

Beginner's Series; Week's Advance Programs

Radio Digest

EVERY
WEEK

Illustrated

TEN
CENTS

REG. U. S. PAT. OFF.

Vol. 5

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SATURDAY, MAY 5, 1923

No. 4

NEW WAVES TO END QRM



To the left is Miss Gertrude Paine, who is spoken of in broadcasting circles as "a peppy monologist and snappy accompanist." From this title you will readily judge she is somewhat of a jack of many trades and her versatility makes her almost indispensable to the broadcasters. Miss Paine recently gave some of her most popular readings and piano selections from Station KQV, of the Doubleday-Hill Electric Company, Pittsburgh, Pa.

MAY 15 DATE PLANTS TAKE ON NEW PLAN

Listener-In's Woes Cease
Official Order by Herbert Hoover
to Take Effect—Stations En-
thusiased Over Unique System

By E. E. Plummer
CHICAGO.—Broadcasting station interference and many other woes of the listener in will disappear at noon, May 15, with the taking effect of the reallocations of wave lengths in accordance with the Second National Radio Conference. The plan to end QRM, as "interference" is known in Radio code abbreviations, has been signed by Secretary of Commerce Hoover, and provides for 34 distinct and well separated wave lengths for Class B stations in 36 different
(Continued on page 2)

Following the recent broadcast of Miss Madeline Borschneck-Bossi from Station WOR, Newark, N. J., we received numerous requests to print the picture of the "lady with the nightingale voice." If you were one of the fortunate ones who were so charmingly entertained by her, you will admit this talented coloratura soprano is equally charming in appearance as is the sound of her voice over the ether. It is unofficially announced that Miss Bossi will again be on one of the early programs of WOR by special request of the many fans who have heard her before



WNAC Gives Jazzmania at Request from Mae Murray

BOSTON, MASS.—Mae Murray, the motion picture star, had a special broadcast arranged for her by WNAC (Shepard Stores) on April 13, when she gave a Radio party in New York. She has been so pleased with WNAC programs that she made a request that the Colonial Orchestra play "Jazzmania" during her party.

TINY RECEIVER TUNES IN WNAC AND OTHERS

BOSTON, MASS.—Carlton Margeson, 171 King street, Dorchester, Mass., has built a tiny crystal Radio set that is only four inches long, seven and one-half inches wide, and one and one-half inches high. The tuner has 500 turns of Number 22 cotton covered wire, with 20 taps 25 turns apart. He gets Station WNAC quite clearly, and even WGI with this set. The total cost was \$1.35.

WGV DISTANCE RECORD CLAIM SUBSTANTIATED

Heard in Alberta, Canada, and Off
the Azores

NEW ORLEANS, LA.—The record long distance range for the small current used is believed to have been achieved by WGV, broadcasting station of the Interstate Electric Co., this city.

The station radiates on one and seven-tenths amperes and recently received a report from Grand Prairie, Alberta, Canada, which arrived simultaneously with a verbal report from the Radio operator of the S. S. Broncho, who came ashore and told L. C. Parker, Jr., of the Interstate company that he had heard WGV programs while at sea off the Azores some weeks ago.

"A similar maximum range is claimed by a St. Louis station, but that record falls to approximate the New Orleans record since the St. Louis station uses a nine ampere current," Mr. Parker declares in an interview with a Digest representative.

EXCLUSIVE WAVE LENGTHS FOR BROADCASTERS

(Continued from page 1)

cities, with 21 other wave lengths reserved for future B plants not now in existence.

Already a part of the plan has gone into effect; no broadcasters falling below the rigid qualifications set for Class B are being licensed for 360 meters, but are assigned wave lengths between 222 and 300 meters.

Listeners In Can Tune Better

The wave lengths assigned to the B stations in the various localities are in accordance with the plan of the conference and are based entirely on the willingness of the various stations to co-operate in putting them into effect.

It is understood that any station now operating on 360 meters will have the privilege of remaining on that wave length if it so desires.

Besides the elimination of the general 400-meter wave, hereafter all government reports will be sent out by each station on its assigned wave, rather than on 485 meters, thus discontinuing use of this wave.

Exclusive Waves for Class B Plants

The thirty Class B stations, now all on 400 meters, will be heard all over the country, once they obtain their new exclusive wave lengths, inasmuch as interference with other similar plants and small local stations has been their only barrier to this goal.

For the purpose of wave distribution without interference the country is divided into five zones. Assignments within these zones are for cities rather than for specific Class B stations, it will be noted. These follow:

ZONE 1

Table listing cities and wave lengths for zones 1 through 5. Includes cities like Springfield and Wellsley Hills, Mass. (300), Philadelphia (435), etc.

Reserved wave lengths in the five zones, that is, wave lengths which will be held awaiting the erection of anticipated plants capable of B ratings, are: Zone 1, 303, 319, 469, 357, and 288 meters...

What "Kilocycle" Means

In the tabulation above, it is noted that frequency in "kilocycles" is made the basis of the assignment. Dividing the speed of Radio waves, 300,000,000 meters per second, by the wave length, gives the frequency in cycles. A kilocycle is 1,000 cycles.

The difference between each locality assignment, it will be noted, is 50 kilocycles. Another technical reason for this separation is to prevent audible heterodyning, sometimes called "beat notes," as a result of one station's frequency being too close in number to another's.

Kilocycles will supercede meters in designating the transmitting waves of all stations next year.

Class A Plan Similar

Similar somewhat to the plan for the Class B stations is that which has gone into effect for the Class A stations. District Radio supervisors are reassigning 833-kilocycle (360 meter) stations according to the plan, and all new Class A plants will receive "district-exclusive" wave frequencies between 1050 and 1350 kilocycles, that is, 222 and 286 meters, to take effect at once.

This gives the better of the Class A broadcasters a partially exclusive transmitting wave. For example, the wave length 222 meters may be assigned to stations only in the 4th, 5th and 8th districts; similarly, the wave of 233 meters will be authorized for use only in the 2d, 5th and 7th districts...

Each of the Class A station allocations, it will be noticed, is separated 10 kilocycles from the next. As in Class B allocations, stations must keep adjusted to within two kilocycles of their assigned wave frequencies.

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Class A Wave Frequencies and Lengths

Below is given the Class A broadcasting wave frequencies and lengths, and whether the particular wave is to be assigned in each of the nine Radio supervision districts or is to be restricted in use to only certain districts.

Table with columns: Kilo-cycles, Wave Length, Assigned Districts. Lists frequencies from 1350 to 1210 and their corresponding district assignments.

Women's Club Gives Hints on Gardening by Broadcast

AKRON, O.—Radio waves were very successfully used by the Ohio Federation of Women's clubs, April 22 to 28, to arouse public interest in gardening and landscaping, it was announced here this week by Mrs. W. W. Milar, chairman of the state federation's conservation committee.

CONTENTS

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List of articles with page numbers: "All the Live News of Radio" (1 to 7), Receiving Records (2), Radio Fools the Pollies (3), etc.

Looking Ahead

Major General Mason M. Patrick, Chief of the U. S. Air Service, in the next issue will tell Digest readers how Radio is being applied in aviation.

The Hazeltine Neutrodyne Circuit—will be discussed in an article next issue by Harry J. Marx, technical editor of the Digest.

Radio Waves; How They Are Made; How They Travel—the subject of Chapter II of Thomas W. Benson's series of articles for Radio beginners.

The Three Tube Reflex De Luxe Set—description for the making of which starts with this issue, will be continued next week.

E. T. Flewelling's One Condenser Flivver Super Set—Part II next week. Due to illness and need of rest, Mr. Flewelling was forced to postpone the article which was to have appeared this week, but assures us he will have many live hints on the new set to tell Digest readers next issue.

Advance Programs of the Big Broadcasters for the Week—and more stations represented than in any other source of similar information. Watch this exclusive Digest feature expand.

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RECEIVING RECORDS? SEND 'EM IN—

By the Contest Editor

BACK again this week with twelve new records and seventeen old ones beaten. Of these, S. S. Atwood of Esperance, Washington, wins honorable mention for submitting the most records and also the longest distance, which is 2500 miles.

Station Heard—Miles Away—Who Heard It

- List of stations and their locations: CFAC—1750, Ted Lehman, Ashland, Ky.; CHYC—2500, S. S. Atwood, Esperance, Wash.; KFDJ—2100, Ted Lehman, Ashland, Ky.; KGB—1725, Louis Bruchess, Chicago, Ill.; etc.

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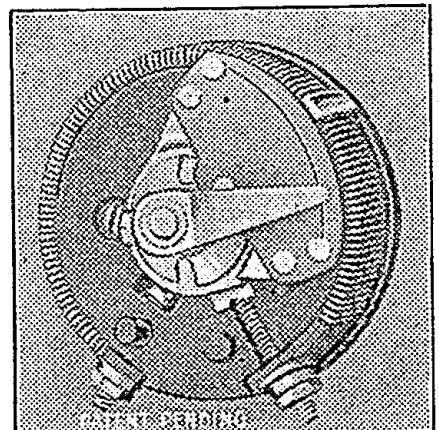
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BOOTLEGGERS FIND PROFITABLE FIELD

SMUGGLE "PEANUT TUBES" ACROSS BOUNDARY

Detroit Fans Make Purchases of Scarce Apparatus—Ask No Questions and Say Nothing

DETROIT.—A new kind of bootlegging has developed between Detroit and Windsor, Ont., just over the international boundary—smuggling "peanut tubes" into the States. Just why a situation of this kind should exist is difficult to determine, although there are plenty of critics ready to offer explanations.

However, the stealthy traffic here is a surprise to a great many people. Many are asking the question, "Is it because the North American market is controlled or divided? Is it made easy for the consumer to buy what the interests wish to sell it, but not at all easy for the public to buy what it wishes when it wishes?"

Can Get It Across the River

It is extremely difficult here to buy much of certain kinds of Radio equipment that the people are after. This comes in at infrequent intervals and even then one must have his order filed several days in advance before he can get it. However, it does not seem to be just the same across the Detroit river, a mile from the center of the city. There is little trouble over there it is said getting the very equipment that cannot be obtained here. Many, however, are not stopping to ask questions but make their purchases, put them away securely and say nothing.

JEK of WOR Has New Test Given Aspirants

Hears Violinist Over Phone Before Giving O. K.

NEWARK, N. J.—You know, or perhaps you don't know, that every one who broadcasts from WOR must submit to a test being made of his voice, or playing. When JEK, program director, made this rule, some of the other station managers thought that she would not be able to make artists come all the way to Newark for tests, especially since Radio programs are not paid for. But artists realize the publicity value in Radio, so they are willing to go to a little trouble to get on a program. Every day from 4 to 5 p. m. there is a steady stream of applicants, to make "try-outs." A novel one was made the other day, however. A very busy young violinist from New York had requested the privilege to broadcast and had been given the usual reply—that he would have to make a try-out. So he called up WOR and asked JEK if it would be possible to play without being heard by her beforehand.

"No," said JEK, "I'm sorry, but I must hear you play before I give you permission to play for the vast audience."

"But I can't possibly get over to make the try-out, as I am leaving on a concert tour in two weeks and I want to play over the Radio before that time."

JEK put on her thinking cap—it's a cap she wears nowadays, more than her other hats, too.

"I'll tell you what to do," said she. "Play a piece for me over the telephone. That would be so like the Radio that I can judge how you would come over the air."

"It's a go," said the young man, and played beautifully! And he played for the Radiophans, on Friday, April 13th, at 8:30 p. m.—Lindsay Lindy, who has given concerts in London, Paris and Berlin, and who plays on a real "Strad."

Some big-hearted New Yorker anonymously contributed \$100 for the purchase of a radio outfit for the leper colony in Porto Rico.

WOO CONCERT HEARD THROUGH PARIS LOOP

PHILADELPHIA, PA.—Station WOO has received a letter from Andre A. Marie, Electrical engineer, 4 Rue Richepanse recording the remarkable fact that Station WOO's transatlantic concert, broadcast March 15 with Marcel Dupre, organist of Notre Dame Cathedral at the grand organ, was heard in Paris on a loop aerial. This concert was heard simultaneously across America and across the Atlantic ocean.

YOUNG BROADCASTER HAS NEIGHBOR TALENT

HOUSTON, TEX.—Fred Mahaffey, Jr., 15-year-old high school student, claims to be the youngest broadcasting station operator in the world. He has regular programs daily except Sunday at 7:30 to 8 p. m. with his own violin selections, piano solos by neighbors and vocal numbers. Mahaffey's station is KFCV, 360 meters. He uses 10 watts antenna input and is heard all over the Southwest.

ENGLISH STATIONS RELAY BROADCAST

SIMILAR WAVE LENGTHS HAMPER TEST

Success of Experiment Opens Big Possibilities for British Broadcasting Company's Stations

MANCHESTER, ENGLAND.—A highly interesting experiment in Radio broadcasting procedure was carried out recently at the Manchester station of the British Broadcasting Company. For some time past the station has been relaying the Paris time signals, which are sent out on a wave length of 2,600 meters, then the officials endeavored to pick up and relay the London and Birmingham broadcasting stations.

This they did, part of the children's "talk" from London and the "talk" and orchestral program from Birmingham being received on a special aerial, which is set some short distance away from the normal transmitting aerial on which the items were re-radiated to the Manchester area listeners-in. The great difficulty lies in the fact that the wave lengths of the stations are so similar—Manchester is 385 meters, London 369 meters, and Birmingham 420 meters,—so that a particularly selective circuit is necessary to avoid jamming by the re-radiated signals.

This is the first time a direct Radio relay has been accomplished on the British Broadcasting Company's stations, and it naturally opens up big possibilities. If, as seems quite likely, the development becomes a thoroughly practical proposition, it may probably result in there being one big central broadcasting station only, say in London, where the best of the leading musical and vocal talent could be engaged, while in other parts of the country the auxiliary stations would merely relay the program for the private listeners-in in their areas.

PHONOFILM GIVES VOICE TO MOVIES

New Device Invented by Dr. De Forest Given First Public Showing

NEW YORK.—The first public showing of Dr. Lee de Forest's latest invention, the phonofilm, was given at the Rivoli Theater recently. Many so-called "talking pictures" have been exploited in the past in which a phonograph supplies the sound, but this will be the first showing of a film that literally talks and supplies music.

The phonofilm, as the name implies, is a combination upon the same film of picture and voice or music. The sound waves are photographed on the film at the same time the pictures are taken, thus insuring at all times perfect synchronization. In reproducing these sound waves are transformed into telephonic electric currents. By the use of Audion amplifier these currents are amplified 100,000 times and finally turned back into sound again through "loud speakers" located behind the motion picture screen.

A most astonishing result is accomplished: a dancer appears on the screen keeping perfect time with the music supplied by the film; a singer appears from whose moving lips comes every note in perfect tone and synchronism; the bow of a cello player holds the fascinated attention of the audience, as every stroke brings forth the mellow strains of the instrument.

Frisco Entertains New Orleans

NEW ORLEANS, LA.—At a recent meeting held by the New Orleans Chapter, American Association of Engineers, a Radio program by the San Francisco chapter of their organization was the chief feature of entertainment. Motion pictures of Louisiana bird life followed the ether program.

RADIO FOOLS THE POLLIES



Miss Marion Merle, pretty vaudeville girl, fooled her trained troop of macaws, cockatoos and parrots with a Radio instrument. The set she carries is made from an old newspaper camera box, but it works just as good as the best of them and the tropical talking birds got the thrill of their young lives trying to learn the source of the mysterious chatter. © International

American Legion Station Closed for Summer, April 1

OMAHA, NEBR.—April 1 marked the close of the American Legion Station, WGAT. The station will not be opened again before early in the fall.

One of the features of WGAT has been simultaneous broadcasting in co-operation with Station WJAB. This was done by using a line and line amplifiers, which connected WJAB with the Legion studio.

Both stations went out on different wave lengths, and the double broadcasting proved quite popular among the Radiophans.

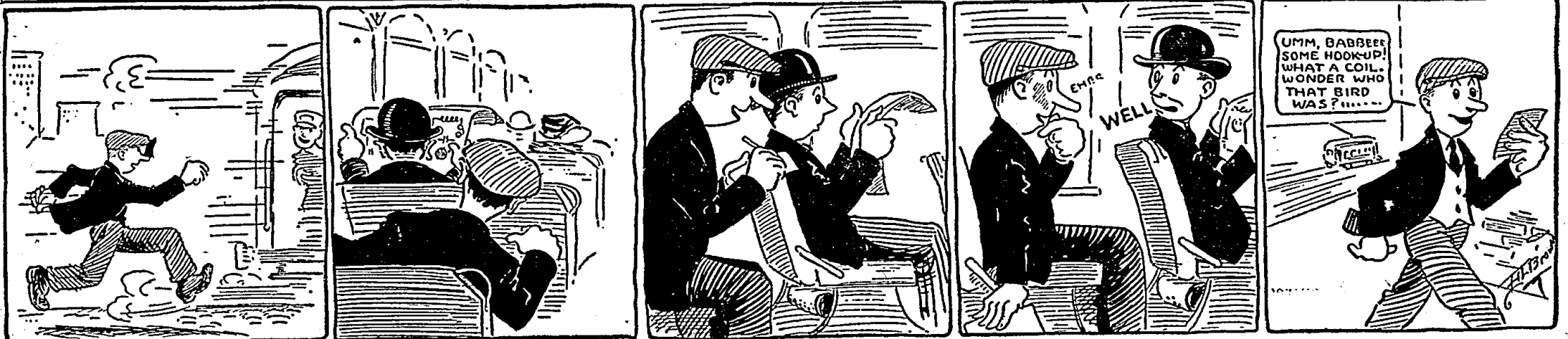
Bequeaths Radio Set

The first case on record of a Radio receiving set being specified in a will was revealed when the will of J. J. O'Heir was probated in New York. He bequeathed a "Radio set and tools, valued at \$500," to William Watson.

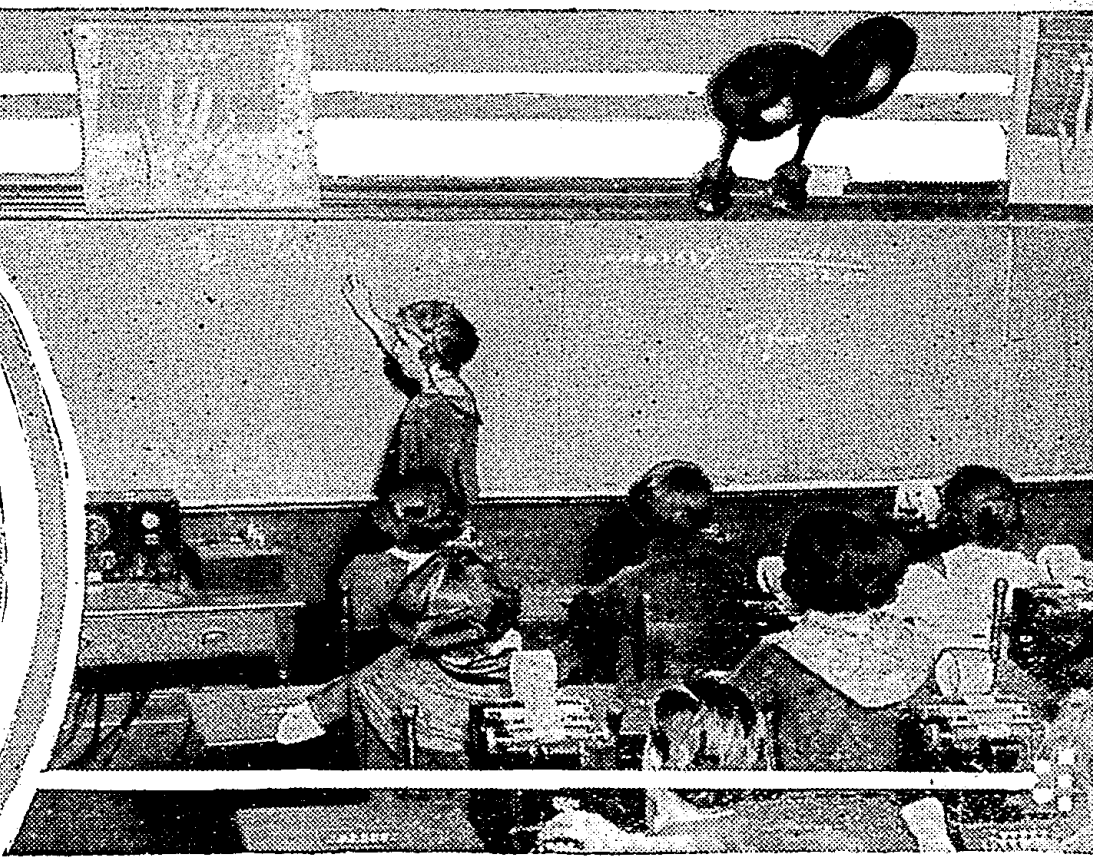
THE ANTENNA BROTHERS

Spir L. and Lew P.

E. T. Flewelling, of Course!



WJZ BROADCASTS SCHOOL LESSONS



Left photo shows H. W. Leyenberger, a teacher of the Haaren high school, giving via Radio several problems for his class in mathematics to figure out in their school room several miles away. Two girl students are checking the results of the problems. Miss Elinore Hastings of the teaching staff of the Haaren high school of New York is shown above teaching a class via Radio. The questions are transmitted via Radio from headquarters of the board of education and the students of the class are then required to solve the problems. This is the first attempt at introducing the Radio in the classroom and is being tried by the New York board of education in co-operation with the Westinghouse station WJZ at Newark, N. J. © International

CUBAN PLANT PWX GIVES FANS OPERA

PRIZES OFFERED HEARERS BY DIRECTOR GALLO

San Carlo Grand Opera Company to Remain Three Weeks—Plan Other Broadcasts

HAVANA, CUBA.—Opera across the sea carried the message of friendship from Cuba to the United States on Tuesday night, April 24th, when the San Carlo Grand Opera Company opened its season in the Teatro Nacional here. The entire opera, "The Barber of Seville," with Titta Ruffo, Tito Schipa, Josephine Lucchese, and others in the cast, was broadcast.

Beginning at 9:00 P. M., Eastern time, the broadcasting was done by the Havana station, PWX, arrangement with The Cuban Telephone Company, which transmitted the performance from a microphone in the theater to the sending plant.

This enterprise had the official stamp of the Cuban government through arrangement by General Crowder, U. S. A., with the President of the Cuban Republic. The President was in attendance at the opera and preceded the broadcasting of the music with a speech through the Radio to those listening in this country.

Award Prizes to Listeners In

Fortune Gallo, director of the San Carlo Grand Opera, will give prizes to those Radiophans who send in the best written accounts of what they heard on Tuesday night. These reports should be addressed to Fortune Gallo, Aeolian Building, New York City. The prizes will consist of boxes and seats for performances of The San Carlo Company on its tour of America next season, 1923-1924. The prize winner will determine the time and

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"Sun Dodgers" Give Radio Sets to Crippled Children

CHICAGO, ILL.—Thousands of crippled children in Chicago will soon be "tuning in" their own Radio receiving sets to jokes, musical entertainments and bedtime stories.

The Board of Trade Radio station, WDAP, located on the Drake hotel, has recently organized a "Sun Dodgers" club for this purpose. Membership is \$5 and this sum will purchase a crystal set for one crippled child. Nearly 700 Radiophans have responded to the "via the air" call for volunteers.

Boy Scouts will make the installation and show the children how to manipulate the knobs and dials.

place where he will attend the opera next season as he will be given seats at a performance in a city nearest to his home town on the San Carlo itinerary.

The San Carlo organization will remain in Havana for three weeks and in its casts will appear Giovanni Martinelli, Lucresia Bori, Mari Kouznezova, Anna Fitzziu, Marie Rappold, Sophia Charlebois Stella De Mette, Manuel Salazar, Marie Valle, and others, with Carlo Peroni and Giacomo Spadoni, conductors, and The Pavley Oukrainsky Russian Ballet. Other broadcasts are planned.

President Harding to Speak on WJZ

Broadcast Enables Nation's Leader to Speak to Largest Audience Reached by Any President

NEW YORK, N. Y.—President Harding's voice will undoubtedly vibrate through the ether from Station WJZ, when he speaks before the Volunteers of America in New York on May 10. Definite arrangements have not been made relative to the hall in which the address will be given, but it is expected that the microphone will pick up the President's voice from either the Metropolitan Opera House or the Hippodrome.

Such broadcasting will give President Harding the distinction of addressing the largest audience of any President in the history of the United States. The waves of WJZ have sufficient power to carry their message to every state in the Union, so when this station places its microphone before the President, his voice will be heard in thousands of homes.

The rates of Swedish coast stations were recently reduced to 30 centimes per word, minimum 3 francs per Radiogram.

Club Discusses Radio Frequency

MILWAUKEE, WIS.—Radio frequency amplification has been the topic of interest and discussion at the last several meetings of the Milwaukee Radio Amateur's Club, Inc. I. H. Strassman, 9AHO, A. R. R. L. City Manager, awakened the members' interest with his talk entitled, "Radio Frequency Intervale Transformers."

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2-inch Bakelite Dials	.25
4-inch Electro Dials	.75
3-inch Bakelite Dials	.35
\$ 1.00 Freshman Variable Grid Leak and Condenser Combined	.75
1.00 Bakelite Socket	.50
5.00 W. D. #12 Audio Frequency transformer	3.75
3.00 Owl Radio Frequency transformer	1.50
5.50 Coto coil Radio frequency transformer	3.45
5.00 Sleeper Radio frequency transformer	1.95
8.00 Dayton Variometer	5.45
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5.50 Murdock variable condenser, 23-plate	2.95
6.50 Murdock variable condenser, 43-plate	3.25
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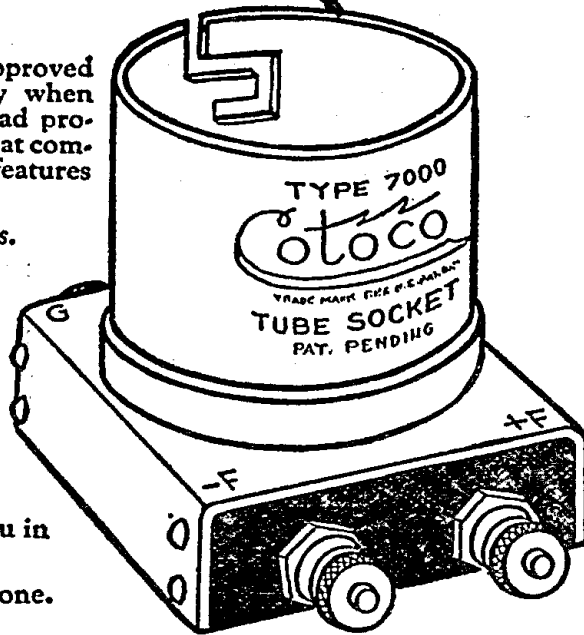
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Radio Digest

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Vol. IV Copyright, 1923 R. D. F. Co., Inc. CHICAGO, ILL., SATURDAY, MARCH 31, 1923 No. 12

UNCLE SAM OWNS AIR

WILL SETTLE WAVELENGTH SAYS HOOVER

Harold T. Powers Suggests
Elimination of All
Spark Sets

Receivers to Be Cheaper

Squier Says Give Broadcasters War
Department's Wave
Lengths

BULLETIN

By E. E. Plummer

WASHINGTON.—On Wednesday, March 21, the public hearing of the Radio Wave Length Conference was closed and the Hoover Committee went into an executive session to promulgate recommendations of changes to be made until adequate legislation can be passed.

At the hearings Wednesday, J. C. Rosenthal, of New York, representing the music publishers and authors threw a bombshell into the meeting by announcing that all broadcasting stations would be asked to make payment on copyrighted material used and if refused the matter would be taken into the courts.

WASHINGTON.—When the senate failed the American public in an emergency it automatically forced 1923 development under 1912 conditions. The only source of cheer to the Radio public then lay in the conference of representatives of the Radio industry which opened in Washington March 20.

In the opening address of the conference, Secretary of Commerce Hoover, chairman, said, as Congress had failed to bring about any step of progress that it was almost necessary and the government probably would give the broadcasters a wave-band of six hundred to sixteen hundred meters.

Ether Is Government Property

Following Hoover's talk a survey of Radio inspectors and complete report of the Radio field was read. Following this all members of the conference were heard in turn. Each signified his willingness and hearty co-operation to make the old law do. Major General Squier said broadcasters could have the war department wave bands if needed, as wars do not happen daily. Hiram B. Maxim asserted it was necessary

(Continued on page 2)



Photo by White

Photo by Bachrac

R. C. A. OFFERS AID TO INVESTIGATE TRUSTS

Preliminary Arrangements for Commission's Probe Nearing Completion

WASHINGTON, D. C.—Officials of the Federal Trade Commission in charge of the Radio investigation under the Congressional resolution state that preliminary arrangements are being worked out. It is not believed at the present time that any hearings will be held and it is probable that only two or three experts will work on the investigation. It is understood that the Radio Corporation of America has offered to co-operate with the commission in any way in which it can.

ASSISTANT INSPECTOR VISITS DISTRICT EIGHT

SPRINGFIELD, O.—Following the report of several complaints in this section, A. G. Parkhurst, assistant Radio inspector for the eighth district, traveling out of Detroit, visited this city. He inspected several Radio stations about which there had been some complaint and will make his report within a short time.

France Handles Letters as Deferred Message Traffic

WASHINGTON, D. C.—A Radio letter service has been put into effect in France, by which letters mailed in that country and received at the Radio station are transmitted as deferred traffic after the clearance of all other messages. On arrival in the destined country they will be mailed to the addressee. The messages must be written in plain language of either the country of origin or the country of destination and must contain at least 20 words. The French Government accepts no responsibility for delays in transmission occurring in the mails of the countries concerned in the Radio letter service.

CALIFORNIA CHURCH WILL TEACH RADIO

EL CAJON, CAL.—This city has a community church that has come to the conclusion that Radio is the great thing of the day. The church, therefore, has installed a complete Radio equipment in a tower room and has invited those who are interested in the use and development of Radio to join a class for instruction. A licensed Radio operator is in charge.

The first trans-Atlantic test of Radio telephony by WJZ was enhanced by "The Original Radio Girl," Miss Vaughn De Leath. (She appears in the circle to the right.) In "The Laughing Lady," recently broadcast by WJZ, Ethel Barrymore (above) plays the star role

U. S. STATION HEARD ALL OVER ENGLAND

ONE MAIL BRINGS FORTY-TWO LETTERS

British Fans Acknowledge Reception of Special Program Broadcast by WOR

NEWARK, N. J.—The remarkable ease with which British Radiophans receive the broadcasting stations in this country during periods when their own local stations are shut down was emphasized by the recent test made by station WOR, at Newark, N. J., in giving a special mid-night program. In a single mail last week the operators of the station received forty-two letters from fans scattered all over England.

Incidentally, the test shows how thoroughly the British public have gone in for Radio, because in order to hear the program they all had to stay up until 5 o'clock in the morning. Even the most "died-in-the-wool" distance bug in this country would scarcely stay up that late for a record.

Gets Humorous Letters

By a strange coincidence, the fan who reported receiving WOR on a loud speaker was N. G. Baguley, of 23 The Park, Newark, England. He wrote a lengthy letter describing his set, which consisted of three stages of Radio-frequency amplification, a detector and two stages of audio.

All of the letters emphasized the clarity of the announcers voice—J. E. K., who in private life is Miss J. E. Koewig. In this respect some of the letters were really funny. One from a fan in Woking, just outside of London, wrote: "Dear Sirs (and Madame your Mistress of Ceremonies whose clarity of speech is wonderful)." Another from Margate was addressed to "The Lady Announcer of WOR."

The letters give an insight to the transmission of the new broadcast stations in England, as all of them were unanimous in declaring that the modulation of all the American stations heard by them was far superior to the local stations.

WEIRD SIGNALS SAID TO COME FROM MARS

French War Ministry Conducts Investigation of Mysterious Noises

PARIS.—The war ministry is investigating mysterious Radio signals heard March 19, which some Radio experts suggest came from Mars.

The Eiffel tower, which is the most powerful station in the vicinity, did not utter the peculiar noises and no other French station emitted them, it is said.

Astronomers say they do not believe another planet was signaling the earth, but they professed ignorance of the origin of the weird Radio noises. Experts agree that it was not static.

U. S. OWNS ETHER

(Continued from page 1)

that the broadcasters learn co-operation as have the amateurs, and this was something lacking by a majority of the plants today. W. A. Wheeler, of the Department of Agriculture, said he thought the agriculture department of second importance only to mobile forces, after Hoover had advanced a new theory that the ether was government property.

Sets Will Be Cheaper

Major Armstrong expressed himself as a believer that Radio sets would be at a minimum in price to everyone within a year, so increasing the listeners in of the broadcasting stations. He urged that the wave lengths be regulated as speedily as possible. L. E. Whittemore, of the Bureau of Navigation, coincided with Mr. Armstrong in his views and said he believed the summer months would not experience the slump in Radio interest as was shown last year. C. Francis Jenkins, inventor of Radio pictures, asked consideration of the conference for his new device when fixing the wave lengths.

A suggestion for the elimination of all spark transmitters was presented by Harold J. Powers of the Amrad. However, this issue was greeted as impracticable by quite a number of the conferees.

Wave Length Big Issue

The prime questions of the conference are understood to be the re-distribution of wave lengths and elimination of interference, especially in the interest of broadcasters and Radio receiving set owners. A new survey of the wave bands assigned tentatively last year to different services by the committee will be made with regard to any vital changes which may have taken place during the last twelve month.

Secretary Hoover is anxious to aid every service without handicapping any, particularly the mobile services such as ships and planes. There are a number of wave bands which it is hoped can be reassigned or transferred so as to improve general conditions.

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

Table with columns: Station and City, Met., Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday. Lists various stations like CFCA, CFCN, CIGG, etc. with their respective broadcast times.

(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. Thus the use is very simple.)

CONTENTS

Radio Digest, Illustrated, Volume 4, Number 12, published Chicago, Illinois, March 31, 1923. Published weekly by Radio Digest Publishing Company, 123 West Madison Street, Chicago, Illinois. Subscription rates, yearly, Five Dollars; Foreign, Six Dollars; single copies, Ten Cents. Entered as second-class matter April 27, 1922, at the postoffice at Chicago, Illinois, under the Act of March 3, 1879.

List of contents including: "All the Live News of Radio", "An Evening at Home with the Listener In", "The Chic Radio-Hat Girl", "The Cave Man Radiophan", "The 'How' of the Simplified Super Circuit", "Announcers Series", "Directory of Broadcasting Stations", "Book Reviews", "Editorials", "A-B-C Lessons for Radio Beginners", "G. Mohaupt", "Two Stage Set Reduces Distortion", "Increased Signals with Two Tube Set", "How to Construct a Flewelling Super Set", "Lightning Protection Hook-Ups", "About Radio Parts", "Construction of the Ultra Reinartz Receiver", "Simple Form of 3-Tube Reflex", "Questions and Answers", "Radio Illustrated, a Page of Pictures".

Looking Ahead

The First Prize Flewelling Set, designed and made by Mr. Lawrence M. Blakely, student at Georgia Institute of Technology, Atlanta, Ga., will appear in the next issue of the Digest. Blakely's design showed such dexterous workmanship and complete understanding of the "Flivver" that the judges were sold on it at first sight. This appears in the April 7th issue. Don't miss it.

The Q and A Page will be devoted to questions and answers on the Reflex circuit. Every day the Digest's mail is flooded with requests for information on the recently popular hook-up. As a result we have decided to turn over the entire Q and A department to the Reflex April 7. Get a copy.

The Announcers Series will be continued in the next issue. This time we will not tell you who they are until the April 7th number appears. Who do you think they are? Maybe it's the announcer from your favorite plant. Better see.

Part II of Broadcasting Station Schedule appears in the Digest next week. Three issues of the Digest gives you the only popular directory published.

E. T. Flewelling will continue his exclusive series of articles on the "Flivver" circuit set. If you are a flivver owner or contemplate building one, don't miss a single article of Flewelling's. Reserve your copy of April 7th at your newsstand.

The Radio Conference was covered in person by E. E. Plummer, of the Digest staff. Mr. Plummer was in Washington and together with the regular correspondent at the Capital, L. M. Lamm, will give you all the latest news in the April 7th issue on the new Hoover regulations. You'll want to know.

A-B-C Lessons for Radio Beginners, Chapter Fourteen to appear next week will in no way fail to keep up the high standard Arthur G. Mohaupt has attained. Turn to page 11, this issue, and read chapter thirteen.

Newsstands Don't Always Have One Left

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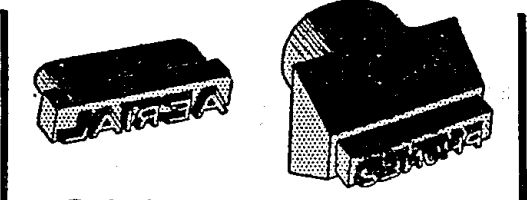
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TUBES: 1 1/2 Volt Mercury Tubes, \$4.95; U. V. 201, 5.50; Imported Peanut Tube, 2.00
CABINETS: 7" x 10", \$1.45; 7" x 18", 2.15; 7" x 24", 2.95
MISCELLANEOUS: \$5.50 Coto Coil Transformer, \$3.95; 8.00 Dayton Variometer, 5.45; 8.00 Dayton Variocoupler, 5.45; DURATEK Permanent Crystal Detector, 2.00; V.D.-11 Adapter, .65; \$1.50 Lightning Arrester, Indoor and Outdoor Type, .85; Ammeter for Testing "B" Batteries, .49; \$5.00 43-Plate Condenser, 1.95; 2-inch Bakelite Dials, .75; 4-inch Electro Dials, .75; 3-inch Bakelite Dials, .85; V.D.-12 Transformer for V.D.-11 Tube, 4.65; \$1.00 Freshman Variable Grid Leak and Condenser Combined, .75; \$ 8.00 Genuine All-Wave Coupler, 6.95; 10.00-3000 Meter Coupler, 4.95; 18.50 Homecharger DeLuxe, 13.95; 1.00 Bakelite Socket, .50; 20.00 Dictograph Loud Speaker, 13.95; Bristol Loud Speaker, 22.50

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NORWEGIAN PLANTS TO BE ALL NORSE

BROADCASTERS WILL RECEIVE LIST OF OWNERS

Telegraph Administration Will Provide Operating Personnel and Cost of Maintenance

WASHINGTON, D. C.—The Norwegian Telegraph Administration has recently made public a memorandum intended to form the basis for negotiations with foreign companies applying for broadcasting licenses in Norway, according to a report received by the Department of Commerce from the American Vice Consul at Christiania. The principal provisions of this memorandum are as follows:

The company to which a license for broadcasting is to be issued must be a stock company in which only Norwegian capital is represented and in which Norwegian Radio manufacturers, Norwegian press, and local amusement syndicates must have an interest. Material to be broadcast will be limited to entertainment, general information, and news. All Norwegian firms interested in any way in the manufacture of Radio receiving apparatus, and all press associations, whether agencies, bureaus, or newspapers, shall be invited to subscribe for stock in the company.

Administration Bears Expense

The Telegraph Administration will place the use of the Christiania Radio station at the disposal of the broadcasting company for experimental purposes and for the erection of any apparatus needed for broadcasting. This additional apparatus must be supplied by the company at its own expense. The Telegraph Administration will provide the operating personnel and bear the cost of maintenance, including the power required. To cover the cost of overhead and operating expenditures, the company will pay the Telegraph Administration a fixed monthly sum to be agreed upon.

Broadcasting from the Christiania Radio station is to be limited to a few hours in the evening. At all other times the Telegraph Administration is to have exclusive use of the station. All material to be broadcast must be censored and edited by the Telegraph Administration or by any other government agency which it may designate. The term of the concession or franchise will be limited to two years pending future legislation.

Can Not Monopolize

Licenses for receiving apparatus are to be sold or rented only to persons who have secured licenses from the Telegraph Administration. The broadcasting company is to furnish each owner or renter of such apparatus with a catalogue containing the names and addresses of all owners or renters. Furthermore, licenses for receiving apparatus will be issued only to those possessing apparatus of Norwegian manufacture, approved by the Telegraph Administration and bearing its seal and registered.

The company is not to have a monopoly in the manufacture of receiving apparatus, but may require a remuneration for broadcasting, the amount of which is to be approved by the Telegraph Administration. Foreign manufacturers shall have the right to make an agreement on reasonable conditions with the broadcasting company. The company shall pay a definite fee to the Telegraph Administration for every receiving set sold or rented.

Convict Has Receiver in Ohio State Penitentiary

COLUMBUS, O.—The most rabid Radio-phan in this section has been found. He is Erwin F. Kumler, an inmate of the Ohio penitentiary serving from three to five years for automobile stealing. He was returned recently to Cleveland to testify at the trial of his alleged partner and was given permission to return to his cell with his Radio outfit by Warden P. E. Thomas.

Kumler brought the set back from his trip and has installed it in the pen. The concert hours have been set from 6 to 7 p. m., and a loud speaker will be used. After these hours, Kumler will be allowed to continue his listening in with an individual headset.

Niagara Falls Fans Band to Combat Interferences

NIAGARA FALLS, N. Y.—To combat the evils of nightly disturbances by amateur Radio senders who disregard all rules of the air, about 100 of the Niagara Falls fans have organized a Radio Association. Efforts are being made to bring membership up to 300. The association has entered complaint regarding unwarranted disturbances to the Radio inspector for the district. There are approximately 1500 fans in Niagara Falls.

USE RADIO TO SELL NEW YORK BUILDING

NEW YORK.—A \$1,200,000 real estate deal was completed by Radio today, after E. Clifford Potter, cruising in the Mediterranean aboard the Adriatic, had "sat in" with his colleagues in discussions of the deal in this city. By the long distance Radio transaction, the seven-story building at Broadway and 39th street was sold to the Amri Realty Company.

BOSTON DX AMATEUR HEARS KDYX-HAWAII

EMORY J. PRISTAS, 62 Bromfield Road, West Somerville (Boston), Mass., picked up Honolulu on the evening of January 7, at 12:15 E. S. T. He heard snatches of a violin solo. He wrote Station KDYX, Honolulu, Hawaii, for confirmation, and after several weeks of waiting, received verification. Honolulu is over 5,100 miles from Boston. This is believed to be a DX record.

THE CHIC RADIO-HAT GIRL



"Something always new," is the spirit of the eternal feminine. Perhaps it is just to keep a step ahead of the opposite sex. But you must admit the Radio Hat is NEW. The petite Miss above exhibited the novel head gear at a recent millinery show and came away with first prize. The best part about it is that it actually works and one can receive messages over it for some distance. This fact was proved by bringing in stations 1,000 miles away

PLAN TO AIRPHONE NEWS TO VETERANS

Commander Personally to Address 50,000 Legionnaires Over Ether

BOSTON, MASS.—Plans are being perfected by State Commander William H. Doyle of the American Legion to have broadcasted all legislation and Legion business of interest to Massachusetts World War veterans, as a means of personally reaching thousands of Legionnaires in their homes and Legion posts throughout the state. The innovation has been approved by National headquarters, and steps have been taken by the latter to have broadcasted weekly Legion news of importance throughout the country.

According to plans now being completed, a special entertainment under the direction of State Legion officials from some central broadcasting station, and arrangements are being made for the placing of a receiving set in every post in the state. Commander Doyle will address the 50,000 or more Legionnaires in this manner, and a synopsis of legislation affecting Legion members will also be given. Weekly concerts for the benefit of disabled veterans in Bay State hospitals is part of the plan also.

FIRE STOPS PLANT IN MIDST OF BROADCAST

WEAN Will Be Off Air Pending Repairs

PROVIDENCE, R. I.—A fire that recently caused a damage of \$1,500,000 in the Shepard Stores here, run by the same management as the Shepard Stores of Boston, burned out the Shepard broadcasting station, WEAN, in the store.

About twenty persons were gathered in the Radio room, listening to a concert that was in progress from the broadcasting department, when the fire started. Immediately the announcer gave out word that there was a fire in the store and that the program would have to be stopped. Before firemen got the blaze under control, it having started a second time when they were about ready to leave, three floors were burned out, with the enormously valuable stock of merchandise, with the damage estimated at over a million.

A hundred lines of hose from surrounding cities and towns poured tons of water into the fourth, fifth and sixth floors for hours before any impression was made. At times it seemed as though half the business section around was doomed. Until repairs are made to the building, the broadcasting station will be out of commission.

"DAUGHTERS OF THE SEA" PHONE CHEER

SEATTLE ORGANIZATION TO LOOK AFTER SAILORS

A Powerful Transmitting Plant Will Give Messages of Courage to Those in Danger

SEATTLE, WASH.—For the purpose of making more comfortable and pleasant the hours spent in their home ports by the masters, mates and pilots of the Pacific and developing Radio broadcasting to their ships while at sea, wives, daughters and sweethearts of mariners living in Seattle have formed an organization called the "Daughters of the Sea."

The Daughters of the Sea plan to bring home closer to the ship, and the Radio will be their chief means toward that end. The club has undertaken the fitting up of quarters on the top floor of one of the city's tall buildings, and is furnishing them with a library, comfortable chairs, smoking accessories and marine glasses, so that seafarers may watch from the windows the ships making and leaving port.

A powerful Radio sending and receiving apparatus is to be installed on the roof of the building and entertainments, concerts, etc., in the clubrooms will be broadcast to the ships at sea. The personnel of vessels in any storm area will be cheered by the voices of loved ones at home. A practical service also will be maintained; the location of all ships from the home port will be recorded from day to day. The plans also include the entertainment of visiting captains from other ports of the world. There will be a committee supplying all arriving ships with flowers, and seamen strangers will be provided with comfort and entertainment.

AMATEUR CONVENTION WILL BE HELD APRIL 6

Ohio A. R. R. L. to Hold Its Second Get-to-gether

COLUMBUS, O.—Arrangements are almost complete for the second Ohio A. R. R. L. Amateur Radio convention to be held at Hotel Columbus in this city on April 6, 7 and 8. The committee in charge of the various phases of the meeting have promised that this will be by far the most elaborate and most interesting gathering of Radiophans ever staged in Ohio.

Numerous attractions have been provided, including the following: Trip to the signal corps station WVZ at Fort Hayes, convention association meeting, A. R. R. L. traffic meeting, code and other contests with many valuable apparatus prizes, meeting a Hartford representative of the A. R. R. L., five-minute talks by district superintendents of Ohio, practical information of C. W. transmitters, information on all types of receiving equipment, discussion of fundamental electrical facts that every amateur should know, initiation services into the Royal Order of Wouf Hong, with every good A. R. R. L. man eligible; visits to Columbus stations, displays of apparatus by dealers and manufacturers, discussion of filters, rectifiers and what not and a great banquet on the closing evening of the convention.

Bob Bohannon, technical adviser of the club and operator of station WBAV, will install a 10-watt broadcasting set in the hotel for demonstration purposes. It will operate with a loop antenna. The first two days of the convention will be for delegates only, and only those having badges will be admitted to the sessions. The third day, Sunday, will be open to the public. Exhibits of dealers and manufacturers will be open at all times to public inspection.

SOS CALL OF SHIP SAVES MAN'S LIFE

Stricken Man Carried from Ships to Hospital in Raging Sea

CAPE MAY, N. J.—John H. Steel today owes his life to the miracle of the Radio and the courage of two hardy skippers who risked their lives, with those of their crews, to save him.

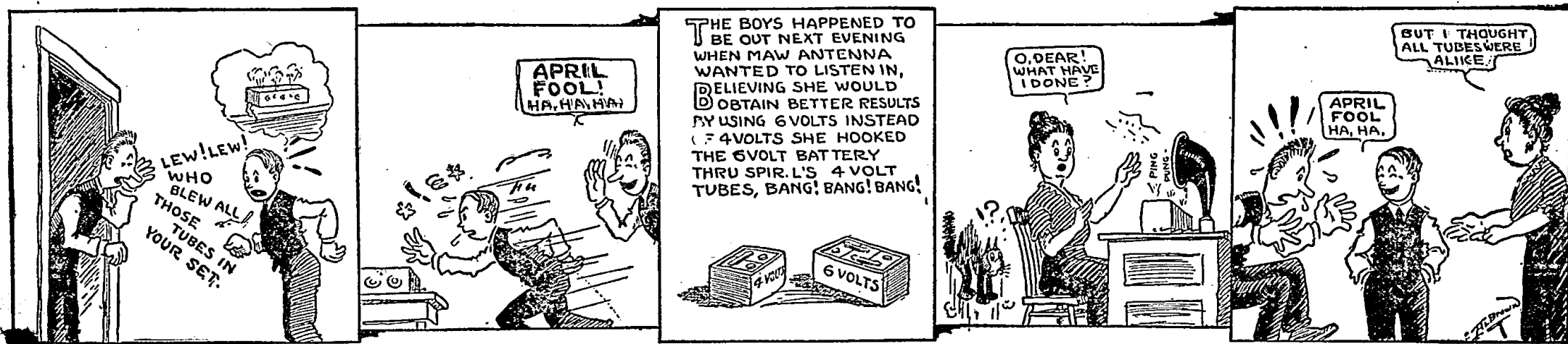
Steel, a member of the crew of the Fenwick island lightship, anchored thirty miles southeast of this city, was attacked with appendicitis Saturday night. The skipper broadcast a Radio appeal, which was picked up here. He rushed it to Capt. R. C. Weightman of the coast guard cutter Kickapoo.

Despite a raging sea and vicious wind, Capt. Weightman put to sea, and by 8 o'clock was alongside the Fenwick. The latter's crew put a boat over with Steel in it, and after a hard fight transferred the sick man to the Kickapoo, whence he was hurried to the government hospital at Lewes.

THE ANTENNA BROTHERS

Spir L. and Lew P.

March 32 and 33



KYW Jazz Revues Keep Fans Awake

Many Small Town Clubs Hold Dances to Isham Jones, Cook and Melody Boys

By ROBERT J. STANTON.

Insomnia has become prevalent with the Chicago Radio audience since the inauguration of the midnight revues which are broadcast every Friday night from Westinghouse Station KYW, a theater without footlights. The old fashioned nightcaps have become a style of the past and have been replaced by the more up-to-date headphones.

Can you imagine reclining at ease in your downy cot while being entertained with a program of the latest popular music with nothing more to do when the show has ended that to shut off your set, remove your headphones and open the gates to the "Land of Nod". However, there is a fly in the ointment, as it is impossible to lie in bed when Isham Jones, Cook's Dreamland, and the Alabama Melody Boys play such "hot" dance selections that even the microphone in the studio starts to "shake and shiver."

Clubs Dance to KYW Jazz

Many clubs in small towns throughout the country have held Radio dances, for which the music has been supplied by selections played during these midnight revues from KYW. Many of the programs have been furnished by musical comedies playing in Chicago theaters, such as Shuf-Along, The Greenwich Village Follies, Spice of 1922, Lillies of the Field, and the French Doll. The next musical comedy to furnish a midnight program will be Raymond Hitchcock's new show which is scheduled to arrive in Chicago this month. Mr. Hitchcock claims the Radio is now his second nature and that he is preparing a special monologue to broadcast from KYW.

SEAMAN FAN SAVES SHIP BY SOS CALL

Amateur Substitutes for Operator and Succeeds in Bringing Aid

SEATTLE, WASH.—With only a slight knowledge of the international Morse code, Seaman Addison Galligan recently saved the entire crew of the wooden steamship Nika, thirty-three men in all, when he sent an "SOS" which brought the Coast Guard cutter Snohomish to the side of his vessel near Umatilla Reef. The ship was rudderless and blazing with a fire that had started in the coal bunkers.

For a long while Galligan had been experimenting with a Radio receiving set at his home in Everett, and like hundreds of Radiophans, he realized the value of the code. Some day, he thought, it might come in handy at sea.

Galligan was a seaman, and pressed into service in the absence of a regular operator, he slowly tapped out the call for help and the letters "F-I-R-E."

Fifteen minutes after the Snohomish caught the first call she was on her way to Umatilla Reef.

The United States now has six transmitting stations and one central receiving station on the Atlantic Coast which serve to connect this country with Europe.

THIEVES USE ETHER FOR COMMUNICATION

BOSTON, MASS.—A high government official expresses the belief that the principals arrested recently and indicted for alleged conspiracy in the theft of \$100,000 worth of motor cars, and violation of the Dyer act, used the Radio in communicating with one another or with so-called agents. It is said that \$100,000 is an estimate of the value of the cars stolen.

J. P. Kibler, Luray Cavern Guide, Is Original and Only "Cave Man" Fan

Guide Learns Code on Improvised Set Built of Nondescript Parts and Crystal Dug from Virginia Mine—Uses Rural Telephone Line for Aerial

By Armstrong Perry

WASHINGTON.—If I had found a mole soaring over the house with the crows and turkey buzzards I would not have been much more surprised than I was to find that J. P. Kibler, Luray Caverns guide, was a Radio enthusiast.

With other officials of the Cave Men's Club of America, I accepted the cordial invitation of T. C. Northcott, owner of the property, to explore Luray and Ruffner's caves. Both are located in the same hill and in spite of the failure of other explorers we hoped to find some connection between the two. Mr. Kibler stayed with us through two days of hard climbing and squeezing. If I wormed my way into any

He took me in. One of the first things I saw was a bookcase full of technical books. Here and there about the room were other watches, repaired or in process, tools and Radio apparatus. A completed



J. P. Kibler emerging from Ruffner's Cave, Luray, Va., where underground Radio experiments are to be made. This cave is not open to the public

passage that he did not enter it was purely a matter of avoiddupois.

Finds Home-Made Genius

After we had penetrated every nook and corner of the two great caverns I walked home with him. He lives on his own farm about a mile from the Luray entrance pavillion. Two men in a carriage were waiting for Mr. Kibler. Going to a shop near the house he brought out some repaired parts of farm implements for one, then he went into the house and brought out a watch he had repaired for the other. I began to wonder what kind of a genius I had met up with.

PHANTOM-CIRCUIT

Build Your Own. This marvel of mystery, using no loop, no aerial and no ground, brings in music instead of interference. We have heard stations 950 miles distant on one tube. By using WD-11 tube set can be entirely self contained. Very easy to build from our instructions, use your own spare parts, nothing complicated like radio frequency or super regenerative. Only one tuning control. Complete instructions, with hookup and photo of circuit mailed to you for 60 cents. Stamps accepted. VESCO RADIO SHOP, Box D-704, Vacaville, Calif.

able condenser, an electron tube from a mail order house, and a home-made grid leak and condenser were other elements in the receiver. The latter was made from two pieces of hard rubber with mica and copper sheets between them, and a lead pencil mark. Using 2,000-ohm phones he had heard stations as far away as Seattle and Des Moines on the one tube. He lighted his filament with an auto battery and for the "B" battery used seventy-five cents' worth of dry cells from a mail order house.

Uses Telephone Aerial

He is patiently learning code by means of a home-made crystal detector. The base is hard rubber. The galena he dug himself from a Virginia mine. The cat whisker is held by a brass spring. In his code work he uses as an aerial the rural telephone line, on which he has worked enough to learn all its various uses.



J. P. Kibler, Luray Cavern guide, and Radio amateur—with 'his' cheap but efficient home-made receiver

Radio receiver consisted of an oatmeal box wound with No. 20 single cotton covered wire. The first six turns were tapped singly. There were sixty more turns, tapped every ten turns. A 23-plate vari-

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Only 50¢



J. N. Cartier, manager and announcer (before megaphone), a direct lineal descendant of the French explorer and discoverer of Canada, whose name he bears. Cartier's voice at CKAC has been heard in Juncau, Alaska, in Copenhagen, and by amateurs on the French coast, including ships in the Bay of Biscay. His voice is strikingly discernible among others, owing to the fact that he speaks French and English without the slightest trace of foreign accent

Stanley W. Barnett (at the left) is in the air every evening and heard all over the country as announcer for WOC, Davenport, Iowa. In addition to having achieved fame as an announcer, Mr. Barnett is licensed as a first class Radio operator. His popularity among fans is best expressed in the words of one Radiophan who wrote, "I think the voice of the announcer at WOC is best adapted to his work. He has many rivals but none better"

Emory L. O'Connell, announcer for WGAT (at the right), the American Legion, department of Nebraska broadcasting station at Lincoln. Emory is a disabled World War veteran studying law at the University of Nebraska. He says that the announcer's job is excellent training for his chosen profession, as a lawyer's words must go "a long way" to convince the average jury. He also says that it trains a man to speak while on his feet

ANNOUNCER MAKES GRAMMATIC BREAK

REQUEST FOR TELEGRAMS HEARD BY FANS

CFCN Draws 373 Fan Letters from United States, Canada and Alaska

By Jeffrey I. Dingman

CALGARY, ALTA.—Once again CFCN the broadcasting station of the W. W. Grant Radio, Ltd., at Calgary has startled Radiophans; in fact, rather shocked them, and another Radiophan has given CFCN the credit for accomplishing something entirely new in broadcasting.

Imagine the startled look that would appear on the countenance of a listener who heard the words, "Where the h—l are those telegrams?" floating in from a station hundreds of miles distant. That is what happened to Edward M. Sehorn, proprietor of The Daily Journal, Willows, California, recently.

Sehorn Chides Grant

In a letter to CFCN, in which he gently chided Mr. Grant, Mr. Sehorn said:

"Last night while listening to your concert—which, by the way, came in as well as the best on the Coast—I distinctly heard your announcer say: 'Where the h—l are those telegrams?' or words to that effect. He probably said it to himself, not realizing that his softly-spoken 'h—l' would be heard all over the country. I don't object to such mild swear-words, however, and this is probably the first time on record such a word has been broadcast."

Mr. Grant laughingly pleaded guilty to the charge, saying he was about to broadcast telegrams from distant points, but the communications had been mislaid.

Draws 372 Letters

"I know I had the microphone extended at arm's length," said Mr. Grant. "I would have spared my audience had I thought my words would have been heard by the outside world. Still, it is certainly an indication of the enormous output power CFCN possesses."

In the same morning's mail with this letter there were 372 other communications from Radiophans who had heard the request for the missing telegrams from the Calgary station. They were from thirty states in the Union, six from provinces of Canada, and one from Alaska.

WPAL Broadcasts Chorus

COLUMBUS, O.—The Westgate Masonic chorus of forty male voices rendered a complete program broadcast from WPAL, the Superior Radio and Equipment Company here. The concert by the chorus was its first experience in the Radio studio.

Station WPAL has inaugurated readings on operas. The first of this series was the opera "Tannhauser" with Burrell Cupp, member of the faculty of the Morey School of Music, explaining the three sets in the opera.

Station KPO Is Monument in Memory of F. J. McCarthy, Cash-Boy-Inventor

Charles V. Logwood Tells of Many Hardships Undergone by Himself and Deceased Companion Who Gave Valuable Aid to Airphone in Its Beginning

By Albert H. Munday

It is not generally known to Radiophans throughout the world, and in San Francisco especially, that the high power station KPO, one of the most powerful in the world, on the top of Hale Brothers' Store at Fifth and Market streets, is a monument to the memory of a boy who, had he lived, would have been one of the wizards of Radio today. That boy was Francis Joseph McCarthy, who in 1906, when only 17 years of age, gave demonstrations on a Radiophone on which he had been working for more than three years. McCarthy was probably the first boy Radiophan in the world and one who was destined to lead the world in matters of Radio. Unfortunately he was killed in an accident in Oakland in 1906, shortly after his first success, but his Radiophone patents have brought his family the sum of \$100,000.

Starved to Get Set

Although only a mere lad he had his assistant and that boy is still one of the leaders in the Radio world today. It is Charles V. Logwood, who claims that had McCarthy lived he would have revolutionized the world with his inventions and his service to the Radiophans. Mr. Logwood worked day and night with McCarthy and together they actually starved for days at a time in order that the money they saved could be spent in making a new set. It must be remembered that in those days it was impossible to buy the parts to make a set and everything piece by piece had to be designed and made by the experimenters.

Will Help the Amateur

The story of McCarthy and his assistant Logwood as boys who toiled for months and years to perfect their youthful inventions, reads like a romance, and is a story that will eventually go down as a part of history of the Radio world. Giving all credit to McCarthy, who he considered a genius, Mr. Logwood told his story especially to the representative of the Digest in order to show that the future of the science really rested with the Radiophans who are struggling day in and day out with their new sets and their experiments. It is chiefly due to his many trials and difficulties that Mr. Logwood understands the trouble of the youthful Radiophans of today whom he is very eager to help them to help themselves. As soon as the Armstrong vs. Logwood case, now pending in the United States Patent Office, is settled, Mr. Logwood intends to work on several new circuits that will be especially suitable for youthful Radiophans. He pointed out that it was only in helping them that the future of the science can progress and

emphasized that in their ranks must be found the future experts who are to carry on with the development of the new science.

Start First Radiophone Company

"McCarthy first started working at the age of twelve for the Pacific Telephone and Telegraph Company in 1903," related Mr. Logwood. "He was then a freckled-faced youngster helping to install house telephones. I was also with the company and we often worked together. We were both interested in Radio and spent considerable time and money in making small sets. Later McCarthy went to work as a cash boy in Hale Brothers store. One day Prentiss Cobb Hale asked young McCarthy what his hobby was and he promptly told Mr. Hale that the only thing he was ever interested in was Radio telephony. Mr. Hale promised to help him and immediately bought several expensive books and encouraged McCarthy as much as possible. A short time later the first Radiophone company to be started in the world was floated by young McCarthy and I was appointed his assistant. We built a station on the beach at San Francisco and carried out many experiments which were successful. In 1905 we gave our first demonstration and spoke a distance of one mile from the Cliff House to Mile Rest. I was sent to New York to purchase special equipment and had just returned to San Francisco when the earthquake came and our apparatus was wrecked. McCarthy was killed in an accident a few weeks later."

Big Station Nearly Ready to Link Argentina to U. S.

BUENOS AIRES.—The big, high-power Radio station at Monte Grande, near Buenos Aires, the first South American station in the international commercial Radio system, is almost completed, and it is announced that service will begin in June or July next.

It will place Argentine in direct Radio communication with the United States for the first time, as well as with Europe. Engineers say there are two strange, static "dead areas," one near the equator off Brazil and one in the South Atlantic which only a station equipped like that at Monte Grande can overcome.

Fifty-one Radiophone stations are broadcasting daily the national crop and market reports of the Department of Agriculture. More than 15,000 individuals, firms and railroads co-operate in gathering the data broadcast throughout the country.

All-Zanesville Program Broadcast by Rotarians

COLUMBUS, O.—An all-Zanesville Radio program was broadcast from Station WBAV, Erner & Hopkins Company, here recently. The program was the second of a series of concerts being presented by talent from various Ohio cities from the Columbus station. The Zanesville Rotarians had charge of the arrangement.

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Inc. Tues, Thurs, Sat, 7:30-9 pm, music. Mountain.

Tues, Fri, Sun, 8:30-9:30 pm, news, concert, bedtime story. Pacific.

Continued—

THE BROADCASTING station directory is the most complete and authentic list of Radiophone plants. Letters are being sent various stations every day for information. No other paper or source provides the data given here.

The station schedules, given here, are listed alphabetically by call letters. Following the call is given the city and state, the wave length (PROVIDING a wave length other than 360 meters is used), the miles range of the station, the owner of the station, the schedule of operating hours, and the kind of time used.

The state, city and call list appears with the last third of the station schedules and is merely an index. One wishing to find the calls of the stations in his vicinity, will find this index useful. Three successive issues of Radio Digest will give one the most complete and accurate list of broadcasting stations obtainable.

KQI, Berkeley, Calif. Univ. of Calif. Daily ex Sun, 4-5 pm, 8:15-9, concert, news. Sun, 10-11 am, 4-5 pm, 8:15-9, church service. Pacific.

(NOTE—The second part of the station schedule list will appear next week.)

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Need for Radio on Aircraft

Ruling in Denmark Forces Radio Equipment on Airplanes
THE air traffic commissioner of Denmark recently rules that all airplanes must be equipped with Radiophones. This is held as an important advance in both aviation and communication in Denmark. It is a progressive step not yet taken in the United States. Although ships of the sea must be so equipped, aircraft do as they please. After many accidents in aerial traffic over sea routes with some loss of life, two aerial navigation lines have voluntarily begun to equip their aircraft with Radio as a safety precaution.

Rear Admiral Moffett, chief of the naval bureau of aeronautics pointed out the necessity of Radio equipment, or at least pigeons on all aircraft, several months ago. All army and naval planes are Radio equipped at least when on long distance trips, and in addition carrier pigeons. The need of legislation for aircraft and aerial navigation is pointed out by many American experts, but a bill now before Congress was caught in the legislative jam and did not pass this session.

Vital Element in Life

The Audience Listening In on Radio Reaches Millions
IN THE last year scientists and engineers outdid themselves. Ten years of ordinary progress was crowded into the short space of twelve months. Turn whichever way you will and Radio greets you. Open your paper tonight, and somewhere within its columns you will find a discussion of Radio and the Radiophone.

The Radiophone is a fact, not a theory. It has already become a vital element in our domestic, industrial, social and political life. Radio provides the biggest show on earth at the present time. The Radio audience numbers millions and consists of people representing every country in the world.

The cast of the Radio show is unlimited; all the world is the stage. World's Series baseball games, play by play, direct from the diamond; prizefights direct from the ringside, blow by blow, mingled with the sound of the gong and outcries of the crowd; football games, direct from the gridiron, yard by yard, backed by college songs and cheers; track meets, lap by lap; and now the latest feature added to the program is opera, aside from the regular stock market quotations, weather reports, timely topics, etc.

About Amateur Operators

Canada Checking Up on Licensed Amateur Stations
CANADA has 1,800 licensed amateur Radio transmitting stations and fifty licensed broadcasting and commercial stations. Every owner of a Radio set in Canada is required to have a license. The rate for a receiving station is \$1 a year and licenses are obtained through the postoffices.

In order to check the wavelengths of transmitting stations Radio inspectors are being appointed in every city with a population in excess of 15,000. Twenty-five of these Radio policemen, most of them ex-service men, already have been appointed, to see that amateur transmitters comply with the new regulations which forbid amateur dots and dashes of voices in the air from 7:30 to 10 p. m., the hours reserved for broadcasting stations.

Amateur transmitters in the United States number 17,000 and there are no hours stipulated when these stations cannot send messages. In many instances the amateur gets above the allotted wavelength and causes interference from those trying to hear the concerts.

Many persons believe that the amateur should be heavily restricted by legislation, but it must be remembered that because of the liberal rights granted by the government to the amateur there was a host of self-trained amateurs in this country, second to none in the world, ready to enter the army and navy as Radio operators when the war broke. Great Britain had placed restrictions on her Radio amateurs and the result was a great shortage of operators in war time. A few Marconi operators had to handle the service until others could be trained. Regulations in the United States have been such that encouragement has been given to the amateur to experiment. The result has been that many improvements have come from amateurs experimenting in the attics of their homes.

Condensed

By DIELECTRIC

The American museum expedition was the first in the history of big scientific explorations to utilize a Radio receiving outfit. With Radio the vast areas are within the touch of civilization, and the hitherto sensation of separation with its tendency to morbidness, is counterbalanced by the reception of broadcast programs.

Not long ago I ventured the assertion that practically the entire world would be able to listen in to a concert from a single station in the near future. Some places were missing from the list of those successful in tuning in WOR, the Station of L. Bamberger and Company, Newark, N. J., when they broadcast a special program recently, but from all accounts a large part of the Radio world heard most of the numbers sung by Miss Bennett. The reception of her voice was singularly true throughout its entire range, which is something to be envied by many of the Radio singers. Not the least comforting feature as regards Edith Bennett is the fact that she is an American girl and received her entire musical training in the United States. Requests for encore numbers will be coming in from European fans if they can be assured of such rendition.

Many instances of isolated communities and of individuals who, because of the peculiarity of their occupation, cannot enjoy the usual social privileges common to the rest of us, have found in Radio receiving sets the secret to pleasures formerly denied them are on record. However, I believe the first time that Radio has altered the dread lot of a leper (banishment from society) is in the case of Mr. Willett, a former state senator of Montana. For a man who has served in a public office to be absolutely cut off from his fellowmen must be a very depressing experience. It is not difficult to imagine the feelings of this man—and his wife, who remains with him—when he can turn to his set and hear from several states various announcements and classes of music. Some financially able Radiophan could greatly enhance the possibility of reducing melancholia among these unfortunate outcasts by donating sets to leper colonies.

The Radio Trust is ever with us, in one form or another, according to those who should be in a position to learn something of the facts. Whether such a thing actually exists or is in process of forming it is advisable for every fan to acquaint himself with as much information on the subject as he can acquire. Radio should never become the exclusive property of a single group, and that includes the manufacture and sale of sets and accessories as well as broadcasting. We are already familiar enough with the results of a monopoly of a very necessary adjunct to an efficient receiving set and such familiarity does not encourage us to see any further monopolistic encroachments. I say we should secure all the information available in order that our correspondence with national representatives may be intelligent. Every fan should make it his business to impress his desires on Congress.

The city of Chicago has not been slow to make innovations either in the material broadcast or in the manner of its transmission. Now we are to have a station in this city which may compare favorably for ornate construction with any anywhere. This "crystal studio" is fortunate in its setting, for one thing, being installed in the Edgewater Beach Hotel and for another, the peculiar construction of the studio itself. It will be possible for those interested in the procedure to witness what takes place in a Radio studio, due to the walls being made of plate glass. This station is not on the air as yet, but when you hear an announcer give the call WJAZ you may know the crystal studio is broadcasting.

We fans (some of us at least) have had access to first-hand information concerning several foreign countries, their mode of living, commercial advantages, presence or lack of progressive institutions, attitude of mind regarding this great country of ours and it has been presented through the popular disseminator—the microphone. On different occasions there have been broadcast "Italian, Russian, Japanese, Mexican Night" programs, consuming most of the evening's allotment of time, presenting some of the foremost artists and public men, with music and addresses calculated to enlarge our knowledge of the world about us. It is quite possible, of course, that some statements to which we listened were polished up for the occasion, nevertheless, such informative features convey facts worthy of attention and tend to acquaint races with each other's motives. It is rather important that we see the other fellow's point of view, not least of all when we turn our sets into transmitters.

Passengers by rail need be without entertainment only so long as the railroad companies fail to provide adequate means of listening to Radio broadcasting. On long journeys one tires of the usual means of diversion ordinarily supplied and wishes for a Radio set placed in one of the cars for the passengers' use. Some trains on a few of the railroads have equipped the dining car with receiving sets and where this has been done it has been greatly appreciated. If you happen to be traveling on the New York limited from West Point, Ga., not only will you be provided with the means of hearing Radio concerts, but the railroads operating in that section will give you a full program during the evening. They have their own broadcasting station maintained for the express purpose of entertaining you. It does more than entertain the passengers, however, for listeners in many States have reported hearing them. I have many times listened to the announcer calling the train number and imagined the group gathered in the diner before the receiver, as the train sped north. Give us more trains equipped for Radio reception.



RADIO INDI-GEST

(This column is open to all aspiring Radioknuts who tender suitable contributions. Try to "make" the column if you can. All unsuitable manuscripts are turned over to the Office Squirrel who does not guarantee their return or anything else for that matter.—Indi.)

Our Steno Sometimes Says Things at Her's

Dear Indi.—I see where a French engineer claims to have invented a new machine for setting type, which has a special attachment permitting Radio copy to be received direct on the machine. Would like to know if any one has built a typewriter that will write out a letter when you talk at it.—Polly, "Sheba Steno."

Yeh, Marconi and He Were Cousins

You've run 'cross the chap who is sixty years or more, Who lives of the past—in the good old days of yore;



He's the type of bug who just sits around to buzz 'Bout the great old Radio "ham" he used to was. —SQUEEGEE.

Marcelled Tonsils Are Also Cute

When "phonographed voices" are sent by radio, the ladies will get the habit of manieuring their voices before having the photos taken.—Brownie.

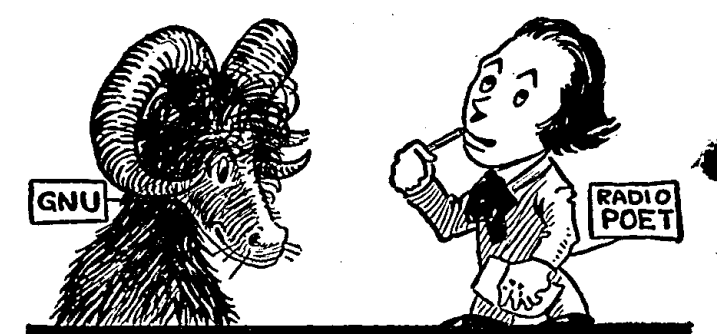
But Thinka Tha Shieks, Rita

Dear Indigest—The static is said to be heavy in the Desert of Sahara. Radiophans should consider this before planning their summer vacations.—Rita M.

Now You've Gone and Spoiled Our Whole Day

Oh, Indi!—Some time ago a Radio amateur claimed to have reduced milk to an ethereal state and sent it by Radio to a distant point and there restored it to its liquid form. What great possibilities suggest themselves for the transportation of—no, the thought is too terrible.—"Oley."

And Insects Have Antennae



Radio news is everywhere, It's on the press, it's in the air; It's in the homes and in the zoos, The latter have their Radio gnus.

—BALD ONE.

A. B. C. Lessons for Radio Beginners

Chapter XIII—Radio Frequency Amplification

By Arthur G. Mohaupt

RADIO frequency amplification is an effective means of increasing the range of a vacuum tube receiving set; that is, it enables a detector circuit to receive signals from distant stations which in themselves would be too weak to operate the detector alone. Radio frequency amplification also makes possible the reception of Radio messages and musical entertainments by means of a loop or other form of indoor antenna.

Adding Stages of Frequency
Although one or two steps of audio-frequency can easily be added to a detector receiving set, the addition of these parts merely strengthens or amplifies the current oscillations after they come from the detector. They do in no manner, however, increase the range of the original receiving. Remarkable changes can be brought about in a receiving set employing two stages of audio frequency amplification, if one step of Radio frequency amplification is substituted for the second stage of audio frequency amplification. In such practice no more tubes are necessary than were initially employed, yet stations can be heard which formerly were entirely out of reach—and all this is accomplished with perfect reproduction and sufficient tone volume to effectively operate a loud speaker.

Operation Must Be First Learned
But simple as it may seem and appear at first thought, the application of Radio frequency amplification should not be attempted until thorough knowledge and skill of operation has been obtained in the use of the plain or regenerative receiver. The three-circuit regenerative receiver is capable of producing remarkable results if the operator knows how to make the proper plate voltage and filament current adjustments in addition to skillfully manipulating the coupler secondary so as to secure the necessary degree of coupling required for tuning in the desired stations and tuning out undesired and interfering stations. Only after the operator is thoroughly satisfied that he understands his set completely and that he is obtaining the best possible results that his outfit is capable of producing, should he direct his thoughts and attention to Radio frequency amplification. The latter at once introduces additional complications and requires special tuning adjustments which were not needed with the plain detector circuit. However, after its application and operation have once been mastered, Radio frequency amplification is capable of producing surprising results that will

amplification can be introduced to such an extent as is necessary to render them capable of operating the detector to best advantage, and after this audio-frequency amplification can be brought into play to further strengthen the rectified current

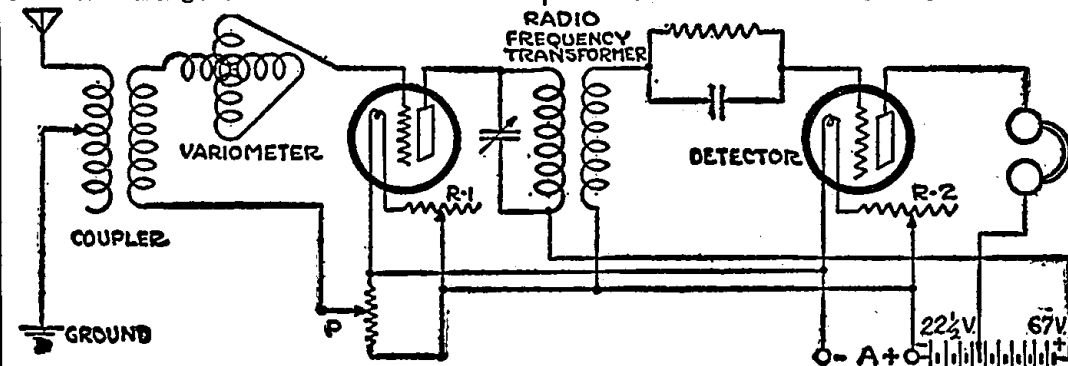


Figure 46

oscillations and render them capable of operating a loud speaker. Radio frequency amplification is thus not limited to one or two stages as was the case with audio frequency amplification, but any number of steps of Radio frequency amplification can effectively be employed until the received signals are of the necessary intensity to operate the detector.

With an indoor loop aerial with which the induced signals are inherently very weak, Radio frequency amplification if properly designed and applied can be used to strengthen these faint oscillations to such an extent that they can affect the detector with the same efficiency as the signals received from a good outdoor antenna. With an outdoor antenna it is seldom necessary to employ more than one or two stages of Radio frequency in order to give the receiving station the desired range, but with a loop aerial as many as three stages are necessary in order to produce sufficient effects upon the detector.

Advantages of Radio Frequency Amplification

With the use of Radio frequency amplification numerous advantages are gained which are not possible with audio frequency amplification. With the latter all noises, irrespective of their source or nature, are amplified; and if such disturbances are present to any extent, they will soon so seriously interfere that the sounds in the phones will be anything but pleasant. Radio frequency, on the other

hand, does not involve the presence of these disturbing tube and battery noises to such an annoying extent; for most of

these noises are the results of oscillations of comparatively low frequency, and these cannot be effectively transmitted through an amplifying circuit designed especially for Radio frequency oscillations.

Also, with Radio frequency a number

of stages can be effectively used without distorting or seriously impairing the quality of the signals amplified. However, a Radio frequency amplifier cannot be used effectively to amplify "loud" signals, as the amplification would be only comparatively slight and hence would not warrant the application of this auxiliary apparatus.

Another advantageous feature resulting from the use of one or more steps of Radio frequency amplification, is that the selectivity of the receiver is greatly increased, for experience has shown that a difference of only twenty-five meters in the wavelengths transmitted by two different sending stations is sufficient to make it possible to tune in one station and exclude the others. It is true, of course, that such effects can be secured only through skillful and efficient tuning. It is for this reason that it was suggested above that Radio frequency amplification should be dealt with only after the simple receiving circuit has been thoroughly mastered.

Types of Radio Frequency Amplifiers

Radio frequency amplifiers are classified according to the methods of coupling that is used between the successive stages of the amplifier circuit and between the last stage and the detector circuit. The simplest of all is the resistance-coupled type,

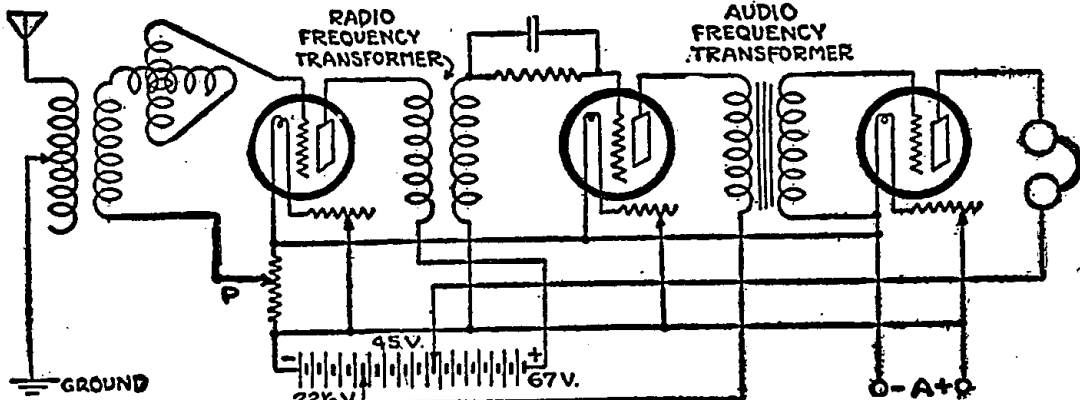


Figure 47

at once induce an incentive to dig deeper into its realm to see if there really is any limit as to what can be accomplished with its assistance.

Principles Underlying Radio Amplification

In order that a three-electrode detector tube can function properly, it is necessary that the potential variations impressed on the grid be of sufficient intensity to affect or influence the migration of the negatively charged electrons from the filament to the plate.

If the incoming oscillations are too weak to produce any appreciable effect upon the flow of current in the plate circuit, no sounds can be produced within the telephone receivers. This would be the case with the signals coming from a far distant station, or if the antenna were indoors or otherwise "shielded" by some intervening object. However, if these faint oscillations could in some way be intensified without distorting them or altering their inherent nature, they would be capable of more effectively acting upon the detector tube and thus rendering it capable of functioning more efficiently.

Operation of Radio Frequency

It is this very effect that is accomplished when Radio frequency amplification is employed. Instead of impressing the received signals directly upon the input circuit of the detector tube, they are first sent through one or more suitably coupled amplifying tubes before they are sent to the detector. As a result the signals are greatly amplified and can hence produce the same effect upon the detector circuit as the signals from a nearby station.

No matter how weak the incoming signals may be to start with, Radio frequency

hand, does not involve the presence of these disturbing tube and battery noises to such an annoying extent; for most of

BUYERS OF RADIO MERCHANDISE CAN SEE THE EXHIBITS OF NEARLY A HUNDRED LEADING MANUFACTURERS OF RADIO MERCHANDISE AT THE

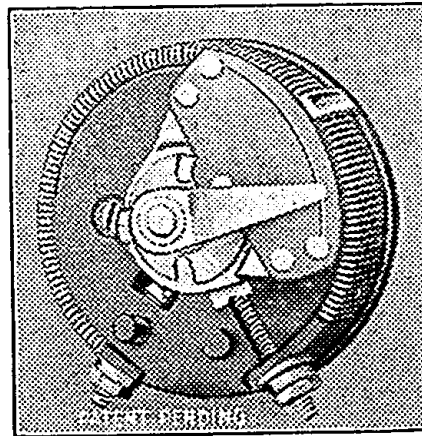
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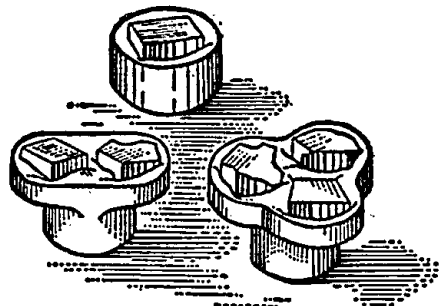
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in which a high resistance of suitable value is connected between the output circuit of one tube and the input circuit of the next tube. This method, however, is satisfactory and efficient only for long wave Radio communication, such as for transoceanic service, and hence is not of interest at this point.

In the inductively coupled type some form of inductance is used between the successive tubes. In some circuits a variometer can be effectively used for this purpose. Then there is also the capacitance method of coupling, but this has thus far not proven satisfactory.

Transformer Coupled Type

Probably the most convenient and most satisfactory type of Radio frequency amplifier is the transformer coupled type. In these the output and input circuits of successive tubes are coupled by means of specially designed Radio frequency trans-

(Continued on page 12)

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Two-Stage Set Reduces Distortion

Use Different Ratios in A.F. Transformers

The illustration shows a hook-up for two stages of audio frequency amplification which has proven very satisfactory in that it cuts down greatly on the dis-

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ortion often obtained in using this type of amplification. It will be noted that two different audio transformers are used. The first has a 10 to 1 and the second a 3 to 1 ratio. Another peculiarity is in the transformer connections. The diagram shows these clearly. — Fritz Franke, Chicago, Ill.

A. B. C. LESSONS

(Continued from page 11)

formers. The one disadvantage of this type of coupling is that the transformer must be especially designed for the wave lengths of the signals which it is desired to receive. Practically all modern Radio frequency transformers as used for the reception of broadcast programs are designed for a range of from 300 to 550 meters. For the efficient receiving of wave lengths above and below this band, transformers of slightly different design are necessary. In general, however, well designed Radio frequency transformers can be depended upon to give quite satisfactory and efficient results.

Circuit With One Stage E. F. Amplification

In Figure 46 is shown an interesting circuit in which one stage of Radio frequency and a detector are employed. The tuning circuit at the left consists of a standard variocoupler in the antenna circuit, and a variometer in the grid circuit for tuning this circuit into resonance with the incoming oscillations. The current oscillations in this tuned circuit are impressed upon the grid and filament of a hard amplifier tube. In this tube the oscillations are amplified and then sent into the primary of a Radio frequency transformer. From the secondary of this transformer the oscillations then pass through the grid condenser into the grid and filament of the detector tube, where they undergo rectification and additional amplification. Into the output circuit of the detector tube are connected the headphones in series with the B battery which supplies the necessary plate pressure.

As was stated, the tube used in the Radio frequency amplifying circuit is a "hard" amplifying tube which has its filament heated by the same A battery that supplies current to the filament of the detector tube. For the plate potential of this amplifying tube it is advisable to use a pressure of at least 67 volts in order to obtain most satisfactory results.

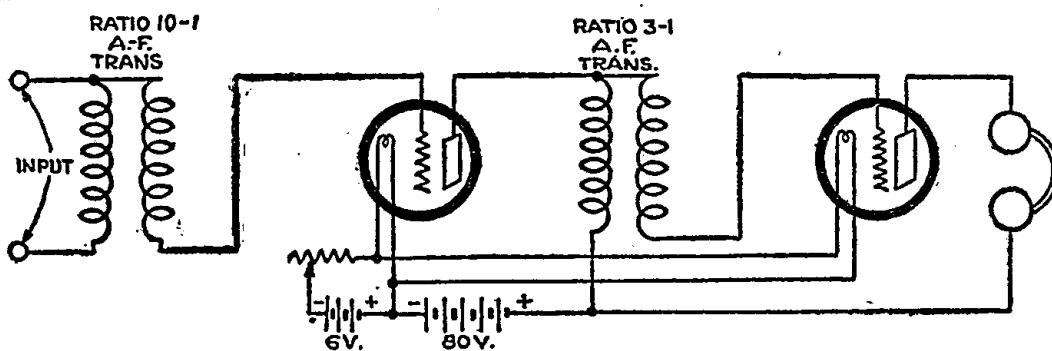
The Potentiometer

Another device used in connection with this amplifying circuit is the potentiometer P in the figure. This potentiometer is a variable resistance usually of about 200 ohms and is connected across the A battery circuit. It also has a third sliding contact which is connected to the tuning circuit of the left. By adjusting this sliding contact the potential of the grid with respect to the filament can be easily varied. Experience has shown that best results are obtained if the grid of the amplifier tube is slightly negative with respect to the filament. Thus with the aid of this potentiometer any degree of negative potential necessary can be supplied to the grid. This is a very important adjustment in all Radio frequency amplifiers.

Radio And Audio Frequency Amplification

In Figure 47 is illustrated another interesting receiver circuit employing one step Radio frequency and one step audio frequency amplification. This circuit if properly tuned is capable of producing very remarkable results. It has a very great range, and at the same time if used with a good antenna can produce signals loud enough to be reproduced in a loud speaker.

CONNECTIONS IN THE CIRCUIT



It will be noticed that the Radio frequency amplifier and detector circuit are the same as shown in Figure 46, but the output circuit of the detector tube feeds directly into one step of audio frequency amplification. Of course, if desired a second step of audio frequency amplification can be added to strengthen the signals still more, but this will seldom be found necessary.

Construction Details

In the construction of receiving sets employing Radio frequency amplification as was illustrated in the above two figures, certain regulations must be observed in order to prevent unpleasant interference between the various component parts. For instance, the variocoupler and variometer, which should be of good quality, should not be mounted closer than four inches apart. In fact, if possible they should be placed at opposite ends of the panel. In arranging the tubes and transformers it is best to allow a space of approximately three inches between the last Radio frequency amplifying tube and the detector tube. Also, if possible, a space of at least four inches should be allowed between the last Radio frequency transformer and the first audio frequency transformer. This is necessary in order to prevent any inductive interference, especially if the transformers are not shielded. If two audio frequency transformers are used, trouble can often be avoided if they are mounted with their cores at right angles to each other.

Close Connected

With the exceptions suggested above, the various parts such as tubes and transformers should be arranged so as to be as close together as possible. In this way the necessary connecting wires will be shorter; and, as is commonly known, the shorter the wires the less danger there is of losses or interference.

To assist in the tuning process it is a good idea to connect a 3-plate or 5-plate variable condenser across the primary of the first Radio frequency transformer. In this way this primary circuit can be tuned into resonance, with the effect that much louder signals will result. In fact, often the adjustment of this little condenser will tune one station out and another in.

Another important element which plays a vital part in the tuning process is the rheostat controlling the current to the

detector tube. For this reason it is best to use a rheostat with a vernier adjustment so that very close settings can be made. The grid leak in the detector tube circuit also needs careful consideration, for if the resistance is too low, it will load up the grid with an excess charge and thus paralyze the tube just when maximum amplification is wanted. Although there are numerous variable grid leaks on the market, the most satisfactory form yet devised is the pencil mark type, for with this the resistance can be easily varied as required. By changing the thickness of the pencil mark between the terminals of the grid leak, the point can readily be determined at which the detector tube will give maximum amplification without paralyzing itself.

Chapter Fourteen

The next chapter will deal with additional circuits employing two or three stages of Radio frequency amplification. In addition, special information will be given in connection with loop aerials and the types of circuits best adapted for this type of aerial. The chapter will thus form an important addition to the present one, and should not be overlooked by any one desiring a complete knowledge of this all important subject.

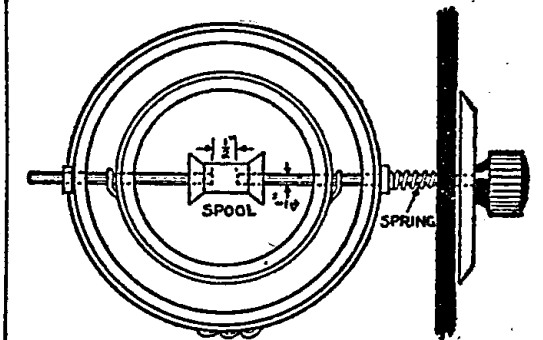
Be sure your lightning switch is not covered with ice, otherwise the signals will be extremely weak.

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Rotor Shaft That Runs True in Variocoupler

Many amateurs would make their own variocouplers if it were not so difficult to get the rotor shafts true. I had this trouble until I hit on the method as shown in the illustration. Procure an empty thread spool and give it a coat of shellac, inside and out. A coat of thick



black enamel may be added to the outside if desired. Wrap the ends of the shafts with one layer of empire cloth, soak it in shellac and push it into the spool while the shellac is still wet. Keep the ends 1/2 inch apart. The shaft will be true and the dial will not scrape the panel.—Jack Ward, Berkeley, Cal.

Back Panel Mounting for Coils

This way to mount spider web coils is exceedingly efficient and they are controlled by knobs on the panel front. I am using this style mounting on my three-circuit tuner and I get excellent results.—Chas. P. Cothran, Covington, Tenn.

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1/16" THICK	3/4¢ PER SQ. INCH
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3/16" THICK	2¢ PER SQ. INCH
1/4" THICK	2 1/2¢ PER SQ. INCH
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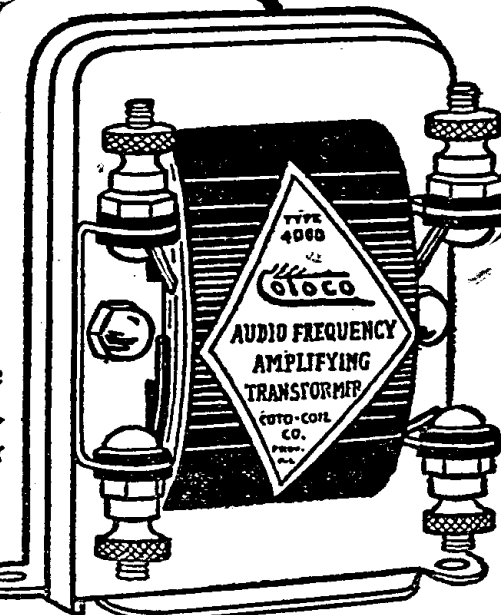
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Increased Signals with Two Tube Set

Loud Tones Produced With Inexpensive Set

The accompanying diagram is that of my receiving outfit. The antenna is one wire 135 feet long and 44 feet high. The lead in is No. 14 gauge wire 40 feet long. This was done to overcome any variability which might be caused by the swaying of the wire, fading away as it is called.

The variocoupler is the secret of the loudness of the signals. The diagram is self-explanatory. The rotor hooked up in this way is practically a variable condenser with increased signal strength. The 1½-volt filament battery gives it another boost on its way. The stator using the whole coil also gives increased signal strength, and does away with taps and switch which are valueless as far as I have experimented.

Tuning the Set

The variometer is another secret to increase your signals, which will take a little patience to learn how to manipulate it. If once accomplished it takes away that critical adjustment of the rheostat.

Set your condensers, variocoupler and variometer at zero. That means, with the plates on the condensers all the way in. The rotors of the variocoupler and variometer are set in the same position as the stator. Turn on your rheostats until the point just below where the hissing and howling starts. Rotate your variocoupler to about 50 on your dial, then adjust your 43-plate condenser in the primary circuit until the whistling or howling starts. For long distance reception the plates will need to be almost entirely all the way out. Try to bring the station almost in, either with the rotor of the variocoupler or condenser then finish off with the variometer until the maximum signal is obtained. Never rotate your variometer over a quarter of a turn from its first position.

Just experiment with it in the position you may have it before you start to tune, then by turning it back to its first normal position, you may get a surprise in the increase of your signal and how it will eliminate tube noises and static. Do the final adjusting with the variable condenser across the primary of your transformer. This should be used sparingly and most of the time left with the plates all the way in. If you want to use a fixed condenser it must be .006 mfd. capacity.

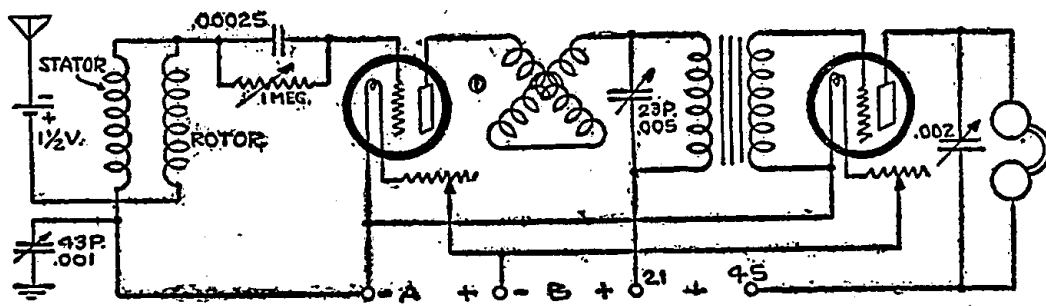
Tune with Condenser

Remember when leaving a station and bringing in a new one to just turn your 43-plate condenser slightly or the variocoupler, either one will give results. As a rule you will need to finish up with the variometer again. I am using a variable grid leak. About 1 megohm is the right capacity, nothing critical about its operation. One thing that must be remembered is that your transformer must be tapped from a 21-volt B battery. This is important.

Body capacity is my worst enemy, but I reduced this to a minimum by taking little strips of nickel plated metal about ¼ inch thick, ⅜ inch wide and 4 inches long and making a double bend in them at right angles. Small holes were drilled in the ends of each strip for the purpose of screwing on the knobs of the dials. Rubber tubes were slipped over the ends of the strips to keep the fingers from touching the metal parts.—O. P. Klein, Luduc, Alta, Canada.

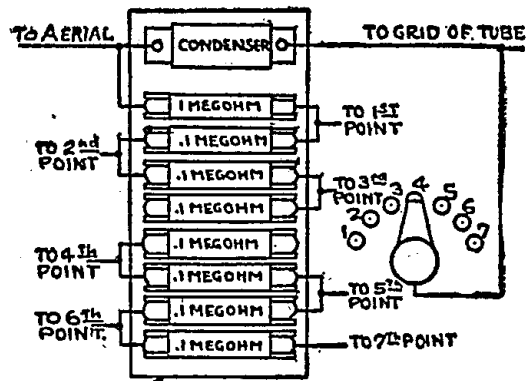
If no solder is handy apply a flux to the joint, then wrap it with several thicknesses of tinfoil and heat the joint with a match. This will make a tight connection that will serve in an emergency.

HOOK-UP USED IN THE SET



Flewelling Variable Grid Leak

In building the Flewelling super circuit I had trouble in adjusting the lead pencil mark variable grid leak, so I set about to make one which resulted in the device illustrated. A very fine adjustment may be had, and by changing the first grid leak tube any resistance that is needed for a certain set is easily found.



A base 2 inches wide and 6 inches long is cut from Formica. On this is mounted the grid leak and grid condenser. This base with its parts can be mounted on the back of the panel as a single unit.

Procure nine pair of grid leaks and condenser mounting clips and one grid leak tube of one megohm, seven of 1/10 megohms and one grid condenser. Mount these on the base and connect up as shown, using a seven-point switch.—A. C. McLellan, Westville, Ind.

Never Dope a Battery

According to the old time horse racers, you can dope any horse, if he is reasonably speedy, so that he can win one race easily. And according to battery men it is possible to dope a storage battery so that it will show a remarkable amount of pep for a while. But, with both the horse

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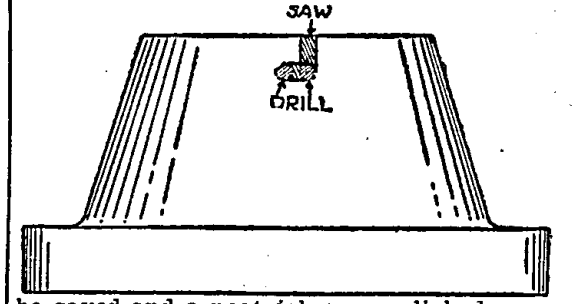
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Very often a molded socket becomes broken at the small lip which locks the bulb. It is a tedious job to repair one of these and a new socket will cost a dollar—often more—to replace it.

If a new lip or lock is made on the opposite side, or any other side and the connections moved accordingly the dollar will



be saved and a neat job accomplished.

Be careful to have the prongs of the tube set firmly on the springs, then mark the place where the lock pin will be when the tube is fully inserted. Drill a hole at this point the same size as the original, then drill another alongside of it and with a hacksaw cut the vertical slot to this last hole so that the lock pin will slide in freely. Be sure to change the connections before using the tube.—H. F. Manchester, Atwater, Cal.

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and the battery, the dope is really the beginning of the swift, sad finish.

There are various kinds of battery dope being put out with rosy promises of increased battery performance, but they are all alike in one particular; the good they do is temporary, and is far over-balanced by the harm they are sure to work later.

Wooden Panels Made Attractive

Wooden panels of a Radio box can be rubberized by breaking several old phonograph records into small pieces, putting them in a tin can, and adding one-half pint of denatured alcohol. This will dissolve in a day or two; then apply on the boards with a brush. A very glossy finish can be obtained if the rubber surface is shellacked. One-quarter inch wood is of correct thickness for most small receiving panels. It would be well to dry the material in a warm oven before applying the insulating mixture.

A buzzing noise in the phones may often be traced to a loose connection or a run down battery.

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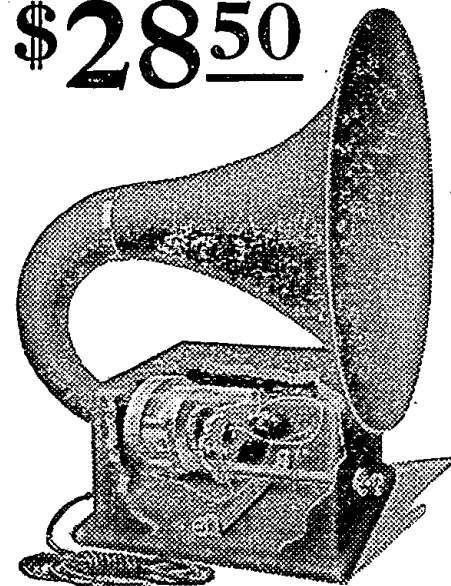
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The DICTOGRAND RADIO LOUD SPEAKER, like all Dictograph products, is guaranteed for a period of one year against all electrical or mechanical defects.

How to Construct a Flewelling Super Set

The Second Prize Winner in the \$100 Flewelling Set Contest

By F. P. Hall

(Editor's Note.—The following article is the second prize manuscript submitted in the \$100.00 Flewelling Set Contest conducted by Radio Digest. The first prize set description will appear next week.)

THE writer, as an enthusiastic reader of Radio Digest since the first issue came out in search of the new and novel "hook-ups" usually to be found in there, ran across the first published layout of the now famous Flewelling circuit, cut it out and immediately began work on it.

A supply of fixed condensers was hurriedly procured, and a rough arrangement hurriedly fixed up on a board, and finally stations began to come in; due to the fact that I was using Myers audion tubes,—this type of tube being a pet of the writer, some difficulty was experienced in getting the proper values of condensers and grid-leaks, and considerable experimentation was necessary before the wonderful concert of squeals and shrieks was gotten under control.

Layout For The Cabinet

The front of the receiver consists of a formica panel 6 inches by 7 inches by 3/8 inches, and a 23 plate variable condenser mounted on the back on the left hand side and about 2 1/2 inches down from the top of the panel—the panel being first shielded by shellacking on the back a sheet of thin copper foil and placing under pressure until dry.

A 4 inch dial was fitted to the shaft of the variable condenser and a small extra knob with a 3/8-inch diameter rubber faucet washer was located at the lower center of the panel, bearing against the 4 inch dial with enough friction to act as a vernier in turning the dial.

Clips For Holding The Tubes

Four clips to hold the Myers tube were obtained and placed at the right upper side of the panel, and directly under the same was fastened a Bradleystat.

At the left and symmetrical with the Bradleystat knob was then drilled a 1/4-inch hole, and from the "makings" of a variable condenser purchased at a department store for 30c, a 3-plate vernier variable condenser was constructed and mounted directly under the 23-plate variable and connected thereto by suitable leads. The movable blade in this vernier condenser was cut down with the tin shears to a size of about that of half of a silver dollar, in order to provide sharper tuning control.

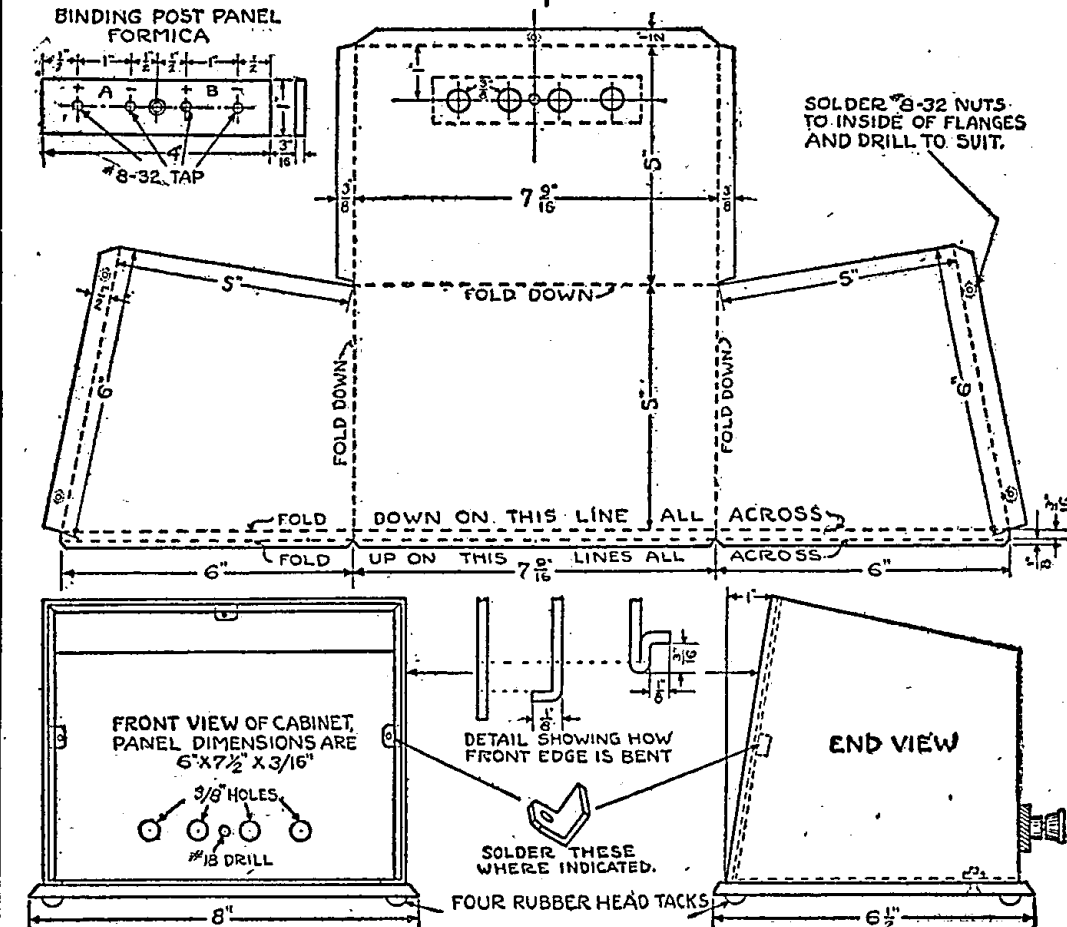
The shaft of the vernier condenser extends through the 1/4-inch hole in the

their proper positions with small escutcheon pins. Three holes were then drilled in the sides and top for fastening the panel to the case. These were countersunk and nickel plated oval head screws were fitted.

Mounting for Coils

A couple of wood blocks 2 inches in diameter and 1 inch thick were made to

condensers, of a value of .006 mfd. each. A small hard rubber panel was prepared slightly larger all around than two of these fixed condensers laid side by side with about 1/4-inch clearance between them, and three long brass screws were fastened to each side of this hard rubber panel in such a way as to permit two condensers to lay side by side with the



fit the inside of the two Giblin-Remler 50 and a 75 turn coils, and four large fibre disks cut out of 1/4-inch fibre of a size equal to the outside diameter of the two coils were fastened to either side of the wood plugs after the coils had been placed thereon.

A brass strip was screwed to the block holding the 50-turn coil and bent and drilled to fasten to the end plate of the 23-plate variable condenser. A longer brass strip is fastened to the other 75-turn block and a small hinge soldered or

third condenser raised above these two by about 1/4-inch and held firmly in that position by two nuts on each screw in the ends of the condenser. (See sketch showing detail.)

The condenser panel was mounted on the rear of the front panel at right angles with it, a brass strip supporting it rigidly.

The Grid Leaks

On the reverse side of this small condenser panel two Freshman variable grid leaks were mounted (see sketch), the sealing wax in them being carefully melted out and the grid condensers removed. As

the Myers tube requires a grid condenser of .0005 mfd. value, one of this size must be obtained, or can be made with two brass or copper strips about 1/4-inch wide, with an overlap of 1/4-inch separated and covered by thin pieces of mica, and fastened securely together.

In order to keep the grid leaks as short as possible, the grid condenser was placed directly between the 23-plate variable condenser and the grid terminal of the tube.

A lead was brought from the grid terminal to the grid leak and from the other terminal, connected to the minus side of the filament or A battery circuit, instead of shunting the grid leak around the grid condenser.

Flexible leads of stranded insulated wire were connected to the outside and inside ends of the 75-turn coil, one lead going to the plate terminal of the tube, and the other to the B battery plus connection.

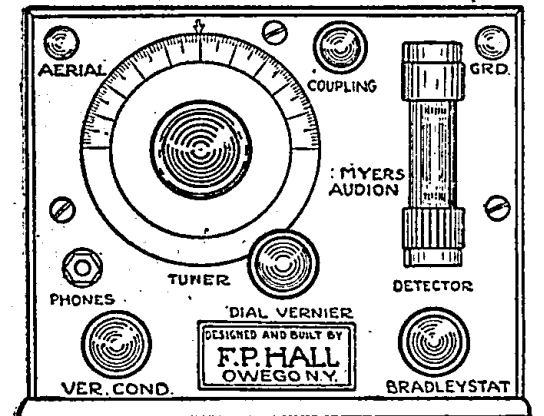
The second variable leak was bridged across the third .006 mfd. condenser which itself bridges the other two, and by sawing slots in the hard rubber buttons or knobs on these two leaks and making corresponding small holes in the case, these can be adjusted from outside the receiver by use a small screw driver.

Leads to the Parts

The other necessary leads were run to connect up the Bradleystat, the 50-turn coil, the condensers and phones. All wiring was of No. 14 wire, covered fully with spaghetti tubing, and all connections soldered and made tight.

Four flexible leads about 9 inch long were arranged to connect with the four

(Continued on page 15)



panel previously described as on the left side, and fitted with an extra knob. This knob has a small screw or saw cut filled in with white lead to designate when the vernier condenser blade is in the "half-in, half-out" position, as to afford maximum tuning control this blade should be placed in this position before tuning with the 4-inch dial.

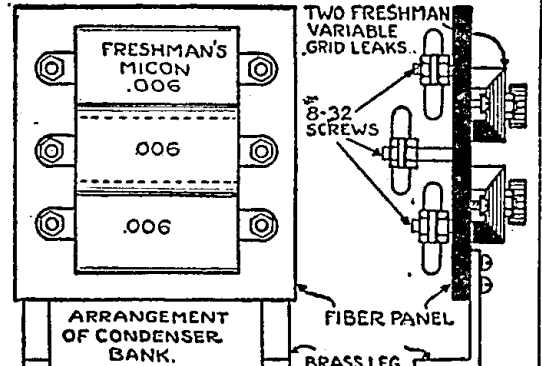
Phone Jack

A phone jack was next fastened to the panel at the extreme left as this location is best adapted to keep the phonocord out of the way while operating the instrument.

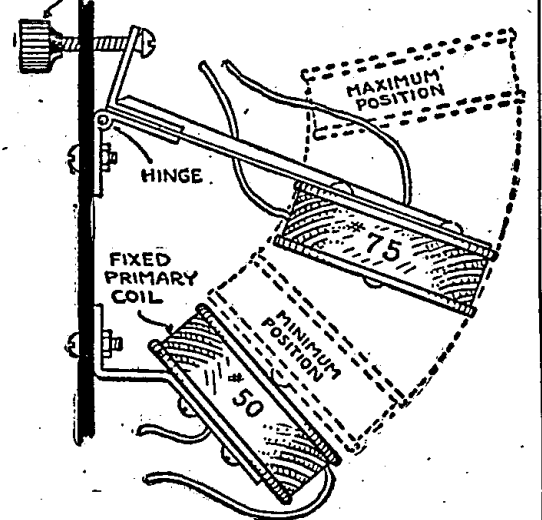
Two black binding-posts were then fitted at the upper corners of the panel, the one at the right making contact with the copper foil shielding only, suitable holes being cut in this shield at the other binding post and also wherever variable condenser shafts, legs, etc., required.

Near the top of the panel, to the right of the dial and not too near the plate terminal of the Myers tube, was drilled a small hole and tapped for an 8-32 screw, into which was placed a long brass screw of this size with the head rounded off on the under side, and fitted on the front of the panel with a small hard rubber knob, which was securely fastened to prevent the knob unscrewing. This knob on the outside of the panel being used for giving a micrometer adjustment in the coupling of the two inductances, as is shown in detail in a sketch submitted herewith.

A number of small name plates with the words "Aerial", "Ground", "Phones", etc., were then fastened to the panel in



ADJUSTING KNOB AND SCREW CONTROLLING SECONDARY.



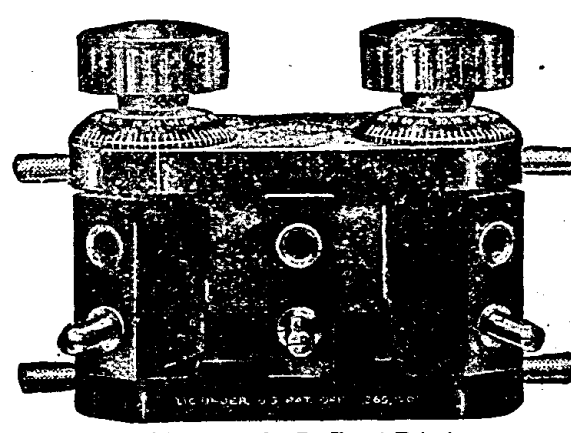
riveted to the lower end of the same, as well as fitted to the back of the panel in such a position as to allow this coil to swing into contact with the other coil on the end of the condenser.

At the bottom of this same brass strip and on the opposite side from the coil was soldered a small angle shaped piece of brass strip having a slot to engage the head of the screw threaded through the panel, as previously described, this being the variable coupling arrangement shown in a sketch.

Condenser Bank

The next step to consider was the construction of the condenser bank,—consisting of the three large fixed capacity con-

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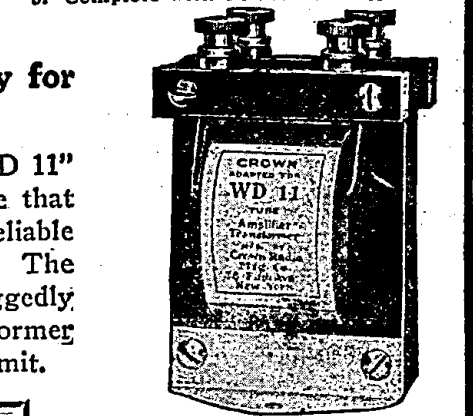
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CROWN Coil Mountings

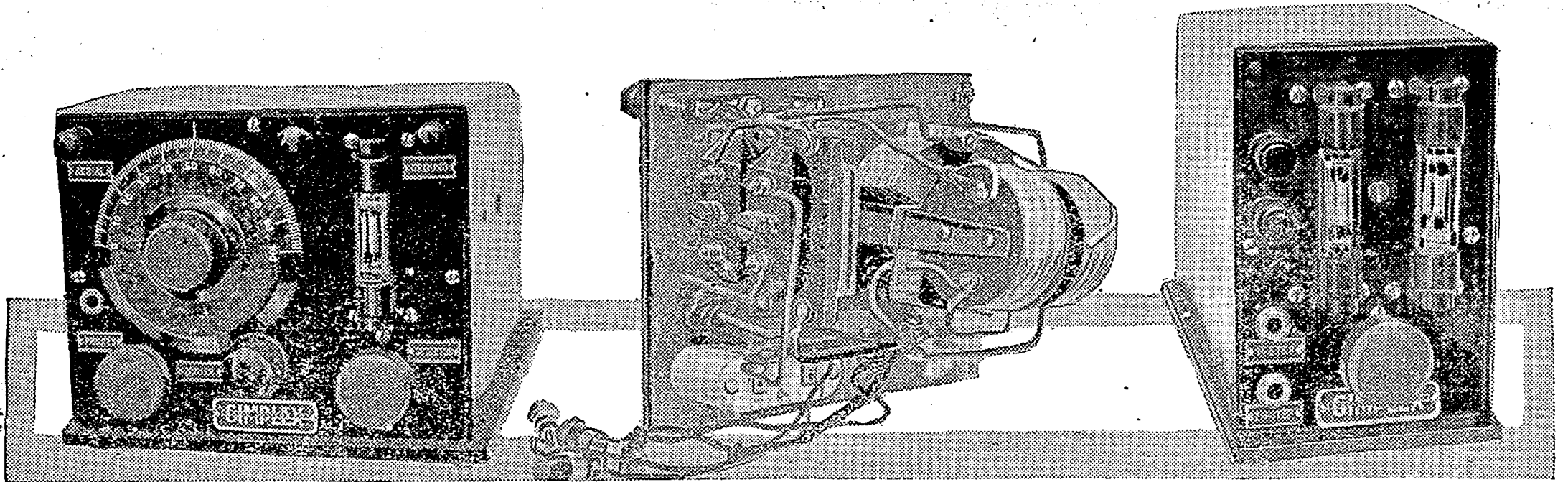
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Used by manufacturers as standard equipment on sets. For long and short wave reception. A few of its many special features.

1. Special Locking Device to keep the coil in place, thus preventing it from being thrown out of adjustment.
2. Special Adjustable Bearing feature.
3. Special constructed Calibrated Dial, showing the stations tuned.
4. Positive Connections on rear of blocks.
5. Complete with Flexible Leads.



Audio Frequency, \$5.00
Radio Frequency, \$4.00
At your dealer's—otherwise send purchase price and you will be supplied postpaid.



FLEWELLING SET

(Continued from page 14)

binding posts fixed to the back of the case which were supported and insulated from the case by a 1-inch strip of formica fastened thereon. This strip was suitably marked with A+ and —, and B+ and —.

Three oval head nickel plated screws fastened the panel securely in place in the case, with a slight rake or slant of about 1/4 inch in 6-inch height, which makes the operation of the knobs, etc., on the front easier and more convenient than when the front panel is vertical.

Sheet Metal Case

The case itself was made from a sheet of medium weight tin, with the dimensions and layout as given in attached sketch. This was cut out and formed up with the aid of a brake, at a sheet metal shop. After forming, the seams were soldered, and the edges as well as the surplus solder filed down smooth and the corners rounded. Three small brass lugs were soldered to the inside at the center of the top edge and the two sides for tapping later to receive the panel holding-on screws.

Five 8-32 brass nuts were also soldered to the inside on the flange that extends around the bottom, and the holes were made to permit screws to be placed in the wood bottom to fasten into these nuts and hold the tin case down firmly upon the base.

When the case was finished, filed and smoothed with emery cloth to a final finish, it was then japanned or painted with black enamel, the first coat rubbed down and a second one given. A piece of hard wood about 1/4-inch or 1/2-inch thick was cut to the required size and finished smooth and enameled. Four rubber head tacks or bumpers were then fastened to the bottom to act as feet.

Aerial or Ground Connections

As explained in Radio Digest both aerial and ground are not required. You will recall that in the first part of this article I stated that the binding post marked

"ground" was attached to the copper shielding and hence to the metal case only, but otherwise has no connection with the wiring. I have found that if a ground connection is made to this binding post, thus grounding the shield, it eliminates the capacity effect and also adds to the loudness and stability of the reception.

In operation the receiver is the acme of simplicity. Just connect the batteries, turn up the filament to a low brilliancy, screw in the coupling knob until you hear the tube grow "mushy", turn the big dial and you meet a number of "squeals".

I find in operating the receiver that the closer the coupling the less B battery is normally required. I get good reception with 45 volts on the plate and sometimes when a distant one refuses to come-in pile on the B battery up to 180 volts, and my, how the tube does sing. With the coupling at about 1 inch between coils and 90 volts on the plate, about everything on the air can be brought in.

Selectivity of Set

The principal advantage of this particular

design is the extreme selectivity obtainable. First there is the vernier filament control, second, the dial vernier, then the small vernier condenser, and for a finishing touch the closely controlled coupling knob.

The small size of the vernier condenser blade is also a great advantage, but yet I have had two stations with waves so close that less than a quarter turn of the vernier gave me either.

In general I think this circuit is the greatest ever, and I have tried out a lot of "trick" hook-ups. I think there are great possibilities yet undisclosed with it. I find, for instance, that in using Myers audion tubes, that on account of the changed values of this tube due to its compact construction and low internal capacity and impedance, that the values of the three fixed condensers of .006 mfd. capacity are not critical, the circuit operating fairly well on as low as .001 mfd. for these condenser values, and as the

grid condenser is 1/5 the usual size for the regular type of tube, it may be that less than a .006 mfd. is best.

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Standard 90 Degree Variocoupler, \$3.50.

OUR 180 DEGREE VARIOCOUPLER is a masterpiece, suitable for use in any circuit. Most efficient and best constructed Coupler in existence. Price, \$4.50.

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MOUNTED 3 CIRCUIT TUNER. Exceptional selectivity and sharp tuning makes the most easily constructed and highest efficiency Set known. Price, without Dial, \$6.00.

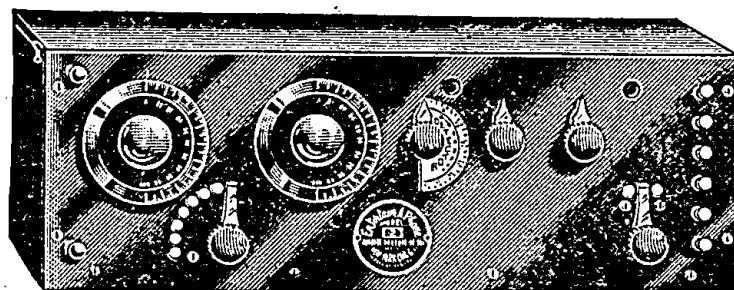
Our Variometers are full size precision instruments. They are not of the "competitive" type. Price, \$4.00.

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11 Plate.....\$1.50	43 Plate.....\$3.00
23 Plate.....2.00	3 Plate.....1.25

NEW YORK ENTERTAIN-A-PHONE RECEIVING SET No. 2—Complete with detector and two stages of amplification, all in one cabinet. Contains a non-regenerative two circuit hook-up with two stages audio amplification. Results are simply a revelation. It must be operated and heard to be appreciated.



Workmanship and design and material of exceptional character throughout. Of unusual interest to the jobber. Price, \$50.00, fully guaranteed.

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Eliminate Wall Pins by using Signal Dots for permanent records. Books can be closed and Maps removed from wall without disturbing record. Made in two sizes for Maps, Books or Cards. Send fifteen cents in stamps for envelope containing 100 signals in three colors. Mention Map, Book or Card. Dealers write for special discount for gross lots. L. L. Smith & Co., 188 Washington St., Lynn, Mass. Mfrs. of Radio and Auto Specialties.

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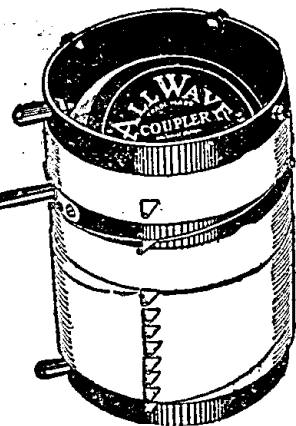
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TRADE MARK

Wave Length—150 to 3,000 Meters

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To listening in on nearby stations, when the "All Wave" coupler in your set will enable you to receive broadcast reception from stations thousands of miles distant?



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To receive on the higher wave lengths that have been and will be allotted to broadcasting stations because of their ever increasing number.

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SIMPLICITY OF EFFICIENCY

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ASSEMBLY AND OF RESULT

Inasmuch as all variometers, variocouplers and loading coils are eliminated. Six efficient hook-ups sent upon receipt of ten cents in stamps to cover cost of mailing.

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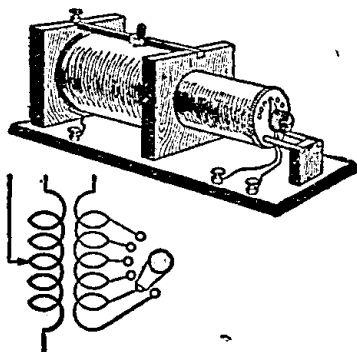
58 Lafayette Street, New York City

About Radio Parts

THE LOOSE COUPLER

Another form of tuning unit that closely resembles the tuning coil is the loose coupler. However due to its bulky construction it has gradually lost its former popularity.

The resemblance to the tuning coil in



this instrument lies in the fact that its primary winding is adjusted for the proper wavelengths by means of a slider, but here the resemblance ends, as there are two distinct circuits which are inductively coupled. The current flowing in the one creates a constantly varying magnetic field which induces an alternating current in the other secondary winding.

This secondary winding can also be adjusted for wavelength control by means of the tapped switch at one end.

By sliding this secondary in and out of the primary winding the induction in the secondary is controlled.

For different wavelengths there are certain points of resonance, that is the point of coupling, where the current in the secondary reaches its maximum value. In this manner very selective tuning is possible.

THE VACUUM TUBE

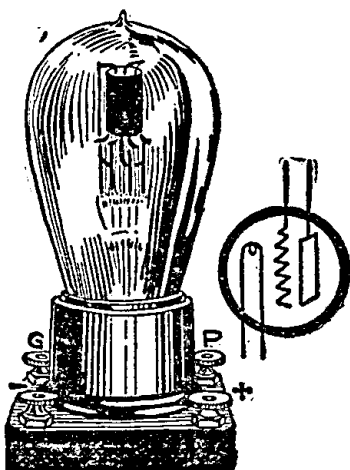
The success of the Radio industry is due to the development of the vacuum tube. Not only because it takes the place of the crystal detector with increased efficiency but also because of its ability to act as an amplifier.

It consists essentially of an evacuated bulb which has four sets of terminals. Two of these terminals are connected to the filament which when heated emits electrons that flow to a second element called the plate. This plate also has an external terminal.

The peculiar property of this flow of electrons or current, which makes it so valuable is the fact that the electrons will flow only from the filament to the plate but not back again. In this manner alternating current when passed through the filament to plate circuit loses all the impulses in one direction and becomes a direct pulsating current.

The third element called the grid also has an external terminal. This grid is

the means of controlling the flow of electrons from the filament to the plate. It can retard or even increase the flow depending on the charged condition of the grid. This third element increased the



efficiency of the tube to an unlimited extent and is the biggest development made in Radio.

Renewing Dial Figures

Every amateur wants a neat looking panel, but in time the marks and numbers become darkened and yellow. This makes a panel look bad. A little white paint may be mixed thickly so that it is like a paste and then spread it over the figures on the dial. When dry the surplus may be wiped off with a damp rag, leaving the depressions full of white paint.—W. King Jenkins, San Francisco, Cal.

The use of Radio for the dissemination of information about the collection of waste paper and its importance to the paper industry is the latest step taken by the book paper and board manufacturers of the country towards relieving the present shortage by informing the public that there is a new and active market for this waste.

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- \$ 6.00 Manhattan 2000 Ohm Fones.....\$ 3.75
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- U. V. 200 Detectors—List \$5.00..... 4.25
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- U. V. 201A..... 5.95
- Improved Detector Tubes..... 2.65
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- \$45.00 Magnavox Loud Speaker, Type R3..... 26.95
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- Mounted Hot Spot Crystals, 35c value..... .20
- Crystal Detector Stands, 90c value..... .40
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- Genuine Reinartz Coils, 15 taps, \$3.00 value..... 1.95
- \$7.50 Moulded Dayton Variocouplers..... 4.95
- 7.25 Moulded Dayton Variometers..... 4.75
- 1.10 Dayton Rheostat..... .75
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- .50 Dials 2 and 3 inch..... .25
- 1.00 Era Sockets..... .45
- Switch Levers, 50c value (adjustable-radius)..... .30
- 10-1 Transformers (well-known) \$4.75 value..... 3.75
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- Genuine Million Point Crystals..... .25
- Solderall..... .20

HONEYCOMB COILS

- 25 Turns.....\$0.35 | 200 Turns.....\$0.70
- 35 Turns..... .35 | 250 Turns..... .70
- 50 Turns..... .35 | 750 Turns..... .90
- 75 Turns..... .35 | 1000 Turns..... 1.15
- 100 Turns..... .45 | 1250 Turns..... 1.40
- 150 Turns..... .55 | 1500 Turns..... 1.50

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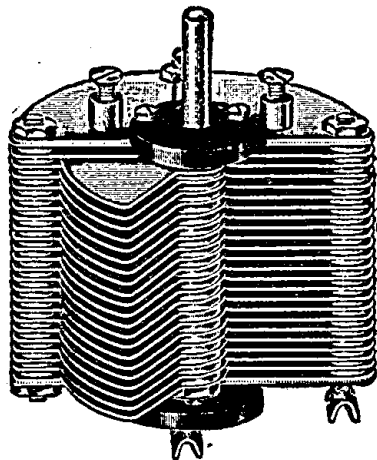
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REINARTZ CIRCUIT

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, 10 switch points and nuts, 4 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 Radion panel and diagram and complete instructions \$10.00

FLEWELLING CIRCUIT

EVERY PART COMPLETE

2 honeycomb coils, 1 2-coil mounting, 2 coil plugs, 3 .006 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 high-grade RADION panel, 1 3" dial and the Radio Digest Booklet on Operation and Construction of Circuit..... \$11.00

TWO STAGE AUDIO FREQUENCY AMPLIFIER

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1 7x9 Panel, 2 Audio Frequency Transformers (5 to 1 Ratio), 2 Rheostats, 2 V. T. Sockets, 3 Jacks (Double Circuit), 7 Binding Posts, 1 Variable Resistance Leak, Necessary Bus Bar Wire. Can be used with either of the above circuits or any other receiver..... \$11.00

TUNING AND DETECTOR UNIT

and 2 stages of audio-frequency amplification

List Price \$35.00 for each unit

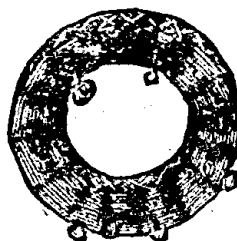
Built in Mahogany finished cabinets measuring 7x7x14 inches for Tuner and Detector Unit and 7x7x8 inches for Amplifying Unit. Affords an unusually high range of program selectivity and local stations can easily be tuned out to secure distant ones. Guaranteed to give excellent results, only the very best material being used in its construction.

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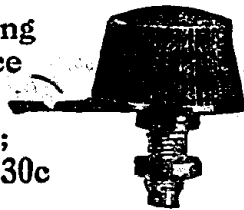
CONDENSERS

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- 23 Plate Variable; value, \$3.50.... 1.35
- 43 Plate Variable; value, \$4.50.... 1.85
- 13 Plate VERNIER; value, \$5.50.. 3.75
- 23 Plate VERNIER; value, \$6.00.. 4.00
- 43 Plate VERNIER; value, \$6.50.. 4.25

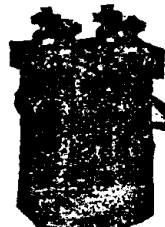
Reinartz Coils Including Mounting Value, \$2.50 \$1.75



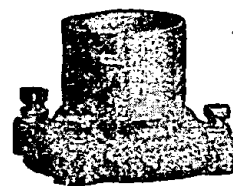
Ball Bearing Inductance Switch Value, 75c; Special at 30c



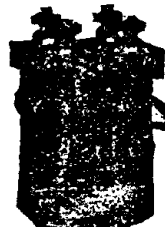
AUDIO FREQUENCY TRANSFORMER Designed for use with W. D. 11 Tubes, List, \$4.50; Price, \$2.75



V. T. SOCKETS Nickel plated brass sleeve, composition base; value, \$1.00; special at 50c



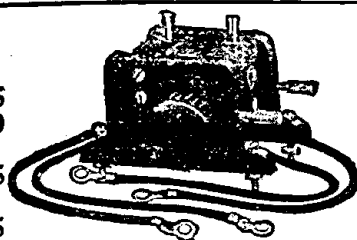
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EXTRA SPECIAL While They Last Clapp-Eastham—39 Plate Variable Condenser, .001 capacity, Bakelite ends. Equipped with 3-in. Dial..... \$1.95 Clapp-Eastham—5 Plate Variable Condenser, Bakelite ends, Dial for vernier..... \$1.15 Clapp-Eastham—39 Plate Variable Condenser, .001 capacity, Glass enclosed for table mounting. Precision made. Equipped with 3-in. dial. Reduced to..... \$3.95

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- FILAMENT RHEOSTAT—Condensite base; value, \$1.10; special at..... .70
- FILAMENT RHEOSTAT with 2 1/2" dial; value, \$1.50; special at..... .85
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Construction of the Ultra Reinartz Receiver

Part II—The Panel Layout

By H. J. Marx

IN PART I, details for the construction of the special tuning units of the ultra Reinartz Circuit were described. The lay-out of the panel with the comments on the mounting of the various instruments are given in this installment. The panel required should have overall dimensions of ten by twenty-two inches and should preferably be made of quarter

inch stock. This circuit is not sensitive or critical to body capacity effects and leakages, but at the same time, it is highly

never practical for assembly of Radio apparatus because of the losses due to leakage on account of the low resistance quality of wood, especially when not thoroughly dried or when covered with a coating of paint. Figure 1 gives the dimensional lay-out for the location of all of the apparatus required for assembly. It will be noticed that no baseboard is used, but

may vary according to the type of instrument used.

Grid Circuit Controls

The grid circuit is controlled by the variation of self-inductive coupling between the rotor and windings of the tuning unit. This control is operated by means of the dial, the location of which is indicated by the lower quarter inch hole,

condenser and will be indicated in a later issue.

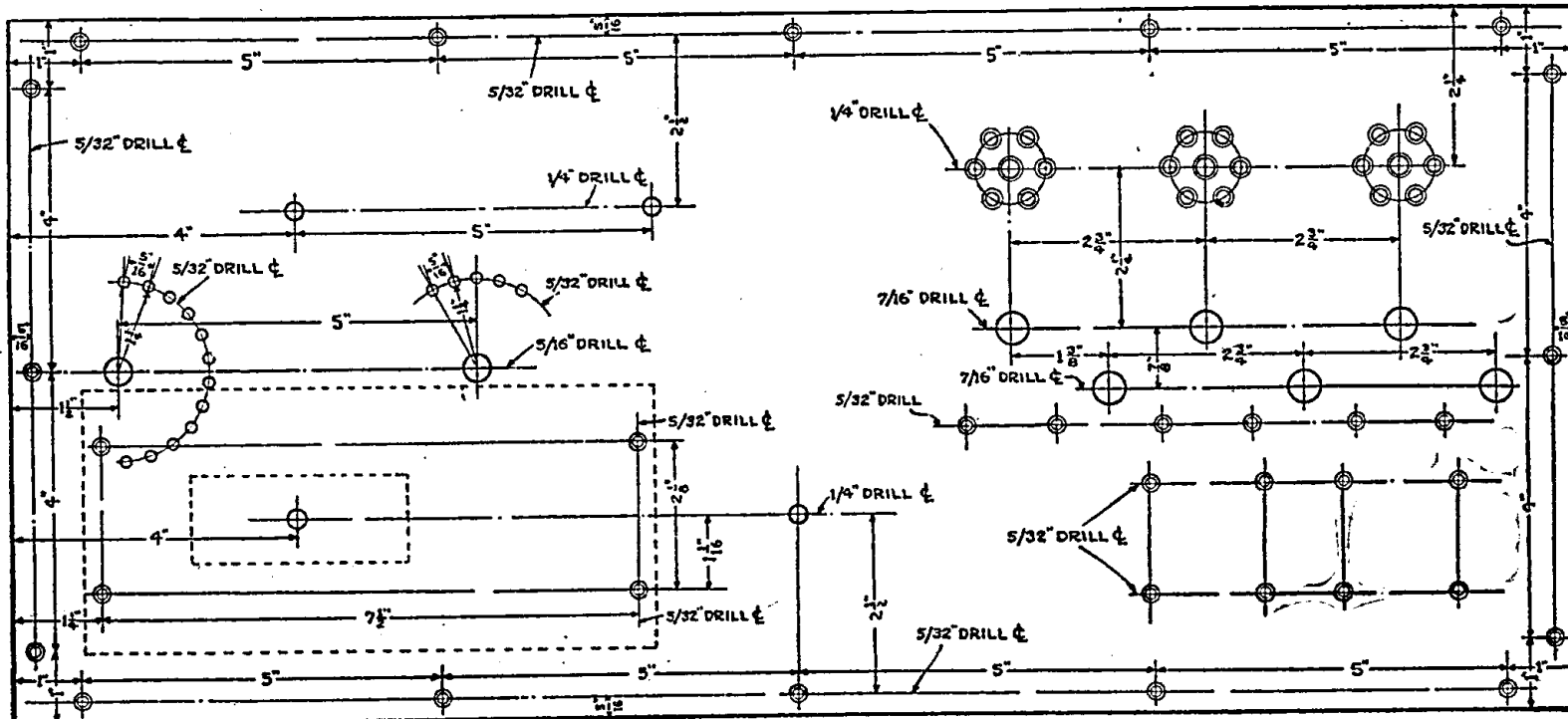
Feed Back Control

The three controls that effect the regeneration of feed back in this circuit are located in the upper left quarter of the panel. The two quarter inch holes are for the plate condensers (No. 2) both of which have a capacity of .00005 and should be equipped with vernier control. The one on the left controls the feed back from the antenna circuit to the plate circuit of the detector tube, while the one on the right controls the feed back from the antenna circuit to the plate circuit of the first Audio frequency amplifier tube. The tapped switch located a little below and between the several lines of these two condensers is used to control the amount of turns used in the tickler coil winding on the tuning unit. It will be noticed that not only do these taps control the actual number of turns in this winding, but also because of the spacing between turns, variation in taps will, to a certain extent, vary the distance and therefore the coupling between this tickler winding and that of the primary and grid circuits.

The same details apply to the location of the contact point holes and the type of switch lever as described for the primary switch and apply to this tickler switch.

In the upper right-hand corner are indicated three sets of peep-holes for ob-

(Continued on page 18)



inch stock. This circuit is not sensitive or critical to body capacity effects and leakages, but at the same time, it is highly

in fact, all of the instruments are directly panel mounted even to the Audio frequency transformer. The sixteen countersunk holes running along the outer edges of the panel are for wood screws that hold the panel in place in the cabinet. All binding posts are located in the rear in order to avoid the unsightly appearance of the many leads running to the front of the set.

Primary Circuit Control

The primary circuit is controlled entirely by means of the tapped switch in the center of the left end of the panel. This switch consists of twelve taps from the primary winding on the tuning unit. The dimensions for the spacing between contact points may vary somewhat due to the variations in the diameter of the heads of the different contact points that are on the present market. In the same manner, the radius on which the circle is drawn for the location of these points may vary depending upon the length of the lever-on of the switch. Likewise the drilled hole for mounting the switch lever

four inches from the left edge of the panel, equipped with vernier control. The fixed (Details of the mounting of this rotor will be covered later.)

The variable grid condenser shown as No. 3 in the hook up diagram in last week's issue is located by the quarter inch hole in the lower half of the exact center of the panel. This condenser has a capacity of .001 Mfd., and can be condenser (No. 4) of .0015 Mfd. capacity is mounted on the back of this variable

REINARTZ
ALL PARTS NECESSARY
DEALERS: ATTRACTIVE DISCOUNTS
HUDSON-ROSS
123 W. Madison St. Chicago

- No. 1—Tuning Unit
- No. 2—.0005 Mfd. Vernier Variable Condenser
- No. 3—One .001 Mfd. Vernier Variable Condenser
- No. 4—One .0015 Mfd. Fixed Condenser
- No. 5—One .0025 Mfd. Fixed Condenser
- No. 6—Two .00015 Mfd. Fixed Condensers
- No. 7—Detector or Soft Tube
- No. 8—Two Amplifier or Hard Tubes
- No. 9—Two Audio Frequency Transformers
- No. 10—One Vernier Rheostat
- No. 11—Two Rheostats (Vernier Optional)
- No. 12—Tapped Tickler and Choke Coil
- No. 13—One .002 Mfd. Fixed Condenser
- 8 Binding Posts
- 3 Tube Sockets (Panel Mount)
- 1 Panel 10 by 22 by 1/4 inches
- 2 Switch Levers
- 17 Contact Points
- 3 Double-Circuit Jacks (Optional)
- 4 Dials

essential that a good quality of panel material be used. Wooden panels are

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All live jobbers and dealers sell "Hot Spots".

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Everything guaranteed as represented.
Coast to Coast Receiving Apparatus of the Very Best Material

We are including all standard articles of the highest class in the sets herein described. Have a number always on hand, packed for immediate shipment. We use material not found in other sets.

REINARTZ COMPLETE PARTS

Consisting of 7 x 18 panel, 23 plate condenser, 11 plate condenser, Barrchus inductance coil used in Reinartz circuit, 2 dials, one bakelite socket, 3 switch levers, contact points, Freshman variable grid leak, vernier rheostat, 8 binding posts, 25 feet wire, and diagram for construction, for only..... **\$10.95**

FLEWELLING COMPLETE PARTS

Consisting of 6 x 14 panel, one 23 plate condenser, one composition dial, 2 honeycomb coils, one double adjustable coil mount, 3 .005 condensers, one Freshman variable grid leak, one condenser, one vernier rheostat, one bakelite socket, 8 binding posts, 25 feet wire and construction diagram, for only..... **\$11.95**

THIS WEEK'S SPECIAL—3,000 OHM HEADSETS

These phones are unusual bargains, excellent standard make, with patented universal joint, adjustment on receiver, and comfortable band for head. Regular list, \$7.50 **\$3.95**

MOUNTED HONEYCOMB COILS

25, 50, 35 and 75 turn coils mounted—regular price, \$1.25; our price, 90c ea. ANNOUNCING THE B-METAL CRYSTAL AND FIXED CRYSTAL DETECTOR

This is the last word in crystals, not a mined mineral but a synthetic crystal sensitive wherever you touch it. The fixed crystal detector needs no adjusting and is set ready for use at all times, encased in glass.
B-Metal crystal packed in individual dust proof container.....50c ea.
B-Metal crystal detector\$1.00 ea.

NOTICE—The products sold by this company are of the best material obtainable. A trial order will convince you that the slight reduction in price on an article made by one of our competitors will not repay you for the difference in the quality you may get. We guarantee everything exactly as represented and cheerfully answer any correspondence. Kindly send money order whenever possible as this insures quick delivery. We prepay postage on orders East of the Mississippi.

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Moco Products 28 SO. WELLS STREET, CHICAGO, ILL.

LISTEN IN ON—Stockton, Calif., or Seattle, Wash.

ORIGINAL BLUE PRINTS

of the Famous MAWHINNEY RECEIVING APPARATUS

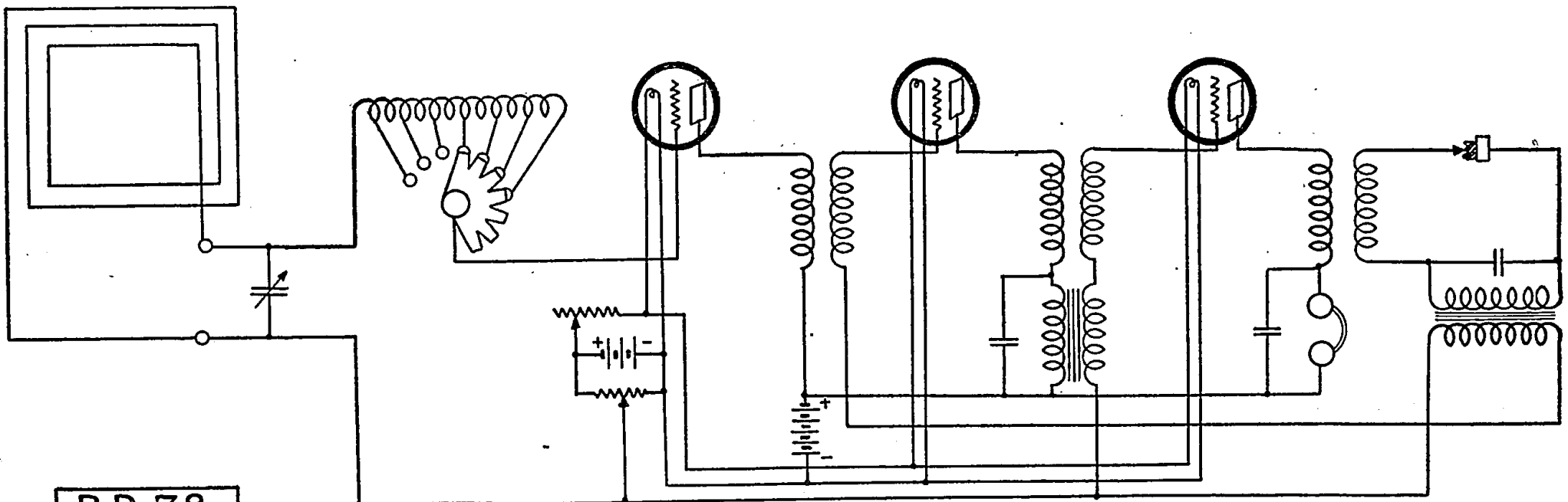
A series of 7 blue prints giving in full details all the necessary information, specifications, and method of construction, and assembling of the MAWHINNEY RECEIVING Apparatus. This is the 5-tube receiving set that picked up 5 stations in California, recently written about in Literary Digest and Radio Globe. The Blue Prints tell you in a very simple and clear manner just how to construct a duplicate of MAWHINNEY'S trans-continental receiving set.

If your dealer cannot supply you—Send \$2.00 for complete set of prints.

A. S. MAWHINNEY
801 RIVERSIDE DRIVE
Dept. 22 New York

DIAGRAMS AND WORKING DRAWINGS

SIMPLE FORM OF 3-TUBE REFLEX



R.D. 78

THIS circuit is another one of the reflex type, especially adapted to loop aeri-als, but is also practical for an outdoor antenna with the addition of an extra tuning unit. It corresponds to three stages of Radio Frequency, detector and two stages of audio frequency.

The tap switch and coil unit shown in the grid circuit is easily constructed. The coil consists of 42 turns of No. 20 gauge double cotton covered wire wound on a 3-inch tube and tapped at every

three turns. This then gives the end terminal on the condenser side of the circuit and seven taps to be connected to contact points. Instead of a lever arm switch, the fan type is recommended. This short circuits the unused turns and reduces dead end losses to a minimum. The condenser has 23 plates and a vernier in order to permit maximum selectivity in tuning in distant stations.

The tubes are all amplifier or hard tubes, and a 60-volt plate battery is recom-

mended. As different tubes work on various plate potential values it is best to experiment to see just what plate voltage will give the best results. A power rheostat is used for controlling the filament current of all three tubes at the same time.

It will be noticed that the grid potential of all three tubes is controlled by means of potentiometer across the A battery. The resistance of this instrument should be 400 ohms.

A crystal detector is used for rectification and can be of the fixed adjustment type. Three Radio frequency transformers and two audio frequency transformers are required. The by-pass condensers used across the primaries of the audio frequency transformers and the phones have a fixed capacity of .002 mfd. each.

This hook-up will give satisfactory results for use with a loud speaker.

REINARTZ RECEIVER

(Continued from page 17)

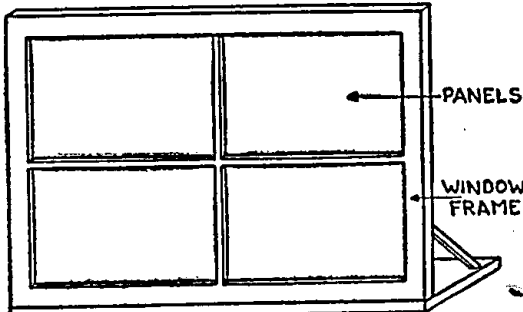
servation of the lighting of the tube filaments. Directly under each one and on the same center lines are indicated the holes for the mounting of three rheostats. In the original set made up, although only the first was required as vernier, for the sake of uniformity of appearance, the same type was used for all three tubes. Two counter-sunk holes under each rheostat location are for the mounting of a panel type of tube socket.

In order to provide sufficient clearance for the rheostats, a spacing block is inserted between the tube socket and the panel. This increases the distance between the tube and the panel and gives plenty of clearance for the movement of the rheostat. The four counter-sunk holes under each of the two tube locations on the right side are for the mounting of the Audio frequency transformers on the panel. The laminated cores are kept in a vernier line in order to avoid magnetic reactions between transformers, although both are of the shielded type. The three holes to the right and a little below the center of the rheostat locations are for the assembly of three double circuit jacks. These jacks are not included in the hook up diagram given in the last issue and the insertion is left to the option of the constructor. They can be omitted or added as desired.

The two countersunk holes below the primary tapped switch and the other two under the second amplifier plate condenser location are for the mounting of the tuning unit. Details of this mounting will be given in the next part of this series.

Novel Panel Set

A panel set can be made from an ordinary window sash having the small panes of glass. The glass is removed and the panels set in their places. The panels on



a set like this are all the same size and are interchangeable. The instruments should be mounted directly on the panels. —Clyde Hansley, Stockton, Cal.

WD-11 Dry Cell Container

With the vogue of the new WD-11 vacuum tube increasing, amateurs are wandering around for means to accommodate these little tubes and accessories to their sets. A Radiophan has this suggestion for taking care of the dry cell used for filament current. A straight-sided aluminum drinking cup was procured at a ten-cent store. A dry cell fits into it nicely. It was secured to the case by two brass flathead wood screws with a fiber washer interposed for insulation purposes.—A. K. Chenoweth, London, O.

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DEALERS: ATTRACTIVE DISCOUNTS

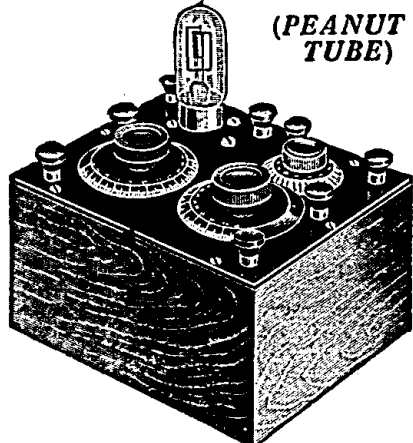
HUDSON-ROSS
123 W. Madison St. Chicago

GREWOL

Enclosed Crystal Detector
Attractive Dealers' Discounts

WERNES and PATCH
159 N. State St., CHICAGO

WD-11 OUTFIT



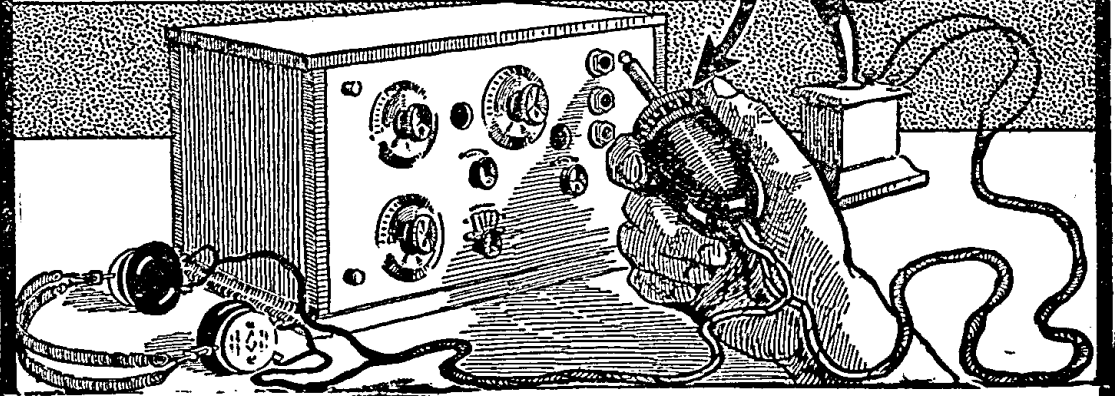
This wonderful dry battery outfit with a range of 600 miles comes to you ready to assemble, panel drilled and marked, mahogany finished box, condenser ready to screw in place. Variocoupler wound complete, rheostat, dials, binding posts, socket, wire, screws and picture diagram for wiring, all at above price. **\$13.85** Less Tube

- Two-stage Amplifier Box to match the above. \$14.15
 - Variocouplers, \$4.00 value. 2.85
 - Variometers, \$4.50 value. 3.10
 - Transformers, \$4.50 value. 3.75
 - Reinartz tuning coil, \$3.00 value. 1.85
 - Rheostat, \$1.00 value. .80
 - Sockets, 50c value. .30
 - 1/2" switch lever, 50c value. .30
 - Baldwin type "C" phones, \$12.00 value. 9.00
 - Frost or Murdock phones, \$5.00 value. 4.25
- Postage extra. No personal checks received. Let us quote on your wants.

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Turn it till you hear it click

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YOU must have a FOUR WAY Radio Switch Plug!—the latest and greatest improvement in Radio.

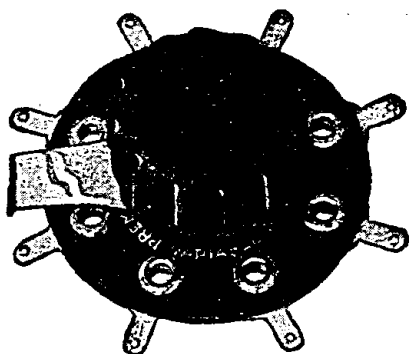
A switch plug that makes it possible to tune in through head set and switch in loud speaker by turning dial. Two head sets can be readily attached, or one head set and loud speaker. Both can be used at the same time or either one alone.

- Turn 1: Head Set
- Turn 2: Loud Speaker
- Turn 3: Both in Series
- Turn 4: Both in Parallel

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Four Way Company
Dept. C, Springfield, Mass.

Questions and Answers

Long and Short Wavelengths
(2064) GMF, Los Angeles, Calif.
Does the Flewelling circuit amplify the short wave lengths more than the longer waves the same as the other super receivers?

Using the proper size coils what is the effective wave length range of this circuit?

Could a peanut tube be used in this circuit? Is a peanut tube so critical that when using it as an amplifying tube vernier rheostats need be employed for long distance reception?

A.—Its action of amplification is the same as that of other super circuits in respect to wave lengths. Its effective wave length range is up to about one thousand meters, using proper inductance coils. A peanut tube may be used and is not critical enough to necessitate vernier rheostats for long distance reception.

Condenser Value and Potentiometer
(2133) AS, Oak Park, Ill.

I would like to try out Hook-Up R.D.65. Please advise the value of the variable condenser shunted across the secondary honeycomb coil and the condenser between potentiometer and one lead of the same coil.

A.—With relation to R.D. 65, a variable condenser of .0005 mfd. capacity is shunted across the secondary honeycomb coil, and either .0005 or .001 mfd. capacity between potentiometer and one lead of coil.

Body Capacity
(2150) HCH, Charleston, W. Va.

Please advise me how to eliminate body capacity. I was told to put tin foil on the back of the bakelite. I did this and connected it to the ground. It helped some but still bothers me very much. I have a three-circuit tuner; variocoupler, variable condenser and two variometers. I get very good results otherwise. I would like to ask also about getting the same stations every night. I get stations from the North, East and West of here but nothing from the South.

A.—There is no practical means of reducing body capacity effect other than the method of shielding as suggested. In

itself shielding somewhat reduces the efficiency of a set and of two evils it seems sometimes a matter of choosing the lesser.

In the matter of your failure to receive stations to the south of you, while receiving from other directions, if the condition is persistent, it is doubtless due to some intervening obstruction, mineral deposit or electric lines.

Reflex Circuit
(2320) EDC, Tecumseh, Neb.

Where should the .002 mfd. fixed condenser be placed in the reflex circuit shown in Radio Digest of January 6?

Would a UV-201 do as well as the Myers tube installed with proper control?

How many turns of wire should one use on a loop? Would a larger loop (a larger frame) be better?

Received WWJ, WFAA and KSD very clearly on a homemade loose coupler and a crystal detector about two weeks ago.

A.—The .002 mfd. fixed condenser is to be placed in the lead one side of which is connected to variable condenser and input and the other side of which goes to rheostat and negative battery.

A UV-201 tube will serve effectively as suggested.

Winding Phone Coils
(2433) GJ, Springfield, Mo.

I wish you would please publish what size wire to use and how to wind an old pair of phones into about 2,000 or 3,000 ohms.

A.—You should use No. 40 S.C.C. wire

and wind each coil full. Care must be exercised to have the polarity of the fixed magnet the same as that of the electric magnet. To determine this use a battery and compass. If with the current flowing through the coil, the electro-magnet attracts the same end of the needle on a pocket compass as the corresponding pole of the fixed magnet, the polarity is correct. This should also be true of the other side of the fixed magnet and its electro-magnet with the exception that they should both attract the opposite ends of the compass needle.

About eight turns of wire on loop will serve. A four-foot frame would be better. We are pleased to congratulate you upon your DX reception with a crystal detector set.

Another cause of fading is the rapid change in barometric pressure between the receiving station and the transmitter. A dense fog between the two stations may absorb some of the radiated energy.

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Investigate the opportunities offered through taking either our RESIDENCE or HOME STUDY COURSE of radio instruction. Conducted by the RADIO CORPORATION OF AMERICA—no new operators accepted by the Eastern Division of that corporation other than our graduates.

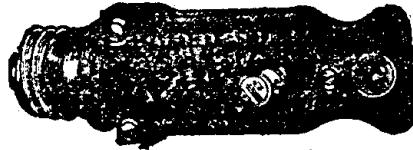
Write for complete information.
RADIO INSTITUTE OF AMERICA
(Formerly Marconi Institute)
323 A Broadway New York City

FREE DIAGRAM AT YOUR DEALER

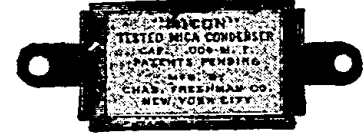
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.006 Mica Condenser.....**\$1.00**
.001 Mica Condenser..... **.40**

OTHER "MICON" SIZES

Size	Price	Size	Price
.00025	\$.35	.0025	\$.50
.0005	.35	.005	.75
.002	.40	.01	1.50

At your dealer's—otherwise send purchase price and you can be supplied without further charge. A diagram of the Flewelling Super Circuit sent free if your dealer can't supply you.

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My Highly Improved Reinartz brings in all important stations on both coasts and Mexican border, loud, clear and without distortion. We dance to music from Atlanta received on one loud Baldwin unit. Build one of these wonderful sets from my blueprints and specifications, price 50c, or with a perfect and complete double wound spiderweb coil, \$3.00 by mail. No other windings used. Photo of my set on a glass panel with every order.
This copyright 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.
Either set is easy to build, easy to operate. Everything clearly shown. These high quality silk insulated coils are machine wound on fiber forms. I wind coils to your specifications in lots of 100 or more. Write for prices.
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REAL RADIO BARGAINS

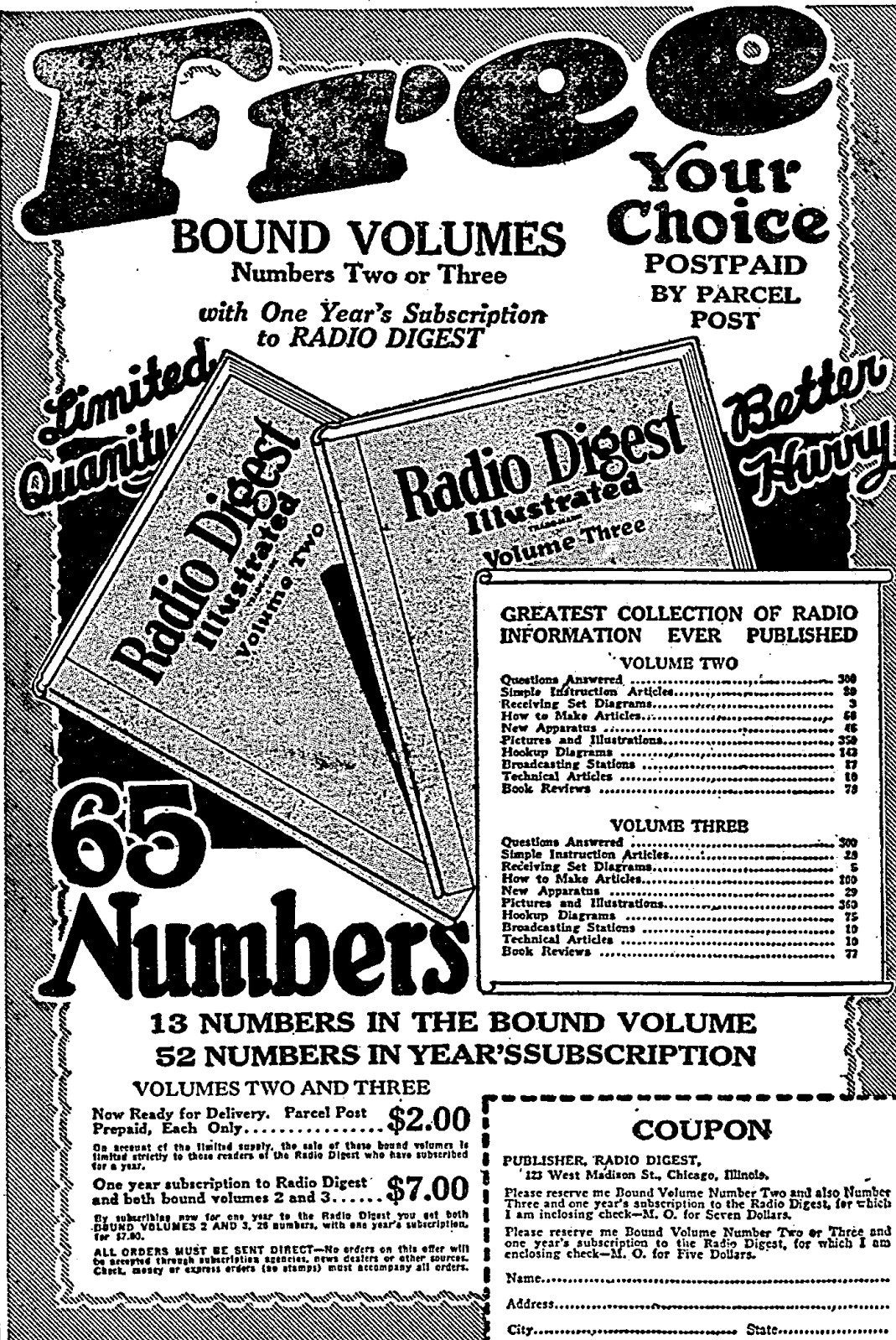
- VARIOMETERS:**
Feri (Revolving stator).....\$2.25
Raysol (Kiln dried parts)..... 2.50
Atwater-KentSpecial Pr.
- VARIOCOUPERS:**
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Dubiller condensers all types and capacities including Variadons in stock.....Special Pr.
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Paragon Standard..... 1.05
Framingham..... .70
Bradleystats..... 1.85
Roberts (6 ohm standard)..... .70
General Radio (Any and all resistances) Special Pr.
Radio Corp.Special Pr.
FadaSpecial Pr.
- POTENTIOMETERS:**
Radio Corp. PR 536 (200 Ohm).....Special Pr.
General Radio (400 Ohm).....Special Pr.
Atwater-KentSpecial Pr.
Framingham (200 Ohm)..... 1.10
Paragon (200 Ohm)..... 1.60
Amsoe (150 Ohm)..... 1.10
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Rameco (Fine quality)..... .40
Turney (All metal fine finish)..... .25
De Forest (Moulded).....Special Pr.
General RadioSpecial Pr.
Radio Corp. (UR 542).....Special Pr.
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Triple (Fada).....Special Pr.
WD 11 (Rameco)......40
WD 11 (Bell Panel or Base Mtg.)......90
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Radio Corp. UV 712.....Special Pr.
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Electrose 4-in. Fada Knob..... .75
Emaloid 3-in. Unbreakable..... .35
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All Standard Tubes in stock at.....Special Pr.
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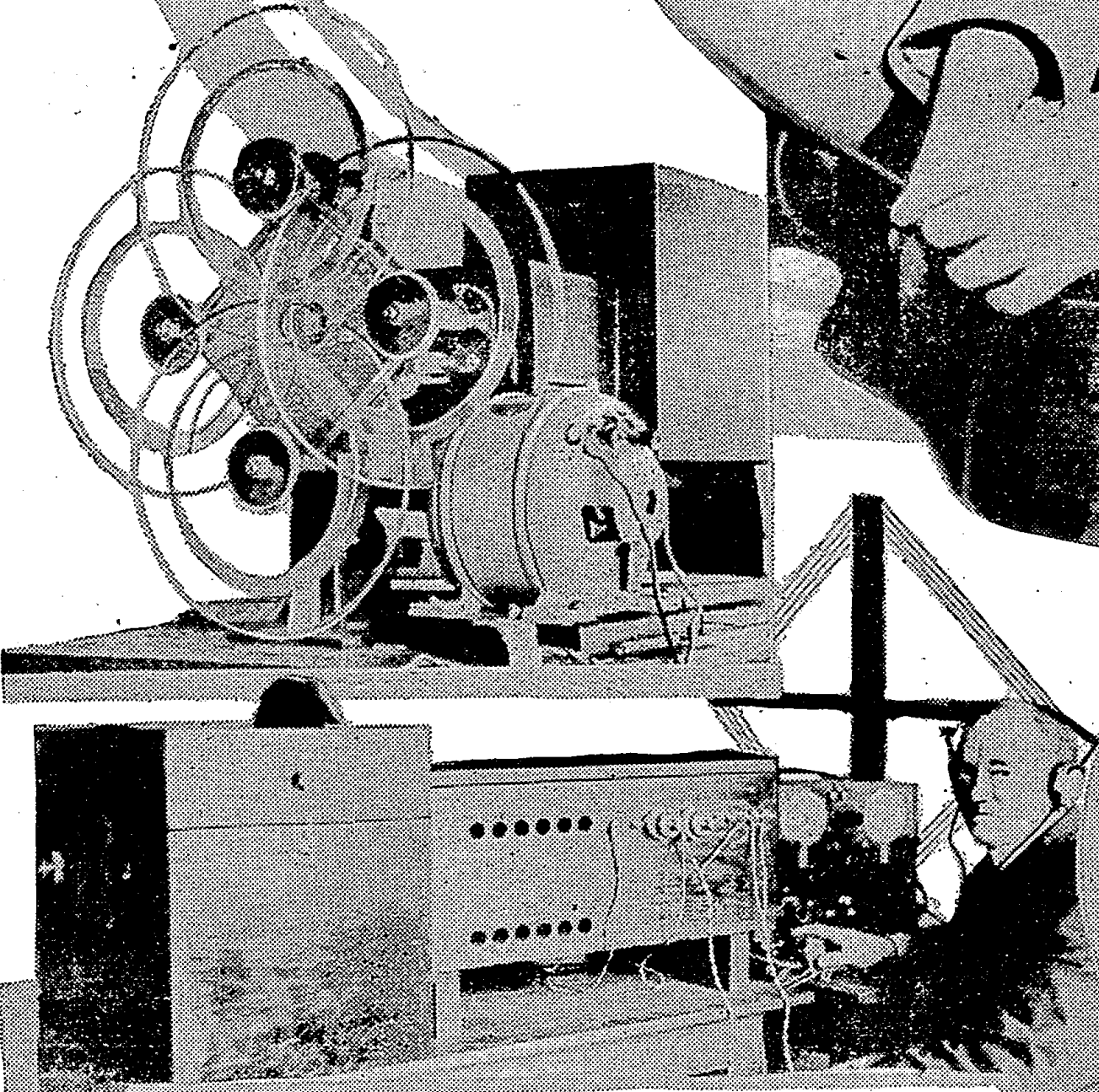
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Radio Illustrated

Jackie Coogan, the youngest movie star, is shown using a crystal set he made all by himself
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Pictures seen and heard at the same time, via Radio, is the new hope of C. Francis Jenkins, the inventor of the photographic Radio picture transmission. He has already sent and received photographs via Radio and is working on an invention that will not only show the event in stills, but will show the action on screens in picture houses throughout the United States. Mr. Jenkins asserts that while his idea seems beyond the realm of possibility, it is very practical in theme. In tests already made, pictures have been sent for short distances of ten or fifteen miles, but plans are being formulated for transmitting photographs via Radio over distances of a hundred miles or more. Insert above is the principal unit of the transmitter, showing the circular disk prism which forms the key to the Radio problem of sending photographs via Radio
© Newsreel

The amateur receiving set contest now in progress at the Radio Fair at the Hotel Imperial, New York City, has drawn entries from all parts of the country among which are many unusuals. Above is a novel entry in a vacuum tube set with spider web inductances, all mounted on the base of a standard audion socket
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