cause of Howling Found

Finally, after many tests and re-checks, the offending member was located and a remedy devised. The howling was found to result from the inherent self-capacity between the primary and secondary windings of the first Radio transformer. Certain makes of transformers would operate satisfactorily, having a very low internal capacity between windings, while others were absolute failures because of the opposite characteristic. Even in apparatus of the same brand, this variation was sufficient to be objectionable. This, then, was the explanation of the erratic results reported from all sources. Many experimenters wrote and informed me of

times will cause no end of difficulty when only of .0001-mfd. capacity. Of course, the larger its value, the greater the likelihood of howling. Figure 5 indicates how the howling takes place between the second and first tube. It will be seen that while the Radio circuit passes from the first to the second tube, the audio passes from the second tube to the first. Hence, if there is any chance for the audio currents to leak back from the first tube to



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Well known for their quality..... \$5.25

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The genuine Nathaniel Baldwins... \$8.75

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The single for loud speakers..... \$4.75

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Makes a loud speaker of any horn... \$2.25

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Gold horn and jet black base..... \$6.50

With unit, complete..... \$10.00

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RADIO FOR EVERYBODY

(Continued from page 15)

acid and water. Overhead, a Welsbach burner, while illuminating the work, added also to the stifling heat. In order to create Radio waves by which to determine the sensitivity of his device, Dr. De Forest had placed an induction or spark coil in the closet of the room and had, on the table near his hand, the key which operated it. When he pressed the key, a stream of blue sparks would jump the gap on the coil and ether waves vibrating at Radio frequency would be set up. He happened to notice suddenly that when he held down the key, the light overhead dimmed and, until he released the key, stayed dim. Were the Radio waves affecting the heat and light waves of the burner? Were light and Radio waves finally to be tied up in some manner useful to man? The electrolytic detector experiments were dropped, never to be resumed.

The Grid Is Added

The first experiments were highly successful in determining what caused the phenomenon Dr. De Forest had observed, but were extremely disappointing in that it was found that the sound waves, radiated by the crashing, hissing spark, were the cause. But the incident was not without value. A new possibility, a new line of research had occurred to a mind that knew how to scientifically, logically, follow a theory to something definite. Fleming's experiments, not having at that time been made public, and the gas light having furnished the initial thought, De Forest utilized gas in his early work to



Figure 45—The De Forest vacuum tube, showing the minute screen placed between filament and plate

produce the Edison effect. Within a few months the fact was proved that anything extremely hot gave off ions, and gas flames were immediately discarded in favor of hot filaments, the latter being much cleaner, easier to control and capable of being enclosed in a vacuum. Dr. De

Forest's work soon brought him to the point where Fleming was content to leave off, but his experiments and data had shown him that some control of the ions streaming from filament to plate was necessary, and insertion in the tube of such a controlling member was the next step. It had to be placed between filament and plate, that was at once evident, but it could not be of such a nature as to entirely stop the ions. Since a solid body would have blocked the ions from reaching the plate, a minute screen was devised and fastened between the two elements already used. (See Figure 45.)

(TO BE CONTINUED.)

Review of Books

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Vacuum Tube Receivers. By O. F. Hessler. A book that tells how to make a simple set. How to make the cabinet. It includes a 27 by 36-inch layout blueprint. Price, 75 cents.

The Armstrong Super-Regenerative Circuit. By George J. Eitz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, \$1.00.

Elements of Radio Communication. By Ellery W. Stone. A splendid, well connected, complete, accurate and up-to-date discussion of every phase of Radio telegraphy and Radiotelephony. Written in simple language. The subject is presented from the physical rather than from the mathematical standpoint, avoiding the use of higher mathematics. Price, \$2.50.

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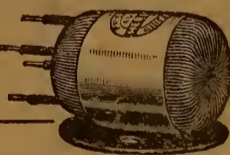
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INVERSE DUPLEX

(Continued from page 17)

by-pass the Radio currents around the telephones so that they proceed to the Radio transformer and pass on to the sec-

into the grid circuit of the second tube, there is no longer any need for the large by-passing condenser. Located as it is, it short-circuits also some audio currents coming from the first audio transformer. This, naturally, somewhat reduces the

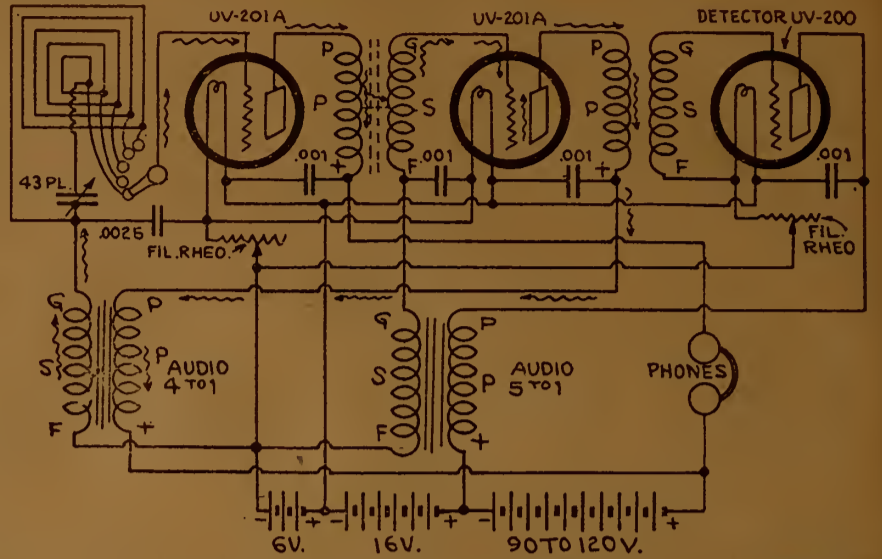


Figure 5—Old type Grimes circuit, showing audio howl resulting from capacity in first Radio transformer. Curved arrows show path of audio currents

ond tube. This is accomplished by a .0025-mfd. fixed mica condenser, across the phones.

This change permits another improvement to be made in the original circuit. The old by-passing condenser employed in the grid circuit of the second tube was .001 mfd. This was necessary to prevent howling even in the old circuit, as it afforded a path to the filament for any leaking audio currents coming into the grid circuit of the second tube via the capacity in the first Radio transformer. The old vacuum tubes, with their lower amplifying qualities, were not efficient enough to pick up what little audio currents did remain. The new tubes decidedly did. Now, with the new shift accomplished in the circuit and no audio currents passing

efficiency of the audio amplifying circuit. The condenser may now be made about .0005 mfd. and in some cases .00025 mfd., depending on local conditions in the apparatus used. This still passes the Radio currents properly but does not interfere a great deal with the audio energy.

(TO BE CONTINUED.)

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Three-Circuit Variocoupler Construction

Special Unit Used in Super-Triplex

By H. J. Marx

WHEN details of the so-called four-circuit tuner were published, it was more or less apparent that the very loose coupling provided by the single turn primary winding was a step in the right direction. While this very loose coupling proved advantageous in some instances, a distinct loss unfortunately is noticeable where so loose a coupling is not essential.

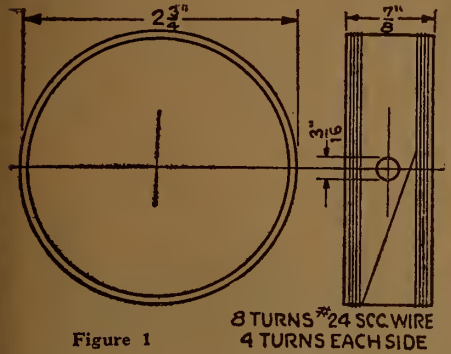


Figure 1
8 TURNS #24 G. WIRE
4 TURNS EACH SIDE

There was need, consequently, for the development of a tuning unit a little more advanced than that used in the above-mentioned circuit, and the conclusion was reached that if a few more turns were added to the one turn primary, and these turns could be variably coupled to the secondary and plate circuits, a decided improvement would be noticed. This led to the development of the three-circuit variocoupler in which conditions are reversed, the rotor becoming the primary and both secondary and plate windings being in fixed relation to each other.

The Super-Triplex

It was found that if the fourth or absorption circuit, consisting of a fixed winding and a variable condenser, was kept isolated, a loss in strength of reception was quite noticeable. Further experimentation indicated that this absorption circuit, or better still, oscillation control could be made an integral part of the plate circuit with no detrimental but decidedly desirable reactions. Despite the fact that the controls are many, the selectivity and volume are very unusual, and one night's reception of local broadcasting will give the constructor sufficient experience to handle any long-distance work.

Parts Required

All parts with the exception of the variocoupler being of standard design, no construction details are necessary, but as it may require some time before manu-

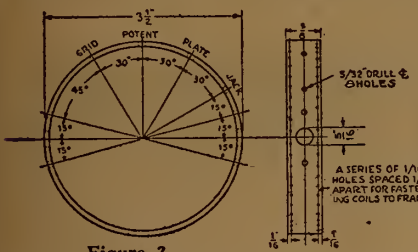


Figure 2

facturers will be able to furnish this special unit complete instructions on how to make it will follow.

The parts required are: one piece of cardboard or composition tubing, 2 3/4 inches in outside diameter and 7/8 inch long; another piece of tubing, 3 1/2 inches in outside diameter and 1/2 inch long; one brass mounting strap of 1/2-inch stock, 1/2 inch wide and 5 inches long; one set of rotor bearings, that can be purchased for 75 cents; two small copper terminals,

four binding posts, sufficient number 24 sec. copper wire, and a winding form consisting of a wooden block, 3 3/8 inches in diameter and 1 1/2 inches wide, with seventy-two 1/8-inch brads 1 1/4 inches long.

Framework Details

Figure 1 shows the details of the rotor. Two 1/8-inch holes are drilled for the shafts. Eight turns of the 24 gauge wire are wound on this rotor, four on each side of the shaft. Each end is locked under the nut fastening one shaft. In other words, the shafts providing for the electrical connections to the rotor winding and connections are taken care of by the rotor terminal shown in Figure 7.

The frame of the fixed windings is shown in Figure 2. Two 1/8-inch holes are drilled on the bearings of the rotor shafts, and four 3/8-inch holes adjacent to the bearing holes are drilled for mounting the bearing. The remaining four holes, also 3/8-inch, are used for binding

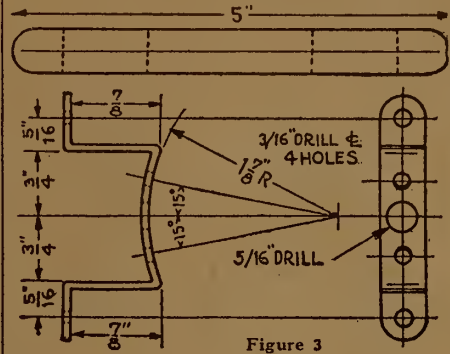


Figure 3

posts for the ends of the fixed secondary and plate coils. This identification of the holes will be clearly understood by reference to Figure 7.

A series of 1/8-inch holes spaced 1/4 inch apart are drilled along both edges of the mounting frame and are used to hold the fixed coils in position against the framework.

Winding the Coils

Details of the coil winding form is shown in Figure 4. Seventy-two brads are

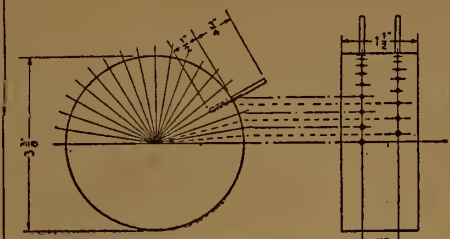


Figure 4

used but they should not be too firmly fastened in the wooden form, as it is necessary to pull them out after the coil has been completely wound. Thirty-six of these brads are put in on each side and spaced at a radial angle of 10°. Both sides are not alike, however, but are staggered. This is necessary to properly advance

the winding one peg every time a complete revolution of turns is made.

The winding is started by making a

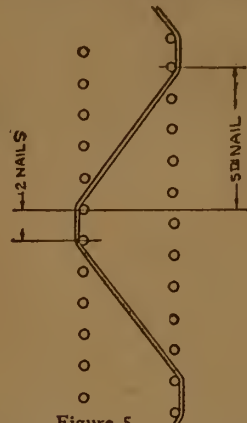


Figure 5

few turns about one nail. The wire is then brought around the outside of the next nail on the same side; then it crosses

diagonally over and around the outside of the fifth and sixth nail on the other side. This is shown in Figure 5.

The secondary coil has 50 turns and the primary has 75 turns. The ends should be left about 3 inches long for connections after the winding has been completed. The last turn is wound around the brad to temporarily secure it and prevent its unwinding. The whole form should then be given a very light coat of high-grade thin shellac, or better still, a cellulose solution made by dissolving celluloid in either acetone, ether or alcohol. When this is dry, strap or bind the turns together with some thread between the interstices of the windings on both sides,

(Continued on page 20)

CARTER "TU-WAY" PLUG



One to four sets of phone connections can be made at one time.

Tipped or plain cord ends can quickly be connected to the Carter "TU-WAY" plug. Can be used with any standard radio Jack. No short circuits, as plug is properly insulated, sturdily built, and will stand constant use. Insulation between tip and sleeve is undercut, preventing particles of brass from collecting on insulation and causing short circuiting.

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Send for circular "What Tubes Shall I Use?" which gives full details and table of various tubes for different receiving sets.

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MY HIGHLY IMPROVED REINARTZ brings in all important stations on this Continent loud, clear and without distortion. We dance to music from Atlanta and Los Angeles.

Build one of these wonderful 3 tube sets from my blueprint and specifications, price 50c. or with a complete and perfect double-wound spiderweb coil \$3.00 by mail. Picture of this set on a glass panel with every order. This copyrighted circuit is the most successful of any Reinartz modification yet produced, and is imitated the most. Thousands are in use.

My W. D. II Circuit is especially designed for use with the "Pickle" tube and brings out the full value of that little tube as no other circuit can. Stations 1000 miles away come in clearly on one tube. This set is small, complete, portable. For the man who wishes the highest efficiency, this is the set to build. Price of blueprint and specifications, 50c. or with complete and perfect windings, \$3.00. Photo of set with every order. Sets built from these copyrighted plans will receive all broadcasting stations operating under the new laws. Their wave length range is from 170 to 800 meters.

All goods prepaid. These instruments are easy to build, easy to operate. Everything clearly shown.

S. A. TWITCHELL
1925 Western Avenue Minneapolis, Minn.

THREE-CIRCUIT COUPLER

(Continued from page 19)

if possible. In this way, if the adhesive quality of the coating is not sufficient to hold the windings together, the threads will prevent the unwinding of the wire. The brads should now be pulled out, taking care that the windings are not displaced. When all of the brads are removed, the coil should be slid from the form and a few more threads may be applied around the borders to hold it together more firmly.

The next step after the bearings and binding posts have been assembled on the frame, is to sew the two coils onto the frame for which purpose the series of small holes were drilled around the edges. The rotor can then be assembled inside of the frame and the ends of the secondary and plate coils can be secured under the

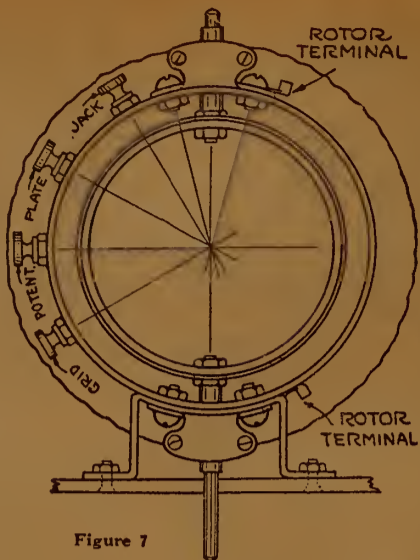


Figure 7

winding. It will, of course, take more time to make, but the finished piece of apparatus is well worth the effort.

How to Make Good Connections

In connecting a wire to a binding post, the wire should pass nearly around the screw, but not cross itself. This will permit the screw or nut to seat evenly. If two or more wires are to be clamped under the same screw, a washer should be put between succeeding wire, or the wires should be twisted together before bending them around the screw.

Rheostat Construction

The usual commercial rheostat consists of a coil of resistance wire, one end of which connects to one side of the circuit and the other unconnected, and a sliding contact, that may be stopped at any point on the coil and to which the second terminal of the circuit is connected. Adjustment of the arm regulates the resistance in the circuit.



proper binding posts, as indicated. Both coils should be wound in the same direction and the outside ends should be used for the grid and plate terminals. If deemed advisable, a final coating of the previously mentioned celluloid solution can be used over the entire unit, but care should be taken not to make it too heavy, as this would destroy the advantage of low capacity value in the windings.

The fan will find this type of tuning unit exceptionally efficient because of the unusually good qualities of this form of

Interference Caused by Phone Ringing Devices

A great deal of trouble is being experienced in many localities from induction caused in Radio receivers by telephone ringers of the interrupter or pole changer type.



These ringers are so connected as to reverse the polarity of storage battery current applied to the telephone line for operating the bells. The wave sent out from these ringers has a very steep front, and this producer clicks in Radio receivers that interfere seriously with the reception of broadcast programs.

The insertion of a simple filter between the pole changer and the ringing keys will smooth out this wave front so that the wave sent out on the line is more like an alternating than a pulsating direct current, and such a smooth wave will not produce serious interference in Radio receivers.

A diagram is shown herewith for the construction of such a filter.

It is very simple and inexpensive, and probably your telephone company will install it for you. It may be constructed of spare parts that are usually available in the exchange.

The filter shown contains eight 2-mfd. condensers and two retardation coils. The retardation coils may be Western Electric

Company's type 5AA, or any retardation or repeating coils available in the exchange. It is only necessary to get a coil with a large number of turns on a large iron core. The primary of a lighting transformer may also be used, or one of the windings of a "ring-through, talk-through" repeating coil.

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| UV-201A | | 3.50 | C-301A | | 3.50 |
| WD-11 | | 3.50 | WD-12 | | 3.50 |
| DV-6 | | 3.00 | DV-6A | | 3.50 |
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| 22½ Volt, Large | | 1.45 |
| 45 Volt, Medium | | 3.00 |
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| Thordarson Low Ratio Transformer | | 3.10 |
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Reflex sets and Radio frequency amplification are becoming more and more popular every day. The average fan wishes to add a stage or two of Radio frequency amplification to his set, but his purse usually balks at the prices asked for transformers.

The author has constructed one as de-

WORKSHOP KINKS? EARN A DOLLAR—

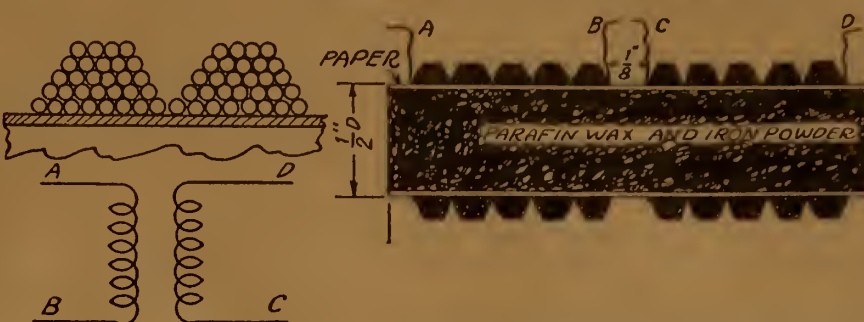
THERE are many little kinks worked out at home that would aid your fellow Radio worker if only he knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in obtaining such material. 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

scribed in this article. A Radio frequency transformer is very easily built, and one of this type will give wonderful results. The complete cost is twenty-five to thirty cents. This is quite different from what the amateur usually puts out for a transformer.

From a chemical supply house get a bottle of iron powder. This is chemically pure, and very soft. Melt a small piece of paraffin wax, and stir the iron powder into the wax. Make the mixture the consistency of bread dough. Then make a cylinder of paper, about 1/2 inch in diameter, and 2 inches long. Stand it on end, and pack the mixture tightly in it. When this has hardened, give the cylinder

IRON POWDER AND WAX MAKES CORE



a coat of shellac, and set it aside to dry. To make the windings, use Number 30 enamel or sec., and starting at one end, make a banked winding of 30 turns. When this is finished, continue the winding by making another bank beside this, and similar to the first. Make five of these banks. This is the primary winding. Now, at a distance of 1/4 inch from this, make another winding of five banks of 30 turns each, in exactly the same manner as the first. When both windings are finished, give the whole thing a coat of shellac, to keep the wire in place. Connect each of the four leads to a binding post. The transformer can be used as it is, or it can be placed inside of a cardboard or bakelite tube. Fill the tube with paraffin, sealing wax or rosin. Connect the transformer as shown by the diagram.

This transformer acts very efficiently over a wave length band of 200 to 500 meters, with a peak at about 360 meters. It is therefore ideal for broadcast reception.—Byrt C. Caldwell, Boston, Mass.

For the new longer waves above 450 meters, use a condenser connected between the aerial and ground terminals of your set.

Material for Winding Forms

Bakelite, kiln-dried wood, hard rubber or composition winding forms should be used, rather than treated cardboard. The initial cost is greater, but the increased efficiency will compensate.

If cardboard forms are used, untreated board is preferable to the treated kind. The shellac and varnish used in treatment affect the winding and add surprisingly large losses to coils that are used in high frequency short wave work.

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When insulators on outdoor aerial systems in localities where there is much smoke become coated with soot, which often happens, there is loss of energy by leakage on the surface of the insulators, requiring the renewal of the defective insulators. This condition is particularly annoying during wet weather.

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One way of removing the greenish substance that collects around the positive pole of a storage battery is to pour the contents of a teakettle of warm water slowly over the surface of the battery. The vent caps or battery corks should be left in place so that the water cannot get into the interior of the cell. After the terminals are cleaned they should be filed or made bright with some heavy sandpaper. Coat the terminals and other exposed metal parts, except the contact points, with vaseline to prevent further corrosion.

Binder for Wires

Shellac should never be used as a binder. It increases the distributed capacity of the coil, with resultant losses. Best is to use no binder at all. If reasonable care is exercised and the turns are wound tight a binder is unnecessary.

Drying Coils

One disadvantage of honeycomb coils is their absorption of moisture during damp weather, causing leakage. The coils may be dried by putting them in an oven of moderate temperature, or may be made moisture-proof by immersing them in melted paraffin until all bubbling stops.

TUBES \$5.55

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It has extra heavy 1/4-inch plates and large acid circulation. It has glass jars, which eliminate cell leakage and allow observation of battery condition.

It will hold its charge for many months at constant voltage.

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Voltage of the Storad "B" Battery is constant and steady, 3 to 6 months' service on one charge. Recharge cost is very slight. (We can turn it into a charger at small cost.) A Storad will last for years and pays for itself in less than a year. Capacity 2250 M. A. H.

USE A STORAD STORAGE "B" BATTERY

It has extra heavy 1/4-inch plates and large acid circulation. It has glass jars, which eliminate cell leakage and allow observation of battery condition.

It will hold its charge for many months at constant voltage.

It prevents many noises in the set ordinarily blamed to static and aids long distance reception.

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Questions and Answers

Vacuum Tube Repairs

(5132) RKT, Lynchburg, Va.
 I see several advertisements of companies claiming to repair vacuum tubes in which the filament has been burned out or otherwise damaged. Do you believe these repair companies really do a good job, and is it worth while to have it done? Do they use a barium oxide coated filament on WD-11 and WD-12, and a thoriated tungsten filament for UV-199 and UV-201A? Or just plain tungsten on all

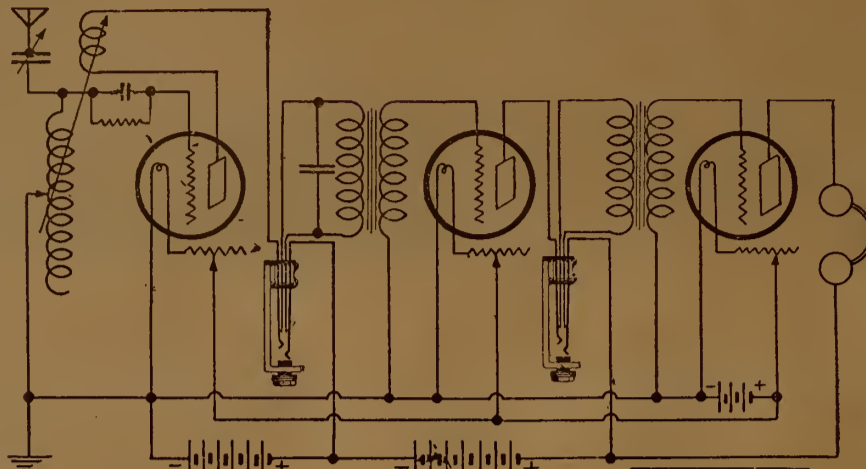
TIME SIGNALS

Your request to the Bureau of Navigation, Department of Commerce, for information concerning the manner in which Arlington Time Signals are transmitted, has been referred to me for reply.

All Naval Time Signals are made in standard manner which is as follows: The signal begins five minutes before the hour to be marked, and consists of a dot for each second. The dot for the twenty-ninth second of each minute is omitted, and also the last five seconds of the first four minutes. The last ten seconds of the fifth minute are omitted, this silence being followed by a one second dash, the beginning of which marks the time signal.

Respectfully,
 F. W. Yeatman, Lieutenant, U. S. N.

of them? In other words, is a dry cell tube changed to a storage battery tube? Has the repaired tube long enough life to justify the expense which is a little over half the cost of a new tube?
 A.—Answering your inquiry we are advising that generally a vacuum tube having a burned out filament can be repaired by responsible concerns quite satisfactorily. Possibly, in some cases, they will not be found to be as sensitive as originally. The filament put in is of the same construction as the original and the characteristics of the tubes are unchanged.
 Good headphones will detect a current as weak as 16 billionths of an ampere.



Circuit and Amplification

(5495) WEC, Decatur, Ga.
 Inasmuch as I am a regular reader of Radio Digest and have been for the past six or eight months, I feel sure you will give me a little help on a circuit which I am using.
 The circuit, as per diagram, is giving very good results. It is very selective, and the volume is better than on any single tube set I have ever used or heard, so that I am very much desirous of amplifying it if possible. I am told that it cannot be amplified, but I believe Radio Digest can do it if anyone can.
 I would sincerely appreciate it if you can help me out by sending me a hook-up of the circuit with two stages of amplification, and also if you can suggest any changes to better it.
 A.—Answering your inquiry we are herewith presenting a hook-up diagram showing method of amplification.
 It is an error to state that any circuit cannot be amplified, which means merely to increase the intensity of detector output. The method, generally speaking, is applied to any standard circuit in the manner indicated in drawing.

Reinartz Coil

(5153) CHL, Philadelphia, Pa.
 I received this morning a booklet on the Reinartz receiver. Unfortunately I have one of these, and they cover hook-ups for the manufactured coil. What I was after was the diagram published in Radio Digest, November, 1922, showing how to wind one's own coil on a circular cardboard tube or oatmeal box. Can you furnish me with this information, showing size of cardboard tube, number of wire used, number of turns, taps, etc., for use in phone work?
 A.—We sincerely regret to state that the back issue desired is long since exhausted. That of November 25 was the one containing description of spider web coil construction, if you are able to locate one. Briefly, form dimensions are 2 1/2 inches inside diameter, slots spaced to taper from 3/8 to 1/2 inch, being 11 in number. Taps are taken in steps, each on the slot following preceding tap. Turns are counted from each tap point. In taking off a tap

Dry Cell Tubes

(5191) EWM, Fort Wayne, Ind.
 At full voltage, what color does the filament show in a WD-11 tube?
 Is there any danger of overloading the filament of a tube using the proper rheostat and a battery?
 Would a 1 1/2-volt flashlight bulb in the B battery leads act as a fuse for a WD-11?
 Using an aerial or ground alone in the Flewelling circuit, would I have to use a separate ground for the panel shield?
 A.—The filament of a WD-11 tube should burn at a cherry red.
 If no greater than rated voltage 1 1/2-volt dry cell is used, there is not a risk of burning out tube.
 A 1 1/2-volt flashlight bulb in the B battery lead is all right as a fuse. However, it is inconceivable that anyone would put B battery potential on filament of a tube; in which case it would be unnecessary.
 Referring to the Flewelling circuit, if it is desired to use antenna alone, it will be necessary to use a separate ground for filament. Otherwise, it is not necessary.

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