Neutrodyne; How to Operate Sets; Wave Traps

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

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MOVIES TO HELP RADIO

Left, Miss Gladys Helmund, drummer of "Marjorie Moore's Melodious Maids," who were heard recently when they entertained visitors to the Cleveland Auto Show from WJAX. Cleveland isn't half bad with such attractions, is it?

In the circle above, Marjorie Moore herself, "boss" and cornetist, and right, Gladys Jaeckal, saxophonist, of the same organization.

METHODIST CHIEFS EYE RADIO STATION

BISHOP OF CHICAGO ASKS BROADCASTING PLANT

Committee, Named to Work with Like Body, Offered $1,000 to Establish Fund

CHICAGO.—Whether or not Radio was fundamental or modern in relation to its use evidently made no difference recently to churchmen in convention in this city. Both the orthodox and the liberal declared that Radio was necessary to the spread of religion. And both confirmed, in a sense, the recent story published exclusively by Radio Digest and reprinted almost all over the world that Christian denominations everywhere contemplated the use of Radio which ultimately might unite all churches.

Urges Early Action

During the convention here a few days ago of the board of Sunday schools, Methodist Episcopal church, Bishop Thomas Nicholson, of this city, head of the Chicago area, urged the early establishment of a Radio station to broadcast religious messages undenominational in character.

The cost of such a plant, estimated at $50,000, did not deter W. E. Carpenter of Brazil, Ind., and C. W. Fletcher of Gassoway, W. Va., from offering $500 each as the nucleus of a fund. A Radio committee was appointed to co-operate with a similar body named previously here by the Methodist board of benevolence.

HOTELS ALSO VOTE AID IN MUSIC FIGHT

Broadcasters Winning in Struggle to Free Popular Music for Radiophans

Two Song Publishers Quit

Prominent Members Resign from American Society—Value Radio Advertising Above "Trust"

CHICAGO.—Waxing hot as it spreads nationwide, the battle of Radio against the American Society of Composers, Authors and Publishers has been strengthened by the addition to the ranks of the National Association of Broadcasters of 16,000 motion picture theaters, 2,000 hotels and 800 dancing academies, the proprietors of all of which oppose the "music trust" and are determined to carry to a finish the already partly successful fight.

To add to the victory achieved by the enlistment of the co-sufferers under the lash of the A. S. C. A. P., came an announcement at the end of the recent meeting of the movie, hotel and dancing academy in-

(Continued on page 5)

"BREAKING INTO MOVIES" BY WJAZ

FILM FANS TO GET SCENES IN BROADCAST PLANT

Chicago Station Shown in First Complete Picture of Kind Ever Made

CHICAGO.—A praiseworthy bit of co-operation with the Radio Industry has just been released by a "movie" news weekly in the shape of "Behind the Scenes of a Broadcasting Station."

Gene McDonald, of the Zenith-Edgewater Beach hotel broadcasting station, and Ray L. Hall, head of the news weekly, chanced to meet one day on the stage of a theater in New York City.

"Radio speaking, I am rather well acquainted with WJAZ," said Hall. "It has often entertained me in my home in New York state. I have never seen the station—often wondered what it looked like."

Said McDonald, "I shall be glad to arrange that not only you see it but all of your big family of 'Kinogram' fans the country over." That was the start of the film.

What the Picture Shows

Next to seeing the station actually, the picture is the closest to a full realization of the beauty of the Crystal studio, the complexities of the operating and motor rooms, the gaiety of the guests in the Marine dining room of the hotel, the eager faces of the famous Oriole orchestra, and all that happens when the artist stands in front of the microphone and sings to 8,000,000 or more WJAZ listeners.

"Movie" audiences are introduced to such grand opera stars as Florence Macbeth, Angelo Minghetti, Virgilio Lazzari, Mary Fabian and Myrna Sharlow of the Chicago Civic Opera Company in periodic flashes of the Crystal studio. The picture shows how the concert is put on the ether at the moment it is being received in different parts of the country.

It is the first glimpse most Radiophans have had of a broadcasting station. Since announcements as to the film were made by Station WJAZ "movie" houses everywhere have been stormed with inquires as to when the film would be shown.

Wolf Pack's Howls Clash with Voice of WEAF

Frozen North Plugs in for Civilization

NEW YORK.—Writing recently from the 'land that God forgot,' H. P. Bracken, of Twin Falls, Ontario, Canada, not far from James Bay, said in a letter to Station WEAF:

"We are a hydro-power plant on a frozen northern river not far from James Bay, bounded on all sides by endless forests. It is necessary only to open the door to hear a wolf-pack howling somewhere 'back beyond.' The contrast makes a fine illustration of the progress of civilization."

Ether Control Subject of Rumpus in Germany

WASHINGTON, D. C.—Until a short time ago the post office authorities in Germany had a complete monopoly of Radio service. It is only lately that they have granted permission to special companies to construct broadcasting stations and given licenses to private persons to buy receiving sets.

The question of control is causing much controversy. Persons advocating control say that Radio is a "luxury" and should be subject to taxation as such, and contend that it will only be possible to finance good broadcasting programs if the matter remains under government control.

The first private license was issued in Frankfort just one month ago. The number granted since is not great.

Blizzard Ruins Joliet Station

JOLIET, ILL.—"Butch" Crowley, Joliet's most noted citizen, had maintained a broadcast station, WWAE, on the roof of his Alamo dance hall. The jazziest tunes from the Alamo were broadcast from WWAE every night there was a dance. The blizzard hopped along and recently turned WWAE into a wreck.

Additions to WAAM Orchestra

NEWARK.—The addition of five instruments to the already popular WAAM dance orchestra was one of the first steps taken by Marlon K. Gilliam, new program director at WAAM, Newark, N. J., in his efforts to restore the quality of the programs and the standard of the participating artists.

Lay Bases for Vancouver Masts

VANCOUVER.—The first step in the erection of the Radio station at Vancouver, unit of the Royal Canadian air force, has been completed in the laying of cement foundations for the masts. The new station will be powerful enough to communicate with High River, Alta., nearly 500 miles east.

Coolidge's Lincoln Day Speech on Air

President's Address Before G. O. P. Meeting Broadcast by WJZ and WGY

SCHENECTADY.—Through co-operation with Station WJZ of New York, WGY, Schenectady, broadcasting station of the General Electric company, arranged to transmit the address of President Calvin Coolidge during the Lincoln birthday celebration of the National Republican Club of New York in New York City.

Broadcasting pick-up circuits, connecting Schenectady with the equipment of Station WJZ, enabled WGY to give the details of the celebration to its listeners.

Club Women of Illinois Use Radio as "Booster"

CHICAGO.—Broadcasting greetings to 700,000 members of the Illinois Federation of Women's clubs, Mrs. George Thomas Palmer of Springfield, president, recently delivered the first of a series of weekly Radio talks to be broadcast by members of the organization from The Daily News station WMAQ.

"I am proud of the privilege to inaugurate this series of personal talks," Mrs. Palmer said, "to the women of Illinois. These messages will be broadcast until the story of what the women's club movement really means has been made clear to all of the people of this state."

OMAHA FANS MEET TO FORM LISTENERS' CLUB

Plan Monthly Gatherings to Discuss Their Problems

OMAHA.—The Omaha World-Herald broadcast a requested program recently between 8 and 9:30 p. m. (Central Standard time), from Station WAAW, Omaha grain exchange, this city, for several hundred disabled ex-soldiers and nurses, in Veterans' hospital No. 55, Fort Bayard, New Mexico.

Immediately before the broadcast of the program, an Omaha Broadcast Listeners' club was organized on the trading floor of the exchange. Monthly meetings were planned. Only broadcast listeners—those who operate crystal and tube receiving sets—were made eligible.

This is said to be the first broadcast listeners' club in this section.

Penal Board Shuts Down on WOS Prison Band Concerts

JEFFERSON CITY.—The Missouri state prison band and orchestra which have been broadcasting two concerts each week from Station WOS in the capital, will be limited to two such entertainments each month in the future, the penal board has announced.

No reason for the curtailment of prison programs was given other than that state authorities did not want to permit the convicts to leave the prison oftener.

British daily papers are advocating the institution of a regular broadcast service of the debates in the House of Commons.

CONTENTS

Radio Digest, Illustrated, Volume VIII, Number 7, published Chicago, Illinois, February 23, 1924. Published weekly by Radio Digest Publishing Company, 123 West Madison Street, Chicago, Illinois. Subscription rates, yearly, Five Dollars; Foreign Postage One Dollar additional; single copies Ten Cents. Entered as second-class matter at the postoffice at Chicago, Illinois, under the Act of March 3, 1879.

"All the Live News of Radio".....1 to 8
Government Complaint against R. C. A..... 9
Operating and Trouble Shooting for Owners of Standard Receivers.....11, 12, 13
An Evening at Home with the Listener In; Wave Traps Now on the Market..... 14
Advance Programs for the Current Week.....15, 16, 17, 18
King Miloplex New Trick Circuit Detailed, Part XX—Amplification of the Wizard Miloplex, by the Mystery Man..... 19
Editorials; Indi-Gest; Condensed, by Dielectric..... 20
How to Make a Lighthouse Keeper's Receiving Set, Part III, by S. R. Winters..... 21
Simple Explanation of Radio for Everybody, Chapter XI, Part II—Dry Cells and Storage Batteries, by M. W. Thompson.....23
Construction of a Four-Tube Reflex Neutrodyne, Part I—Hook-Up Diagram, by H. J. Marx..... 25
Four-Tube Armstrong Circuit Variation..... 27
Neutralizing Circuit Quickly, by John P. Davis; Review of Books..... 29
Questions and Answers..... 30
Radiophone Broadcasting Station Directory..... 31
Radio Illustrated, a Page of Pictures..... 32

Looking Ahead

Wave Traps by an Expert at Trapping the Waves—the Mystery Man. The inventor of the Miloplex will tell you next week how to set up some real interference eliminators. If the wave traps function as good as does old King Miloplex, we won't need silent nights to get past the local stations.

Programs from all the Big Broadcasters Every Week—in advance, too, so you can select your stations and the features you like most to hear. Several readers have commented recently on our "new" advance program feature. It isn't new, really. The advance programs have been given for over a year.

Four-Tube Reflex Neutrodyne by H. J. Marx—Next week will see the continuation of instructions for building this unique design of the popular Hazeltine set. Mr. Marx will give the panel layout, and views of the panel shield, if one is desired.

Radio Frequency Amplification Explained Simply—by M. W. Thompson next issue. Have you been following Mr. Thompson's comprehensive series on the principles of Radio? Begin this week. You'll like the series.

For the Set Buyer, Another "How to Operate" Article—telling the essentials of "chauffeuring" the dials of standard sets and describing the necessary "carburetor" adjustments—is planned for next week.

"First Aid and Helpful Hints for Listeners In" is the title of a series by Peter J. M. Clute to start next week. The first article tells about regenerative sets and gives several popular circuits.

Newsstands Don't Always Have One Left

WHEN YOU WANT

Radio Digest

YOU WANT IT!

BE SURE OF YOUR WEEKLY COPY BY SUBSCRIBING NOW

SEND IN THE BLANK TODAY

Publisher Radio Digest,
123 West Madison St.,
Chicago, Illinois.

Please find enclosed check M. O. for Five Dollars (Six, Foreign) for One Year's Subscription to Radio Digest, Illustrated.

Name .....

Address .....

City..... State.....

TUBE GIVES "RADIO TRUST" NEW BLOW

WATER-COOLED TRIODES AID TO INDEPENDENTS

Station WTAM's Quick Adoption of Novel Device Balks Western Electric Company

CLEVELAND.—Another blow was delivered at what the Federal Trade commission recently called the "Radio trust" when Station WTAM, Willard Storage Battery company, this city, successfully defied the Western Electric company by installing and operating a water-cooled, new broadcasting circuit three hours after the company is said to have accused the station of violation of patent.

Station WTAM now is one of the few large plants in the United States operating independently of the Western Electric and its allies.

Water-Cooled Tube to Rescue

It was while the station faced a lawsuit that Fred F. McCullough, Radio engineer for the Glenn L. Martin company, pioneer in the development of Radio apparatus for airplanes, came to the rescue. His water-cooled device was installed after the Western Electric contrivance had been dismantled and removed. The delay in broadcasting was short. And the efficiency of the station was increased, it was said, although the maximum rate of the new installation was not applied.

The McCullough tubes are smaller than the 250-watt glass vacuum tubes. Two of the former tubes do the work, it is reported, of eight of the latter. The McCullough tube is equipped with a new filament material capable of extremely high electronic emission. It is also distinguished by a new grid arrangement and an airtight, heatproof seal between copper and glass. The McCullough tube operates, it is said, at a plate voltage lower than any other.

The McCullough interests declared that their tubes are covered by patent. They may compete soon with the factors of the alleged "Radio trust."

Icebound Boats Upset Things for These Fans

Wolverines Hope Wind Will Blow Trouble Away

DETROIT.—The joy seems to have gone out of life for hundreds of Radio fans in Holland, Grand Haven, Muskegon, and other towns in this state. They are "kicking" because they have trouble hearing clearly the big broadcasting stations of the nearby cities.

After much investigation the trouble was laid to the icebound boats in the harbors, equipped with Radio. The fans are waiting for a shift in the wind that will set the craft free.

Two-Way Radio Price Plan Aids Texas Spinach Men

LAREDO, TEX.—While transmission of market news by Radio to farmers, stock growers, and remote business interests long since entered the commonplace, Texas has taken the first steps, it is believed here, by which a two-way service is maintained.

The price of spinach raised in this section of the state is stabilized and the raisers given the advantage of knowing just what they should charge the consumer through a Radio service connecting them constantly with the state bureau of warehouses and markets. Then these prices, which really are the farmers', are sent out. To make the service successful it was necessary to obtain the assistance of Station WCM, the University of Texas station, and the station of the signal corps at Fort McIntosh. With the help of these two Radio units, the reports come in and are sent out from this city through S. T. Phelps, operator of amateur station 5MT, official relay station of the American Radio Relay league.

Gives Course in Chamber Music

NEW YORK.—The Adolph Lewisohn free public course in chamber music presented by Hunter college under the direction of Dr. Henry T. Fleck, is broadcast each Thursday evening. Dr. Henry T. Fleck founded the free concert system in the public schools of New York. The nature of the series of recitals was explained to a Radio audience recently by Mrs. Maxwell Hall Elliott, a trustee of Hunter college.

Wants Radio for New Zealand

WELLINGTON.—Premier Massey, who recently said that New Zealand must have a high-power Radio station to keep abreast with Empire progress, intends to submit proposals to the cabinet for the erection of a station linking New Zealand with London and other centers.

RADIO BESTS SNOW; HAILED AS SAVIOR

CITIES AND TRAINS AIDED AS WIRE SERVICES FAIL

Newspapers, Railways and Other Great Business Bodies Praise Broadcaster Volunteers

CHICAGO.—What was declared to be one of the greatest feats of science, one that would advance research and experiment perhaps more than any other, was that accomplished by Radio during the recent blizzards which bound the greater part of the United States east of the Rockies and north of the Ozarks. When every other means of long-distance communication had failed, when despite heroic efforts cities were isolated and the commerce and welfare of millions of people were imperiled, Radio came to the rescue.

Press Services Hail Radio

The world's greatest engineers in science and finance enthusiastically acclaimed Radio as the master of the future. Chief among those who thus hailed Radio were high executives of railway companies, the Associated Press, United Press, International News and like services, the Board of Trade, and other powerful commercial bodies, and the Red Cross.

The use of Radio to relieve suffering caused by the blockade of railroads was predicted a few months ago by Radio Digest. At that time many leading railway officers had practically completed a national scheme to co-ordinate broadcasting stations into a vast rescue or relief agency.

Radio's Work Highly Praised

When the storm of snow, sleet and wind was worst, when trains and towns were severed from civilization, Radio was impressed into service as a last hope. Almost every broadcasting station in the country voluntarily tried to re-establish communication. Among the plants whose work was highly praised were Station WMAQ, Chicago Daily News; 9 AAW, DX, W. E. Schweitzer, Chicago; WSE, code station, Long Island, N. Y.; KYW, Westinghouse, Chicago; WTAS, Elgin, Ill.; WHB, Kansas City, Mo.; WOC, Davenport, Ia.; 9 ZA, 9 BGT and 9 BZI.

Broadcasters of every kind and power were besieged by urgent business and private messages. Daily newspapers all over the affected area printed their appreciation of the fact that had it not been for Radio they would have been compelled to appear locally, virtually devoid of domestic and foreign intelligence.

The storm proved the commercial supremacy of Radio, its immunity to the elements.

Manufacturers Honor E. T. Flewelling, Inventor

Famed Air Wave Engineer Appointed to Committee

CHICAGO.—E. T. Flewelling, of this city, famous Radio engineer, whose invention of the Flewelling super "flivver" upset Radiodom more than a year ago, was recently honored by an appointment to the Radio receiving and transmitting sets committee of the National Association of Electrical Manufacturers. The committee is specializing in the development of standards for Radio apparatus.

Flewelling's appointment is undoubtedly the result of his pioneering in the education of the public to the use of first quality parts in their receiving and transmitting sets. He is sponsor of the idea of a central laboratory for the testing and rating of Radio parts, some of which, manufactured by even the largest manufacturers, are notoriously deficient as to performance.

Now They Want the Eggs

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

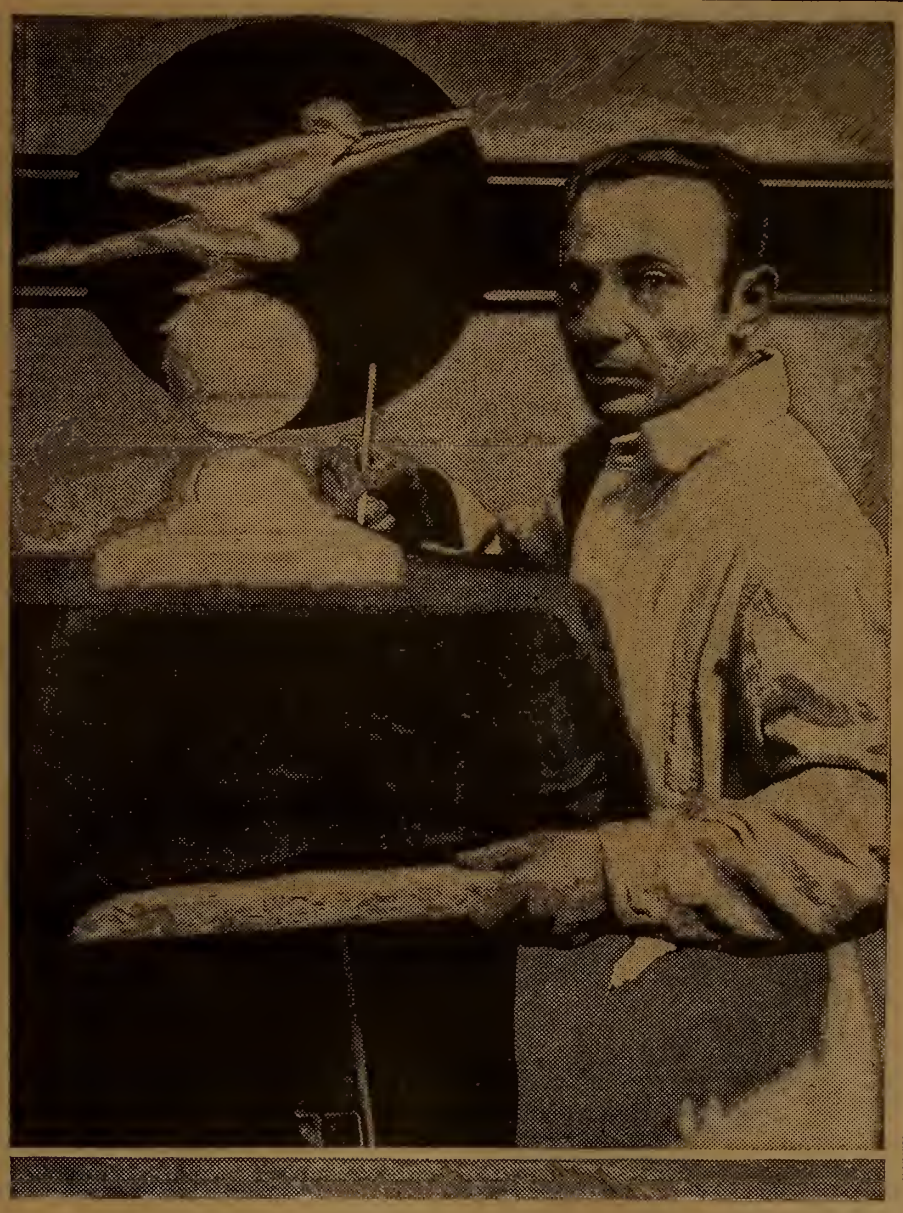
OH, NO! THESE COPS! YOU CAN'T FOOL 'EM

KANSAS CITY, MO.—Police generally are supposedly not moved by the frequent low estimates of their ability and knowledge placed by persons sometimes outside the law. The Kansas City police are no exception; but even they remonstrated when George Lear, alleged bootlegger, recently attempted to convince two city detectives that the copper coil found in his basement was Radio apparatus.

ALL WIRES FAIL, BUT RADIO HELPS WIDOW

CHICAGO.—After the telegraph and the telephone had failed to inform her kin in St. Louis that her husband had been fatally burned in a collision of electric interurban cars in Indiana, a woman here resorted to Radio by means of Station WJAZ, Edgewater Beach hotel. Her family finally informed the widow, by means of a railway telegraph line, that they had received her message.

"RADIO" SPIRIT OF STATUETTE



Leo Bayman, well-known New York sculptor, has electrified art circles with his newest bit of sculpture, entitled "Radio." It will soon be placed on exhibition. Radiophans will be interested in examining this unusual piece of work. Note the angular pose denoting the legendary Radio or lightning flash. © Keystone

RADIOPHANS TO PICK BEST CONTEST SONGS

New York's Musical Competition Closes March First

NEW YORK.—Paul Specht's amateur song contest for unknown writers conducted over WJZ twice weekly will come to a close on March 1.

The Radio public will be the judges. The prizes include a $200 credit at the Alamac hotel, a $175 phonograph, a Radio set valued at $120 and an $80 saxophone.

Tunes In 406 Stations in 5 Months—a Record?

FORT WORTH, TEX.—A record in receiving programs of different broadcast stations is claimed by Otho Cunio, Radiophan here, who asserts he tuned in 406 stations in the last five months. Cunio's total in October, 1923, he says, was 365 after two months' work with a single circuit set.

Only a single stage of amplification was added with the result that in the next two weeks his total was brought to 403 stations. Since then he has received three other stations.

URGES DISCARD OF 450-METER CODES

TERRELL OFFERS WAY TO END INTERFERENCE

Recommendation for Elimination of Service Is Sent to Secretary Hoover, Report

WASHINGTON, D. C.—There is only one thing that can be done to eliminate the 450-meter code interference, according to Chief Radio Inspector Terrell—discontinue the service. It is understood that a recommendation to this effect has been submitted to Secretary of Commerce Hoover. The recommendation is the result of a recent conference in New York city.

Terrell said it was advisable to discontinue the 450-wave length code particularly along the Atlantic coast, that the code on the Pacific coast is causing no trouble; if it is, practically nothing is heard of it here.

Other Channels Necessary

The inspector declared that if the wave length should be discontinued, the department, of course, would have to provide other channels for ship and shore stations. Much of this traffic, Terrell explained, is for ships' positions. The position reports, generally sent out at about 8 o'clock each night are particularly objectionable because they interfere seriously with entertainment. He thought it migh be possible to induce the ship and shore stations to do away with the position report.

Terrell said that practically every American vessel and many foreign craft are equipped with apparatus for the 450-meter wave length. There are 2,700 American ships so equipped. He said that if the licenses were changed the ships could go on a 600- or 706-wave length.

See Bugaboo's End as Ships Drop 450 Wave

New Canadian Policy Enabled by Conference with U. S.

OTTAWA.—Canadian policy has succeeded internationally in promoting the interests of Radio users through the elimination of one of the principal causes of interference—the use by ships in communication with the shore of the 450 meter wave length.

So declared Commander C. P. Edwards, Canadian director of Radio, who returned recently from a conference in New York, where the policy of the Canadian Radio administration was adopted.

The proposal of the United States government representatives at the international conference was that the ships be prohibited from using the 450 meter wave length between seven and 11 o'clock at night, the broadcasting hours, except in emergency.

"ROXY" GETS HIS CARD AND A WAGER IS WON

All of Which Proves Popularity of New York Announcer

NEW YORK.—S. L. Rothafel is treasuring a postcard postmarked Washington, D. C., which was delivered at the Capitol theater recently and which bore on the address side, the single word "Roxy." It is as "Roxy" that Mr. Rothafel is known to thousands of Radiophans who listen in on the concerts broadcast from the Capitol through WEAF here every Sunday night. The message on the other side of the card read:

"I have a small wager that a postcard addressed as is this one would reach you. If it does, it proves (1) the efficiency of the postoffice and (2) the extent of your popularity. Do I win the bet?"

The card was signed "S. M, Bernhardt, 1443 T Street, N. W., Washington, D. C. and postmarked January 21st. Mr. Rothafel telegraphed back "You win!"

THE ANTENNA BROTHERS — Spir L. and Lew P. — WOW Coming In

WEAF'S BIG POWER MAY ADD TO SALES

FANS SEE A. T. & T. AID WESTERN ELECTRIC

Increase in New York Station's Power Causes Changes in Receiving and Sending

NEW YORK—Reports circulated recently all over the United States by Station WEAF, American Telephone and Telegraph company, here, that its increase in power had bettered reception after proper adjustment had been effected, was interpreted as a "boost" for the sale of devices deemed necessary, not only for listeners in but for broadcasting stations with lesser volume.

Station WEAF is owned by the "telephone combine" which in turn owns 98 percent of the Western Electric company. The latter concern practically controls, it is said, the sale of broadcasting equipment.

A. T. & T. "Explains" Move

"It has long been realized by Radio engineers," the A. T. and T. company declared, "that there can be no further improvement in broadcasting conditions, particularly in relation to spark telegraph interference, until it is possible to increase the power of (New York) stations." The improvement, the company asserted, applied not only to expensive receiving sets but to inexpensive. "Sets possessing vacuum tubes with many stages of amplification," the company said, "are able to operate successfully (because of WEAF's increased power) with reduced amplification, thus avoiding the overloading of tubes and bettering the quality of reproduction."

Receiving sets a short distance from Station WEAF's transmitter or those not adapted to selective tuning may at first experience unsatisfactory reception, the A. T. and T. warned. "However, such conditions may certainly be corrected by simple adjustments," the company declared.

WTAM Plans 3 A. M. Programs for Coast

Cleveland Station to Feature Storage Battery Power

CLEVELAND.—Station WTAM, Willard Storage Battery company, recently began a special 3 o'clock in the morning program for listeners in west of the Mississippi, particularly those in the Pacific coast states.

Station WTAM has been heard clearly in the Hawaiian islands. Broadcasting on storage battery power alone, as WTAM does, there is a clearness to the signals, when received at long distances, that distinguishes the station, it is said.

Officials of WTAM arranged the concert so there would be no broadcasting, either east or west.

RADIO HELPS SEARCH FOR 5 BANK BANDITS

Directs Work of Police in Illinois Cities

CHICAGO.—Chicago police recently responded to Radio messages from the University of Illinois broadcasting station at Urbana asking co-operation in heading off five auto bandits who held up the Commercial bank at Champaign and escaped with $10,799 in cash.

The messages were relayed to the police by Radio amateurs here. Squads of police in automobiles were dispatched to patrol the roads leading into Chicago from Champaign. Captain George H. Weidling of the county highway police announced that he had sent two automobiles filled with men armed with sawed off shotguns to guard the roads.

Loud Speakers on Ship to Entertain Voyagers

NEW YORK.—When the steamship Kroonland recently cleared the bar at Sandy Hook on her way to California ports via the Panama Canal, there was begun one of the most interesting tests that has yet been made wtih portable Radio loud speakers at sea.

The ship had been equipped with portable loud speakers that enabled her passengers in all three classes to hear music, speeches and other matter broadcast from shore stations.

Airwaves May Yet Sell Old Alabama Courthouse

BIRMINGHAM, ALA.—The board of revenue of Jefferson county will use Radio to assist them to sell the old Jefferson county courthouse. It is in the business section of Birmingham, and is valued at $1,200,000.

The board of revenue will broadcast a description of the property, and the fact that it is offered for sale, over Station WSY.

AMATEUR GETS BOWDOIN DIRECT

Bartholomew Molinari, San Francisco high school student, exchanged Radio greetings recently with the Donald B. MacMillan Expedition ship Bowdoin, now near the North Pole. Molinari worked his message direct without relay. He used a 250-watt transmitter. Photo shows him with his sending apparatus. P. & A. Photo

"Wonder Man" Tries to Read Minds Over Radio

CHICAGO.—Alexander the Great, the "man who knows," who appeared in a theater here recently, went on the air here a few days ago by means of Station KYW and an evening newspaper.

He tried to read the minds of his listeners.

Norse Fear Amundsen's Arctic Ship Is Grounded

CHRISTIANA, NORWAY.—It is feared here that the Amundsen exploration ship Maud, which is drifting with the ice in the Arctic ocean, is in danger of grounding on the New Siberian islands. A recent Radio message from the vessel gave its position as lat. 75.13 north, long. 156.45 east.

BREAKS RECORD IN SHORE-SHIP TALK

9,300 MILES; RECEPTION IN DAYLIGHT PERFECT

Boat Operator Picks Up Commercial 600-Meter Waves from WIM, Chatham, Mass.

NEW YORK.—All records were broken for commercial 600-meter continuous wave transmission when Operator M. A. Obradovic, of the steamship West Nilus, while 95 miles north of Wellington, New Zealand, recently copied a number of messages direct from WIM, the Radio Corporation of America station at Chatham on the Massachusetts coast. Perfect reception was obtained in broad daylight.

The distance is 9,300 miles.

Obradovic, whose reception has been checked and confirmed, sent a letter to the marine superintendent at Chatham, in which he reported the history-making achievement. The letter which reads in part as follows reached the United States more than 50 days after it was mailed in New Zealand:

"Enclosed is one of a number of messages which I have been copying from WIM on 600-meter C. W. The enclosed was copied in broad daylight at 7:10 p. m., New Zealand time, while 95 miles north of Wellington, N. Z., en route from Auckland.

"Your C. W. is always strong and clear down here; can hear you any evening when interference is not too heavy."

Type CR-12—4 tubes. Combines Regeneration and Tuned R.F. $175.00
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Dependability!

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A. H. GREBE & CO., Inc.
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Western Branch: 451 E. 3rd St., Los Angeles, Calif.

MOVIE EXHIBITORS JOIN RADIO'S SIDE

TWO BIG PUBLISHERS QUIT SO SONGS GO ON AIR

More Resignations Hinted as Picture Houses, Hotels and Dancing Academies Throw Off Yoke

(Continued from page 1)

terests here, that two of the foremost publisher members of the American Society had resigned, because, as one of the resignations stated, "We are not in sympathy with their program, in so far as it has for its purpose the collection of money in any form from broadcasting stations, hotels, or moving picture theaters for the privilege of playing our copyrighted music."

Two Big Members Resign from A. S. C. A. P.

One of the members who has so resigned and cast his weight in the balance in favor of the broadcasters is the famous firm of Waterson, Berlin & Snyder, known the world over for its many popular song hits and one of the "Big Six" of the American Society. The second of the "trust" members to voice his disapproval of the A. S. C. A. P. policies and to resign therefrom has been rightly called the "Father of Music Publishing." He is Will Rossiter.

The enlistment of these two well-known music publishers can have but one effect on the American Society, that of lowering the "trust's" morale. But perhaps the effect is as it should be. It is told by an authority that Will Rossiter years ago was forced by "big stick" and unfair methods to sign as a member of the "trust."

Buys License Under Pressure; Won't Use

That the Edgewater Beach hotel was recently enrolled by the Society with a license to broadcast is true. But the license will not be used. When the Edgewater Beach Hotel dining room music license expired recently, the A. S. C. A. P. refused its renewal unless a license was bought for broadcasting at the same time. The station license was quoted at $1,000. Prices were not even maintained by the Society for the license was later bought, under pressure as explained, for but $750, this price including the dining room license.

But American Society copyright music will not be played by WJAZ. Regardless of the license, the popular Chicago station will continue to confine its numbers to those released by the National Association of Broadcasters, of which Gene McDonald, the owner of WJAZ, is president.

The letter from the National Association of Broadcasters to E. C. Mills, "Czar of the music trust," of whom more will be told, stated, "You are therefore in the unenviable position of extorting money from a Radio station through coercive methods, for a license which was not wanted, was not asked for, and your music will not be used."

"Watch Out for Program Directors"

It is common talk that music publishers contaminate anything they come in contact with with bribes of various kinds. One authority on this subject was enthusiastic when interviewed. "Radio will beat the American Society," he said. "It already has them toppling. But be careful of your broadcasting station program directors. Not that I would say that any of them are deliberately crooked, but something is wrong somewhere."

When asked what he meant, he refused to name specific stations or program directors but warned members of the National Association of Broadcasters from allowing "cheating" members of the music "trust" from sending singers, or "pluggers" as they are known in Tin Pan Alley, to their stations and either singing "trust" songs or singing songs that are shortly to be copyrighted and published by trust members. He suggested that the singers be made to leave copies of signed publishing contracts at the stations, and where the pluggers were known to be in the employ of A. S. C. A. P. publishers, that the station program directors bar the use of their microphones.

Well-Known Program Director Crooked?

While the practice has not become seriously dangerous, there is at least one well-known program director who is employing doubtful methods in the conduct of his station, one of the most powerful in the United States. This program director has allowed American Society music to be played at his station, it is said, even with his absolute knowledge that the numbers were to be published by A. S. C. A. P. members.

Then after the songs had appeared in published and copyrighted form, this program director continued to allow the songs to be played and sung from his station. Whether the A. S. C. A. P. has been using pure friendship to get its music on the air through this program director, or is paying by favoritism or financial remuneration for the Radio plugging, is a matter for conjecture. The program director's methods are, however, being investigated by several highly interested parties.

Leo Feist, a member of the A. S. C. A. P., is reported as one of the most active "cheaters" in the "trust." His pluggers have become familiar figures at many broadcasting stations, where, it is said, they have no reason to be singing. That is, they have no reason to be singing at the stations providing the program directors are not intimidated, and providing Leo Feist is upholding the verdict of the A. S. C. A. P. not to allow its numbers to go forth from unlicensed stations.

Movies Hard Hit By A. S. C. A. P. for Years

The motion picture exhibitors, recently won to the cause of the National Association of Broadcasters, have been paying heavy licenses to the American Society of Composers, Authors and Publishers for years.

An authority who prefers to remain unknown but is one of the dissatisfied members of the American Society and is considering resigning his membership, made the statement that if Radio had been beaten in its war on the "trust," movie admission prices would have been raised to prohibitive rates," not because the exhibitors themselves would be getting the money, but because the American Society publishers are practically bankrupt, every one of them, and would welcome the opportunity to add to the already heavy tax on movie seats, in houses playing Society music, which means practically 15,000 of them."

An independent music publisher suggested that movies use their screens every night to explain to the public why admission costs are so much higher than a decade ago. A very effective means of educating the public to the dangerous power of the music "trust" is being neglected, it seems.

How Rossiter Was Forced Into Society

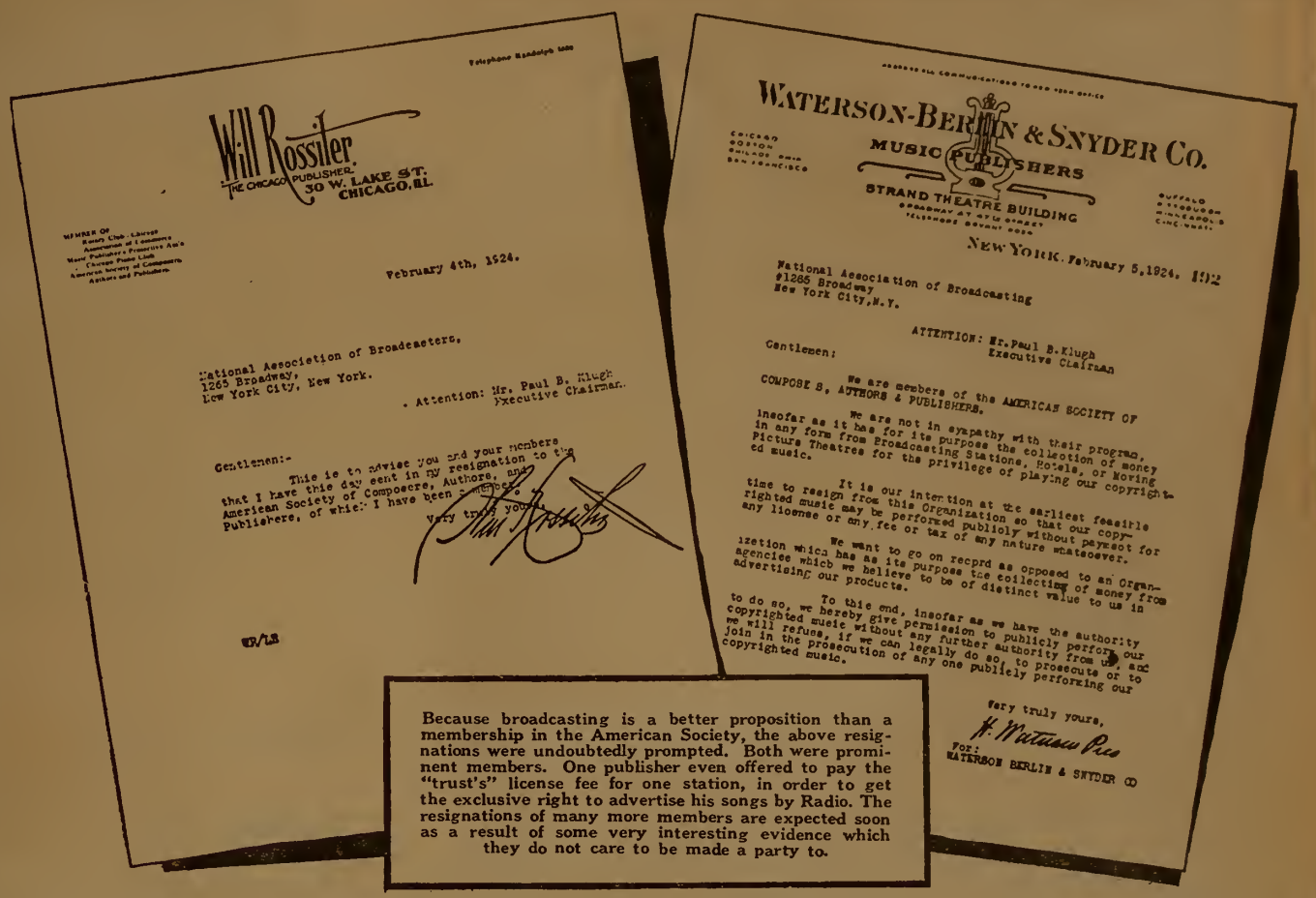
Will Rossiter is said to have been forced

(Continued on page 6)

THE FOLLOWING list of music publishers are members of the American Society of Composers, Authors and Publishers. The list is being given for the benefit of broadcasting stations not licensed by the A. S. C. A. P. and others who may be interested in knowing whose music they are playing. Stations not desiring to play the American Society music should keep this list for reference. It will be revised from time to time, as more members resign.

Abrahams, Maurice, Inc.
Ager, Yellen & Bornstein, Inc.
Belwin, Inc.
Berlin, Irving, Inc.
Beilin & Horowitz, Inc.
Broadway Music Corporation.
Chappell-Harms, Inc.
The John Church Co.
Clark & Leslie, Inc.
Curtis, L. B., Music Publisher.
Dixon-Lane Publishing Co.
Enoch & Sons.
Feist, Leo, Inc.
Fischer, Carl, Inc.
Fischer, J., & Bro.
Fisher, Fred, Inc.
Flammer, Harold, Inc.
Forster, F. J. A.
Fox, Sam, Publishing Co.
Goodman & Rose, Inc.
Gordon, Estate of Hamilton S.
Handy Brothers Music Co.
Harms, T. B., Company.
Harms, Inc.
Harris, Charles K.
Jacobs, Walter, Inc.
Kendis, Brockman Music Co., Inc.
Marks, Edward B., Music Co.
McKinley Music Co.
Mills, Jack, Inc.
Paull, E. T., Music Company.
Remick & Co., Jerome H.
Richmond, Robbins, Inc.
Ricordi, G., & Co., Inc.
Rossiter, Will,
(Resignation pending.)
Schirmer, G., Inc.
Shapiro, Bernstein & Co., Inc.
Sherman, Clay & Co.
Skidmore Music Company, Inc.
Stark & Cowan, Inc.
Tama Publishing Co.
Triangle Music Publishing Co.
Victoria Publishing Co.
Von Tilzer, Harry, Music Pub. Co.
Waterson, Berlin & Snyder Co.,
(Resignation pending.)
Witmark, M., & Sons.

TWO MUSIC "TRUST" MEMBERS RESIGN; MORE LATER



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

February 4th, 1924.

National Association of Broadcasters,
1265 Broadway,
New York City, New York.

Attention: Mr. Paul B. Klugh
Executive Chairman.

Gentlemen:-

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

Very truly yours,

WR/LS

WATERSON-BERLIN & SNYDER CO.
MUSIC PUBLISHERS
STRAND THEATRE BUILDING
BROADWAY AT 47TH STREET

New York, February 5, 1924.

National Association of Broadcasting
1265 Broadway
New York City, N.Y.

ATTENTION: Mr. Paul B. Klugh
Executive Chairman

Gentlemen:

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

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

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

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

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

Very truly yours,
WATERSON BERLIN & SNYDER CO

Because broadcasting is a better proposition than a membership in the American Society, the above resignations were undoubtedly prompted. Both were prominent members. One publisher even offered to pay the "trust's" license fee for one station, in order to get the exclusive right to advertise his songs by Radio. The resignations of many more members are expected soon as a result of some very interesting evidence which they do not care to be made a party to.

IF it's the outdoor antenna that's been holding you off, you want D-7-A or D-10 Portable the De Forest Radiophones that use an indoor loop aerial the size of a small picture frame—and bring in the broadcast of half the American Continent.

Authorized agents everywhere.

DE FOREST RADIO TEL. & TEL. CO.
Dept. R. D. 6 JERSEY CITY, N. J.

MOVIE EXHIBITORS JOIN RADIO'S SIDE

TWO BIG PUBLISHERS QUIT SO SONGS GO ON AIR

More Resignations Hinted as Picture Houses, Hotels and Dancing Acadamies Throw off Yoke

(Continued from page 5)

into the American Society and the Music Publishers Protective Association years ago. Sophie Tucker, who was working in 'big time' vaudeville and singing some of Rossiter's songs, found it necessary to wire Mr. Rossiter stating that she had been approached by certain persons very influential in the theatrical world, and that it had been intimated to her that she would have to cease featuring Rossiter's songs unless he joined the music "trust."

It was a choice of two things; either to join the "trust," or to have no one singing his songs in vaudeville.

It is reported that certain interests wielded the "big stick" and organized to control the music output of the United States several years ago.

Unless vaudeville artists sang "trust" songs they were not billed, and unless music publishers were in the "trust" their songs could not be sung by the vaudeville artists, so the story goes.

Independents Pay Song Writers Best

It is said that the income received by American Society song writers does not compare with the income from one hit published by an independent.

Another friend of the American Society says: "Whenever a new jazz song is put together, so that it plays all right without knocking off the piano legs the publisher who happens to do the assembly work calls up the various phonograph recording companies and tells them to be sure to get it on the records right away. They usually oblige and put the piece on a record and the song is made a hit by the records rather than by the music publishers."

The thing that caused the big commotion in the American Society and undoubtedly brought on their present hurrried struggle is that one of their most reliable and dependable writers, Gus Kahn, had broken loose from the Society and published the biggest hit of the year through an independent publisher namely, "The Girl I Love Belongs to Somebody Else." Needless to say Mr. Kahn's latest hit was Radio plugged.

One of the most salient points against the stand of the music "trust" is the answer to their own argument, "Radio is going to kill the music publishing business." The simple answer, hard for the "trust" to refute, is, "Why do they want to license Radio, if it is going to kill their business?"

The answer is obvious. The public always pays.

But meanwhile—more resignations from the music "trust" are forthcoming.

Tourists in Hongkong Join Etherwave Club

Chinese, Mystery Lovers, Deeply Interested in Radio

WASHINGTON.—The urge to broadcast and listen in has reached Hongkong, China, where a few foreigners interested in Radio have formed the Hongkong Radio society, membership in which now numbers more than 100. There are over 500 listeners in but it is predicted that that number will be doubled within a year.

So far, there are only two broadcasting stations in Hongkong—one, a 100-watt American set, operated by the local telephone company which transmits phonograph music for an hour each evening, the other, a ten-watt Canadian-made set operated by the Radio Communication company, Ltd. The latter concern is planning to install a 1-KW set for broadcasting at Kowloon to serve South China with piano and vocal music, news bulletins, weather and shipping reports.

Fans are also able to receive entertainment three evenings a week from the Manila Electric Supply company and from the Evening News of Shanghai, irregularly. The Chinese love anything mysterious, it is said; consequently, Radio has a strong appeal.

Woman Tells How She Became Bank Official

Helen V. Boswell Feature of WOR'S "Half Hour" Series

NEWARK, N. J.—The feature of a recent afternoon program at Station WOR was a talk by Helen Varick Boswell, vice president of the Co-Operative Trust company of New York, entitled "How I Became a Bank Official." The talk was one of a series—"Half Hours With Successful Women."

RADIO TALKS

Often times we are not able to get the volume of sound from our audio amplifier that we think we should. This is very often indeed due to the tubes used. Try changing them around or borrow a few for a trial. You might be considerably surprised.

E. T. Flewelling

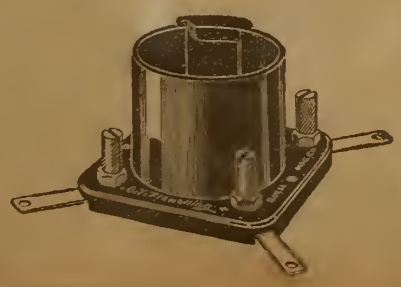
Genuine-
E. T. Flewelling
Radio Apparatus
De Luxe

Which would you rather have—a box full of "never did work good" sockets or just ONE real good socket in your set? The former collection is just what will accumulate when the fellow who never considers quality, buys. The Radiophan who knows, demands Flewelling Parts and keeps the junk box empty. It is not a genuine Flewelling part unless manufactured by

BUELL MANUFACTURING COMPANY
2977 Cottage Grove Ave.
CHICAGO

Flewelling TUNERS $8.00

Flewelling SOCKETS $1.00



BRISTOL
SINGLE CONTROL
RADIO RECEIVER

(NON REGENERATIVE)

Using Grimes Inverse Duplex System

ONE CONTROL ONLY Makes It Most Simple to Operate.

SIMPLICITY OF OPERATION is the outstanding feature of this Receiving Set. One Control Dial includes every adjustment. To tune in, turn this Dial. A station once located can always be brought in again at the same setting.

NOT CONFINED TO LOCAL BROADCASTING—this four-tube set has power equal to six. Because the Grimes Inverse Duplex System utilizes the first two tubes for both Radio and Audio Amplification.

ANTENNA OR LOOP—either may be used to suit conditions.

SOLID MAHOGANY CASE with walnut finish encloses the complete Receiving Set. It is a beautiful piece of furniture fully in keeping with the most luxurious room.

The Price

Bristol Single Control Radio Receiver

$190.00

Ask for copy of Bulletin AY-3013 describing this set.

THE BRISTOL CO.
Waterbury, Connecticut

RADIO WORKS WELL ON SPEEDING TRAIN

RECEPTION GOOD, ASSERTS WESTINGHOUSE LOG

Test of Six-Tube Heterodyne on Commerce Tour Proves Feasibility on Railways

CHICAGO.—Reports mailed almost daily recently by R. H. Holmes, Westinghouse company Radio engineer, in charge of the six-tube super-heterodyne receiver on the private coach of the railway tour of the United States Chamber of Commerce, show that, excepting periods of fading, the reception even of distant stations was excellent despite the varying speed of the train, tunnels and conditions usually considered adverse.

The first report to Radio Digest, dated January 23, aboard the coach "Advance," told how Stations KDKA, East Pittsburgh, and WGY, Schenectady, were received just before the train left Chicago, on a loud speaker in spite of the broadcasting of several local stations. The market reports, according to the Radio log, of Station KYW, filled the whole car. Station WBAP, Fort Worth, Texas, was heard distinctly more than two hours later while the train was running at the rate of 60 miles an hour, and afterward while it was standing still. During the night Station WFI, Philadelphia; WOAW, Omaha; KSD, St. Louis, and WCAP, Washington, D. C., were received.

Shortly after the train had left Memphis WMC, Commercial-Appeal, broadcast market reports and river stages. During dinner, KDKA's concert was heard. Then there came a "static storm" which lasted about one and a half hours. Then Station WHAS, Louisville, was received; fading marred the reception. WOC, Davenport, Ia., and WOS, Jefferson City, Mo., came in strong at first but weakened at intervals. Holmes said that rain storms probably caused the fading. The tourists were entertained by WHAS the rest of the way to New Orleans.

While in New Orleans the log reported the reception of Stations KYW, WOC, WSAI, Cincinnati; WACT; WCAG, New Orleans; WOQ, Kansas City, Mo. The log showed the absence of reception from Atlantic coast stations. The reception from KFKX, Hastings, Neb., was remarkably loud and clear, the log revealed. Stations on a line from New Orleans to Pittsburgh were apparently shielded from New Orleans.

On the way to San Francisco, WFAA, Dallas, was heard as were WEAY, Houston; WBAP; WEV, Houston; WOAI, San Antonio, Texas; WHB, Kansas City; WOC, Davenport; WSB, Atlanta; WOAW, Omaha; WTAM, Cleveland, and CYL, Mexico City. The latter's announcement was in Spanish.

Other stations received on the way to Golden Gate were KFI, Los Angeles, and KLX, Oakland. The log indicated, according to Holmes, that Radio reception on moving trains was feasible and desirable.

RADIO ABOARD C. OF C. SPECIAL

R. H. Holmes (at right), Westinghouse Radio engineer, aboard U. S. Chamber of Commerce special train with super-heterodyne receiver which picked up many broadcasting stations as the train sped along on its long tour. The gentleman at the left is one of the chamber delegates.

"How to Treat a Watch" Subject of Expert's Talk

NEW YORK.—Lawrence S. Mayer, horological expert, recently delivered a talk for WEAF's audience on "What You Should Know About Watches."

To get the full value of an accurate watch it must receive certain care, he said. Mayer and his assistants have been doctors for tens of thousands of watches, it was reported.

MAIL ORDER FIRM TO OPEN STATION

Sears-Roebuck to Be Only Exclusively Agricultural Station in U. S.

CHICAGO.—Officials of the new Radio broadcasting station of the Sears-Roebuck Agricultural Foundation, now under construction, announced recently the appointment of L. P. Dryden as director.

The station will be the only exclusively agricultural broadcasting plant in the United States; it is to use a 130-foot aerial post on the top of the firm's nine-story tower building. The 14-story tower will be used as the other post.

According to Dryden, the station will be ready for the opening broadcasting program about March 1. It will be a 500-watt station, employing two motors and will carry a class B license.

WMAQ MUSIC TEST NETS RARE TALENT

GREAT CRITICS ENTHUSED BY 1,400 ENTRIES

"America's Compositions World's Best," Say Masters; See "Jazz Trust" End Approach

CHICAGO.—More than 1,400 musical compositions of the highest order were submitted in the contest recently closed by Station WMAQ, Chicago Daily News This was the report of those in charge, including Maurice Rosenfeld, widely known critic. "The contest proved," declared Rosenfeld, "that America today, its musicians and composers, have taken front rank in creative musical accomplishment, its composers have not only the training but the inherent musical talent and gift for the best that is put before the world."

Judges Astounded at Results

Symphonic works, chamber music, solos for various instruments and their combinations and many songs of striking musical brilliance were produced by means of the contest, said Rosenfeld. "The judges were astounded by the high standard of the works," concluded the critic. His and the opinions of other competent authorities, including those of the financial phases of musical production, indicated strongly that the attitude of the American Association of Composers, Authors and Publishers was futile, that it was doomed to failure and obliteration.

Great Conductor Participates

Among the judges of the contestants were Frederick Stock, conductor of the Chicago Symphony Orchestra, considered one of the greatest directors of his time, and Eric DeLamarter of Chicago, widely known as a conductor, organist and musical essayist.

The first grand prize was unanimously awarded to Leo Sowerby of Chicago, formerly of Grand Rapids, Mich., winner of the fellowship of the American academy in Rome, where he now is studying music. The title of his composition was "Two American Pieces." Miss Helen Dallam of Chicago won second prize.

Successful tests have been carried out in Switzerland in sending Radio messages from the Alpine heights at an altitude of 6,000 feet to an office in the valley six miles away.

Behind the Iron-Clad Guarantee on Federal Radio Equipment

BEHIND every Federal radio set and behind every one of the 130 separate units manufactured by Federal stands the iron-clad Federal guarantee. . . . And behind this guarantee stands the whole Federal organization with 25 years of experience in designing and manufacturing radio equipment.

Federal's enormous engineering and financial resources are responsible for the mechanical accuracy of Federal radio units and for the guarantee that *means* something to every user of Federal equipment.

Federal Telephone and Telegraph Company
BUFFALO, N. Y.

Boston New York Philadelphia Chicago San Francisco
Pittsburgh Bridgeburg, Canada London, England

"HIT OR MISS" FUN NEWEST AT WMAQ

"MESCAL IKE," "KING OF BLACK ISLES," CAVORT

Keith Preston and His Column Contributors in Chicago Daily News Now Entertain

CHICAGO.—That funny columns can be funny even when they are columned on a train of carrier waves, will be proven here when the Daily News station, WMAQ, has its first "Hit or Miss" night, Wednesday, February 20.

"Hit or Miss" is Keith Preston's humorous column, appearing daily, made chiefly of contributions from aspiring humorists and poets and even nationally known writers who still find interest in submitting their manuscripts for "hit" or "miss." And inasmuch as no financial remuneration is given the contributors, the contributor's only satisfaction is of the sort he obtains in seeing his brain child in print.

Popular Contributors to Broadcast

A true column contributor never reveals his or her identity. The mystery is one of the sweet illusions. Therefore readers of "Hit or Miss" undoubtedly will find great pleasure in tuning in "mescal ike," "The King of the Black Isles" and Keith Preston when the three make their ether debuts. For the first time in the history of "Hit or Miss," the voices of Keith Preston and two of his chief "contribs" will be heard.

The material is to be the same kind as is used in the column. If the broadcasting of the column goes as well as has its printing, Station WMAQ plans to make a regular feature of "Hit or Miss" night.

Seek to Trim WOAW Bill

OMAHA.—A petition recently circulated in this vicinity signed by local listeners, requested the operators of WOAW to trim its programs so that the station would be on the air not more than two hours in any evening. Complaint was made by some of those who signed the petition that the station is so "broad" they could not tune within 100 meters on either side of WOAW's wave—526 meters—even with expensive sets.

MUSIC AIDS HIS DIGESTION?

It is said that music makes the cows chew the cud with greater contentment and give better milk. Here is a fan who applies the same idea to his own interior works while consuming some of the cow's product—and he doesn't look dyspeptic! Photonews Photo

India in Radio Chain

LONDON.—The government of India has invited applications from private enterprises to establish and operate an Indian link of the proposed imperial Radio chain and also commercial Radio communication with other countries.

Expedition into Brazil Will Carry Radio Sets

Explorers of Fearsome Jungles Will Test Ability of Air Wave

WASHINGTON. — From the Arctic, Radio is keeping MacMillan in touch with the world; the Shenandoah will carry Radio to the Pole itself. Now comes Dr. A. Hamilton Rice who plans a Radio-equipped expedition into the Brazilian tropics. Perils of the cold northern night and interference by the Aurora will be offset in the wilds of South America by savages, beasts and insects, and the strong static found under the equator. John H. Swanson, the Radio aide expects however to conquer all difficulties.

Although Radio permits must be obtained from the Brazilian authorities, the department of commerce here has given the expedition a temporary mobile call for identifying its base and portable stations. It is "WJS."

Carrying several complete sets of Radio transmitting and receiving apparatus, the party, including 10 white men and a woman, will leave New York late in March for the headwaters of the Amazon river.

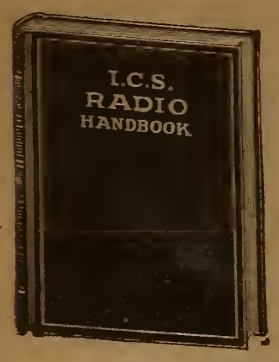
The Greatest Book on

RADIO

ever written

only

$1



614 pages Pocket Size

25,000 SOLD

Compiled by HARRY F. DART, B.S.E.E. Formerly with the Western Electric Co., and U. S. Army Instructor of Radio *Technically edited by* F. H. DOANE

JUST off the press! The greatest book on radio ever written. Price only $1. Filled with sound, practical, *tested* information for every radio fan, from beginner to hard-boiled owl. Written, compiled and edited by radio experts of national reputation.

Every page tells you something useful. And there are 514 pages! More than 150 illustrations and diagrams!

You may dip into this I. C. S. Radio Handbook at random, or hunt up special information you want, or read it right through. Different types of receiving and sending hook-ups are explained; proposed insurance regulations; radio compass stations; interesting experiments; definitions; codes and symbols; technical data and thousands of suggestions for getting more pleasure out of radio. Will save you from wasting money on things that won't work.

Send $1 to-day and get this 514-page I. C. S. Radio Handbook before you spend another cent on parts. Money back if not satisfied.

TEAR OUT HERE

INTERNATIONAL CORRESPONDENCE SCHOOLS
Box 8277-F, Scranton, Penna.

I enclose One Dollar. Please send me—postpaid—the 514-page I. C. S. Radio Handbook. It is understood that if I am not entirely satisfied I may return this book within five days and you will refund my money.

Name.....

Address.....

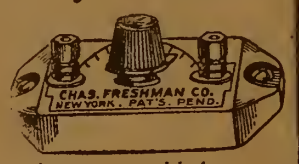
For Better Radio Reception—

Freshman Products

GUARANTEED to be mechanically perfect, scientifically accurate and built for unusual durability. Used by discriminating manufacturers and amateurs all over the world, who realize that a radio set is only as good as each individual part.

The Standard Unit for Every Tube Set

FRESHMAN
VARIABLE GRID LEAK and CONDENSER COMBINED



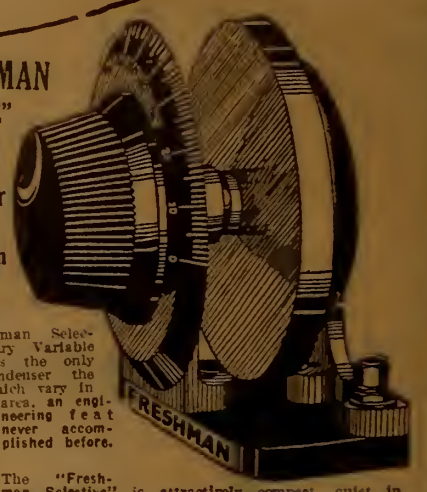
Permits you to adjust your circuit to any resistance you wish from zero to 10 megohms, in an unbroken range of 180 degrees.

It takes the place of a grid condenser, grid leak mounting and grid leak, and, in addition permits an adjustment to the correct amount of resistance.

It is the most compact, the most efficient, the most adaptable to all grid circuits, and the only one which is entirely sealed and always remains unaffected by any climatic conditions.

Base or Panel Type complete with .00025 or .0005 Freshman Condenser, $1.00
Either Type without condenser, $.75

"FRESHMAN SELECTIVE" Mercury Variable Condenser *For* Transmission *or* Reception



The "Freshman Selective" Mercury Variable Condenser is the only variable condenser the plates of which vary in area, an engineering feat never accomplished before.

The "Freshman Selective" is attractively compact, quiet in operation and will withstand 5000 volts without leakage or danger of short-circuiting.

.0003 MF (Equiv. to 17 pl.)
.0005 MF (Equiv. to 23 pl.)
.001 MF (Equiv. to 43 pl.)
} **$5** EACH

All molded parts and dial of finest Bakelite.

Double Adjustable Freshman Crystal Detector

for base or panel mounting. When mounted on panel only the knob shows on the front. No more searching for the sensitive spot. Merely turn the knob as you would a dial, thus adjusting the crystal instead of the cats-whisker. Best for both Reflex and Crystal sets.
Price **$1.50**

Guaranteed Capacities

STYLE 100 FRESHMAN NOISELESS TESTED MICA CONDENSER MFD. BY CHAS. FRESHMAN CO. Inc. 106 W. 7th ST. NEW YORK CITY

Capacity	Each
.00005	$ .35
.0001	.35
.00015	.35
.0002	.35
.00025	.35
.0003	.35

THE CONDENSER SENSATION OF MODERN RADIO
FRESHMAN NOISELESS TESTED MICA CONDENSER

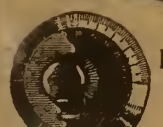
Every Condenser is individually tested on high voltage for capacity, break-down and leakage. Every piece of Mica embodied in the Condenser is individually tested and examined.

The new Style No. 101 is equipped with Freshman Soldering Terminals which allow 3 distinct connections with a very small amount of solder.

Capacity	Each
.00035	$ .35
.0005	.35
.0006	.40
.0008	.40
.001	.40
.0015	.40
.002	$ .40
.0025	.50
.003	.60
.0035	.70
.004	.75
.005	.75

STYLE 101 FRESHMAN NOISELESS TESTED MICA CONDENSER MFD. BY CHAS. FRESHMAN CO. Inc. NEW YORK CITY

Capacity	Each
.006	$ .75
.007	1.00
.008	1.00
.009	1.00
.01	1.00
.015	1.50



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FEDERAL COMPLAINT AGAINST R.C.A.

How R.C.A. Ties Up with Marconi Company to Get World-Wide Business

Where A.T.&T. Comes In

Powerful Telephone "Trust" Acquires Exclusive Right to Make and Sell Broadcasting Stations

(Believing that Radiophans in general are interested in the recent complaint against the Radio Corporation of America filed by the Federal Trade Commission, Radio Digest has undertaken the complete reprinting of the material contained in the report of the commission. While the complaint is in true legal form and is not easily read by Radiophans other than lawyers, the direct reprint is undertaken because it is believed no other publication will give the information in so complete a form.—Editor's Note.)

Part II (Continued from last week)

PARAGRAPH ELEVEN: Said agreement of November 20, 1919, between the Marconi Wireless Telegraph Company, Ltd. (British), and the Radio Corporation of America recited the agreement of November 20, 1919, described in Paragraph Ten, between the General Electric Company and the Radio Corporation of America; also that both companies (Radio and British Marconi) owned and controlled patented inventions in Radio devices and intended to prosecute diligent research for improving same and producing others in order to establish economically world-wide public commercial wireless; that the Marconi Company owns rights in all the Marconi Radio patents for the British Empire and Marconi patents and inventions of its employees outside of the British Empire existing and in the future; whereupon it is agreed that the trans-Atlantic circuit of Radio communication shall be maintained by the parties together and a traffic agreement entered into therefor between them, temporary provision being made for the division of tolls equally.

The Radio Corporation then sells to the Marconi Company for Radio purposes only, all its patents and licenses, etc., existing or acquired during the term of the agreement, for the Marconi territory (except those acquired by purchase, as specially provided), and the Marconi Company grants to the Radio Corporation (subject to previous grants) non-exclusive rights and licenses under its patents, present and future, for Radio purposes, and the right to make and sell thereunder Radio devices in the territory between the southern jurisdiction of the United States and the Republic of Panama and adjacent islands and regions.

The agreement provides that the traffic agreement shall run to January, 1945, and the British Marconi Company agrees to transmit or receive over the circuit established by it and the Radio Corporation, every message sent or received by or to it, or any affiliated company or interest, which originates in or passes through or to Great Britain and is destined to or routed through or from the territory of the Radio Corporation, and, reciprocally the Radio Corporation agrees to transmit over said circuit every message sent or received by it or any affiliated company or interest which originates in or passes through or to the territory of the Radio Corporation and is destined or routed to or through or from Great Britain. The agreement of November 20, 1919, by which the licenses and rights of the Marconi Wireless Telegraph Company of America under all the patents of the British Marconi Company were transferred to the Radio Corporation of America and the grant above described of its patents for Radio purposes by the Radio Corporation to the British Marconi Company effected an interchange of licenses in all the patents now or during the term of the contract owned or controlled by the British Marconi and Radio Corporation pertaining to Radio. The agreement provides for the maintenance of special departments by each of the parties for the diligent prosecution of research for the improvement of the Radio art and for free exchange of information and patents relating thereto, all of which more fully appears by the terms of said agreement of November 20, 1919.

Westinghouse-International Contract

PARAGRAPH TWELVE: On or about May 22, 1920, the Westinghouse Electric & Manufacturing Company entered into a contract with the International Radio Telegraph Company (see Paragraph Five) for the formation of a new company of the same name. The International Radio Telegraph Company to take over patents and certain assets of the International Radio Telegraph Company (the prior company) relating to apparatus for Radio communication. The consideration for this contract was the payment by the Westinghouse Company of $2,500,000 for one-half of the common voting stock of the new company. The purpose was that the new organization should enter the commercial Radio communication field in a more comprehensive way and in pursuance of said purpose, the new company did construct and operate stations for the transmission and reception of Radio messages at Cape May, N. J. and Siasconsett, Mass., and reopened or rehabilitated stations formerly operated by the old International Company.

In connection with the contract of May 23, 1920, the old International Company agreed to grant to the Westinghouse Company the right to manufacture and sell Radio devices and apparatus under all the patent rights to be transferred to the International Company, subject to the condition that it should not sell such devices or apparatus to business competitors of The International Company for use in the latter's field. On or about June 29, 1921, the parties above named entered into an agreement which recited that The International Company had, by separate instruments, assigned to the Westinghouse Company all of its existing patents and applications therefore, and that The International Company granted to the Westinghouse Company the exclusive, divisible right to make and to sell Radio devices to the International Company only, as well as the exclusive, divisible right to make use of and sell devices other than Radio devices under all its future patents and applications for patents, inventions and rights or licenses under or in connection with patents which The International Company may require during the term of the agreement, namely until January 1, 1945, except as to certain patents acquired by purchase.

The Westinghouse Company granted to The International Company an exclusive, divisible license to use and sell, as well as a non-exclusive, indivisible license to make only when the Westinghouse Company is not in a position to supply the desired device with reasonable promptness, every Radio apparatus under all patents, applications for patents, inventions or right and licenses under or in connection with patents which the Westinghouse Company owns or may acquire during the term of the contract. The International Company further agreed to purchase from the Westinghouse Company all Radio devices covered by said patents and the Westinghouse Company agreed to produce the same. The International Company agreed to use care not to enter under any patent rights into the field of the Westinghouse Company or encourage others so to do. The parties also agreed to assist each other with scientific information and results of research of their engineers, in their respective fields. Among the patents so acquired by the Westinghouse Company were patents covering important inventions for Radio communication known as the Fessenden or heterodyne, all of which more fully appears from said agreement of June 29, 1921.

On December 31, 1922, the Westinghouse Company owned 1,000,000 shares of the common and 1,000,000 shares of the preferred stock of the Radio Corporation of America.

A.T.&T. Corners Broadcast Transmitters

PARAGRAPH THIRTEEN: On or about July 1, 1920, the General Electric Company and the American Telephone & Telegraph Company made an agreement by which each granted to the other, with certain reservations and restrictions, licenses under all patents and rights to or under patents, owned by each respectively, present and future, for the term of the agreement (namely, 10 years, unless previously terminated by consent of the parties) to use methods and processes, and to make, use, lease, sell or otherwise dispose of apparatus, machines and devices thereunder in the fields in which the licenses are granted to each respectively, but no rights are granted to either party to manufacture under patents, license for which are granted in said agreement, apparatus at the time manufactured by the other party, except in the factories of either party; the uses by each party to which said grants of licenses are restricted, in the fields of telephony and telegraphy, broadcasting and commercial communication, are carefully defined; certain fields of use and manufacture of Radio apparatus under said licenses being granted to one party and others to the other.

The American Telephone & Telegraph Company acquired the exclusive right to manufacture and sell broadcasting transmitting apparatus for commercial purposes, and the General Electric Company acquired the exclusive right to manufacture and sell receiving apparatus for non-commercial purposes. It is provided that when either party acquires rights to patents applicable to the fields of both, it must do so in such a manner that both parties shall be given an opportunity to acquire the patent, in their respective fields.

Each party grants to the other a license for trans-oceanic wireless telephony, subject to the condition that the General Electric Company, so far as concerns service on this continent for the public and other than the General Electric Company, must render such service through only the telephone company's wire or wireless telephone systems, so long as it supplies that service; and that the telephone company in the field of trans-oceanic wireless telephony, so far as concerns service for the public or for others than the telephone company, shall render such service through only the General Electric Company's system for trans-oceanic communication, so long as the latter supplies such system. It is agreed that information with reference to patents and inventions shall be exchanged and facilities mutually afforded for the development of wireless telephony, and that each party shall manufacture for the other certain apparatus covered by patents which are the subject of this agreement; as more fully appears from the said agreement of July 1, 1920.

On December 31, 1922, the American Telephone & Telegraph Company owned 400,000 shares of the preferred stock of the Radio Corporation of America.

Patent "Swapping" Takes Place

PARAGRAPH FOURTEEN: By an agreement dated July 1, 1920, between the General Electric Company, The American Telephone & Telegraph Company, the Radio Corporation and the Western Electric Company, provision was made whereby the Telephone Company could extend to the Western Electric and likewise the General Electric could extend to the Radio Corporation their respective rights under the agreement of July 1, 1920, described in Paragraph Thirteen, and the Western Electric Company did extend to the General Electric Company and the Radio Corporation of America grants to the American Telephone & Telegraph Company rights under their respective Radio patents, present and future, of the same character and scope as the rights granted between the General Electric Company and the American Telephone & Telegraph Company by the agreement of July 1, 1920, described in Paragraph Thirteen, and subject to similar reservations, limitations, and conditions as therein provided, as more fully appears from said agreement dated July 1, 1920, first named herein.

United Fruit Gets Concessions

PARAGRAPH FIFTEEN: On March 7, 1921, the Radio Corporation of America entered into an agreement with the United Fruit Company by which the former granted to the latter a license to use the inventions and devices covered by its patents, present or future, relating to wireless communication or apparatus or devices in connection therewith. This grant was limited, however, to certain territory, defined in said agreement and being generally the territory in which said United Fruit Company had previously op-

(Continued on page 10)

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COMPLAINT ON R.C.A.

(Continued from page 9)

erated in Central America and adjacent regions, and limited otherwise. The United Fruit Company in said agreement granted to the Radio Corporation an exclusive license under its patents, reserving a right to license similarly, the Wireless Specialty Apparatus Company, to make or have made, use and sell Radio devices under its own patents. The United Fruit Company further agreed to limit its wireless communication business within its territory as defined in said agreement, and to purchase its supplies under the patents under which it is licensed by the Radio Corporation from the Radio Corporation, except at its option to purchase from the Wireless Specialty Apparatus company such apparatus as the latter is licensed to make.

Provision is made for the exchange of information with reference to inventions and patents relating to wireless communications or apparatus and exchange of licenses under patents thereafter obtained; the agreement includes provisions for exchange of traffic, all of which more fully appears in the said agreement of March 7, 1921. Prior to the date of the agreement above described, namely, March 7, 1921, the United Fruit Company had purchased 200,000 shares of the preferred stock (par value $5) and 200,000 shares of the common stock (no par value) of the Radio Corporation for the sum of $1,000,000 cash. On December 31, 1922, the United Fruit Company owned 160,000 shares of the common and 200,000 shares of the preferred stock of the Radio Corporation of America.

Wireless Specialty Apparatus of Boston

PARAGRAPH SIXTEEN: On March 7, 1921, the Radio Corporation of America and the General Electric Company, parties of the first part, entered into an agreement with the Wireless Specialty Apparatus Company, being a subsidiary of the United Fruit Company, whereby the parties of the first part granted to the Wireless Specialty Apparatus Company under all patents or patent rights owned by them then or thereafter, a non-exclusive license to manufacture and sell certain apparatus, specifically named, and excluding vacuum tubes, for use in Radio communication, limited, however, to manufacture for sale to the United Fruit Company or its subsidiaries for use under the license granted of even date, namely, March 7, 1921, by the Radio Corporation of America, to the United Fruit Company (Paragraph Fifteen above); and the Wireless Specialty Apparatus Company granted to the parties of the first part an assignable license to make and use under all its patents having to do with Radio communication or with apparatus or devices in connection therewith, present or future, reserving, however, the right to grant licenses to the United Fruit Company, the said agreement to continue until January 1, 1945, all of which more fully appears in said agreement of March 7, 1921.

More Patent Agreements

PARAGRAPH SEVENTEEN: By letter of June 30, 1921, the American Telephone & Telegraph Company and the Western Electric Company agreed to the extension by the General Electric Company and the Radio Corporation of America to the Westinghouse Electric & Manufacturing Company of the rights under the licenses acquired or to be acquired under the agreement of July 1, 1920 (described in Paragraphs Thirteen and Fourteen), in consideration of the grant to the American Telephone & Telegraph Company and the Western Electric Company of licenses under the present and future patents and inventions of the Westinghouse Electric & Manufacturing Company, corresponding to rights granted by the General Electric Company in the aforesaid agreement of July 1, 1920; the receipt of such grants from the Westinghouse Electric & Manufacturing Company being acknowledged by the American Telephone & Telegraph Company and the Western Electric Company.

PARAGRAPH EIGHTEEN: On June 13, 1921, an agreement was made between the Westinghouse Electric & Manufacturing Company, the Radio Corporation of America and the General Electric Company, by which rights under the Armstrong-Pupin patents were extended by the Westinghouse Electric & Manufacturing Company, with the consent of the Radio Corporation of America, to the General Electric Company and the terms of payment therefor by the Radio Corporation and the General Electric Company were fixed.

International Sells Out for R. C. A. Stock

PARAGRAPH NINETEEN: On June 30, 1921, the Radio Corporation of America entered into an agreement with The International Radio Telegraph Company by which, in consideration of the issuance to it by the Radio Corporation of America of 1,000,000 shares of its preferred and 1,000,000 shares of its common stock, The International Radio Telegraph Company by which, in consideration of the issuance to it to the Radio Corporation, including its patent rights and licenses under patents, real estate, and especially the right to the sum of $2,200,000 payable by the Westinghouse Electric & Manufacturing Company to the International Radio Telegraph Company in accordance with the terms and provisions of an agreement dated June 21, 1921, between said companies. (See Paragraph Twelve above.)

PARAGRAPH TWENTY: By a letter dated March 9, 1921, the American Telephone & Telegraph Company and the Western Electric Company, its subsidiary, assented to the grant by the General Electric Company, and the Radio Corporation of America of special licenses to the United Fruit Company, the Tropical Radio Telegraph Company and the Wireless Specialty Apparatus Company under the patent licenses acquired or to be acquired under the agreement of July 1, 1920, between the General Electric Company and the American Telephone & Telegraph Company (Paragraph Fourteen above), on the condition of a grant to the American Telephone & Telegraph Company and the Western Electric Company by the United Fruit Company, the Tropical Radio Telegraph Company and the Wireless Specialty Apparatus Company of licenses under all United States patents now or hereafter owned or controlled by the United Fruit Company, Tropical Radio Telegraph Company and the Wireless Specialty Apparatus Company.

PARAGRAPH TWENTY-ONE: On or about March 14, 1923, the Radio Corporation of America procured from the Radio Engineering Company, a New York Corporation, an assignable and divisible license to make, use, sell and lease under certain patents owned by the Radio Engineering Company, with the right to the Radio Corporation of America, after two years, to take an assignment of these patents, all of which more fully appears from said agreement.

(TO BE CONTINUED.)

French Rules Boost Radio

WASHINGTON. — French authorities have issued a set of regulations intended to encourage broadcasting and the use of Radio equipment by amateurs. It is provided that receiving sets may be possessed by any citizen of France who will sign a formal declaration, receivable at any post-office, stating the kind of equipment used and agreeing that no part shall be taken in the transmission of private correspondence.

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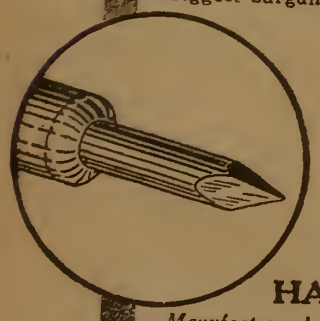

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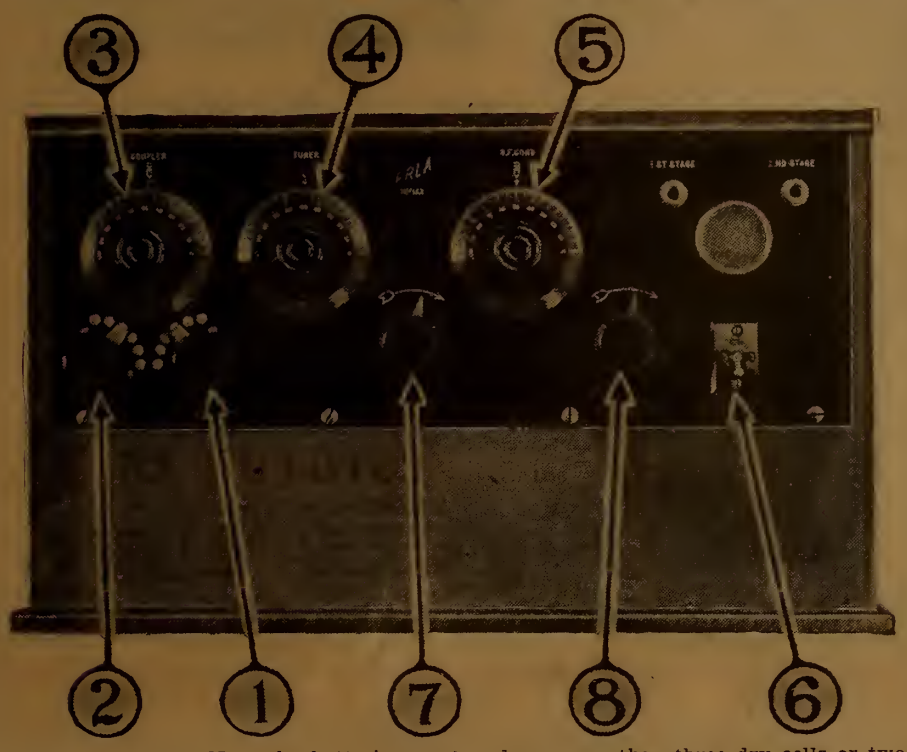
OPERATING AND TROUBLE SHOOTING

For the Owner of an ERLA Three-Tube Duo-Reflex Set

"OPERATING and Trouble Shooting" is a Radio Digest feature whose purpose is to study the late models of various standard receiving sets and to show the newly initiated broadcast listener, who has purchased such a set, how he can operate it to get the best there is in it and how he can overcome minor difficulties which may be causing some trouble. On pages 11, 12 and 13 this week the Erla Three-Tube Duo-Reflex set is described. Radiophans with other sets will also find these articles worth reading, particularly the notes on trouble finding.

AFTER the receiving apparatus has been assembled and carefully checked for proper wiring and arrangement, it should be hooked to the aerial and ground system, in accordance with the A and G markings on the accompanying diagram. Next the batteries can be assembled and connected.



First, the B battery, consisting of small, high voltage units, is connected together in series. This is accomplished by connecting the highest voltage positive (plus) tap of one battery to the negative (minus) tap of the next, and continuing this process until all the batteries are thus joined together. When finished, a positive tap will be left open at one end of the group and a negative tap at the other. These taps are then connected to the two B battery terminals of the set, in accordance with the positive B (plus) and negative B (minus) markings on the accompanying diagram.

Choose Correct Tube Equipment

While any make of tube will perform to better advantage in reflex than in other circuits, it is essential, for maximum results, to use only tubes of the highest efficiency possible. It must be remembered that in Erla Duo-Reflex circuits the tubes do triple duty, serving as amplifiers of Radio frequency, reflexed Radio frequency, and reflexed audio frequency currents. To carry this extra load with full efficiency, the best type of vacuum tubes are demanded.

Tubes are rated, in the order of their effectiveness, as determined through extended test in the Electrical Research Laboratories, as follows: C-301A, UV-201A, C-299, UV-199, WD-11, and WD-12.

Batteries and rheostats should be selected to correspond to the requirements of the tube equipment. If 201A or 301A tubes are employed, the filament battery should consist either of four dry cells or three storage cells, regulated through a 25-ohm rheostat. If 199 or 299 tubes are used, no more than three dry cells or two storage cells should be employed, with a 30-ohm rheostat for control of current flow. For WD-11 or WD-12 tubes, the filament battery should consist of either one dry cell (1.5 volts) or one storage cell (2 volts), regulated by a 6 or 8-ohm rheostat.

The B battery for UV-201A or C-301A tubes should deliver from 90 to 135 volts, the best voltage being determined by experimentation with the particular tubes employed. The B voltage for UV-199, C-299 or WD-11 and WD-12 tubes should not exceed 90 volts.

A C battery in the last stage of the three-tube circuit may work a slight improvement in tone quality, but, because of the added complication, it is not recommended. The C battery, when used, should be introduced into the grid return lead of the third tube circuit, as shown by the manufacturer in the wrapper accompanying the tube.

Storage Batteries Are Preferred

To obtain uniform results, it is obvious that the rated voltage of batteries must be maintained. For this reason, storage batteries, capable of being frequently recharged, are to be preferred. Similarly, where dry cells are used, it is advisable to conserve their output as much as possible, through tubes of relatively low current consumption, even though this sacrifices tube efficiency, with a consequent lessening of range and volume.

Generally, for use with dry cells, C-299 or UV-199 tubes are recommended, while, with storage batteries, the more powerful C-301A or UV-201A tubes are to be preferred.

In no instance is the use of a vacuum tube recommended for detector purposes, any slight resulting increase in volume being more than offset by loss of tone quality, ease of adjustment and freedom from noises and distortion.

High Aerial Gives Best Results

In erecting an aerial, maximum reception will be obtained if the aerial is as high as possible and at maximum distance from neighboring objects, such as trees, metallic buildings, chimneys and conducting wires. Also, it should be thoroughly insulated at all points of support.

The total length of the antenna system, consisting of the aerial and lead-in wire, can vary from 75 to 200 feet, though 125 feet has been found the most desirable. Where conditions do not permit erection of a single wire of this length, the aerial portion may be divided into two equal, parallel sections, spaced two or three feet apart, and connected at both ends.

Should a high and long aerial be employed within ten or fifteen miles of powerful broadcasting stations, some difficulty may be experienced in tuning through these stations for long distance signals. This can be largely overcome by substituting a single-wire aerial having a total length, including the lead-in wire, of not more than 75 feet. When local stations are silent, the long aerial can again be used.

Stranded Wire Is Recommended

Though either bare or insulated wire may be used for the entire antenna system, best practice is to employ bare, preferably stranded wire for the aerial portion, and insulated wire for the remainder. The size of wire should be number 14 gauge or larger.

For the ground connection, a similar size of insulated wire should be used, with a good electrical connection either to a water pipe or to a metal stake driven 4 or 5 feet into moist ground.

Also, where an outside aerial is used, an approved lightning arrester should be placed between the aerial and the ground. Not only is this dictated on grounds of personal safety, but in conformity with the demands of insurance companies as well.

Throughout the antenna system, joints should be well spliced and soldered, in order to insure full transmission of received electrical energy.

Good Results with Inside Aerial

For indoor use, an excellent aerial may be erected by running insulated wire the full length of the attic or through several rooms, along the top of the picture mould-

(Continued on page 12)

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OPERATING AND TROUBLE SHOOTING

(Continued from page 11)

ing. If this is done in rooms above the first floor, results comparable to those obtained through an outside aerial will be obtained.

Inside Aerial Excels Loop

Though a loop may be employed with Erla Duo-Reflex circuits to correspondingly better advantage than with other circuits, its use is not recommended, because of its inferior efficiency, requiring, on the average, an additional stage of amplification, as compared with an inside aerial carrying an equal length of wire.

The sole advantage of a loop is its directional selectivity, and this, in Erla Duo-Reflex circuits, is not needed, owing to the inherent selectivity of these circuits. Besides, a loop is unsightly.

Even outdoors, where portability is a prime factor, a single strand of insulated wire, loosely thrown over a tree, is more conveniently carried and more efficient in range and volume than the most carefully constructed loop.

Connecting the A Battery

Next, the A or filament lighting battery is made ready. If dry cells are used, they should be wired in series by connecting the outer (zinc or negative) terminal of one to the center (carbon or positive) terminal of the next, continuing this process until all the cells have been linked together leaving a positive terminal at one end of the chain and a negative terminal at the other. If the battery is of storage type, the individual cells will be found already strapped together, with the two end terminals marked positive (plus) and negative (minus).

Check All Connections

After the A battery has been carefully checked, to guard against mistakes in wiring or loose connections, the positive and negative terminals should be attached to the corresponding plus and minus terminals on the set, in accordance with the markings on the diagram.

Since it is extremely important that the negative and positive connections of both batteries are correct, every precaution in making these connections should be observed.

Check All Tube Contacts

After the batteries are hooked up, insert the tubes into their sockets, with the rheostats turned off, making sure that the socket springs press firmly against the tube contact points.

Now plug in the headphones through the jack provided, and give the rheostat controls 7 and 8 slightly more than half a turn. A slight crackling sound (static) in the phones should accompany this movement. Continue to advance the rheostat controls until further movement causes no increase in the crackling sound.

Up to this point, instructions for setting up and operating Erla Duo-Reflex circuits apply equally to all types. When it comes to tuning, however, individual methods must be pursued, because of the different characteristics of the various circuits involved.

Fishing for Signals

To tune in a signal, set both switches 1 and 2 of the variocoupler so that they are in contact with their respective central taps, and turn the rotor dial 3 to an angle of about 45° with the stator. Then slowly rotate the dials 4 and 5 of both condensers, taking care that their markings are held in practically the same relation to each other. When a signal is brought in, delicately adjust the condenser dials until maximum volume is attained.

If the signal is fuzzy or slightly distorted, increase the coupling, dial 3, by decreasing the angle between the rotor and stator of the variocoupler. When this is done, it will prove necessary to retune the secondary or 23-plate condenser, dial 4, and change the tap switch or rotor adjustment affecting this condenser also. Finally, sharpen the tuning by slightly adjusting the Radio frequency (11-plate) condenser, dial 5.

Whenever the coupler is adjusted to any other position than full coupling (rotor parallel to the stator), the relationship of the condensers undergoes a change as well. Consequently, a certain degree of variance or lag must be maintained between the condenser dials, as they are rotated together over the scale. Experience will quickly determine the degree of variance which must be maintained between the condenser dials as they are rotated together over the scale. Experience will quickly determine the degree of variance to employ for the various coupler settings.

Loose Coupling Is Best

Both maximum volume and minimum interference result when the coupling between rotor and stator is quite loose, i, e., with the rotor as nearly at a right angle as possible to the stator. This is especially true of wave lengths over 350 meters. For wave lengths under 350 meters, considerably closer coupling is required.

Rheostat Setting Is Non-Critical

Careful experiment and study of adjustments will soon disclose exactly what measures are necessary to secure maximum results under any given conditions. Ordinarily, only the variocoupler and condensers require attention, the rheostat setting, knobs 7 and 8, being non-critical, provided it has been adjusted, to start, on a signal of fair strength.

Shooting Trouble in Reflex Circuits

In the event of trouble, first check all the wiring and connections, and make sure that both tubes and batteries are in good condition. As an aid in diagnosing trouble, enabling the application of prompt corrective measures at its source, the following suggestions have been prepared:

Failure of Tube to Light

1. Tube is burned out. Test by connecting the two filament terminals of the tube socket to the terminals of the A battery by means of insulated wires, taking care that the bare ends of the wires themselves do not come together.

2. Tube is not making contact with

(Continued on page 13)

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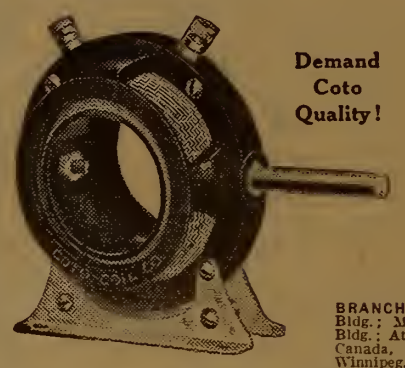

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The Neutrodyne receiver completely built to order, in Cabinet including all of the above parts and Loud Speaker. Our price

$125

OPERATING AND TROUBLE SHOOTING

(Continued from page 12)

socket springs. Bend up socket springs until firm, positive connection is made.

3. Rheostat is defective. Test by connecting the rheostat terminals together with a short piece of wire. If this causes the tube to light, the rheostat is defective and should be replaced.

4. A battery is not connected. Test by connecting a voltmeter to the A binding posts of the apparatus. If the dial of the voltmeter fails to move, look for a break in the connecting wires, for a faulty connection or for a defect in the battery itself.

5. Presence of an opening in the filament circuit wiring. Check all wiring for open or loose connections.

Antenna Circuit Does Not Tune

1. If turning the coarse tap switch of the variocoupler does not affect the tuning, the trouble is due to one of the following: (a) The primary winding of the variocoupler is open; (b) the aerial or ground connections are not properly made; (c) there is an open connection in the aerial or ground circuits.

2. If revolving the rotor of the variocoupler does not affect the signal, there is an open connection in the primary circuit, either in the variocoupler, the aerial or the ground.

3. If placing the finger on a short length of wire on the binding posts of either the aerial or the ground improves the signal strength, there is an open connection either in the ground or aerial, or else the antenna is not long enough.

Secondary Condenser Does Not Tune

1. Rotor of the variocoupler is open.

2. An imperfect connection exists between the variocoupler and condenser or between the grid and grid-return filament leads.

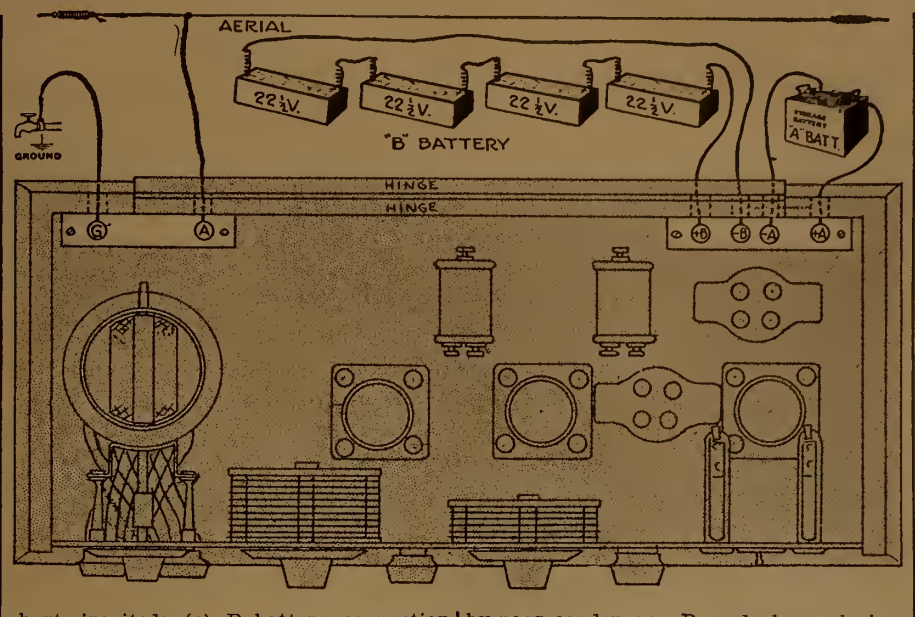
3. The condenser is open or short-circuited.

Radio Frequency Condenser Does Not Tune

Either the connections to the condenser or Radio frequency reflex transformer are imperfect, or the condenser itself is open or short-circuited.

Third Tube Does Not Increase Signal Strength

Test by plugging the phones into the first and second jacks alternately, with the tubes lit. If a click is heard in both instances, the trouble is due to the following: (a) Contacts of first jack are defective; (b) audio transformer is defective; (c) grid contact on last tube socket is imperfect. If no click is heard: (a) Plate contact of tube is faulty; (b) second jack does not make contact or is



short-circuited; (c) B battery connection is not properly made.

If changing the third tube to the second socket and transferring the plug to the first jack gives no signal, it is evident that the tube is defective.

Click in Phones with Tubes Not Burning

With the tubes turned out, no click should be heard when the phones are plugged in on any circuit. Should a click be audible upon plugging into the one or two-tube receivers or the first jack of the three-tube receiver, the B battery is short-circuited directly across the phones, as the result either of a faulty .002 by-pass condenser or improper wiring.

If a click is heard when plugging into the second jack of the three-tube receiver, there is a mistake in wiring.

Noises in the Phones

If crackling sounds in the phones are affected by tuning and disappear upon disconnecting the aerial and ground, they are caused by atmospheric electrical disturbance. If they persist after disconnecting the aerial and ground, they are due to the following: (a) Leakage in apparatus resulting from imperfect contacts or defective insulation; (b) defective A or B batteries.

With the tubes not burning, if a crackling sound is heard when the phones are plugged into any jack, the trouble is caused by a short-circuited or leaky .002 by-pass condenser. Remedy by replacing.

Audio Transformer Does Not "Reflex"

Disconnect the aerial and ground, and test by opening the circuit of the crystal rectifier, when a howl should be heard in the phones, disappearing when the circuit is again closed. If no howl is heard, try reversing the connections of the primary of the audio transformer that is connected to the rectifier. If this does not produce a howl, the transformer does not "reflex" and should be replaced.

Carrier Wave Whistle

This results from oscillating tubes. If not eliminated by increasing the coupling, there is either an intercoupling between apparatus that can be remedied by rearranging the various parts, or else the crystal rectifier is not functioning properly.

Distorted Signals

1. The set is improperly tuned. Correct through closer coupling, i. e., reducing the angle between the rotor and stator of the variocoupler.

2. Crystal rectifier is defective, usually as a result of loose or grainy structure of crystal employed.

3. Transformers do not synchronize received and reflexed currents having the same phase characteristics.

Loud Hum in Phones

If this hum stops when the aerial and ground are disconnected, it is caused by interference from nearby power lines. Remedy by re-erecting the aerial at right angles to these lines, and as far away from them as possible. If this is not enough, run a 75 or 100-foot wire parallel to and about 3 or 4 feet from these lines and ground one end.

If the hum persists after disconnecting the aerial and ground, the grid circuit of one of the tubes is open. Examine the grid connections to the secondary of the coupler, the Radio frequency transformer and the secondary of the audio transformer.

Howls and Body Capacity Effects

Rotor is too loosely coupled to stator. Reduce angle between them.

If moving the hands near the variable condensers causes signals to swing in and out, the condensers are improperly connected. Recheck the connections, making sure that the connection at the end of the shaft supporting the movable plates is making good contact. If this does not solve the difficulty, move the condensers back and away from the panel, using shaft extensions to connect them with their respective dials.

Howl in third tube is identified by the fact that it persists when the second tube is turned off. To remedy, reverse either the primary or secondary connections of the second audio frequency transformer. Do not confuse with the reflex howl that is produced by opening the rectifier circuit.

In some localities and under certain conditions, a continual hum, increasing at night, is audible in the phones of the one-tube receiver. The origin of this hum is invariably an adjoining light or power circuit. To remedy, disconnect the lead from the aerial connection on the receiver to the movable-plate connection on the variable condenser, and remove the .001 condenser from the primary of the audio transformer. If this weakens the signals, insert a .002 fixed condenser between the G on the audio transformer and the G on the Radio transformer, whereupon signal strength will be restored.

(ANOTHER SET NEXT WEEK.)

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1 Battery Switch (Cutler-Hammer)
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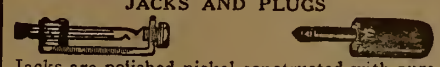
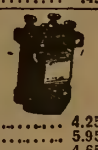


Jacks are polished nickel constructed with pure silver contacts.

D118 One spring open circuit.....$ .39
D119 Two spring closed circuit..... .49
D120 Round plug as illustrated..... .49

Audio Frequency Transformers



The following transformers are guaranteed standard makes, and will produce very efficient results.

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D174 Cockaday Coil..... 2.45
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D177 Switch Arm, Tapered Knob..... .19

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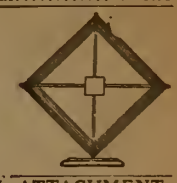
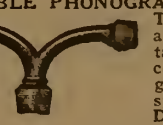


DOUBLE PHONOGRAPH ATTACHMENT



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D132 Double attachment $0.85
D180 Single attachment fits any single phone unit to be used on phonograph.... .49

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D58 Wood Cabinet; panel size 7"x12"..... 3.45
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Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCN, Calgary, Alta	440	12:00- 1:00	Silent	11:00- 2:00	Silent	Silent	11:00- 1:00	Silent
CKAC, Montreal, Que	425	Silent	6:00-10:30	Silent	6:00-10:30	Silent	6:00-10:30	3:30- 4:30
CYB, Mexico City, Mex	425	Silent	8:00- 9:30	Silent	8:30-10:30	Silent	8:00- 9:30	Silent
CYL, Mexico City, Mex	500	Silent	9:30-11:00	Silent	Silent	9:30-11:00	Silent	Silent
KDKA, E. Pittsburgh, Pa	326	5:00- 9:00	5:00-11:30	5:00- 9:00	5:00-11:30	5:00- 9:00	5:00- 9:00	6:30- 7:30
KDZE, Seattle, Wash	455	10:30-12:30	Silent	10:30-12:30	Silent	10:30-12:30	Silent	Silent
KFAE, Pullman, Wash	330	9:30-10:30	Silent	9:30-10:30	Silent	9:30-10:30	Silent	Silent
KFAF, Denver, Colo	360	9:00-10:00	9:00-10:00	Silent	8:30- 9:00	9:00-10:00	9:00-10:00	Silent
KFI, Los Angeles, Calif	469	12:00- 1:00	8:45- 1:00	8:45- 2:00	8:45- 1:00	8:45- 2:00	8:45- 2:00	8:45- 1:00
KGO, Oakland, Calif	312	Silent	8:00- 9:00	Silent	8:00- 9:00	8:00- 9:00	8:00- 9:00	Silent
KGU, Honolulu Hawaii	360	12:00- 1:30	12:00- 1:30	12:00- 1:30	12:00- 1:30	12:00- 1:30	12:00- 1:30	12:00- 1:30
KGW, Portland, Ore	492	9:30-12:30	9:30- 1:00	9:30- 1:00	9:30- 1:00	9:30- 2:00	9:30- 1:00	8:00-10:00
KHJ, Los Angeles, Calif	395	8:45- 2:00	8:45- 2:00	8:45- 2:00	8:45- 2:00	8:45- 2:00	8:45- 2:00	10:00-12:00
KLX, Oakland, Calif	509	Silent	10:00-12:00	10:00-12:00	10:00-12:00	10:00-12:00	Silent	Silent
KPO, San Francisco, Calif	423	10:00- 1:00	10:00- 1:00	10:00-12:00	10:00- 1:00	10:00-11:00	10:00- 2:00	10:30-12:00
KSD, St. Louis, Mo	546	8:30- 1:00	8:00- 1:00	8:00- 1:00	8:00-10:30	Silent	7:00- 9:00	Silent
KYW, Chicago, Ill	536	Silent	7:00- 9:30	7:00- 2:00	7:00- 9:30	7:00- 2:00	7:00-12:00	6:30- 8:00
NAA, Radio, Va	435	5:45- 7:20	6:05- 7:20	6:25- 7:40	5:45- 7:40	7:05- 7:40	Silent	Silent
PWX, Havana, Cuba	400	Silent	Silent	7:30-10:00	Silent	Silent	7:30-10:00	Silent
WBAP, Fort Worth, Texas	476	7:30-10:45	7:30-10:45	7:30-10:45	7:30-10:45	7:30-10:45	7:00- 7:30	5:00- 6:00
WBAV, Columbus, O	390	8:00-10:00	Silent	Silent	Silent	8:00-10:00	Silent	4:00- 5:00
WBZ, Springfield, Mass	337	6:00- 9:00	6:30- 9:00	5:00-11:00	6:30- 8:00	5:00-11:00	6:30- 8:00	5:45- 8:30
WCAE, Pittsburgh, Pa	426	5:30- 8:30	5:30- 8:30	5:30- 8:30	5:30- 8:30	5:30- 8:30	5:30- 8:30	5:30- 8:00
WCAP, Washington, D. C	469	Silent	6:30- 9:00	Silent	6:15-11:00	Silent	6:15-11:00	6:20- 9:00
WCBD, [illegible], Ill	345	8:00-10:00	Silent	Silent	Silent	8:00-10:00	Silent	2:30- 5:30
WCX, Detroit, Mich	517	7:30- 9:00	7:30-11:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	Silent	6:15- 7:15
WDAF, Kansas City, Mo	411	8:00- 1:00	11:45- 1:00	8:00- 1:00	11:45- 1:00	8:00- 1:00	11:45- 1:00	Silent
WDAP, Chicago, Ill	360	Silent	7:00- 1:00	7:00- 1:00	7:00- 1:00	7:00- 1:00	7:00- 1:00	9:15-11:15
WDAR, Philadelphia, Pa	395	6:30- 9:55	6:30- 7:00	6:30-10:00	6:30- 7:00	6:30-12:00	6:30- 7:00	1:00- 3:00
WEAF, New York, N. Y	492	6:30- 9:00	6:30- 9:00	6:30- 9:00	6:00-11:00	6:30- 9:00	6:30-11:00	6:20- 9:00
WFAA, Dallas, Tex	476	8:30- 9:30	8:30-12:00	Silent	8:30- 9:30	8:30- 9:30	8:30-12:00	6:00-11:00
WFI, Philadelphia, Pa	395	5:30- 6:00	5:30- 8:00	5:30- 6:30	5:30- 8:00	5:30- 6:30	5:30- 8:00	6:30- 7:30
WGI, Medford, Mass	360	Silent	6:30- 7:30	6:00- 8:00	6:00- 7:30	6:30- 8:00	6:30- 8:00	7:30-10:00
WGR, Buffalo, N. Y	319	5:30-11:00	5:30- 7:45	5:30-11:00	5:30- 7:45	5:30-11:00	5:30- 7:45	2:00- 4:00
WGY, Schenectady, N. Y	380	6:45- 9:00	6:45- 9:00	Silent	6:45- 9:00	6:45-10:30	8:30- 9:30	6:30- 7:30
WHA, Madison, Wis	360	7:30- 8:30	Silent	7:30- 8:30	Silent	7:30- 8:30	Silent	Silent
WHAS, Louisville, Ky	400	Silent	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	4:00- 5:00
WHAZ, Troy, N. Y	380	8:00- 9:30	Silent	Silent	Silent	Silent	Silent	Silent
WHB, Kansas City, Mo	411	7:00- 7:45	7:00-10:00	7:00- 7:45	7:00-10:00	7:00- 7:45	7:00- 7:45	8:00-10:00
WHK, [illegible]eland, O	283	5:00- 5:30	5:00- 5:30	5:00- 5:30	5:00- 5:30	5:00-10:00	5:00- 5:30	7:00- 9:00
WHN, New York, N. Y	360	6:30-11:00	8:30-11:00	6:30-11:00	8:30-11:00	8:30-11:00	6:30-11:00	8:30-11:00
WIP, Philadelphia, Pa	509	5:00- 6:30	5:00-11:00	5:00- 6:30	5:00-10:00	5:00- 6:30	5:00-11:00	7:00-10:00
WJAR, Providence, R. I	360	Silent	6:00- 7:00	6:00-11:00	Silent	6:00- 9:00	Silent	Silent
WJAX, Cleveland, O	390	Silent	6:30- 8:30	Silent	7:00- 9:30	Silent	Silent	Silent
WJAZ, Chicago, Ill	448	Silent	10:00- 2:00	10:00- 2:00	10:00- 2:00	10:00- 2:00	10:00- 2:00	6:00- 9:00
WJY, New York, N. Y	405	Silent	6:30- 9:30	Silent	6:30- 9:15	6:30-11:00	Silent	7:15-10:00
WJZ, New York, N. Y	455	6:00-10:30	6:00-10:30	6:00-10:30	6:00-10:30	6:00-10:30	6:00-10:30	6:00- 9:30
WKAQ, San Juan, P. R	360	Silent	7:00- 8:30	Silent	Silent	7:00- 8:30	Silent	Silent
WLAG, Minn.-St. Paul	417	Silent	Silent	9:15-10:45	Silent	9:15-10:45	9:15-12:30	7:45- 9:15
WLW, Cincinnati, O	309	10:00-12:00	10:00-12:00	8:00-10:00	10:00-12:00	Silent	Silent	Silent
WMAQ, Chicago, Ill	448	Silent	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	Silent
WMC, Memphis, Tenn	500	8:30- 9:30	8:30-12:00	Silent	8:30- 9:30	8:30-12:00	8:30- 9:30	Silent
WNAC, Boston, Mass	278	5:00- 9:00	7:00- 9:00	5:00- 9:00	7:00- 9:00	5:00- 9:00	8:00- 9:00	6:30- 8:30
WOAI, San Antonio, Texas	385	Silent	9:30-10:30	Silent	7:30- 8:30	Silent	Silent	9:30-10:30
WOAW, Omaha, Neb	526	6:00-11:00	6:00-11:00	Silent	6:00-11:00	6:30-11:00	6:00-11:00	9:00-11:00
WOC, Davenport, Ia	484	8:00- 9:00	Silent	8:00-11:00	8:00- 9:00	8:00- 9:00	9:00-10:00	7:00-11:00
WOO, Philadelphia, Pa	509	6:30-10:00	Silent	6:30-10:00	Silent	6:30-10:00	Silent	Silent
WOR, Newark, N. J	405	5:15-10:00	5:15- 6:30	5:15-10:00	5:15- 6:30	5:15- 6:30	5:15-10:00	Silent
WOS, Jefferson City, Mo	441	8:00- 9:30	Silent	8:00- 9:30	Silent	8:00- 9:30	Silent	7:30- 8:30
WRC, Washington, D. C	469	7:00- 9:00	Silent	7:00- 9:00	Silent	7:00- 9:00	Silent	Silent
WRM, Urbana, Ill	360	Silent	7:00- 9:30	Silent	8:30- 9:30	Silent	Silent	Silent
WSAI, Cincinnati, O	309	Silent	8:00-10:00	Silent	8:00-10:00	Silent	10:00-12:00	Silent
WSB, Atlanta, Ga	429	8:00-12:00	8:00-12:00	Silent	8:00-12:00	8:00-12:00	8:00-12:00	7:30- 9:15
WSY, Birmingham, Ala	360	Silent	8:00- 9:00	Silent	Silent	8:00- 9:00	Silent	8:00- 9:00
WTAM, Cleveland, O	390	Silent	Silent	7:00- 9:30	Silent	Silent	8:00-10:00	Silent
WWJ, Detroit, Mich	517	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30-11:00	7:30- 9:00	Silent	4:00- 5:00

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

WAVE TRAPS NOW ON THE MARKET

ANOTHER of the wave traps at present on the market is known as the "Silencer" and manufactured by the Pfanstiehl Radio Service Company of Highland Park, Illinois. The instructions that accompany this instrument are as follows:

Connect this instrument with any Radio set. It will enable you to silence that loud station which you hear at all adjustments; furthermore, it will sharpen your tuning so that you can separate two stations coming in on wave lengths approximately the same. This Silencer is scientifically designed and of the coupled circuit type, which was developed in response to a demand for a really efficient device for eliminating undesired signals. The average set was designed at a time when present conditions were practically unknown and therefore cannot discriminate between stations. An instrument of this type can be applied to any type of receiver.

1. Remove the antenna wire from your Radio set, and connect it to either binding post of the silencer, the other binding post to the Radio set's binding post for antenna. There are two other optional arrangements. One is to insert the silencer in series in the ground circuit, the other to retain the ground and antenna connections on receiving and in addition also connect one binding post of the silencer to the antenna post on the set, and the other silencer post to ground post of the set, and the tube.

2. Turn the silencer dial to zero.
3. Tune in the undesired station as sharply as possible.
4. Adjust the silencer dial until reception from this station is completely eliminated.
5. Tune your set in the regular manner for any other stations you wish to hear.
6. Occasionally a slight retuning of the silencer and a final retuning of the set will be found effective in improving reception.

Theory

For two reasons nearby stations of high power are difficult to tune out.

1. While a station sends out most of its power on its rated wave length it also sends out slightly weaker waves above and below this frequency known as harmonics. Such waves usually die out after traveling from 25 to 75 miles.

2. Any powerful wave will often create a forced oscillation in the neighboring receiving sets unless the set is capable of extremely sharp tuning. This forced oscillation may be compared to the irregular and unnatural vibration of a pendulum which is deliberately shaken by the hand. To prevent such interference it is necessary to absorb this undesired energy. The silencer then is designed as a trap, or absorption device, for all undesired energy and thus eliminates this interference and enables you to reach out for long distance work.

"Radio Tantrums" Bring Man and Wife to Court

Kansas City Court Hears Airphone Alters Husband

KANSAS CITY.—Until the inception of Radio, W. B. Watson, 33 years old, street railway motorman here, was a model husband, a devoted father, gentle, with no bad habits.

Things have changed materially, since the advent of Radio, according to Mrs. Watson, self-described "radio widow," who bared to the North Municipal court the devastation wrought in her home by variocouplers, variometers, aerials, condensers, amplifiers and detectors. Yes, Watson was a CW hound, too, she said.

"Judge," said Mrs. Watson in court, "my husband never had a bad habit until this Radio craze came along. He got off work at 1:30 o'clock in the morning. One morning a friend induced him to 'drag,' on a Radio head set. This morning I had him arrested for disturbing my peace. It's [illegible] like 'booze,' judge. When he can't get anything he goes into tantrums."

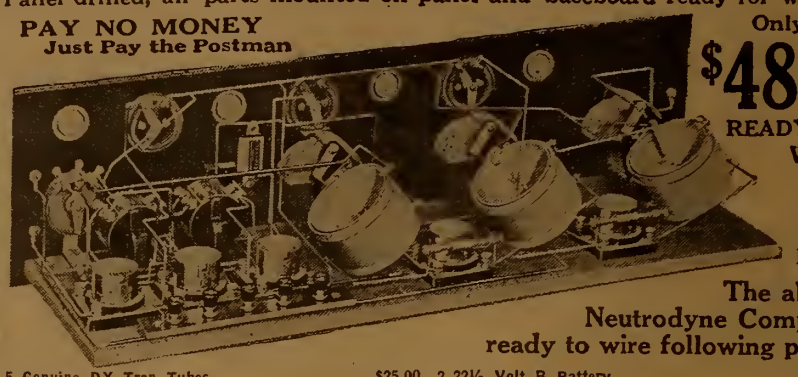
BRINGS IN EVERYTHING

BEAUTIFUL MAHOGANY NEUTRODYNE

WHEN you get this magnificent looking set wired and hooked up, you will be able to hear all stations without interference. All parts are same as illustrated in Radio Digest, Feb. 2nd. Panel is mahogany with beautiful mahogany dials—a set fitted for the most exclusive home.

Panel drilled, all parts mounted on panel and baseboard ready for wiring

PAY NO MONEY
Just Pay the Postman



Only **$48.50** READY TO WIRE

FREE BLUE PRINT

The above Neutrodyne Complete ready to wire following parts:

5 Genuine DX Tron Tubes	$25.00	2 22½ Volt B Battery	$ 6.00
1 110 Ampere Storage Battery	18.00		$86.00
1 DeLuxe Homecharger	18.00		
1 Genuine Baldwin Headset	12.00	1 Fultone Loud Speaker	9.50
1 Complete Aerial Equipment	1.50	TOTAL	$95.50
1 45 Volt B Battery	5.50		

The above parts and equipment complete would cost you $144.00! **Our Price $125.00**

It Works Great—NEUTRODYNE—All Standard Parts

3 Rheostats, 30 ohms	$ 2.00	2 Transformers	$ 9.50
1 Rheostat, 6 ohms	.90	9 Readem Binding Posts	.85
3 Air Core R. F. Transformers, mounted on condensers, and 2 balancing condensers	20.00	1 8x26 Mahogany Panel	3.64
1 Potentiometer, 600 ohms	1.85	4 Bezels	.80
3 Jacks	2.70	3 Dials	4.50
1 Condenser	.40	1 Baseboard	.50
1 Grid Leak	.65	24 ft. Square Brass Bus Wire	.60
5 Sockets	5.00	Total	$53.89

Only $45.50 with blue prints FREE.

LIMITED SUPPLY

BALDWIN PHONES

ONLY **$6.25**

Genuine Baldwin double head phone receivers with head band complete, list price, $12.00. Special as they last.....

NOT MORE THAN TWO TO EACH CUSTOMER

A FEW LEFT

BALDWIN UNITS

ONLY **$3.19**

Genuine Baldwin Type C unit with mica diaphragm, list $6.00...

ONLY TWO TO A CUSTOMER

Special Sale on Webster Condensers

None Better Made

Variable condenser, .0005 (Same as 23 plate) list, $5.50.
BARGAIN AT
$2.98
While They Last

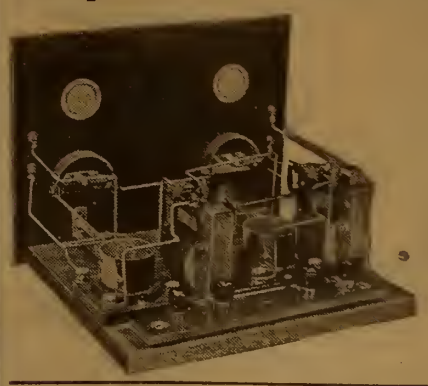
Variable Condenser, .001 (Same as 45 plate) list, $6.00.
BIG BUY AT
$2.98

SALE OF FINE CABINETS

HIGH MAHOGANY FINISH

9x14x8 with baseboard. List, $12.00.....**$5.98**
7x16x8 with baseboard. List, $12.00..... **5.98**

Complete Parts—MILOPLEX—2-Step Amplifier



Mounted on baseboard and panel.

1 Panel 7x9x3/16"	$1.25
2 Webster's 4-1 Transformers	9.50
2 30 Ohm Rheostats	2.00
2 Sockets	2.00
2 Double Circuit Jacks	1.80
1 Set Readem Engraved Binding Posts	.75
1 Baseboard	.25
1 Cabinet Mahogany Finish	3.50

The above mentioned parts will include any Ohm Rheostat and All-American Transformers if desired.

List—$21.06
OUR PRICE
Only $16.50

Complete Parts — MILOPLEX — Cabinet FREE

1 .0005 Variable Condenser, Vernier	$6.00	1 Socket Bakelite Base	$0.90
1 Estru Variometer	5.00	1 Bakelite Panel, 9x14x3/16	2.50
1 .00025 Variable Condenser	2.00	1 WD-12 Tube	6.50
1 Variable Grid Leak	.75	1 B Battery, large, 22½ volt	3.00
1 .00025 Mica Fixed Condenser	.40	3 Dry Cells	1.35
2 .002 Phone Condensers	.80	12 ft. sq. brass Bus wire	.30
3 3½-inch Dials, each 75c	2.25	1 Set Readem Binding Posts	.75
1 Potentiometer, 1850 ohms	2.20	TOTAL	$35.70
1 Rheostat	1.00		

ONLY **$28.50**

Blue print FREE only with order for complete parts

WAVE TRAP

You can now enjoy the comfort of selecting any station that you desire by hooking up one of our METRO Wave Traps with your Set. Mounted in Mahogany Cabinet with the highest grade material. Regular List Price $7.50. Our Price .....

ONLY **$6.50**

We Are Responsible Folks, Money Promptly and Cheerfully Refunded If You Are Not Satisfied

Everything in Radio Write Us

All Orders Mailed Promptly. Parcel Post Prepaid on $5.00 or Over. No Stamps Accepted.

Quality Merchandise at Low Prices

Economical Radio House

4600 LINCOLN AVENUE, CHICAGO

We Personally Guarantee All Goods

THE WEEK'S ADVANCE PROGRAMS

Tuesday, February 19

CKAC, Montreal, Canada (Eastern, 425), 4:30 p. m., Special talk; 7:00, Kiddies atories in French and English; 7:30, Rex Battle and his Mount Royal Hotel concert orchestra; 8:30, Studio Entertainment; 10:30, Joseph C. Smith and his Mount Royal Hotel orchestra; Teddy Brown, saxophonist and xylophonist.

KOKA, E. Pittsburgh, Pa. (Eastern, 326), 6:15 p. m., Dinner coucert; 7:15, Address, E. Blower; 7:30, "Tendencies in American Education," D. E. Carpenter; 7:45, Children's period; 8:15, "Industry," Dr. John Ray Ewers; 8:30, Sara Peck, soprano; Mrs. Gertrude Centorbi, contralto; Walter Pease, accompanist; Louis Glugosz, violinist; 11:30, Special late eveulng concert, Queen City orchestra.

KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Concert program presented by the George J. Birkel Music Co.; 10:00-11:00, Musicale presented by Sol Cohen, violinist and associates.

KFKX, Hastings, Neb. (Central, 341), Rebroadcasts program of KDKA.

KFSG, Los Angeles, Calif. (Pacific, 278), 3:30-4:30 p. m., Special musicale and readings for shut-Ins, the sick and afflicted; 7:00-7:30, Bible stories for children; 8:00-9:30, Music and sermon by Aimee Semple McPherson.

KGO, Oakland, Calif. (Pacific, 312), 8:00-10:00 p. m., Concert program including both vocal and Instrumental numbers.

KGW, Portland, Ore. (Pacific, 492), 3:30 p. m., Talk, Jeannette P. Cramer; 7:45, Talk for farmers, Oregon Agricultural College.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:30 p. m., Program presented by White's Californians; 2:30-3:30, Matinee musicale presenting White's Californians; 6:45-7:30, Weekly visit of "The Sandman," and Queen "Titsnia"; Dorothy Hendrix, cornetist, age 10 years; 8:00-10:00, Program presenting Janet Norman McIntyre, soprano; Lillian Althouse, saxophonist; Louis F. Klein, harmonica and auto harp soloist; Dr. Louis Guild, lecturer; 10:00-12:00 p. m., Art Hickman's orchestra.

KPO, San Francisco, Calif. (Pacific, 423), 8:00-9:00 p. m., Solos, Swiss harp-zither, A. Eckert; Trio from Mills; 9:00-10:00, San Francisco Players' Club; 10:00-11:00, Palace Hotel Dance Orchestra.

KSD, St. Louis, Mo. (Central, 546), 8:00 p. m., Mrs. William H. Hopkins, soprano; Mildred Freeze, accompanist; "Weeds Used in Medicine," O. S. Ledman.

KYW, Chicago, Ill. (Central, 536), 11:35 a. m., Table talk, Mrs. Anna J. Peterson; 2:35-3:30 p. m., Studio program; 6:50, Children's bedtime story; 7:00-7:30, Dinner concert; 7:00-7:10, Joska DeBabary and his orchestra; 7:10-7:20, Clyde Doerr and his orchestra; 7:20-7:30, Joska DeBabary and his orchestra; 8:20-8:45, Program, American Farm Bureau Federation; "Some Business Aspects of Farmer Organizations," R. A. Cowles; "Dairy Industry and Its Relation to National Health," Louise Fitzgerald; 8:45-9:30, Musical program, Chicago Musical College, D. Paul Breitwiser, director.

WAAM, Newark, N. J. (Eastern, 263), 8:00-8:15 p. m., "Star-Spangled Banner," Nell Curzon, contralto; 8:15-8:30, Charles T. Lawson, harmonica; 8:30-8:45, "Gems from the Treasure Vault of Memory," Mrs. Helen Kingsley in one of her intimate chats on literary classics; 8:45-9:00, James Clark, pianist; 9:00-9:15, Joseph Sherman, double voiced tenor; 9:15-9:30, Lucille Wilson, society entertainer in a series of humorous readings; 9:30-9:45, Original New Orleans Jazz Band; 10:00-10:15, Al Novins, tenor, Clinton Sommer, pianist; 10:15-10:30, Paradise Quartette, in saxophone selections; 10:30-10:45, Bob Schaefer and his gloom-chasers, in a hodge-podge of song hits from Broadway.

WBAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Concert D. G. Griffin Quartet; 9:30-10:45, Concert, E. Clyde Whitlock's violin ensemble.

WBZ, Springfield, Mass. (Eastern, 337), 7:30 p. m., Bedtime story for kiddies; 8:00, Concert, Alice Anna Mikus, harpist; Alphonse Guyon, pianist; 9:00, Bedtime story for grown-ups, Orison S. Marden.

WCAE, Pittsburgh, Pa. (Eastern, 462), 4:30 p. m., Sunshine Girl; 6.30, Dinner concert, William Penn Hotel; 7:30, Uncle "Kaybee"; 8:30, Musical program, Blue Ridge Synkos.

WCAP, Washington, D. C. (Eastern, 469), 7:30-10:00 p. m., Joint program with WEAF, N. Y. C., concert of music and short talks.

WOAF, Kansas City, Mo. (Central, 411), 3:30 p. m., Eddie Kuhn's Kansas City Athletic Club Orchestra; 6:00-7:00, School of the Air: Piano tuning in number on the Duo-Art; Travelogue, E. O. Moffatt; Address, J. Frank Smith; Children's story and information period; Fritz Hanlein's Trianon Eusemble: 11:45-1:00 a. m., Nighthawk frolic: "Merry Old Chief" and the Coon-Sanders Novelty-Singing Orchestra.

WDAP, Chicago, Ill. (Central, 360), 7:00-8:00 p. m., Drake Concert Ensemble and Blackstone String Quintette; 8:00-8:30, Barton Organ played by Ralph Emerson; 10:00, Voris Worthley, Annette Chayes, Fred W. Agard, Bob Cougle, Rosemary Hughes, Jack Chapman's Orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily Almanac; 12:02 p. m., Organ recital, Stanley Theater; dinner music, Arcade Cafe Concert Orchestra; 7:30, Dream Daddy's bedtime stories; 7:50, Arnold Abbott's play review.

Headliners of the Week

THE POPULAR opera, "The Bohemian Girl," will be heard over WHAS *Tuesday* night. This melodious opera was composed by an Irishman and thus holds a unique place in the operatic world.

Cincinnati plans *Wednesday* night to give to the air its best minstrel talent through WLW. WGR claims that Edna L. Stewart, the promising lyric soprano who is to be heard this same night, has received more fan notes than any other singer who has appeared at this station. On this same evening, WMAQ offers two very famous artists, Madame Eugene di-Primo-Zanco, composer-pianist, daughter of Count Tolstoy, and her husband, Servais de Zanco, both internationally famous.

Thursday the music of the first American composer, Hopkinson, one of the signers of the Declaration of Independence and a friend of George Washington, will be heard over the air from WLW and will reach so large an audience that the composer would be greatly surprised were he alive and knew how far one little note of his music can now travel. Early Indian music will also be featured. Please notice the famous viola d'amour on the next page. This instrument which will be played by Maurice Kessler, its owner, from WJAX, is over 400 years old and is also an old-timer apt to be shy before the microphone.

KSD is putting on a pageant *Friday*. This is a surprise to many who have always considered pageants visible rather than audible. The name of this pageant is "The Dreamer Awakes." Are you listening in to WDAR's "Morning Glory Club"? They feature all the best stars in town. This week Irene Bordoni, the French actress, will sing her latest song hits.

WEAF is a very popular station on *Saturday* nights with the bridge fans, who play listening in to Raymond F. Rode, the Bridge expert. If you dance, dance to the music from WTAM and you may dance with people from Labrador to Guatemala.

Monday all the ladies will be interested in getting WEAF, and "New Spring Styles for Women."

WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Topics of Interest to Women, 10:00, Concert, St Edward Choir, Larry Hess, director, Elizabeth Hess, soprano; 10:45, Double Quartette, Gamma Gamma Zeta of Lambda Chi Alpha Fraternity, Fraternity Songs, U. of Cincinnati Yells; 11:00, Woody Meyers Frolics Cincinnati Orchestra; "The Air Is Full of Mystery," Howard Thurston, Magician.

WMAQ, Chicago, Ill. (Central, 447.5), 2:35 p. m. Lyon and Healy program; 4:20, Items of Interest to Women; 4:30, Pupils, Glenn Dillard Gunn School of Music, 5:00, Weekly Child Lite Talk for Children, Marjorie Barrows; 7:00, talks, Dr. H. E. Pike, Norman Pearce, Dr. R. A. Allen, "Patagonia Patty," Mrs. John Meck, Talk, Harry Hanson, Literary editor, 9:15, Lyon and Healy program.

WMC, Memphis, Tenn. (Central, 500), 6:00 p. m., afternoon tea, Britling Orchestra, Frank Bracciante, director, 8:00, "An Evening of Stories and Music," Ralph Bingham; 11:00, Pipe organ recital, H. O. Nichols.

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

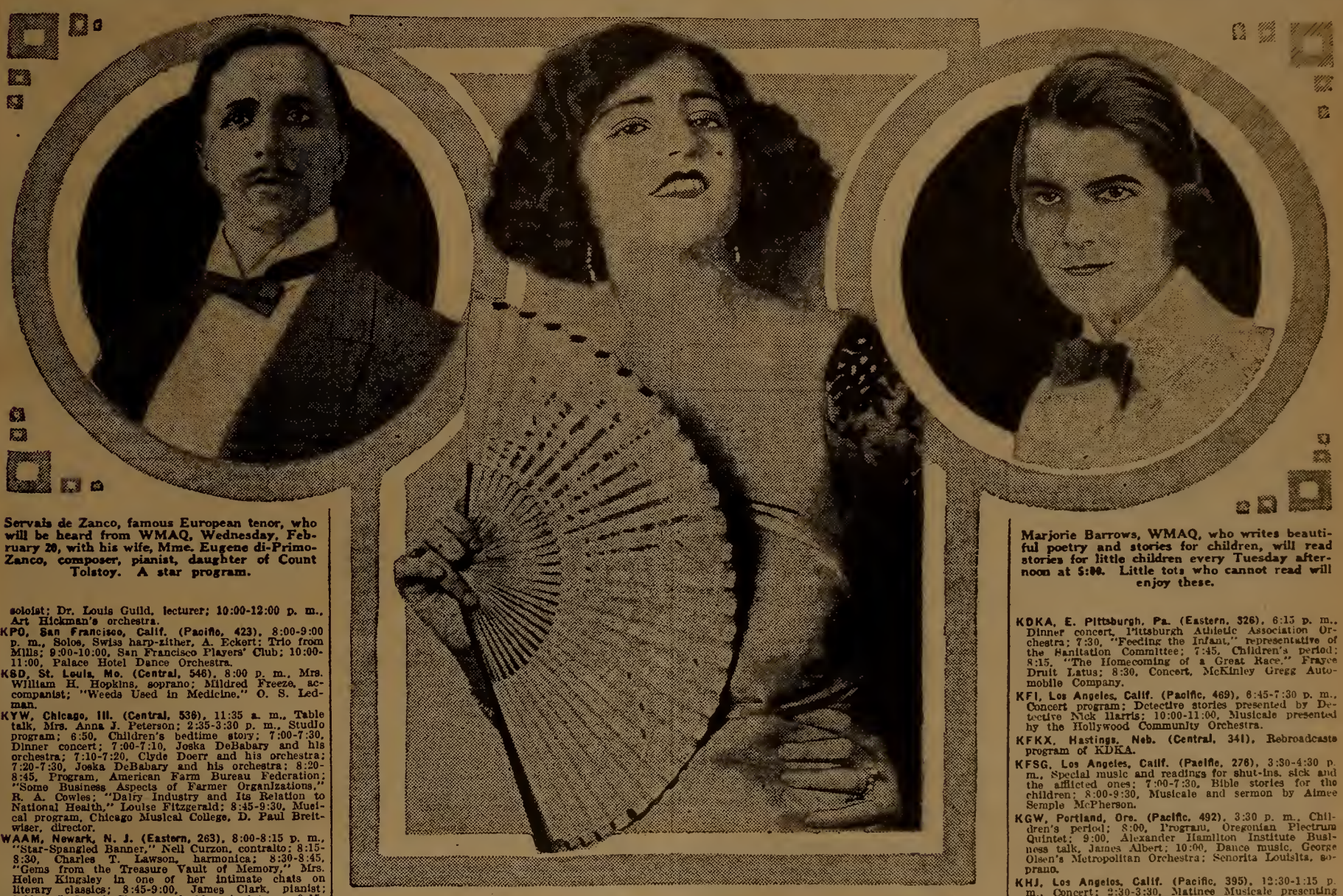
WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt; 12:00 m., Wanamaker Crystal Tea Room Orchestra; 4:45 p. m., Organ recital, Mary E. Vogt.

WSB, Atlanta, Ga (Central, 429), 8:00-9:00 p. m., Lieutenant William Laurier and his band; 10:45, "Old Time Religion" concert, Charlie Tillman, evangelist.

WWJ, Detroit, Mich. (Eastern, 517), 9:30 a. m., "Tonight's Dinner," Woman's Editor; 9:45, "Ironing Day," Fred Shaw, pianist, 3:00 p. m., Detroit News Orchestra; 7:00, Detroit News Orchestra; Vocal numbers, Thaddeus Wronski.

Wednesday, February 20

CKAC, Montreal, Can. (Eastern, 425), 1:45 p. m., Classical concert, Mt. Royal Hotel Concert Orchestra; 4:30, Special afternoon dance program, Mt. Royal Hotel Dance Orchestra.



Servais de Zanco, famous European tenor, who will be heard from WMAQ, Wednesday, February 20, with his wife, Mme. Eugene di-Primo-Zanco, composer, pianist, daughter of Count Tolstoy. A star program.

Annette Chayes, soprano, will also be heard from WDAP, but on Tuesday, February 19.

Marjorie Barrows, WMAQ, who writes beautiful poetry and stories for children, will read stories for little children every Tuesday afternoon at 5:00. Little tots who cannot read will enjoy these.

WEAF, New York, N. Y. (Eastern, 492), 11:15 a. m., Edward Howard Griggs from the Town Hall; 11:50, U. S. Dept. of Agriculture; 4:00 p. m., Pirate's Den Trio; 5:00, Margaret McCambridge, soprano, and Miss Shaar, violinist; 7:30, Thornton Fisher; 7:40, Hettie E. Matthews, soprano; 8:00, Orange County (Florida) Chamber of Commerce; 8:10, American Surety Co.; 8:30, Brooklyn Eagle News Review; 9:00, Mendelssohn Glee Club; 9:30, Columbia Phonograph Co., Mendelssohn Glee Club.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., Address DeWitt McMurray; 8:30-9:30, Recital, Lucile Lechner and assisting musicians, Elizabether F. Crawford, director; 11:00-12:00, Orchestral and vocal music, Earle D. Behrends, director.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Concert Orchestra; 6:00, Bedtime stories; 6:30 p. m., Meyer Davis Bellevuo Stratford Orchestra; 9:00, Strawbridgo and Clothier Radio Players.

WGI, Medford Hillside, Mass. (Eastern, 360), 12:00 m., Selections on the Ampico in the Chickering; Amrad Round Table; selections on the Brunswick; 3:00 p. m., Amrad Women's Club program; 3:45, "Tuesday Tea Talk," David M. Cheney; 6:30, Meeting of the Big Brother Amrad Club; 7:00, Evening program; "Africa from Cape Town to the Congo," A. S. Flint; Concert, Prof. Ripley and friends.

WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., George Albert Bouchard, organist; 2:30-4:00, Tho Yankee Six Orchestra; 4:00, Tea time music, Martha Gomph, harpist; Katherine Stang, violinist; 6:30-7:30, Vincent Lopez Hotel Statler Orchestra; 7:30, Digest of the day's news.

WGY, Schenectady, N. Y. (Eastern, 380), 7:45 p. m., program, St. John's Student Serenaders: Mrs. Edward O'Donnell, soprano; Frank Davis, tenor.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Strand Theater Orchestra; Walnut Theater Orchestra; 7:30-9:00, "The Bohemian Girl," Peter Zanone, director; Louisville Elks Bank; Vocal soloists, New Albany, Ind., Elks; Choruses, Jeffersonville, Ind., Elks.

WHB, Kansas City, Mo. (Central, 411), 12:35-1:00 p. m., Popular music, Sweeney Radio Orchestra; 2:00-3:00, Ladies' Hour Program, Sweeney Radio Orchestra; Thomas McCluskey, violinist; 7:00-7:45, W. C. T. U. talk, Rosa M. Webb; Musical program, pupils of Mrs. E. L. Thompson; Piano duet, A. B. French, Kenneth Clutter; Cornelia Price, pianist; 8:00-10:00, Eddie Kuhn's Orchestra; Alma Nash's String Orchestra; Sweeney Radio Orchestra.

WIP, Philadelphia, Pa. (Eastern, 509), 1:00 p. m., Gimbel Brothers Tea Room Orchestra, Ray Steen, director; Organ recital, Karl Bonaditz; 6:05, Dick Regan and His WIP Symphony Orchestra; 7:00, Uncle Wip's bedtime stories; 8:00, Dramatic review, Elliott Lester; 10:15, Ted Weems and his Cafe L'Aiglon Orchestra; Charlie Kerr and his St. James Hotel Orchestra.

WJAX, Cleveland, Ohio (Eastern, 390), Program arranged by Cleveland News-Leader; 7:30 p. m., Bedtime story by E. G. Johnson; 7:45, Chorus numbers by Lakewood (Ohio) Presbyterian Choir; Ralph Everett Sapp, director, Ethel M. Kunkel, organist; Solo numbers by Mrs. Robert Kelly, soprano; Walter Logan, violinist; Nell Steck, harpist; Quartette numbers by Mesdames Kelly and Sloan and Messrs. Backus and Sapp; Duet numbers by L. N. Roller, W. J. May; Mesdames Kelly, Gracey; Violin and harp duet, Walter Logan and Miss Nell Steck; Men and women chorus numbers.

WJAZ, Chicago, Ill. (Central, 448), 10:00 p. m., Oriole Orchestra.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 6:15 p. m., Dinner concert, Pittsburgh Athletic Association Orchestra; 7:30, "Feeding the Infant," representative of the Sanitation Committee; 7:45, Children's period; 8:15, "The Homecoming of a Great Race," Fryce Druit Latus; 8:30, Concert, McKinley Gregg Automobile Company.

KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Concert program; Detective stories presented by Detective Nick Harris; 10:00-11:00, Musicale presented by the Hollywood Community Orchestra.

KFKX, Hastings, Neb. (Central, 341), Rebroadcasts program of KDKA.

KFSG, Los Angeles, Calif. (Pacific, 278), 3:30-4:30 p. m., Special music and readings for shut-Ins, sick and the afflicted ones; 7:00-7:30, Bible stories for the children; 8:00-9:30, Musicale and sermon by Aimee Semple McPherson.

KGW, Portland, Ore. (Pacific, 492), 3:30 p. m., Children's period; 8:00, Program, Oregonian Plectrum Quintet; 9:00, Alexander Hamilton Institute Business talk, James Albert; 10:00, Dance music, George Olsen's Metropolitan Orchestra; Senorita Louisita, soprano.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Concert; 2:30-3:30, Matinee Musicale presenting Dorothea Anderson, pianist; Mary Booth, contralto; Vern Tsom, violinist; Marie MacAlister, reader; 6:45-7:30, Children's program presenting Maude Fenlon Bollman, soprano; Alice Lee Wiley, pianist; Mickey McBan, screen juvenile; Bedtime story, "Uncle John"; 8:00-10:00, Program presented by California Hut, Disabled Veterans; Irene Kircher, blue singer; Todd Phillips, banjoist; Dr. Mars Baumgardt, lecturer; 10:00-12:00, Art Hickman's Orchestra.

KPO, San Francisco, Calif. (Pacific, 423), 12:00 m., Reading from the Scriptures; 1:00-2:00 p. m., Rudy Seiger's Fairmont Hotel Orchestra; 2:30-3:30, Jack Fait's Entella Cafe Orchestra; 4:30-5:30, Rudy Seiger's Fairmont Hotel Orchestra; 5:30-6:30, Children's hour; Stories for children, "Big Brother of KPO," taken from the Book of Knowledge; Piano-key box accordion solos, Walter Gamba, 11 years; 8:00-11:00, E. Max Bradfield's Palace Hotel Dance Orchestra; Sherman Clay & Co. Trio.

KSD, St. Louis, Mo. (Central, 546), 7:00 p. m., Seth Abergh's Concert Ensemble; Arne Arnesen, violinist; 8:00, Music Dept. Faculty and Pupils of Junior College.

KYW, Chicago, Ill. (Central, 536), 11:35 a. m., Table talk, Mrs. Anna J. Peterson; 6:50 p. m., Children's bedtime story; 7:00-7:30, Dinner concert; 7:00-7:10, DeBabary's Orchestra; 7:10-7:20, Clyde; 7:20-7:30, Joska DeBabary's Orchestra; 8:00-8:58, Sidelights on Music," Morgan L. Eastman; H. C. McClory, tenor; Sallie Menkes, accompanist; 9:05, Reviews on the latest books, Llewellyn Jones; 10:00-2:00 a. m., Midnight revue.

PWX, Havana, Cuba (Eastern, 400), 8:30 p. m., Concert, Staff Band of the Navy.

WAAM, Newark, N. J. (Eastern, 263), 7:45-8:00 p. m., "Star Spangled Banner," Castillo de Rojas, violinist 8:15-8:30, Phillip Ellis, pianist; 8:30, Chris[illegible]

(Continued on page 16)

WASHINGTON'S BIRTHDAY INSPIR

Where to Hear Concerts

THESE are the stations for music lovers to dial, you and can hear, providing you dial correctly and read the programs carefully, everything from jazz to opera.

Tuesday: CKAC, KDKA, KFI, KGO, KHJ, KPO, KSD, KWY, WBAP, WBZ, WCAE, WCAP, WDAF, WDAP, WEAF, WFAA, WGI, WGY, WHAS, WHB, WHN, WJAX, WJAZ, WLW, WMAQ, WMC, WSB, WWJ.

Wednesday: KDKA, KFAE, KFI, KGW, KHJ, KPO, KSD, KYW, PWX, WBAP, WBZ, WDAF, WDAP, WCAE, WEAF, WFAA, WGI, WHAS, WHB, WHN, WJAZ, WLW, WMAQ, WOC, WSB, WTAM, WWJ.

Thursday: KDKA, KFI, KGO, KHJ, KPO, KGW, KSD, KYW, WBAP, WBZ, WCAE, WDAF, WDAP, WEAF, WFAA, WGI, WGY, WHAS, WHB, WHN, WJAX, WJAZ, WLW, WMAQ, WMC, WOC, WSB, WWJ.

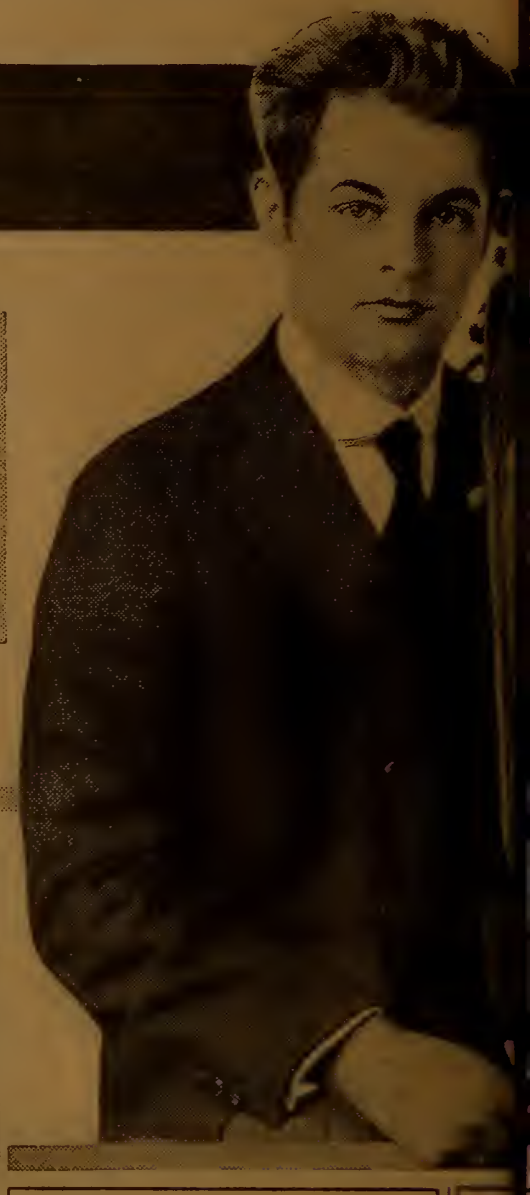
Friday: CKAC, KDKA, KFAE, KFI, KHJ, KGW, KSD, KYW, WBAP, WBZ, WCAE, WDAF, WDAP, WEAF, WFAA, WGI, WGY, WHAS, WHB, WHK, WHN, WJAZ, WLAG, WMAQ, WMC, WOC, WOS, WSB, WWJ.

Saturday: KDKA, KFI, KGO, KHJ, KPO, KSD, KYW, PWX, WBZ, WCAE, WCAP, WDAF, WDAP, WEAF, WFAA, WGI, WHAS, WHB, WHK, WHN, WMC, WOC, WSB, WTAM, WWJ.

Sunday: CKAC, KPO,KHJ, KYW, WBAP, WDAP, WEAF, WFAA, WGI, WHAS, WHK, WHN, WOC, WSB, WWJ.

Monday: KDKA, KFAE, KPO, WBAP, WDAF, WEAF, WHAZ, WHN, WLW, WM, WOC, WOS.

This is Chris W. Graham, known to thousands of children as Uncle Wip, who will broadcast bedtime stories every night from station WIP, Philadelphia. He is also tenor of the WIP Radio Concert Quartet.



Wednesday, February 20

(Continued from page 15)

Traynor, lyric tenor; 8:45-9:00, John Sheehan, Tom Brooks, and George Robinson, singing; 9:15-9:30, Hamilton-Reid Burns, elocutionist; 9:30-9:45, Triauon Melody Four offering "The Garden of Your Heart" and "In a Woodland Glade"; 9:45-10:00, Melville Carter, operatic tenor; 10:00-10:15, James A. Brenna, song-writer and composer, assisted by Judith Roth and Oscar Taylor; 10:15-10:30, Curreut Book Reviews by Andrew McPae, 10:30-10:45, Richard Douglas, baritone soloist.

WBAP, Fort Worth, Tex. (Central, 476), 7:30-8:30 p. m., Monthly student recital, Sam S. Losh, baritone and pianist; 9:30-10:45, Concert, George Freeman's Sooner Serenaders.

WBZ, Springfield, Mass. (Eastern, 337), 6:00 p. m., Dinner concert, WBZ String Choir; 7:30, Bedtime story for the kiddies; 8:00, Chamber music, WBZ String Choir; Waino E. Arvo, cornetist; Rene J. Kern, cornetist, 9:00, Bedtime story, Grown-ups, Orison S. Marden.

WCAE, Pittsburgh, Pa. (Eastern, 45.2), 3:00 p. m., Piano recital, Fred Rosenfeld; 4:30, Sunshine Girl; 6:30, Dinner concert, William Penn Hotel; 7:30, Popular songs; 8:30, Musical program.

WDAF, Kansas City, Mo. (Central, 411), 3:30-4:30 p. m., Johnnie Campbell's Kansas City Club Orchestra; 6:00-7:00, Piano tuning-in number on the Duo-Art; Weekly health talk, auspices of the Health Conservation Association; Speaker, Swift & Co.; Children's story and information period; Fritz Hanlein's Trianon Ensemble; 8:00-9:15, Classical concert, Kansas City Junior Music Clubs; 11:45-1:00 a. m., Nightbawk frolic: "Merry Old Chief" and the Coon-Sanders Novelty-Singing Orchestra.

WDAP, Chicago, Ill. (Central, 360), 7:00-8:00 p. m., Drake Concert Ensemble and Blackstone String Quintette; 10:00, Geo. Leland Nichols, Geraldine Ikert; 10:10-10:25, Barton Organ played by Ralph Emerson.

WDAR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily Almanac; 12:02 p. m., Organ recital, Stanley Theater; piano recital, Edna Firestone; dinner music; Arcadia Cafe Concert Orchestra; 2:00, Arcadia Cafe Concert Orchestra; 7:30, Dream Daddy's bedtime stories; 8:15, Square Glee Club, Herman Weise, director; Stanley Symphony Orchestra, Josef Pasternack, director; 10:10, Howard Lanin's Arcadia Cafe Dance Orchestra.

WEAF, New York, N. Y. (Eastern, 492), 11:00 a. m., Myra Burtis Bindenberger, contralto; 11:30, Columbia University; 11:40, N. Y. Tuberculosis Society; 11:50, U. S. Dept. of Agriculture; 4:00 p. m., Beethoven Trio; 5:00, John Martin and Helen Waldo in songs and stories; 7:00, United Synagogue of America; 7:30, Thornton Fisher; 7:40, Reginald F. Moser, baritone; 8:10, American Sole and Leather Belting Tanners, Inc.; 8:20, Esther Dale, soprano; 8:50, Arthur Haag, pianist; 9:20, N. Y. Tuberculosis Society.

WFAA, Dallas, Tex. (Central, 476), 12:30-1:00 p. m., Musical program, The Red Head Girl.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis' Bellevue Stratford Concert Orchestra; 6:00, Bedtime stories; 6:30, Meyer Davis' Bellevue Stratford Orchestra.

WGI, Medford Hillside, Mass. (Eastern, 360), 6:30 p. m., Meeting of the Big Brother Amrad Club; 6:50, Message to Camp Fire Girls, "Big Smoke," Charles W. Casson; 7:20, "Science Up to Date," Scientific American; 7:30, Evening program, Musicale.

WGR, Buffalo, N. Y. (Easter, 319), 12:30-1:00 p. m., George Albert Bouchard, organist; 2:30-4:00, The Yankee Six orchestra; 4:00, Tea time music, Martha Gomph, harpist; Katherine Stang, violinist; 6:30 and 11:30, Vincent Lopez Hotel Statler orchestra; 7:30, Digest of the day's news; 9:00, Concert, direction of H. C. Weasner, featuring Edna Lawson Stewart and H. F. Tenney.

WGY, Schenectady, N. Y. (Eastern, 380), 6:30 p. m., "Adventure Story," Youth's Companion.

WHA, Madison, Wis. (Central, 360), 7:30 p. m., "A $10,000 prize contest in Chemistry for the Youth of the Nation, Prof. J. H. Mathews, director of the courses in Chemistry and Chemistry-Commerce.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Walnut Theater Orchestra; Strand Theater Orchestra; Alamo Theater organ; 7:30-9:00, Ches Myer's Orchestra; Mrs. R. Hayes Davis, contralto.

WHB, Kansas City, Mo. (Central, 411), 12:35-1:00 p. m., Popular music, Sweeney Radio Orchestra; 2:00-3:00, Ladies' Hour program, Sweeney Radio Orchestra; 7:00-7:45, Sweeney Radio Orchestra.

WIP, Philadelphia, Pa. (Eastern, 509), 1:00 p. m., Gimbel Brothers' Team Room Orchestra; 6:05, Jimmy Campbell's Little Club Orchestra; 7:00, Uncle Wip's bedtime stories.

WJAZ, Chicago, Ill. (Central, 448), 10:00 p. m., Martha M. Brown, pianist; Dorothy Brown, violinist; Sandy Meek, tenor; Oriole Orchestra.

WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Special program for "Shut-ins," Wurlitzer Concert Company; 8:00, "Lyric Minstrels."

WMAQ, Chicago, Ill. (Central, 447.5), 1:00 p. m., Speeches, Chicago Assn. of Commerce; 4:20, Items of interest to women; 4:30, Pupils of Cosmopolitan School of Music; 7:00, Georgene Faulkner, the Story Lady; 7:30, Weekly lecture from Northwestern University, Prof. James L. Lardner; 8:00, Keith Preston, famous columnist of the Daily News; 9:00, Talks, Chicago Charities; 9:15, Serrals De Zance, tenor; Eugenie De Primo Zance, composer-pianist.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:30 p. m., "Blast Furnace Iron," C. A. Russell; 6:30, Sandman's visit; 7:00, "Progress and Rural Education," Hermine Schneckloth; 8:00, Double Quartette of Women's voices, Maud E. Arnold, director; Kittie Glee Merrill, reader; Donal Leslie, tenor.

WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt; 12:00 m., Wanamaker Crystal Tea Room Orchestra; 4:45 p. m., Organ recital, Mary E. Vogt; 7:30, Adelphia Hotel Concert Orchestra; 8:30, WOO Orchestra, Robert E. Golden, director; 10:10, Hotel Adelphia Dance Orchestra.

WOS, Jefferson City, Mo. (Central, 440.9), 8:00 p. m., Address on agricultural topic, faculty member of the Missouri College of Agriculture; 8:20, Dance program, S. C. Stancil's Novelty Six Dance Orchestra.

WSB, Atlanta, Georgia (Central, 429), 10:45-11:45, "Song Ecboes of Yesterday," Win-One Male Quartet; Bonnie Barnhardt.

WTAM, Cleveland, Ohio (Eastern, 390), 8:00 p. m., Orchestra numbers by the WTAM Symphony Concert Orchestra; Xylophone solos, Frank Sholle; Vocal solo, Morries A. Scott, tenor; Mrs. S. P. Mong, pianist: Piano solos, Miss Florence Beebe; Vocal numbers, Heleue Almendinger; R. J. Proctor, pianist; Vocal numbers, Clarence A. Hanna, baritone; Mrs. Mong, pianist; Saxophone solo, Frank Hruby; Miss Clara Sharp, pianist; Cello solo, Max Schmitt; Miss Sharp, pianist; Duet, Messrs. Hanna and Scott.

WWJ, Detroit, Mich. (Eastern, 517), 9:30 a. m., "Tonight's Dinner," Woman's Editor; 9:45, Public Health talks; 12:00 m., Jean Goldkette's Orchestra; 3:00 p. m., Detroit News Orchestra; 7:00, Detroit News Orchestra; Vocal numbers, Chamber Music Society of Detroit.

Thursday, February 21

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 6:15 p. m., Dinner concert, KDKA Little Symphony Orchestra; 7:45, Children's period; 8:15, Farm program; 8:30, KDKA Little Symphony Orchestra; Mrs. Catherine McComb Enoch, contralto; Alvin Adams, accompanist; C. A. Gerst, baritone; Mrs. C. A. Gerst, accompanist; 11:30, Special concert.

KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Bedtime story. Concert program presented by the Y. M. C. A., 10:00-11:00, Concert program presented under direction of Mrs. William Barber.

KFKX, Hastings, Neb. (Central, 341), Rebroadcasts program of KDKA.

KFSG, Los Angeles, Calif. (Pacific, 278), 3:30-4:30 p. m., Special music and readings for shut-ins, the sick and the afflicted; 7:00-7:30, Bible stories for children; 8:00-9:30, Music and sermon by Aimee Semple McPherson.

KGD, Oakland, Calif. (Pacific, 312), 8:00-10:00 p. m., Concert features of both instrumental and vocal nature.

KGW, Portland, Ore. (Pacific, 492), 3:30 p. m., "The Midlander," Booth Tarkington; 8:00, One-act plays, Doris Smith, director; 10:00, Dance music, George Olsen's Metropolitan Orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Concert; 2:30-3:30, Matinee Musicale presenting Violet Steinemann, violinist and pianist; Trosi, Italian tenor; 6:45-7:30, p. m., Children's program presenting Dickie Brandon, screen juvenile, and Jane Hammel, age 12 years, pianist, pupil of Ruth Thomas; 8:00-10:00, Edendale program arranged by Mary Watts; 10:00-12:00, Art Hickman's Orchestra.

KPD, San Francisco, Calif. (Pacific, 423), 1:00-2:00 p. m., Rudy Seiger's Fairmont Hotel Orchestra; 4:30-5:30, Rudy Selger's Fairmont Hotel Orchestra; 8:00-9:00, Theodore J. Irwin, organist; 9:00-10:00, Program, auspices of the San Francisco Telephone and Telegraph Company; Patriotic address, Frederick T. Leo; 10:00-11:00, E. Max Bradfield's Palace Hotel Dance Orchestra.

KSD, St. Louis, Mo. (Central, 546), 8:00 p. m., St. Louis Symphony Orchestra, Rudolph Ganz, conductor; Ethel, Leginska, pianist.

KYW, Chicago, Ill. (Central, 536), 11:35 a. m., Table talk, Mrs. Anna J. Peterson; 2:35-3:30 p. m., Studio program; 6:50, Children's bedtime story; 7:00-7:30, Dinner concert, Joska DeBabary and his orchestra; Clyde Doerr and his orchestra; 8:00-8:20, "Twenty Minutes of Good Reading," Rev. C. J. Pernin; 8:20-9:00, Musical program, National Ceramic Tile Convention; 9:00-9:30, Mendelsohn Club Concert.

WAAM, Newark, N. J. (Eastern, 263), 7:45-8:00 p. m., "Star Spangled Banner," Victor Wilbur, tenor; 8:15-8:30, Joseph Macy, concert pianist; 8:30-8:45, "Scientific Feeding of Children," talk by Dr. G. A. Lowenstein, scientific dietitian; 8:45-9:00, Fritzl Leyton, songwriter and vaudeville head-liner; 9:00-9:15, Martha Unger; pianist; 9:15-9:30, Dance Music of Distinction, by the Carolina Ramblers Orchestra; 9:45-10:00, "The Turn of the Wheel of Events," second in a series of talks by Arthur W. Brooks, business psychologist; 10:00-10:15, Benjamin Friedman, singing; 10:15-10:30, Elsie Blum and Sylvia Goodman, singing; 10:30-10:45, Martha Shannon, harpist.

WAAW, Omaha, Neb. (Central, 360), Educational program, "Radio Chats on Animal Disease Problems," Dr. Van Es.

WBAP, Fort Worth, Tex. (Central, 476), 7:30-8:30 p. m., Concert, jubilee singers of the Dickson Colored Orphanage; 9:30-10:45, Organ concert, Will Foster.

WBZ, Springfield, Mass. (Eastern, 337), 7:30 p. m., Bedtime story for the kiddies; Farmers' period, Letter from the New England Homestead; 8:00, Concert, Doris Wyman, violinist; Olive Wyman, cellist; Miriam Sullivan, violinist; Alberta M. Kelleher, violinist; 9:00, Bedtime story for Grown-ups, Orison S. Marden.

WCAE, Pittsburgh, Pa. (Eastern, 462), 4:30 p. m., Sunshine Girl; 0:30, Dinner concert, William Penn Hotel; 7:30, Uncle "Kaybee"; 8:00, Address, Rev. Clyde L. Nevins; 8:30, Musical program, Conneaut Syncopators.

WCAP, Washington, D. C. (Eastern, 469), 7:15-9:45 p. m., Concert, Orchestra; 10:00-12:00, Dance music, Meyer Davis' Le Paradia Band.

WDAF, Kansas City, Mo. (Central, 411), 3:30-4:30 p. m., D. Amherst Haley's Dance and Concert Orchestra; 6:00-7:00, School of the Air; Piano tuning in number on the Duo-Art; Address, Speaker, William Jewel College; Children's story and Information period; Fritz Hanlein's Trianon Ensemble; 11:45-1:00 a. m., Nighthawk Frolic: "Merry Old Chief" and the Coon-Sanders Novelty-Singing Orchestra; Pipe organ recital, Norma Mannering.

WDAP, Chicago, Ill. (Central, 360), 7:00-8:00, Drake Concert Ensemble and Blackstone String Quintette; 8:00-8:30, Barton Organ played by Ralph Emerson; 10:00, Owen R. Goodpaster, Doris Gieselman, Jack Chapman's Orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily Almanac; 12:02 p. m., Organ recital, Stanley Theater; dinner music, Arcadia Cafe Concert Orchestra; 2:00, Arcadia Cafe Concert Orchestra; 2:30, Mrs. Anna B. Scott; 7:30, Dream Daddy's bedtime stories.

WEAF, New York, N. Y. (Eastern, 492), 11:30 a. m., Reinhardt Blechschmidt, violinist; 11:50, U. S. Dept. of Agriculture; 4:00 p. m., Union College Musical Assn.; 7:00, N. Y. Federation of Churches; 7:30, Thornton Fisher; 7:40, Jeane Alfred, soprano; 8:20, Bank of America; 8:30, Hunter College Musical Program; 9:45, Columbia Phonograph Co., 9:45, Earle Tuckerman, baritone; 10:30, Audrey Roslyn, pianist; 11:00, Vincent Lopez Orchestra, courtesy Gimbel Bros.

WFAA, Dallas, Tex. (Central, 476), 12:30-1:00 p. m., "Old Times in North Texas," Epps G. Knight; 8:30-9:30, Musical program, A. Harris & Co.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis' Bellevue Stratford Concert Orchestra; 3:00, Loretta Kerk, pianist; 6:00, Bedtime stories; 6:30 Meyer Davis' Bellevue Stratford Orchestra; 8:00, Boy Scouts Radio Corps.

WGI, Medford Hillside, Mass. (Eastern, 360), 6:30 p. m., Meeting of the Big Brother Amrad Club; 7:00, Evening program, J. Silliker and friends.

WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., George Albert Bouchard, organist; 2:30-4:00, The Yankee Six Orchestra; 4:00, Tea time music, Martha Gomph, harpist; Katherine Stang, violinist; 6:30-7:30, Vincent Lopez Hotel Statler orchestra; 7:30, Digest of the day's news; Boy Scout Radiograms, Employment bulletin, story from "The American Boy" magazine; 8:00, Lecture, "Our Commercial Relations with China," F. J. Dean, representative of the Chamber of Commerce in China.

WGY, Schenectady, N. Y. (Eastern, 380), 7:45 p. m., Welcome to new citizens by Schenectady Post, American Legion and Citizen's Committee; Addresses, music, American Legion Band, chorus of 50 boys.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Strand Theater Orchestra; Walnut Theater Orchestra; 7:30-9:00, Concert, auspices Ella Sharrard Violin Quartet, Walter Bodeman, 1st violinist; Christine Janaing, 2nd violinist; Dorothy Near, 3rd violinist; Theodore Williams, 4th violinist; Mrs. C. C. Harne, contralto; Corida G. Petrie, reader.

WHB, Kansas City, Mo. (Central, 411), 12:35-1:00 p. m., Popular musical program; 2:00-3:00, Ladies' hour program, Sweeney Radio Orchestra; Floyd Estep, saxophonist; 7:00-7:30, "Conservation of Vision." Dr. George J. Erskine; Dorothy Rice, pianist; 8:00-10:00, Sweeney Radio Orchestra; Bonnie A. Blynn, soloist; Lois Rogers, accompanist.

WIP, Philadelphia, Pa. (Eastern, 509), 1:00 p. m., Gimbel Brothers' Tea Room Orchestra; 6:05, Frank Winegar's "Pennsylvanians" orchestra; 7:00; Uncle Wip's bedtime stories; 8:00, "Timely Talks to Motorists," by Eugene Hogle, secretary, Automobile Club of Philadelphia; 11:15, Ted Weems and his Cafe L'Aiglon orchestra.

WJAX, Cleveland, Ohio (Eastern, 390), 8:00 p. m., Concert program by the Oberlin (Ohio) Conservatory of Music String Quartet, assisted by Mrs. Josephine Bonazzi, pianist; Maurice Kessler, first violinist; Miss Gherkins, violaist; Mr. Funkhouser, 2nd violinist; Frederick Goerner, cellist; Solo numbers by members of the quartet; Dance program, Hollenden Hotel Orchestra, Carl Rupp, director.

WJAZ, Chicago, Ill. (Central, 448), 10:00 p. m., Eva Dugan, soprano; Dorothy Fergeson, xylophonist; Howard Prissle, pianist; Louise Langley, cellist; Oriole Orchestra.

WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Piano solos, Adelaide Apfel; 10:00, Special Washington program, Thomas J. Kelly, director, Early American Music and Music of American Indian Tribes; 11:00, Doherty's Melody Boys; American Hawaiian Orchestra; 11:15, "Do Spirits Return?"—Howard Thurston, magician.

WMAQ, Chicago, Ill. (Central, 447.5), 2:35 p. m., Concert, Lyon and Healy recital hall; 4:20, Items of interest to women; 4:30, Illinois Federation of Women's Clubs; 7:30, Boy Scouts Weekly Talk; Talk, Rockwell R. Stephens, Auto Editor; Lessons in Golf, B. A. Andrews; 9:00, Y. M. C. A. Glee Club.

WMC, Memphis, Tenn. (Central, 500), 8:30 p. m., Musical program, Chisca Hotel Orchestra, Clara Ahern, director.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:30 p. m., "Tuberculosis," Karl G. Stephan; 5:45, Chimes; 6:30, Sandman's visit; 7:00, P. S. C. Orchestra; V. B. Rochte, baritone.

WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt; 12.00 m., Wanamaker Crystal Tea Room Orchestra; 4:45 p. m., Organ recital, Mary E. Vogt.

WSB, Atlanta, Georgia (Central, 429), 8:00-9:00 p. m., Lieut. William Laurier and his band; Wendall Hall, eveready entertainer; 10:45, "International Melodies." Dr. Charles A. Sheldon, organist.

WWJ, Detroit, Mich. (Eastern, 517), 9:30 a. m., "Tonight's Dinner"; 3:00 p. m., Detroit News Orchestra; 7:00, Detroit News Orchestra; Hawaiian Serenaders; 10:00, Dance music, Jean Goldkette's Orchestra.

Friday, February 22

CKAC, Montreal, Can. (Eastern, 425), 1:45 p. m., Mount Royal Hotel Concert Orchestra; 4:30, Mount Royal Hotel Dance Orchestra.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 6:15 p. m., Organ recital, Lucile Hale; 7:15, Radio Boy Scout Meeting; 7:45, Children's period; 8:15, "The Long Struggle with Idolatry," Dr. R. L. Lanning; 8:30, Pittsburgh Male Sextet.

KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Special Washington's Birthday affair; 10:00-11:00, Concert under direction of Myra Belle Vickers.

KFKX, Hastings, Neb. (Central, 341), Rebroadcasts program of KDKA.

KFSG, Los Angeles, Calif. (Pacific, 278), 3:30-4:30 p. m., Special music and readings for shut-ins, the sick and the afflicted; 7:00-7:30, Special program giving in advance the international Sunday-school lesson; 8:00-9:30, Musical program and sermon by Aimee Semple McPherson.

KGW, Portland, Ore. (Pacific, 492), 3:30 p. m., Lecture for women; 8:00, John Sylvester, accordionist; 8:15, Dance music, George Olsen's Metropolitan Orchestra; 9:00, "Portraits of Washington," Prof. Frederick S. Dunn; 10:30, Hoot Owls with Pantages frolic.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Program presented by Studebaker Six of Long Beach, arrangement of Glen E. Thomas; 2:30-3:30, Matinee Musicale presented by Studebaker Six of Long Beach, Calif.; 6:30-7:00, Children's program presenting Richard Headrick, screen juvenile; Bedtime story by "Uncle John"; 8:00-10.00, Program presenting Long Beach (Calif.) Municipal Band, direction of Herbert L. Clarke; E. A. Brinistool in an address about George Washington; 10:00-12:00 p. m., Art Hickman's Orchestra.

KPD, San Francisco, Calif. (Pacific, 423), 1:00-2:00 p. m., Rudy Seiger's Fairmont Hotel Orchestra; 2:30-3:30, Theodore J. Irwin, organist; 4:30-5:30, Rudy Selger's Fairmont Hotel Orchestra.

KSD, St. Louis, Mo. (Central, 546), 8:00 p. m., "The Dreamer Awakes" (pageant), Inter-uuit Organization of the Catholic Students Mission Crusade; Address, Rev. Archbishop John J. Glennon.

KYW, Chicago, Ill. (Central, 536), 11:35 a. m., Table talk, Mrs. Anna J. Peterson; 6.50 p. m., Children's bedtime story; 7:00-7:30, Dinner concert, Joska Debabary and his orchestra; Clyde Doerr and his orchestra; 10:00-2:00 a. m., Midnight revue.

WBAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Concert, Yeoman Orchestra, Owen Crockett, director; 9:30-10:45, Concert, Palo Pinto, Texas Square Dance Orchestra.

WBZ, Springfield, Mass. (Eastern, 337), 6:00 p. m., Dinner concert, WBZ Orchestra; 7:00, "Just Plain Joy Riders," dramatized story, Youth's Compa ion; 7:30, Bedtime story, Current Book Review, R. A. MacDonald; Story for Grown-ups, Orison S. Marden, 11:00, Chamber music, WBZ Orchestra; Mrs. Dorothea Abbey Waite, contralto; A. E. Waite, accompanist.

WCAE, Pittsburgh, Pa. (Eastern, 462), 4:30 p. m., "The Sunshine Girl"; Uncle Kaybee; 6:30, Dinner concert, William Penn Hotel; 7:30, Uncle Kaybee, 8:30, Standard Male Chorus.

m., Service.

WDAF, Kansas City, Mo. (Central, 411), 3:30-4:30 p. m., Regular "request" program, Leo R. Davis "Radio" orchestra; 6:00-7:00, School of the Air; Piano tuning in number on the Duo-Art; Address, speaker from the Kansas City Children's bureau; Children's story and information period; Fritz Hanlein's Trianon Ensemble; 8:00-9:15, Novelty Night, Program, James E. Prior, baritoue; 11:45-1:00 a. m., Nighthawk Frolic: "Merry Old Chief" and the Coon-Sanders Novelty Singing Orchestra.

WDAP, Chicago, Ill. (Central, 360), 7:00-8:30 p. m., Drake Concert Ensemble and Blackstone String Quintet; 10:00, Special Washington's Birthday program; 10:10-10:25, Barton Organ played by Ralph Emerson.

WDAR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily Almanac; 12:02 p. m., Organ recital Stanley Theater; 2:00, Arcadia Cafe Concert Orchestra; 7:30, Dream Daddy's bedtime stories; 7:45, Book [illegible] by Robert Bruce; 10:10, Howard Lanin's Arcadia Cafe

S WEEK OF PATRIOTIC FEATURES

Above, we present a photograph of Herman Kenin, director of George Olsen's Metropolitan orchestra, specially posed for Radio Digest. He may be heard from KGW five times a week.

Have you heard the piano selections played by Miss Adelaide Apfel, from the WLW studio every Thursday afternoon at four o'clock? Here she is in the circle above. The gentleman to the left of her is Maurice Kessler and his famous viola d'amour, over 400 years old and often heard as played by Mr. Kessler from WJAX. It has a double set of strings and produces a most pleasing harmony.

Where to Hear Talks

TALKS, instructive, serious, humorous and even frivolous, are broadcast daily and below are listed the stations. Chemists should listen in to WHA Wednesday. Prof. J. H. Mathews, director of the courses in Chemistry and Chemistry-Commerce, will tell about the $10,000 prize contest in Chemistry.

Tuesday: KDKA, KGW, KHJ, KYW, WBZ, WCAE, WDAF, WEAF, WFAA, WGI, WHB, WHN, WMAQ, WMC, WOC.

Wednesday: KDKA, KFAE, KYW, WDAF, WEAF, WGI, WHA, WMAQ, WOC.

Thursday: KDKA, KYW, WBZ, WCAE, WDAF, WEAF, WFAA, WGI, WGY, WHB, WMAQ, WOC.

Friday: KFAE, KGW, KHJ, KYW, WBZ, WDAF, WEAF, WFAA, WGI, WGY, WHA, WMAQ, WOC.

Saturday: WBAP, WBZ, WDAF, WFAA, WGI, WOC.

Monday: KFAE, WEAF, WFAA, WHAZ, WOC.

WEAF, New York, N. Y. (Eastern, 492), 11:30 a. m., Sons of American Revolution; 11:50, U. S. Dept. of Agriculture; 4:00 p. m., Blue Horse Trio; 5:00, Children's Hour Stories; 7:00, Ida Deck, pianist; 7:30, Thornton Fisher; 7:40, Winifred T. Barr; 7:50, Battery Talk; 8:00, Billy Jones and Ernest Hare; 8:30, Isadore Geffen, cellist; 9:00, Astor Coffee Dance Orchestra; 10:00, President Calvin Coolidge in Washington's Birthday Address; 10:15, Roberta Beatty, mezzo soprano.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., "Period of the Judges," Dr. Robert S. Hyer; 8:30-9:30, Musical program, Jessie McKee's Orchestra.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis' Bellevue Stratford Concert Orchestra; 6:00, Bedtime stories; 8:30, Meyer Davis' Bellevue Stratford Orchestra.

WGI, Medford Hillside, Mass. (Eastern, 360), 3:00 p. m., Amrad Women's Club program; Talk, Dorothy H. Goodwin; 3:30, Talk, Dorothy Dean, Dir. Metropolitan Division Mass. Council of Girl Scouts; 6:30, Meeting of the Big Brother Amrad Club; 7:30, Evening program, Selected verses, Charles L. H. Wagner, Radio poet; Red Cross Health talk, Henry Copley Green; Musicale.

WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., George Albert Bouchard, organist; 2:30-4:00, The Yankee Six Orchestra; 4:00, Tea time music, Martha Gomph, harpist; Katherine Stang, violinist; 6:30 and 11:30, Vincent Lopez Hotel Statler orchestra; 7:30, Digest of the day's news; 9:00, Concert, Masten Park High School orchestra, direction of Prof. W. A. Furman; 10:15, Address, "Industrial Relations Between China and the United States," by Hon. Chang Chien, Jr., Chinese high commissioner.

WGY, Schenectady, N. Y. (Eastern, 380), 7:45 p. m., "George Washington," Benedict Hatmaker; Radio drama, "The Gamblers," Charles Klein, WGY Players; 10:30, Dance music.

WHA, Madison, Wis. (Central, 360), 7:30 p. m., Washington's Birthday—Anniversary Address, Prof. Frederick L. Paxson, Prof. of History.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Walnut Theater Orchestra; Strand Theater Orchestra; 7:30-9:00, Concert, auspices Annette Wearen Music Studio.

WHB, Kansas City, Mo. (Central, 411), 12:35-1:00 p. m., Popular music; 2:00-3:00, Ladies' hour program, Sweeney Radio Orchestra; 7:00-7:45, Sweeney Radio Orchestra.

WHK, Cleveland, Ohio (Eastern, 283), 8:00 p. m., Concert program arranged by the Cleveland Radio Dealers' Association; Musical numbers by Tomson's Novelty Dance Orchestra; Stephen N. Tomson, director and pianist; Vocal solos by popular entertainers.

WIP, Philadelphia, Pa. (Eastern, 509), 6:05 p. m., Jordan-Lewis Dance Orchestra; 7:00, Uncle Wip's bedtime stories.

WJAZ, Chicago, Ill. (Central, 448), 10:00 p. m., Oriole Orchestra.

WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Lecture recital.

WMAQ, Chicago, Ill. (Central, 447.5), 4:20 p. m., Items of interest to women; 4:30, Pupils of Bush Conservatory; 7:00, "Wide Awake Club," Mrs. Frances M. Ford; 7:30, Music Memory Contest, Mrs. Marx E. Oberndorfer; 9:00, George Washington Program, Union League Club of Chicago.

WMC, Memphis, Tenn. (Central, 500), 8:30 p. m., Concert, Carl Metz Saxophone Band; 11:00, Frolic, Britling's Orchestra, Frank Bracciante, director.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:30 p. m., "Structure of the Hair, Skin and Nails," R. G. Maybach; 5:45, Chimes; 6:30, Sandman's visit; 7:20, Sunday School Lesson, Dr. Frank Willard Court, pastor; 8:00, Musical program, Erwin Swindell, director; Program, Chamber of Commerce of Rock Island.

WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt; 7:30 p. m., Adelphia Hotel Concert Orchestra; 8:30, Special Washington Birthday program; 10:10, Hotel Adelphia Dance Orchestra.

WOS, Jefferson City, Mo. (Central, 440.9), 8:00 p. m., Washington's Birthday program, E. S. Emerson, director of the Miller Theater Orchestra.

WSB, Atlanta, Georgia (Central, 429), 8:00-9:00 p. m., Methodist jubilee at Wesley Memorial Church, sacred and popular male quartet, Hawaiian music, humorous lecture, Rev. Marvin Williams; 10:45-12:00, Oldtime tunes, Hometown Boys' String Band.

WWJ, Detroit, Mich. (Eastern, 517), 9:30 a. m., "Tonight's Dinner"; 12:00 m., Dance music, Jean Goldkette's Orchestra; 3:00 p. m., Detroit News Orchestra; 7:00, Detroit News Orchestra; Anne Campbell, poet; Victor L. LeBlanc, tenor.

Saturday, February 23

CKAC, Montreal, Can. (Eastern, 425), 7:00 p. m., Kiddies' stories in French and English; 7:30, Mount Royal Hotel Concert Orchestra; 8:30, French folklore, Conrad Gauthier, director; 10:30, Mount Royal Hotel Dance Orchestra.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 6:15 p. m., Dinner concert, Westinghouse Band; 7:45, Children's period; 8:15, "Buying a Home," Robert W. Wemenow; 8:30, Concert, Westinghouse Band; Herman Nibbe, tenor.

KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Concert; Bedtime story; 8:00-9:00, Concert numbers presenting Maude Reeves-Barnard; 10:00-11:00, Vocal and instrumental concert.

KFKX, Hastings, Neb. (Central, 341), Rebroadcasts program of KDKA.

KFSG, Los Angeles, Calif. (Pacific, 278), 8:00-9:30 p. m., Musical program and sermon by Aimee Semple McPherson.

KGO, Oakland, Calif. (Pacific, 312), 8:00-10:00 p. m., Concert program of pleasing vocal and instrumental selections.

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

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Concert; 2:30-3:30, Matinee Musicale; 6:45-7:30, Children's program presenting Dick Winslow Johnson and the Johnson family; Bedtime story by "Uncle John"; 8:00-10:00 p. m., Program arranged by Barker Bros.; 10:00-12:00, Art Hickman's Orchestra.

KPO, San Francisco, Calif. (Pacific, 423), 1:00-2:00 p. m., Rudy Selger's Fairmont Hotel Orchestra; 2:30-3:30, Varied program; 3:30-5:30, Palace Hotel tea dansants; 8:00-12:00 midnight, Art Weidner and his Fairmont Hotel Dance Orchestra; KPO Trio.

KSD, St. Louis, Mo. (Central, 546), 9:00 p. m., Orchestra concert, organ recital, vocal and instrumental specialties, Missouri Theater.

KYW, Chicago, Ill. (Central, 536), 11:35 a. m., Table talk, Mrs. Anna J. Peterson; 6:50 p. m., Children'a bedtime story; 7:00-7:30, Dinner concert, Joska DeBabary and his orchestra; Clyde Doerr and his orchestra; 8:00-8:58, Musical program, Henry B. Roney, director, "Roney's Masonic Quartet"; 10:00-12:00, Midnight revue.

PWX, Havana, Cuba (Eastern, 400), 8:30 p. m., Concert, Prof. Carlos Fernandez, pianist; Nena Gerra, soprano; Nena Planas, soprano; Paquita Elias; F. Alvarez, tenor.

WBAP, Fort Worth, Texas (Central, 476), 7:00-7:30 p. m., Review of the Interdenominational Sunday School Leaaon and Radio Bible Class, Mrs. W. F. Barnum.

WBZ, Springfield, Mass. (Eastern, 337), 7:00 p. m., Dinner concert, Hotel Kimball Trio; 7:30, Bedtime story for the kiddies; 8:00, Concert, Mrs. Nora Gladden Winton, soprano; Mrs. Miriam Munyan Thomson, accompanist; Gustav LaZazzera, cellist; 9:00, Bedtime story for Grown-ups, Orison S. Marden.

WCAE, Pittsburgh, Pa. (Eastern, 462), 3:00 p. m., Special musical program; 6:30, Dinner concert, William Penn Hotel; 7:30, Uncle "Kaybee"; 8:30, Musical program.

WCAP, Washington, D. C. (Eastern, 469), 7:30-10:00 p. m., Joint program with WEAF; 10:00-12:00, Dance music.

WOAF, Kansas City, Mo. (Central, 411), 3:30-4:30 p. m., Riley Ehrhart Orchestra; 6:00-7:00, School of the Air: Piano tuning-in number on the Duo-Art: Travelogue, Edgar A. Linton; Children'a atory and information period; Fritz Hanlein's Trianon Ensemble; 11:45-1:00 a. m., Nighthawk Frolic: "Merry Old Chief" and the Coon-Sanders Novelty Singing Orcheatra.

WDAF, Chicago, Ill. (Central, 360), 7:00-8:30 p. m., Drake Concert Ensemble and Blackatono String Quintet; 10:00, Harry E. Ehrhart, "The Original Dream Daddy," and Carl Zorns, both of WDAR; Harmony Girls, Bob Brown, Viola Tascott; 10:10-10:25, Barton Organ played hy Ralph Emerson; Jack Chapman's Orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily Almanac; 12:02 p. m., Arcadia Cafe Concert Orchestra; Organ recital, Stanley Theater; 2:00, Arcadia Cafe Concert Orchestra; 4:30, Bobbie Lee and his Cotton Pickers; 7:30, Dream Daddy's bedtime atorles.

WEAF, New York, N. Y. (Eastern, 492), 4:00 p. m., Bob Fridkin's Orchestra; 5:00, Kitty Borchman, lyric soprano, and Edna Rlester, mezzo soprano; 7:30, Sara Sharkey, mezzo contralto; 8:00, American Chicle Quartet and Trio; 9:00, Orange County (Florida) Chamber of Commerce; 9:10, Rata Present, pianist; 9:30, Marie A. Kiraly, pianist; 10:00, James McKinley Rose, tenor; 10:30, Fan O'Brien, soprano; 11:00, Vincent Lopez Orchestra, courtesy Gimbel Brothers.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., "Labor Organizing for Co-ordination and Co-operation"; 8:30-9:30, Piano recital; 11:00-12:00, Adolphus Hotel Orchestra.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis' Bellevue Stratford Orchestra; 3:00 p. m., WFI Male Quartet; 6:00, Bedtime stories; 6:30, Meyer Davis' Bellevue Stratford Orchestra; 10:30, Meyer Davis' Dance Orchestra.

WGI, Medford Hillside, Mass. (Eastern, 360), 6:30 p. m., Meeting of the Big Brother Amrad Club; 7:30, New England Business Industry, Arthur R. Curnick; Arthur Murray's course in Ball Room Dancing, Lesson No. 12; Musicale.

WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., George Albert Bouchard, organist; 2:30-4:00, The Yankee Six Orchestra; 6:30, Vincent Lopez Hotel Statler Orchestra; 7:30, Digest of the day's news.

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

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Strand Theater Orchestra; Walnut Theater Orchestra; Alamo Theater Orchestra; 7:30-9:00, Concordia Singing Society, Prof. D. Dentinger, director.

WHB, Kansas City, Mo. (Central, 411), 12:40-1:00 p. m., Dance music, Sweeney Radio Orchestra; 2:00-3:00, Ladies' Hour Concert, Sweeney Radio Orchestra.

WIP, Philadelphia, Pa. (Eastern, 509), 1:00 p. m., Organ recital, Karl Bonawitz; 3:00, Popular program by a Paul Whiteman Orchestra; 6:05, Greenwich Village Follies Serenaders; 7:00, Uncle Wip's bedtime stories; 8:00, Science Talk, Philadelphia College of Pharmacy and Science; 10:15, Ted Weems and his Cafe D'Aiglon Orchestra; Charlie Kerr and his Hotel St. James Orchestra.

WMAQ, Chicago, Ill. (Central, 447.5), 7:15 p. m., Dr. Charles M. Gilkey, Hyle Park Baptist Church; 7:30, Program, Dartmouth Glee Club; 8:00, Concert, Salvation Army Band; 9:00, Balaban and Katz Chicago Theater Revue.

WMC, Memphis, Tenn. (Central, 500), 8:30 p. m., Musical program, Union Avenue Baptist Church.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:30 p. m., "Soap Making," C. C. Hall; 5:45, Chimes; 6:30, Sandman's visit; 7:00, "George Washington," J. W. Gannaway; 9:00, P. S. C. Orchestra, Gerald M. Barrow, director; V. B. Rochte, baritone.

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

WSB, Atlanta, Georgia (Central, 429), 8:00-9:00 p. m., Variety concert; Thomas Gibbs Fowler, balladist; Wendall Hall, Eveready entertainer; 10:45-11:45, Week-end Skylark, Atlanta Journal Hired Help.

WTAM, Cleveland, Ohio (Eastern, 390), 9:00 p. m., Regular Saturday evening dance program by the WTAM Dance Orchestra; Solo numbers by favorite entertainers.

WWJ, Detroit, Mich. (Eastern, 517), 9:30 a. m., "Tonight's Dinner"; 3:00 p. m., Detroit News Orchestra; 7:30, Detroit News Orchestra.

Sunday, February 24

CKAC, Montreal, Can. (Eastern, 425), 4:30 p. m., Sacred concert.

KFI, Los Angeles, Calif. (Pacific, 469), 10:00-10:30 a. m., service.

KFSG, Los Angeles, Calif. (Pacific, 278), Entire church services at 10:30-12:30 m., 2:30-5:00 p. m., 8:00-9:30 p. m

KHJ, Los Angeles, Calif. (Pacific, 395), 10.00 a. m., Sermon; 1030-12:30 m., Organ recital and service from First M. E. Church, Rev. E. E. Helms, pastor, Arthur Blakeley, organist; 7:00-7:30 p. m, Organ recital from First M E. Church, Arthur Blakely, organist; 8:00-10:00, Concert.

KPO, San Francisco, Calif. (Pacific, 423), 11:00-12:00 m., Radio church services, American Bible Society; Reginald Warrick, baritone; Theodore J. Irwin, organist: 8:30-10:00 p. m., Concert, Rudy Selger and his Fairmont Hotel Orchestra.

KYW, Chicago, Ill. (Central, 536), 11:00 a. m., Central Church service, Dr. F. F. Shannon, pastor; 7:00 p m., Chicago Sunday Evening Club, Pres. W. H. P. Faunce, speaker; Edgar Nelson, music director.

WBAP, Fort Worth, Texas (Central, 476), 11:00 a. m., Church services, First Presbyterian Church, Rev. J. K. Thompson, pastor; 4:00-5:00 p. m., Organ concert; 5:00-6:00, Address, Rev. J. Frank Norris, pastor of the First Baptist Church; 11:00-12:00, Concert, Fred Cahoon's WBAP Southern Serenaders' Orchestra.

WCAP, Washington, D. C. (Eastern, 469), 7:20-9:00 p. m., Joint program with WEAF; 9:00-10:00, Organ recital.

WDAP, Chicago, Ill. (Central, 360), 5:00-6:00 p. m., Barton organ recital, played by Ralph Emerson; 9:15, Drake Concert Ensemble and soloists.

WDAR, Philadelphia, Pa. (Eastern, 395), 7:30 p. m., Church services, Memorial Church of Overbrook, Henry Gordon Thunder, organist; 2:00, Arcadia Cafe Concert Orchestra, Feri Sarkozi, director.

WEAF, New York, N. Y. (Eastern, 492), 2:15 p. m., N. Y. Federation of Churches; 3:45, Dr. S. Parkes Cadman; 7:20, Capitol Theater Orchestra and staff of artists; 9:00, Skinner organ recital.

WFAA, Dallas, Texas (Central, 476), 6:00-7:00 p. m., Radio Bible Class, Dr. William M. Anderson, Jr.; 9:30-10:00, "Christianity and Modern Education," Dr. Paul B. Kern; 10:00-11:00, Lee's Fox Trotter's Orchestra.

WFI, Philadelphia, Pa. (Eastern, 395), 10:30 a. m., Arch Street Presbyterian Church services; 4:30 p. m., Studio chapel services.

WGI, Medford Hillside, Mass. (Eastern, 360), 4:00 p. m., Twilight program, "Adventure Hour," Youth's Companion; Musicale, Corine Schlagel, contralto; Jacquelyn Bickford, soprano; 8:30, "World Unity," auspices of the Greater Boston Federation of Churches; Evening's musicale.

WGR, Buffalo, N. Y. (Eastern, 319), 3:00 p. m., Vesper service, the Rev. W. F. Salisbury, St. Clement's Episcopal Church; 4:00-5:00, Robert Munn, organist.

WHAS, Louisville, Ky. (Central, 400), 9:57 a. m., Organ music; 10:00, Church service; 4:00-5:00 p. m., Sacred concert, St. Peter's Evangelical Church Choir, George C. Cannon, director.

WHK, Cleveland, Ohio (Eastern, 283), 8:00 p. m., Concert program by the WHK Trio; Ben Silverberg, violinist; Ben Burtt, pianist; Max Schnitt, cellist and director; Vocal numbers by popular entertainers.

WIP, Philadelphia, Pa. (Eastern, 509), 4:00 p. m., Germantown Y. M. C. A. meeting; 7:30, Services, Holy Trinity Church, Rev. Floyd Tompkins, D. D.; 9:30, Sunday night symphonic concert, direction of Ben Stad, assisted by Karl Bonawitz.

WLW, Cincinnati, Ohio (Central, 309), 9:30 a. m., School, editorial staff of Sunday school publications of the Methodist Book Concern; 11:00, Services, Church of the Covenant, Dr. Frank Stevenson, minister; 7:45, Services of the Church of the Covenant.

WOC, Davenport, Iowa (Central, 484), 9:00 a. m., Sacred chimes concert; 1:30 p. m., Orchestra; 7:00, Organ recital; 8:00, Church service; 9:30, Musical program, Erwin Swindell, director.

WOS, Jefferson City, Mo. (Central, 440.9), 7:30 p. m., Church services, Central Evangelical Church, Rev. E. W. Berlekamp, pastor; Prof. F. J. Ziesberg, pianist.

WSB, Atlanta, Ga. (Central, 429), 11:00 a. m., First Presbyterian Church service; 5:00-6:00 p. m., Sabbath twilight, Methodist choir of Monroe; 7:30-9:00, Wesley Memorial Methodist Church, service.

WWJ, Detroit, Mich. (Eastern, 517), 2:00 p. m., Detroit News Orchestra; 3:00, Selections from "The Lady in Ermine" and "The Chimes of Normandy," Detroit Light Opera Co.; 7:30, St. Paul's Episcopal Cathedral.

Monday, February 25

CKAC, Montreal, Can. (Eastern, 425), 1:45 p. m., Mount Royal Hotel Concert Orchestra; 4:30, Mount Royal Hotel Dance Orchestra.

KPO, San Francisco, Calif. (Pacific, 423), 10:00-2:00 p. m., Rudy Selger's Fairmont Hotel Orchestra; 2:30-3:30, Organ recital, Theodore J. Irwin; 4:30-5:30, Rudy Seiger's Fairmont Hotel Orchestra; 5:30-6:30, Children's hour, stories for children, "Big Brother" of KPO, taken from "Book of Knowledge"; 7:00-8:00, Dinner concert, Rudy Selger's Fairmont Hotel Orchestra; 8:00-9:00, Theodore J. Irwin, organist; 9:00-10:00, Program, auspices of the Irvine Sisters; 10:00-11:00, E. Max Bradfield's versatile band.

KSD, St. Louis, Mo. (Central, 546), 8:30 p. m., Grand Central Theater.

WAAM, Newark, N. J. (Eastern, 263), 7:45-8:00 p. m., "Star Spangled Banner"; 8:15-8:30 Nelson Rogers' WAAM Dance Orchestra; 8:45-9:00, Joseph G. Wood, "knight of the road," in the fourth of his popular talks on salesmanship; 9:00-9:15, Arthur Sorenson, of the Toronto Melody Five, jazz pianist; 9:15-9:30, James Moore, tenor, with Marcia Paquita, Spanish prima donna; 9:30-9:45, Andrew Boyle, pianist, in a medley of old-time favorites; 9:45-10:00, Puritan Trio, in song and syncopation; 10:00-10:15, "The New Spring Styles for Women," talk by Bertha Ford, designer; 10:15-10:30, Bert Carlyle's Five Chocolate Drops, in a jazzical jamboree; 10:30-10:45, George Blundon and Frederick J. Metzger, singing.

WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., George Albert Bouchard, organist; 2:30-4:00, The Yankee Six Orchestra; 4:00, Tea time music, Martha Gomph, harpist; Katherine Stang, violinist; 6:30-7:30, Vincent Lopez Hotel Statler Orchestra; 7:30, Digest of the day's news; 9:00, Concert, mixed program, auspices of E. C. Sutton of the Wheat Ice Cream Co.

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

WHAZ, Troy, N. Y. (Eastern, 380), 9:00 p. m., Rensselaer Polytechnic Institute Students' Night, Students' Symphony Orchestra; Address, Dr. John M. Clarke, director of the New York State Museum.

WIP, Philadelphia, Pa. (Eastern, 509), 1:00 p. m., Gimbel Brothers' Tea Room Orchestra; 6:05, Chas. West's Orchestra; 7:00, Uncle Wip's bedtime stories.

WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Special program, Wurlitzer Concert Company; 8:00, Piano duet, Mrs. Cora Higdon, Mrs. Ray Higdon Shafer; Westwood Presbyterian Choir; Mary Waltz, contralto; O. H. Katterjohn, tenor; Mrs. Birdie Cramer, soprano; Mrs. Florence Cohan, contralto; Herman Sterdel, tenor; Mrs. Bernard Lea Rice, soprano; Talk, Rev. Bernard L. Rice; Mrs. Elizabeth Jamerson Hock, soprano; Edward Deitemeier, bass; Grace Potts, soprano.

WMC, Memphis, Tenn. (Central, 500), 8:30 p. m., Musical program, Prof. Gasper Pappalardo, director.

WAAW, Omaha, Neb. (Central, 360), Halliday Orchestra of Council Bluffs.

WBAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Program by the Christian College; 9:30-10:45, Concert, Chamber of Commerce of Marlin.

WDAF, Kansas City, Mo. (Central, 411), 3:30-4:30 p. m., Dance and concert orchestra; 6:00-7:00, School of the Air: Piano tuning-in number on the Duo-Art; Speaker, U. of Kansas; Children's story and information period; Fritz Hanlein's Trianon Ensemble; 8:00-9:15, Popular program; 11:45, Nighthawk Frolic, "Merry Old Chief" and the Coon-Sanders Novelty Singing Orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily almanac; 12:02 p. m., Organ recital, Stanley Theater; 2:00, Arcadia Cafe Concert Orchestra; 7:30, Dream Daddy's bedtime stories; 10:10, Fred Jordan, songs; Howard Lanin's Arcadia Cafe Orchestra.

WEAF, New York, N. Y. (Eastern, 492), 4:00 p. m., Francis May, violinist; 4:10, Marion Christian, mezzo-soprano; 4:40, Phil N. Darby, tenor; 5:00, Mother's program; 7:30, Thornton Fisher; 7:40, Samuel Furedi, cellist; 8:00, "Watches," Mears & Co.; 8:10, Sara Alter, pianist; 8:40, Max Brick, tenor; 9:00, Friendly Sons of Saint Patrick Glee Club.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Piano solos, Caroline Hoffman; 6:00, Bedtime stories; 8:30, Meyer Davis Bellevue Stratford Orchestra.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:30 p. m., Lecture; 5:45, Chimes; 6:30, Sandman's visit; 8:00, Musical program, Erwin Swindell, director; 10:00, Musical program.

WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt; 12:00 m., Wanamaker Crystal Tea Room Orchestra; 4:45 p. m., Organ recital, Mary E. Vogt; 7:30, Adelphia Hotel Concert Orchestra; 9:15, Ernio Rapee and Orchestra from Fox Theater; 10:30, Kentucky Kernels Dance Orchestra from Hotel Adelphia.

WOS, Jefferson City, Mo. (Central, 440.9), 8:00 p. m., Program, band of the Missouri State Prison, Virgil E. Combs, handmaster.

WSB, Atlanta, Ga. (Central, 429), 8:00-9:00 p. m., Elk's Royal Purple Band; 10:45-11:45, Back stage frolic, scene-shifters of Atlanta Local, International Association Theatrical Stage Employes.

WASHINGTON'S BIRTHDAY INSPIRES WEEK OF PATRIOTIC FEATURES

Where to Hear Concerts

THESE are the stations for music lovers to dial, you and can hear, providing you dial correctly and read the programs carefully, everything from jazz to opera.

Tuesday: CKAC, KDKA, KFI, KGO, KHJ, KPO, KSD, KWY, WBAP, WBZ, WCAE, WCAP, WDAF, WDAP, WEAF, WFAA, WGI, WGY, WHAS, WHB, WHN, WJAX, WJAZ, WLW, WMAQ, WMC, WSB, WWJ.
Wednesday: KDKA, KFAE, KFI, KGW, KHJ, KPO, KSD, KYW, PWX, WBAP, WBZ, WDAF, WDAP, WCAE, WEAF, WFAA, WGI, WHAS, WHB, WHN, WJAZ, WLW, WMAQ, WOC, WSB, WTAM, WWJ.
Thursday: KDKA, KFI, KGO, KHJ, KPO, KGW, KSD, KYW, WBAP, WBZ, WCAE, WDAF, WDAP, WEAF, WFAA, WGI, WGY, WHAS, WHB, WHN, WJAX, WJAZ, WLW, WMAQ, WMC, WOC, WSB, WWJ.
Friday: CKAC, KDKA, KFAE, KFI, KHJ, KGW, KSD, KYW, WBAP, WBZ, WCAE, WDAF, WDAP, WEAF, WFAA, WGI, WGY, WHAS, WHB, WHK, WHN, WJAZ, WLAG, WMAQ, WMC, WOC, WOS, WSB, WWJ.
Saturday: KDKA, KFI, KGO, KHJ, KPO, KSD, KYW, PWX, WBZ, WCAE, WCAP, WDAF, WDAP, WEAF, WFAA, WGI, WHAS, WHB, WHK, WHN, WMC, WOC, WSB, WTAM, WWJ.
Sunday: CKAC, KPO, KHJ, KYW, WBAP, WDAP, WEAF, WFAA, WGI, WHAS, WHK, WHN, WOC, WSB, WWJ.
Monday: KDKA, KFAE, KPO, WBAP, WDAF, WEAF, WHAZ, WHN, WLW, WM, WOC, WOS.

Wednesday, February 20

(Continued from page 15)

Traynor, lyric tenor; 8:45-9:00, John Sheehan, Tom Brueben and George Robinson, singing; 9:15-9:30, Hamilton-Reid Burns, elocutionist; 9:30-9:45, Trianon Melody Four, offering "The Garden of Your Heart" and "In a Woodland Glade"; 9:45-10:00, Melville Carter, operatic tenor; 10:00-10:15, James A. Drenan, song-writer and composer, assisted by Judith Roth and Oscar Taylor; 10:15-10:30, Current Book Reviews by Andrew McFae; 10:30-10:45, Richard Douglas, baritone soloist.
WBAP, Fort Worth, Tex. (Central, 476), 7:30-8:30 p. m., Monthly student recital, Sam S. Losh, baritone and pianist; 9:30-10:45, Concert, George Freeman's Boulter Serenaders.
WBZ, Springfield, Mass. (Eastern, 337), 6:00 p. m., Dinner concert, WBZ String Choir; 7:30, Bedtime story for the kiddies; 8:00, Chamber music, WBZ String Choir, Willie E. Arto, cornetist, Rene J. Kern, cornetist; 9:00, Bedtime story, Grown-ups, Orison S. Marden.
WCAE, Pittsburgh, Pa. (Eastern, 46.2), 3:00 p. m., Piano recital, Fred Rosenfeld; 4:30, Sunshine Girl; 6:30, Dinner concert, William Penn Hotel; 7:30, Popular songs; 8:30, Musical program.
WDAF, Kansas City, Mo. (Central, 411), 3:30-4:30 p. m., Johnnie Campbell's Kansas City Club Orchestra; 6:00-7:00, Piano tuning-in number on the Duo-Art; Weekly health talk, auspices of the Health Conservation Association; Speaker, Swift & Co.; Children's story and information period; Fritz Hanlein's Trianon Ensemble; 8:00-9:15, Classical concert, Kansas City Junior Music Clubs; 11:45-1:00 a. m., Nighthawk frolic: "Merry Old Chief" and the Coon-Sanders Novelty-Singing Orchestra.
WDAP, Chicago, Ill. (Central, 360), 7:00-8:00 p. m., Drake Concert Ensemble and Blackstone String Quintette; 10:00, Geo. Leland Nichols, Geraldine Hert; 10:10-10:25, Barton Organ played by Ralph Emerson.
WDAR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily Almanac; 12:02 p. m., Organ recital, Stanley Theater; piano recital, Edna Firestone; dinner music, Arcadia Cafe Concert Orchestra; 2:00, Arcadia Cafe Concert Orchestra; 7:30, Dream Daddy's bedtime stories; 8:15, Kanaru Glee Club, Herman Weise, director; Stanley Symphony Orchestra, Josef Pasternack, director; 10:10, Howard Lanin's Arcadia Cafe Dance Orchestra.
WEAF, New York, N. Y. (Eastern, 492), 11:00 a. m., Myra Hurtis Hindenburger, contralto; 11:30, Columbia University; 11:40, N. Y. Tuberculosis Society; 11:50, U. S. Dept. of Agriculture; 4:00 p. m., Beethoven Trio; 6:00, John Martin and Helen Webb in songs and stories; 7:00, United Synagogue of America; 7:30, Thornton Fisher; 7:40, Reginald F. Moser, baritone; 8:10, American Sole and Leather Belting Tanners, Inc.; 8:20, Esther Dale, soprano; 8:50, Arthur Haag, pianist; 9:20, N. Y. Tuberculosis Society.
WFAA, Dallas, Tex. (Central, 476), 12:30-1:00 p. m., Musical program, The Red Head Girl.
WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis' Bellevue Stratford Concert Orchestra; 6:00, Bedtime stories; 6:30, Meyer Davis' Bellevue Stratford Orchestra.
WGI, Medford Hillside, Mass. (Eastern, 360), 6:30 p. m., Meeting of the Big Brother Amrad Club; 6:50, Message to Camp Fire Girls, "Big Smoke," Charles W. Cassell; 7:30, "Science Up to Date," Scientific American; 7:30, Evening program, Musicale.
WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., George Albert Bouchard, organist; 2:30-4:00, The Yankee Six orchestra; 4:00, Tea time music, Martha Gomph, harpist; Katherine Stang, violinist; 6:30 and 11:30, Vincent Lopez Hotel Statler orchestra; 7:30, Digest of the day's news; 9:00, Concert, direction of H. C. Wessner, featuring Edna Lawson Stewart and H. F. Tenney.
WGY, Schenectady, N. Y. (Eastern, 380), 6:30 p. m., "Adventure Story," Youth's Companion.
WHA, Madison, Wis. (Central, 360), 7:30 p. m., "A $10,000 prize contest in Chemistry for the Youth of the Nation," Prof. J. H. Mathews, director of the courses in Chemistry and Chemistry-Commerce.
WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Walnut Theater Orchestra; Strand Theater Orchestra; Alamo Theater organ; 7:30-9:00, Chas Maer's Orchestra; Mrs. R. Hayes Davis, contralto.
WHB, Kansas City, Mo. (Central, 411), 12:35-1:00 p. m., Popular music, Sweeney Radio Orchestra; 2:00-3:00, Ladies' Hour program, Sweeney Radio Orchestra; 7:00-7:15, Sweeney Radio Orchestra.
WIP, Philadelphia, Pa. (Eastern, 509), 1:00 p. m., Gimbel Brothers' Tea Room Orchestra; 6:05, Jimmy Campbell's Little Club Orchestra; 7:00, Uncle Wip's bedtime stories.
WJAZ, Chicago, Ill. (Central, 448), 10:00 p. m., Martha M. Brown, pianist, Dorothy Brown, violinist; Sandy Meek, tenor; Oriole Orchestra.
WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Special program for "Shut Ins," Wurlitzer Concert Company; 8:00, "Lyric Minstrels."
WMAQ, Chicago, Ill. (Central, 447.5), 1:00 p. m., Speeches, Chicago Assn. of Commerce; 4:20, Items of interest to women; 4:30, Pupils of Cosmopolitan School of Music; 7:00, Georgene Faulkner, the Story Lady; 7:30, Weekly lecture from Northwestern University, Prof. James L. Lardner; 8:00, Keith Preston, famous columnist of the Daily News; 9:00, Talks, Chicago Charities; 9:15, Serrals De Zanco, tenor; Eugenie De Primo Zanco, composer-pianist.
WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:30 p. m., "Blast Furnace Iron," C. A. Russell; 6:30, Sandman's visit; 7:00, "Progress and Rural Education," Hermine Schoeckloth; 8:00, Double Quartette of Women's voices, Maud E. Arnold, director; Kittie Glee Merrill, reader; Donal Leslie, tenor.
WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt; 12:00 m., Wanamaker Crystal Tea Room Orchestra; 4:45 p. m., Organ recital, Mary E. Vogt; 7:30, Adelphia Hotel Concert Orchestra; 8:30, WOO Orchestra, Robert E. Golden, director; 10:10, Hotel Adelphia Dance Orchestra.
WOS, Jefferson City, Mo. (Central, 440.9), 8:00 p. m., Address on agricultural topic, faculty member of the Missouri College of Agriculture; 8:20, Dance program, S. C. Stancil's Novelty Six Dance Orchestra.
WSB, Atlanta, Georgia (Central, 420), 10:45-11:45, "Song Echoes of Yesterday," Win-One Male Quartet; Bonnie Barnhardt.
WTAM, Cleveland, Ohio (Eastern, 390), 8:00 p. m., Orchestra numbers by the WTAM Symphony Concert Orchestra; Xylophone solos, Frank Sholle; Vocal solo, Morrie A. Scott, tenor, Mrs. S. P. Mong, pianist; Piano solos, Miss Florence Beebe; Vocal numbers, Helene Altmendinger; R. J. Proctor, pianist; Vocal numbers, Clarence A. Hauna, baritone; Mrs. Mong, pianist; Saxophone solo, Frank Bruhy; Miss Clara Sharp, pianist; Cello solo, Max Schmitt; Miss Sharp, pianist; Duet, Messrs. Hanna and Scott.
WWJ, Detroit, Mich. (Eastern, 517), 9:30 a. m., "Tonight's Dinner," Woman's Editor; 9:45, Public Health talks; 12:00 m., Jean Goldkette's Orchestra; 3:00 p. m., Detroit News Orchestra; 7:00, Detroit News Orchestra; Vocal numbers, Chamber Music Society of Detroit.

Thursday, February 21

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 6:15 p. m., Dinner concert, KDKA Little Symphony Orchestra; 7:45, Children's period; 8:15, Farm program; 8:30, KDKA Little Symphony Orchestra; Mrs. Catherine McComb Enoch, contralto; Alvin Adams, accompanist; C. A. Gersl, baritone; Mrs. C. A. Gersl, accompanist; 11:30, Special concert.
KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Bedtime story. Concert program presented by the Y. M. C. A.; 10:00-11:00, Concert program presented under direction of Mrs. William Barber.
KFKX, Hastings, Neb. (Central, 341), Rebroadcasts program of KDKA.
KFSG, Los Angeles, Calif. (Pacific, 278), 3:30-4:30 p. m., Special music and readings for shut-ins, the sick and the afflicted; 7:00-7:30, Bible stories for children; 8:00-9:30, Music and sermon by Aimee Semple McPherson.
KGO, Oakland, Calif. (Pacific, 312), 8:00-10:00 p. m., Concert features of both instrumental and vocal nature.
KGW, Portland, Ore. (Pacific, 492), 3:30 p. m., "The Millander," Booth Tarkington; 8:00, One-act plays, Doris Smith, director; 10:00, Dance music, George Olsen's Metropolitan Orchestra.
KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Concert; 2:30-3:30, Matinee Musicale presenting Violet Steinemann, violinist and pianist; Trosi, Italian tenor; 6:45-7:30, p. m., Children's program presenting Dickie Brandon, screen juvenile, and Jane Hammel, age 12 years, pianist, pupil of Ruth Thomas; 8:00-10:00, Edendale program arranged by Mary Watts; 10:00-12:00, Art Hickman's Orchestra.
KPO, San Francisco, Calif. (Pacific, 423), 1:00-2:00 p. m., Rudy Seiger's Fairmont Hotel Orchestra; 4:30-5:30, Rudy Seiger's Fairmont Hotel Orchestra; 8:00-9:00, Theodore J. Irwin, organist; 9:00-10:00, Program, auspices of the San Francisco Telephone and Telegraph Company; Patriotic address, Frederick T. Leo; 10:00-11:00, E. Max Bradfield's Palace Hotel Dance Orchestra.
KSD, St. Louis, Mo. (Central, 546), 8:00 p. m., St. Louis Symphony Orchestra, Rudolph Ganz, conductor; Ethel Leginska, pianist.
KYW, Chicago, Ill. (Central, 536), 11:35 a. m., Table talk, Mrs. Anna J. Peterson; 2:35-3:30 p. m., Studio program; 6:50, Children's bedtime story; 7:00-7:30, Dinner concert, Joska DeBabary and his orchestra; Clyde Doerr and his orchestra, 8:00-8:20, "Twenty Minutes of Good Reading," Rev. C. J. Pernin; 8:20-9:00, Musical program, National Ceramic Tile Convention; 9:00-9:30, Mendelssohn Club Concert.
WAAM, Newark, N. J. (Eastern, 263), 7:35-8:00 p. m., "Star Spangled Banner," Victor Wilbur, tenor; 8:15-8:30, Joseph Mary, concert pianist; 8:30-8:45, "Scientific Feeding of Children," talk by Dr. O. A. Lowenstein, scientific dietitian; 8:45-9:00, Fritzi Leyton, song-writer and vaudeville head-liner; 9:00-9:15, Martha Finger, pianist; 9:15-9:30, Dance Music of Distinction, by the Carolina Ramblers Orchestra; 9:45-10:00, "The Turn of the Wheel of Events," second in a series of talks by Arthur W. Brooks, business psychologist; 10:00-10:15, Benjamin Friedman, singing; 10:15-10:30, Elsie Blum and Sylvia Goodman, singing; 10:30-10:45, Martha Shannon, harpist.
WAAW, Omaha, Neb. (Central, 360), Educational program, "Radio Chats on Animal Disease Problems," Dr. Van Es.
WBAP, Fort Worth, Tex. (Central, 476), 7:30-8:30 p. m., Concert, jubilee singers of the Dickson Colored Orphanage; 9:30-10:45, Organ concert, Will Foster.
WBZ, Springfield, Mass. (Eastern, 337), 7:30 p. m., Bedtime story for the kiddies; Farmers' period, Letter from the New England Homestead; 8:00, Concert, Doris Wyman, violinist; Olive Wyman, cellist; Miriam Sullivan, violinist; Alberta M. Kelleher, violinist; 9:00, Bedtime story for Grown-ups, Orison S. Marden.
WCAE, Pittsburgh, Pa. (Eastern, 462), 4:30 p. m., Sunshine Girl; 6:30, Dinner concert, William Penn Hotel; 7:30, Uncle "Kaybee"; 8:00, Address, Rev. Clyde L. Nevins; 8:30, Musical program, Conneaut Syncopators.
WCAP, Washington, D. C. (Eastern, 469), 7:15-8:45 p. m., Concert Orchestra; 10:00-12:00, Dance music, Meyer Davis' Le Paradis Band.
WDAF, Kansas City, Mo. (Central, 411), 3:30-4:30 p. m., D. Amherst Haley's Dance and Concert Orchestra; 6:00-7:00, School of the Air; Piano tuning in number on the Duo-Art; Address, Speaker, William Jewel College; Children's story and information period, Fritz Hanlein's Trianon Ensemble; 11:45-1:00 a. m., Nighthawk Frolic: "Merry Old Chief" and the Coon-Sanders Novelty-Singing Orchestra; Pipe organ recital, Norma Mainwering.
WDAP, Chicago, Ill. (Central, 360), 7:00-8:00, Drake Concert Ensemble and Blackstone String Quintette; 8:00-8:30, Barton Organ played by Ralph Emerson; 10:00, Owen R. Goodpaster, Doris Gieselman, Jack Chapman's Orchestra.
WDAR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily Almanac; 12:02 p. m., Organ recital, Stanley Theater; dinner music, Arcadia Cafe Concert Orchestra; 2:00, Arcadia Cafe Concert Orchestra; 2:30, Mrs. Anna R. Scott; 7:30, Dream Daddy's bedtime stories.
WEAF, New York, N. Y. (Eastern, 492), 11:30 a. m., Reinhardt Bleschuchdt, violinist; 11:50, U. S. Dept. of Agriculture; 4:00 p. m., Union College Musical Assn.; 7:00, N. Y. Federation of Churches; 7:30, Thornton Fisher; 7:40, Jeane Alfred, soprano; 8:20, Bank of America; 8:30, Hunter College Musical Program; 9:45, Columbia Phonograph Co., 9:45, Earle Tuckerman, baritone; 10:30, Audrey Roslyn, pianist; 11:00, Vincent Lopez Orchestra, courtesy Gimbel Bros.
WFAA, Dallas, Tex. (Central, 476), 12:30-1:00 p. m., "Old Times in North Texas," Epps G. Knight; 8:30-9:30, Musical program, A. Harris & Co.
WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis' Bellevue Stratford Concert Orchestra; 3:00, Loretta Kerk, pianist; 6:00, Bedtime stories; 6:30 Meyer Davis' Bellevue Stratford Orchestra; 8:00, Boy Scouts Radio Corps.
WGI, Medford Hillside, Mass. (Eastern, 360), 0:30 p. m., Meeting of the Big Brother Amrad Club; 7:00, Evening program, J. Stillker and friends.
WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., George Albert Bouchard, organist; 2:30-4:00, The Yankee Six Orchestra; 4:00, Tea time music, Martha Gomph, harpist; Katherine Stang, violinist; 6:30-7:30, Vincent Lopez Hotel Statler orchestra; 7:30, Digest of the day's news; Boy Scout Radiograms, Employment bulletin, story from "The American Boy" magazine; 8:00, Lecture, "Our Commercial Relations with China," F. J. Dean, representative of the Chamber of Commerce in China.
WGY, Schenectady, N. Y. (Eastern, 380), 7:45 p. m., Welcome to new citizens by Schenectady Post, American Legion and Citizen's Committee; Addresses, music, American Legion Band, chorus of 50 boys.
WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Strand Theater Orchestra; Walnut Theater Orchestra; 7:30-9:00, Concert, auspices Ella Sharrard Violin Quartet, Walter Bodeman, 1st violinist; Christine Jensing, 2nd violinist; Dorothy Neat, 3rd violinist; Theodore Williams, 4th violinist; Mrs. C. C. Barne, contralto; Corlia O. Petrie, reader.
WHB, Kansas City, Mo. (Central, 411), 12:35-1:00 p. m., Popular musical program; 2:00-3:00, Ladies' hour program, Sweeney Radio Orchestra; Floyd Estep, saxophonist; 7:00-7:30, "Conservation of Vision," Dr. George J. Erskine; Dorothy Ries, pianist; 8:00-10:00, Sweeney Radio Orchestra; Bonnie A. Bispon, soloist; Lois Rogers, accompanist.
WIP, Philadelphia, Pa. (Eastern, 509), 1:00 p. m., Gimbel Brothers' Tea Room Orchestra; 6:05, Frank Winegar's "Pennsylvanians" orchestra; 7:00; Uncle Wip's bedtime stories; 8:00, "Timely Talks to Motorists," by Eugene Hogle, secretary, Automobile Club of Philadelphia; 11:15, Ted Weems and his L'Aiglon orchestra.
WJAX, Cleveland, Ohio (Eastern, 390), 8:00 p. m., Concert program by the Oberlin (Ohio) Conservatory of Music String Quartet, assisted by Mrs. Josephine Bonazzi, pianist; Maurice Kessler, first violinist; Miss Gherkins, violist; Mr. Funkhouser, 2nd violinist; Frederick Goerner, cellist; Solo numbers by members of the quartet; Dance program, Hollenden Hotel Orchestra, Carl Rupp, director.
WJAZ, Chicago, Ill. (Central, 448), 10:00 p. m., Eva Dugan, soprano; Dorothy Ferguson, xylophonist; Howard Prisale, pianist; Louise Langley, cellist; Oriole Orchestra.
WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Piano solos, Adelaide Apfel; 10:00, Special Washington program, Thomas J. Kelly, director, Early American Music and Music of American Indian Tribes; 11:00, Doherty's Melody Boys; American Hawaiian Orchestra; 11:15, "Do Spirits Return?"—Howard Thurston, magician.
WMAQ, Chicago, Ill. (Central, 447.5), 2:35 p. m., Concert, Lyon and Healy recital hall; 4:20, Items of interest to women; 4:30, Illinois Federation of Women's Clubs; 7:30, Boy Scouts Weekly Talk, Talk, Rockwell R. Stephens, Auto Editor; Lessons in Golf, B. A. Andrews; 9:00, Y. M. C. A. Glee Club.
WMC, Memphis, Tenn. (Central, 500), 8:30 p. m., Musical program, Chisca Hotel Orchestra, Clara Ahern, director.
WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes, 3:30 p. m., "Tuberculosis," Karl G. Stephan; 6:15, Chimes; 6:30, Sandman's visit; 7:00, P. S. C. Orchestra, V. R. Roehle, baritone.
WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt; 12:00 m., Wanamaker Crystal Tea Room Orchestra; 4:45 p. m., Organ recital, Mary E. Vogt.
WSB, Atlanta, Georgia (Central, 429), 8:00-9:00 p. m., Lieut. William Laurier and his band, Wendall Hall, everready entertainer; 10:45, "International Melodies," Dr. Charles A. Sheldon, organist.
WWJ, Detroit, Mich. (Eastern, 517), 9:30 a. m., "Tonight's Dinner"; 3:00 p. m., Detroit News Orchestra; 7:00, Detroit News Orchestra; Hawaiian Serenaders, 10:00, Dance music, Jean Goldkette's Orchestra.

This is Chris W. Graham, known to thousands of children as Uncle Wip, who will broadcast bedtime stories every night from station WIP, Philadelphia. He is also tenor of the WIP Radio Concert Quartet.

Have you heard the piano selections played by Miss Adelaide Apfel, from the WLW studio every Thursday afternoon at four o'clock? Here she is in the circle above. The gentleman to the left of her is Maurice Kessler and his famous viola d'amour, over 400 years old and often heard as played by Mr. Kessler from WJAX. It has a double set of strings and produces a most pleasing harmony.

Above, we present a photograph of Herman Kenin, director of George Olsen's Metropolitan orchestra, specially posed for Radio Digest. He may be heard from KGW five times a week.

Friday, February 22

CKAC, Montreal, Can. (Eastern, 425), 1:45 p. m., Mount Royal Hotel Concert Orchestra; 4:30, Mount Royal Hotel Dance Orchestra.
KDKA, E. Pittsburgh, Pa. (Eastern, 326), 6:15 p. m., Organ recital, Lucile Hale; 7:15, Radio Boy Scout Meeting; 7:15, Children's period; 8:15, "The Long Struggle with Idolatry," Dr. H. L. Lanning; 8:30, Pittsburgh Male Sextet.
KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Special Washington's Birthday affair; 10:00-11:00, Concert under direction of Myra Belle Vickers.
KFKX, Hastings, Neb. (Central, 341), Rebroadcasts program of KDKA.
KFSG, Los Angeles, Calif. (Pacific, 278), 3:30-4:30 p. m., Special music and readings for shut-ins, the sick and the afflicted; 7:00-7:30, Special program giving in advance the International Sunday-school lesson; 8:00-9:30, Musical program and sermon by Aimee Semple McPherson.
KGW, Portland, Ore. (Pacific, 492), 3:30 p. m., Lecture for women; 8:00, John Sylvester, accordionist; 8:15, Dance music, George Olsen's Metropolitan Orchestra; 9:00, "Portraits of Washington," Prof. Frederick S. Dunn; 10:30, Hoot Owls with Pantages frolic.
KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Program presented by Studebaker Six of Long Beach, arrangement of Glen E. Thomas; 2:30-3:30, Matinee Musicale presented by Studebaker Six of Long Beach, Calif.; 6:30-7:00, Children's program presenting Richard Headrick, screen juvenile; Bedtime story by "Uncle John"; 8:00-10:00, Program presenting Long Beach (Calif.) Municipal Band, direction of Herbert L. Clarke; E. A. Brindstool in an address about George Washington; 10:00-12:00 p. m., Art Hickman's Orchestra.
KPO, San Francisco, Calif. (Pacific, 423), 1:00-2:00 p. m., Rudy Seiger's Fairmont Hotel Orchestra; 3:30-3:30, Theodore J. Irwin, organist; 4:30-5:30, Rudy Seiger's Fairmont Hotel Orchestra.
KSD, St. Louis, Mo. (Central, 546), 8:00 p. m., "The Dreamer Awakes" (pageant), Inter-unit Organization of the Catholic Students Mission Crusade; Address, Rev. Archbishop John J. Glennon.
KYW, Chicago, Ill. (Central, 536), 11:35 a. m., Table talk, Mrs. Anna J. Peterson; 6:50 p. m., Children's bedtime story; 7:00-7:30, Dinner concert, Joska DeBabary and his orchestra; Clyde Doerr and his orchestra; 10:00-2:00 a. m., Midnight revue.
WBAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Concert, Yeoman Orchestra, Owen Crockett, director; 9:30-10:15, Concert, Palo Pinto, Texas Square Dance Orchestra.
WBZ, Springfield, Mass. (Eastern, 337), 6:00 p. m., Dinner concert, WBZ Orchestra; 7:00, "Just Plain Joy Riders," dramatized story, Youth's Companion; 7:30, Bedtime story, Current Book Review, R. A. MacDonald; Story for Grown-ups Orison S. Marden; 10:00, Chamber music, WBZ Orchestra; Mrs. Dorothea Abbey Waite, contralto; A. E. Waite, accompanist.
WCAE, Pittsburgh, Pa. (Eastern, 462), 4:30 p. m., "The Sunshine Girl"; Uncle Kaybee; 6:30, Dinner concert, William Penn Hotel; 7:30, Uncle Kaybee; 8:30, Standard Male Chorus.
WDAF, Kansas City, Mo. (Central, 411), 3:30-4:30 p. m., Regular "request" program, Leo R. Davis "Radio" orchestra; 6:00-7:00, School of the Air; Piano tuning in number on the Duo-Art; Address, speaker from the Kansas City Children's bureau; Children's story and information period, Fritz Hanlein's Trianon Ensemble; 8:00-9:15, Novelty Night, Program, James F. Pryor, baritone; 11:45-1:00 a. m., Nighthawk Frolic: "Merry Old Chief" and the Coon-Sanders Novelty Singing Orchestra.
WDAP, Chicago, Ill. (Central, 360), 7:00-8:30 p. m., Drake Concert Ensemble and Blackstone String Quintet; 10:00, Special Washington's Birthday program; 10:10-10:25, Barton Organ played by Ralph Emerson.
WDAR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily Almanac; 12:02 p. m., Organ recital, Stanley Theater; 2:00, Arcadia Cafe Concert Orchestra; 7:30, Dream Daddy's bedtime stories; 7:34, Book review by Robert Bruce; 10:10, Howard Lanin's Arcadia Cafe Dance Orchestra; songs by Harry Glyn; Irene Bordoni; Special Morning Glory Club program; attractions from Philadelphia's leading theaters.
WEAF, New York, N. Y. (Eastern, 492), 11:30 a. m., Sons of American Revolution; 11:50, U. S. Dept. of Agriculture; 4:00 p. m., Blue Horse Trio; 5:00, Children's Hour Stories; 7:00, Ida Dock, pianist; 7:30, Thornton Fisher; 7:40, Winifred T. Barr; 7:50, Battery Talk; 8:00, Billy Jones and Ernest Hare; 8:30, Isadore Geffen, cellist; 9:00, Astor Coffee Dance Orchestra; 10:00, President Calvin Coolidge in Washington's Birthday Address; 10:15, Roberta Beatty, mezzo soprano.
WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., "Period of the Judges," Dr. Robert S. Hyer; 8:30-9:30, Musical program, Jessie McKee's Orchestra.
WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis' Bellevue Stratford Concert Orchestra; 6:00, Bedtime stories; 6:30, Meyer Davis' Bellevue Stratford Orchestra.
WGI, Medford Hillside, Mass. (Eastern, 360), 3:00 p. m., Amrad Women's Club program; Talk, Dorothy G. Goodwin; 3:30, Talk, Dorothy Dean, Dir. Metropolitan Division Mass. Council of Girl Scouts; 6:30, Meeting of the Big Brother Amrad Club; 7:30, Evening program, Selected verses, Charles L. H. Wagner, Radio poet; Red Cross Health talk, Henry Copley Green; Musicale.
WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., George Albert Bouchard, organist; 2:30-4:00, The Yankee Six Orchestra; 4:00, Tea time music, Martha Gomph, harpist; Katherine Stang, violinist; 6:30 and 11:30, Vincent Lopez Hotel Statler orchestra; 7:30, Digest of the day's news; 9:00, Concert, Masten Park High School orchestra, direction of Prof. W. A. Furman; 10:15, Address, "Industrial Relations Between China and the United States," by Hon. Chang Chien, Jr., Chinese high commissioner.
WGY, Schenectady, N. Y. (Eastern, 380), 7:45 p. m., "George Washington," Benedict Hatmaker; Radio drama, "The Gamblers," Charles Klein, WGY Players; 10:30, Dance music.
WHA, Madison, Wis. (Central, 360), 7:30 p. m., Washington's Birthday—Anniversary Address, Prof. Frederick L. Paxson, Prof. of History.
WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Walnut Theater Orchestra; Strand Theater Orchestra; 7:30-9:00, Concert, auspices Annette Wearen Music Studio.
WHB, Kansas City, Mo. (Central, 411), 12:35-1:00 p. m., Popular music; 2:00-3:00, Ladies' hour program, Sweeney Radio Orchestra; 7:00-7:15, Sweeney Radio Orchestra.
WHK, Cleveland, Ohio (Eastern, 283), 8:00 p. m., Concert program arranged by the Cleveland Radio Dealers' Association; Musical numbers by Tomson's Novelty Danra Orchestra; Stephan N. Tomson, director and pianist; Vocal solos by popular entertainers.
WIP, Philadelphia, Pa. (Eastern, 509), 6:05 p. m., Jordan-Lewis Dance Orchestra; 7:00, Uncle Wip's bedtime stories.
WJAZ, Chicago, Ill. (Central, 448), 10:00 p. m., Oriole Orchestra.
WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Lecture recital.
WMAQ, Chicago, Ill. (Central, 447.5), 4:00 p. m., Items of interest to women; 4:30, Pupils of Bush Conservatory; 7:00, "Wide Awake Club," Mrs. Frances M. Ford; 7:30, Music Memory Contest, Mrs. Marx E. Oberndorfer; 9:00, George Washington Program, Union League Club of Chicago.
WMC, Memphis, Tenn. (Central, 500), 8:30 p. m., Concert, Carl Metz Saxophone Band; 11:00, Frolic, Brilling's Orchestra, Frank Bracalante, director.
WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:30 p. m., "Structure of the Hair, Skin and Nails," R. G. Maybach; 5:45, Chimes; 6:30, Sandman's visit; 7:20, Sunday School Lesson, Dr. Frank Willard Court, pastor; 8:00, Musical program, Erwin Swindell, director; Program, Chamber of Commerce of Rock Island.
WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt; 7:30 p. m., Adelphia Hotel Concert Orchestra; 8:30, Special Washington birthday program; 10:10, Hotel Adelphia Dance Orchestra.
WOS, Jefferson City, Mo. (Central, 440.9), 8:00 p. m., Washington's Birthday program, E. S. Emerson, director of the Miller Theater Orchestra.
WSB, Atlanta, Georgia (Central, 429), 8:00-9:00 p. m., Methodist jubilee at Wesley Memorial Church, sacred and popular male quartet, Hawaiian music, humorous lecture, Rev. Marvin Williams; 10:45-12:00, Hilltime tunes, Homeloin Boys' String Band.
WWJ, Detroit, Mich. (Eastern, 517), 9:30 a. m., "Tonight's Dinner"; 12:00 m., Dance music, Jean Goldkette's Orchestra; 3:00 p. m., Detroit News Orchestra; 7:00, Detroit News Orchestra, Anne Campbell, poet; Victor L. LeBlanc, tenor.

DANCING AND DRAMATICS

WHERE and when to dial to dance:
Tuesday: CKAC, KHJ, KPO, KYW, WDAF, WIP, WJAZ, WLW, WMAQ, WWJ.
Wednesday: CKAC, KGW, KHJ, KPO, KSD, KYW, WBAP, WDAF, WJAZ, WMAQ, WOS, WWJ.
Thursday: KFI, KGW, KHJ, KPO, KYW, WCAP, WDAP, WEAF, WIP, WJAX, WJAZ, WMAQ, WWJ.
Friday: CKAC, KGW, KHJ, KPO, KYW, WDAP, WHB, WMAQ, WWJ.
Saturday: CKAC, KFI, KHJ, KPO, KGW, KYW, WCAP, WDAP, WEAF, WFAA, WGY, WIP, WJAZ, WOC, WTAM, WWJ.
Monday: CKAC, KPO, WOS.

Drama Notes
Tuesday: KPO, The San Francisco Players Club; WFI, Stanbridge & Walker Radio Players.
Thursday: KGW, One-Act Play, Doris Smith, director.
Friday: WGY, "The Gamblers," WGY Players.

Saturday, February 23

CKAC, Montreal, Can. (Eastern, 425), 7:00 p. m., Kiddies' stories in French and English; 7:30, Mount Royal Hotel Concert Orchestra; 8:00, French folklore, Conrad Gauthier, director; 10:30, Mount Royal Hotel Dance Orchestra.
KDKA, E. Pittsburgh, Pa. (Eastern, 326), 6:15 p. m., Dinner concert, Westinghouse Band; 7:45, Children's period; 8:15, "Buying a Home," Robert W. Wemedore; 8:30, Concert, Westinghouse Band, Herman Nibbe, tenor.
KFI, Los Angeles, Calif. (Pacific, 469), 6:45-7:30 p. m., Concert; Bedtime story, 8:00-9:00, Concert numbers presenting Maude Reeves-Barnard; 10:00-11:00, Vocal and instrumental concert.
KFKX, Hastings, Neb. (Central, 341), Rebroadcasts program of KDKA.
KFSG, Los Angeles, Calif. (Pacific, 278), 8:00-9:30 p. m., Musical program and sermon by Aimee Semple McPherson.
KGO, Oakland, Calif. (Pacific, 312), 8:00-10:00 p. m., Concert program of pleasing vocal and instrumental selections.
KGW, Portland, Ore. (Pacific, 492), 3:30 p. m., Children's program, Story, Aunt Nell; 10:00, Dance music, George Olsen's Metropolitan Orchestra.
KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Concert; 2:30-3:30, Matinee Musicale; 6:45-7:30, Children's program presenting Dick Winslow Johnson and the Johnson family; Bedtime story by "Uncle John"; 8:00-10:00 p. m., Program arranged by Barker Bros.; 10:00-12:00, Art Hickman's Orchestra.
KPO, San Francisco, Calif. (Pacific, 423), 1:00-2:00 p. m., Rudy Seiger's Fairmont Hotel Orchestra; 2:30-3:30, Varied program; 3:30-5:30, Palace Hotel, tea dansants; 8:00-12:00 midnight, Art Weidner and his Fairmont Hotel Dance Orchestra; KPO Trio.
KSD, St. Louis, Mo. (Central, 546), 9:00 p. m., Orchestra concert, organ recital, vocal and instrumental specialties, Missouri Theater.
KYW, Chicago, Ill. (Central, 536), 11:35 a. m., Table talk, Mrs. Anna J. Peterson, 6:30 p. m., Children's bedtime story; 7:00-7:30, Dinner concert, Joska DeBabary and his orchestra; Clyde Doerr and his orchestra; 8:00-8:58, Musical program, Henry H. Roney, director, "Roney's Masonic Quartet"; 10:00-12:00, Midnight revue.
PWX, Havana, Cuba (Eastern, 400), 8:30 p. m., Concert, Prof. Carlos Fernandez, pianist; Nena Gerra, soprano; Nena Planas, soprano; Paquita Ellas; F. Alvarez, tenor.
WBAP, Fort Worth, Texas (Central, 476), 7:00-7:30 p. m., Review of the Interdenominational Sunday School lesson and Radio Bible Class, Mrs. W. F. Barnum.
WBZ, Springfield, Mass. (Eastern, 337), 7:00 p. m., Dinner concert, Hotel Kimball Trio; 7:30, Bedtime story for the kiddies; 8:00, Concert, Mrs. Nora Oadden Winton, soprano; Mrs. Miriam Munyan Thompson, accompanist, Gustav LaZazzera, cellist; 9:00, Bedtime story for Grown-ups, Orison S. Marden.
WCAE, Pittsburgh, Pa. (Eastern, 462), 3:00 p. m., Special musical program; 6:30, Dinner concert, William Penn Hotel; 7:30, Uncle "Kaybee"; 8:30, Musical program.
WCAP, Washington, D. C. (Eastern, 469), 7:30-10:00 p. m., Joint program with WEAF; 10:00-12:00, Dance music.
WDAF, Kansas City, Mo. (Central, 411), 3:00-4:30 p. m., Riley Ehrhart Orchestra; 6:00-7:00, School of the Air; Piano tuning-in number on the Duo-Art; Travelogue, Edgar A. Linton; Children's story and information period, Fritz Hanlein's Trianon Ensemble; 11:45-1:00 a. m., Nighthawk Frolic; "Merry Old Chief" and the Coon-Sanders Novelty Singing Orchestra.
WDAP, Chicago, Ill. (Central, 360), 7:00-8:30 p. m., Drake Concert Ensemble and Blackstone String Quintet; 10:00, Harry E. Ehrhart, "The Original Dream Daddy," and Carl Zorns, both of WDAR, Harmony Girls, Bob Brown, Viola Tasset; 10:10-10:25, Barton Organ played by Ralph Emerson, Jack Chapman's Orchestra.
WDAR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily Almanac, 12:02 p. m., Arcadia Cafe Concert Orchestra; Organ recital, Stanley Theater, 2:00, Arcadia Cafe Concert Orchestra; 4:00, Bobbie Lee and his Cotton Pickers; 7:30, Dream Daddy's bedtime stories.
WEAF, New York, N. Y. (Eastern, 492), 4:00 p. m., Bob Fridkin's Orchestra; 5:00, Kitty Horchman, lyric soprano, and Edna Kleeter, mezzo soprano; 7:30, Kara Sharkey, mezzo contralto; 8:00, American Chicle Quartet and Trio; 9:00, Orange County (Florida) Chamber of Commerce; 9:10, Kate Present, pianist; 9:30, Marie A. Kiraly, pianist; 10:00, James McKinley Rose, tenor; 10:30, Fan O'Brien, soprano; 11:00, Vincent Lopez Orchestra, courtesy Gimbel Brothers.
WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., Lecture on Freemasonry, Geo. Vincent; 8:30-9:00, Piano recital; 11:00-12:00, Adolphus Hotel Orchestra.
WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis' Bellevue Stratford Orchestra; 6:00 p. m., WFI Male Quartet; 6:00, Bedtime stories; Meyer Davis' Bellevue Stratford Orchestra; 10:00, Meyer Davis' Dance Orchestra.
WGI, Medford Hillside, Mass. (Eastern, 360), 6:30 p. m., Meeting of the Big Brother Amrad Club; 7:00, New England Business Industry, Arthur H. Chirch; Arthur Murray's course in Ball Room Dancing, lesson No. 12, Musicale.
WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., George Albert Bouchard, organist; 2:30-4:00, The Yankee Six Orchestra; 4:00, Vincent Lopez Hotel Statler Orchestra; 7:30, Digest of the day's news.
WGY, Schenectady, N. Y. (Eastern, 380), 9:30 p. m., Romano's Orchestra.
WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Strand Theater Orchestra; Walnut Theater Orchestra; Alamo Theater Orchestra; 7:30-9:00, Concordia Singing Society, Prof. D. Beninger, director.
WHB, Kansas City, Mo. (Central, 411), 12:40-1:00 p. m., Dance time, Sweeney Radio Orchestra; 2:00-3:00, Ladies' Hour Concert, Sweeney Radio Orchestra.
WIP, Philadelphia, Pa. (Eastern, 509), 1:00 p. m., Organ recital, Karl Bonawitz; 3:00, Popular program by a Paul Whiteman Orchestra; 6:05, Greenwich Village Follies Serenaders; 7:00, Uncle Wip's bedtime stories; 8:00, Science Talk, Philadelphia College of Pharmacy and Science; 10:15, Ted Weems and his Cafe L'Aiglon Orchestra; Charlie Kerr and his Hotel St. James Orchestra.
WMAD, Chicago, Ill. (Central, 447.5), 7:15 p. m., Dr. Charles M. Gilkey, Hyde Park Baptist Church; 7:30, Program, Dartmouth Glee Club; 8:00, Concert, Salvation Army Band; 11:00, Balaban and Katz Chicago Theater Revue.
WMD, Memphis, Tenn. (Central, 500), 8:30 p. m., Musical program, Union Avenue Baptist Church.
WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:10 p. m., "Soap Making," C. Hall; 5:45, Chimes; 6:30, Sandman's visit; 7:00, "George Washington," J. W. Gannaway; 9:00, P. S. C. Orchestra, Gerald M. Barrow, director; V. R. Roehle, baritone.
WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt; 12:00 m., Wanamaker Crystal Tea Room Orchestra; 4:45 p. m., Organ recital, Mary E. Vogt.
WSB, Atlanta, Georgia (Central, 429), 8:00-9:00 p. m., Variety concert, Thomas Gibbs Fowler, balladist; Wendall Hall, Eveready entertainer; 10:45-11:45, Week-end Skylark, Atlanta Journal Hired Help.
WTAM, Cleveland, Ohio (Eastern, 390), 9:00 p. m., Regular Saturday evening dance program by the WTAM Dance Orchestra; Solo numbers by favorite entertainers.
WWJ, Detroit, Mich. (Eastern, 517), 9:30 a. m., "Tonight's Dinner"; 3:00 p. m., Detroit News Orchestra; 7:30, Detroit News Orchestra.

Where to Hear Talks

TALKS, instructive, serious, humorous and even frivolous, are broadcast daily and below are listed the stations. Chemists should listen in to WHA Wednesday. Prof. J. H. Mathews, director of the courses in Chemistry and Chemistry Commerce, will tell about the $10,000 prize contest in Chemistry.

Tuesday: KDKA, KGW, KHJ, KYW, WBZ, WCAE, WDAF, WEAF, WFAA, WGI, WHB, WHN, WMAQ, WMC, WOC.
Wednesday: KDKA, KFAE, KYW, WDAF, WEAF, WGI, WHA, WMAQ, WOC.
Thursday: KDKA, KYW, WBZ, WCAE, WDAF, WEAF, WFAA, WGI, WGY, WHB, WMAQ, WOC.
Friday: KFAE, KGW, KHJ, KYW, WBZ, WDAF, WEAF, WFAA, WGI, WGY, WHA, WMAQ, WOC.
Saturday: WBAP, WBZ, WDAF, WFAA, WGI, WOC.
Monday: KFAE, WEAF, WFAA, WHAZ, WOC.

Sunday, February 24

CKAC, Montreal, Can. (Eastern, 425), 4:30 p. m., Sacred concert.
KFI, Los Angeles, Calif. (Pacific, 469), 10:00-10:30 a. m., service.
KFSG, Los Angeles, Calif. (Pacific, 278), Entire church services at 10:30-12:30 m., 2:30-5:00 p. m., 7:00-9:30 p. m.
KHJ, Los Angeles, Calif. (Pacific, 395), 10:00 a. m., Sermon, 10:00-12:30 m., Organ recital and service from First M. E. Church, Rev. E. P. Helms, pastor, Arthur Blakeley, organist; 7:00-7:30 p. m., Organ recital from First M. E. Church, Arthur Blakeley, organist; 8:00-10:00, Concert.
KPO, San Francisco, Calif. (Pacific, 423), 11:00-12:00 m., Radio church service, American Bible Society, Reginald Warrick, baritone; Theodore J. Irwin, organist; 8:30-10:00 p. m., Concert, Rudy Seiger and his Fairmont Hotel Orchestra.
KYW, Chicago, Ill. (Central, 536), 11:00 a. m., Central Church service, Dr. F. F. Shannon, pastor; 7:00 p. m., Chicago Sunday Evening Club, Rev. W. H. P. Faunce, speaker, Edgar Nelson, music director.
WBAP, Fort Worth, Texas (Central, 476), 11:00 a. m., Church services, First Presbyterian Church, Rev. J. K. Thompson, pastor; 4:00-5:00 p. m., Organ concert; 5:00-6:00, Address, Rev. J. Frank Norris, pastor of the First Baptist Church; 11:00-12:00, Concert, Fred Cahoon's WBAP Southern Serenaders' Orchestra.
WCAP, Washington, D. C. (Eastern, 469), 7:20-9:00 p. m., Joint program with WEAF; 9:00-10:00, Organ recital.
WDAP, Chicago, Ill. (Central, 360), 5:00-6:00 p. m., Barton organ recital, played by Ralph Emerson; 9:15, Drake Concert Ensemble and soloists.
WDAR, Philadelphia, Pa. (Eastern, 395), 7:20 p. m., Church services, Memorial Church of Overbrook, Henry Gordon Thunder, organist; 7:00, Arcadia Cafe Concert Orchestra, Carl Harland, director.
WEAF, New York, N. Y. (Eastern, 492), 2:45 p. m., N. Y. Federation of Churches, 3:45, Dr. H. Parkes Cadman; 7:20, Capitol Theater Orchestra and staff of artists; 9:00, Skinner organ recital.
WFAA, Dallas, Texas (Central, 476), 6:00-7:00 p. m., Radio Bible Class, Dr. William M. Anderson, Jr. [illegible] "Christianity and Modern [illegible]" Dr. Paul B. Kern, 11:00-12:00, Low's Fox Trotter [illegible]
WFI, Philadelphia, Pa. (Eastern, 395), 10:30 a. m., Arch Street Presbyterian Church services; 4:00 p. m., [illegible] chapel services.
WGI, Medford Hillside, Mass. (Eastern, 360), 4:00 p. m., Twilight program, "Adventure Hour," Youth's Companion [illegible] Jacquelyn Bickford, soprano; 6:30, "World Unity," auspices of the Greater Boston Federation of Churches, Evening musicale.
WGR, Buffalo, N. Y. (Eastern, 319), 3:00 p. m., Vesper service, the Rev. W. Y. [illegible] Episcopal Church; 6:00-6:30, Robert Munn, organist.
WHAS, Louisville, Ky. (Central, 400), 9:57 a. m., Organ music, 10:00, Church service; 4:00-5:00 p. m., Sacred concert, St. Peter's Evangelical Church Choir, George C. Cannon, director.
WHK, Cleveland, Ohio (Eastern, 283), 8:00 p. m., Concert program by the WHK Trio, Her Silvertons [illegible] and director. Vocal numbers by popular entertainers.
WIP, Philadelphia, Pa. (Eastern, 509), 1:00 p. m., [illegible] Trinity Church, Rev. Floyd Tomkins, 3:00 p. m., Sunday night [illegible] concert, direction of [illegible], assisted by Karl Bonawitz.
WLW, Cincinnati, Ohio (Central, 309), 9:30 a. m., Sunday school [illegible] staff of Sunday school publications of the Methodist Book Concern; 11:00, Services, Church of the Covenant, Dr. Frank Stevenson, minister; 7:45, Services of the Church of the Covenant.
WOC, Davenport, Iowa (Central, 484), 9:00 a. m., Sacred chimes [illegible]; 7:00, Organ recital, 8:00 Church service; 9:30, Musical program, Erwin Swindell, director.
WOS, Jefferson City, Mo. (Central, 440.9), 7:30 p. m., [illegible] Central Evangelical Church, Rev. F. W. Hellekamp, pastor [illegible] J. Zirnberg, pianist.
WSB, Atlanta, Ga. (Central, 429), 11:00 a. m., First [illegible] church service; 5:00-6:00 p. m., Sabbath twilight, Methodist choir of Marietta; 7:30-9:00, Wesley Memorial Methodist Church, service.
WWJ, Detroit, Mich. (Eastern, 517), 2:00 p. m., Detroit News Orchestra; 3:00, Selections from "The [illegible] in Firmine" and "The Chimes of Normandy," [illegible] Opera Co., 7:30, St. Paul's Episcopal Cathedral.

Monday, February 25

CKAC, Montreal, Can. (Eastern, 425), 1:15 p. m., Mount Royal Hotel Concert Orchestra; 4:30, Mount Royal Hotel Dance Orchestra.
KPO, San Francisco, Calif. (Pacific, 423), 10:00 a. m., Rudy Seiger's Fairmont Hotel Orchestra; [illegible] Organ recital, Theodore J. Irwin, [illegible] Rudy Seiger's Fairmont Hotel Orchestra; [illegible] Children's hour, stories for children, Big Brother of KPO, taken from "Book of Knowledge"; 7:00 [illegible] concert, Rudy Seiger's Fairmont Hotel Orchestra, 8:00-9:00, Theodore J. Irwin, organist; 9:00-10:00, Program auspices of the Irwin Sisters; 10:00-11:00, E. Max Bradfield's Versatile Band.
KSD, St. Louis, Mo. (Central, 546), 8:30 p. m., Grand Central Theater.
WAAM, Newark, N. J. (Eastern, 263), 7:35-8:00 p. m., "Star Spangled Banner"; 8:15-8:30 Nelson Rogers' WAAM Dance Orchestra; 8:45-9:00, Joseph G. Wood, "Knight of the Road," in the fourth of his popular talks on salesmanship; 9:00-9:15, Arthur Solomon, of the Toronto Melody Five, jazz pianist; 9:15-9:30, James Moore, tenor, with Magda Pennilla, Spanish prima donna; 9:30-9:45, Andrew Boyle, planist, in a medley of old-time favorites; 9:45 [illegible] Fullian Trio, in song and syncopation; 10:00 [illegible] "The New Spring Styles for Women," talk by Bertha Ford, designer; 10:15-10:30, Dot Carlyle's Five Chocolate Drops, in a jazzical jamboree; 10:30-10:45, George Blanding and Frederick J. Metzger, singing.
WGR, Buffalo, N. Y. (Eastern, 319), 12:30-1:00 p. m., George Albert Bouchard, organist; 2:30-4:00, The Yankee Six Orchestra; 4:00, Tea time music, Martha Gomph, harpist; Katherine Stang, violinist; 6:30, 7:30, Vincent Lopez Hotel Statler Orchestra; 7:30, Digest of the day's news; 9:00, Concert, Vocal program, auspices of C. C. Sutton of the Wise Ice Cream Co.
WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Walnut Theater Orchestra; Strand Theater Orchestra.
WHAZ, Troy, N. Y. (Eastern, 380), 9:00 p. m., Rensselaer Polytechnic Institute Students' Night, Students' Symphony Orchestra, Address, Dr. John M. Clarke, director of the New York State Museum.
WIP, Philadelphia, Pa. (Eastern, 509), 1:00 p. m., Gimbel Brothers' Tea Room Orchestra, 6:05, Chas West's Orchestra; 7:00, Uncle Wip's bedtime stories.
WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Special program, Wurlitzer Concert Company; 8:00, Piano duet, Mrs. Cora Hinton, Mrs. Ray Hinton Shafer; Westwood Presbyterian Choir, Mary Waite, contralto; G. H. Katterjohn, tenor; Mrs. Hettie Cramer, soprano; Miss Florence Cohen, contralto, Herman Stendel, tenor; Mrs. Bernard Lee Blee, soprano; Talk, Rev. Bernard L. Klee; Mrs. Elizabeth Jameson Bleck, soprano; Edward Dettemeier, bass, Grace Potts, soprano.
WMC, Memphis, Tenn. (Central, 500), 8:30 p. m., Musical program, Prof. Gaspar Pappalardo, director.
WAAW, Omaha, Neb. (Central, 360), Halliday Orchestra of Council Bluffs.
WBAP, Fort Worth, Texas (Central, 476), 7:00-8:30 p. m., Program by the Christian College; 9:30-10:45, Concert, Chamber of Commerce of Marlin.
WDAF, Kansas City, Mo. (Central, 411), 3:30-4:30 p. m., Dance and concert orchestra, 6:00-7:00, School of the Air; Piano tuning-in number on the Duo-Art; Speaker, U. of Kansas; Children's story and information period, Fritz Hanlein's Trianon Ensemble; 8:00-9:15, Popular program; 11:45, Nighthawk Frolic, "Merry Old Chief" and the Coon-Sanders Novelty Singing Orchestra.
WDAR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily almanac, 12:02 p. m., Organ recital, Stanley Theater, 2:00, Arcadia Cafe Concert Orchestra; 7:30, Dream Daddy's bedtime stories; 10:10, Fred Jordan, songs, Howard Lanin's Arcadia Cafe Orchestra.
WEAF, New York, N. Y. (Eastern, 492), 4:00 p. m., [illegible] Mac, [illegible]; 4:10, Marion Christian, soprano; 4:30, Chil. S. Hardy, tenor; 5:00, Mathews' [illegible]; 7:40, Thornton Fisher, 7:50, Samuel Farrell, [illegible]; 8:00, "War [illegible]" Weers & Co.; 8:30 [illegible], Mae Hirsh, tenor, 9:00, Friendly Sons of Saint Patrick Glee Club.
WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Concert Orchestra, [illegible] Flora [illegible] 6:00, Bedtime stories, 6:30, Meyer Davis Bellevue Stratford Orchestra.
WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes, [illegible] p. m., Lecture [illegible] Chimes, [illegible] Sandman's visit; 8:00, Musical program, Erwin Swindell [illegible]
WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt; 12:00 m., Wanamaker Crystal Tea Room Orchestra; 4:45 p. m., Organ recital, Mary E. Vogt; 7:30, Adelphia Hotel Concert Orchestra [illegible] Theater [illegible] Orchestra.
WOS, Jefferson City, Mo. (Central, 440.9), 8:00 p. m., Program [illegible] of the Missouri State Prison [illegible]
WSB, Atlanta, Ga. (Central, 429), 8:00-9:00 p. m., [illegible] Atlanta [illegible] American Theatrical Stage Employes.

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ern, 509), 4:00 p. m.,
meeting; 7:30, Services,
loyd Tompkins, D. D.;
ic concert, direction of
Bonawitz.

ral, 309), 9:30 a. m.,
day school publications
ncern; 11:00, Services,
Frank Stevenson, min-
urch of the Covenant.

al, 484), 9:00 a. m.,
p. m., Orchestra; 7:00,
service; 9:30, Musical
ector.

ral, 440.9), 7:30 p. m.,
gelical Church, Rev. E.
F. J. Ziesberg, pianist.

9), 11:00 a. m., First
5:00-6:00 p. m., Sab-
of Monroe; 7:30-9:00,
urch, service.

517), 2:00 p. m., De-
Selections from "The
Chimes of Normandy,"
St. Paul's Episcopal

uary 25

, 425), 1:45 p. m.,
rchestra; 4:30, Mouut

cific, 423), 10:00-2:00
Hotel Orchestra; 2:30-
J. Irwin; 4:30-5:30,
Orchestra; 5:30-6:30,
ldren, "Big Brother"
of Knowledge"; 7:00-
iger's Fairmont Hotel
J. Irwin, organist;
of the Irvine Sisters;
s versatile band.

6), 8:30 p. m., Grand

263), 7:45-8:00 p. m.,
-8:30 Nelson Rogers'
45-9:00, Joseph G.
the fourth of his
9:00-9:15, Arthur
jazz pianist;
a Paquita,
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45-10:00,
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30-10:45,
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0 p. m.,
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Martha
:30-7:30,
Digest
program,
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0 p. m.,
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. Rens-
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m.

p. m.,
Chas.
stories.
p. m.,
9:00,
Higdon
Waltz,
Birdie
ntralto;
Rice.
Eliza-
temeier,

p. m.,
irector.
Orches-

:30-9:30
)-10:45,

4:30 p.
School
uo-Art;
nforma-
; 8:00-
Frolic,
Novelty

11:45 a. m.,
l recital, Stanley
rt Orchestra; 7:30,
10:10, Fred Jordan,

WJAZ, Chicago, Ill. (Central, 448), 10:00 p. m., Oriole Orchestra.

WLW, Cincinnati, Ohio (Central, 309), 4:00 p. m., Lecture recital.

WMAQ, Chicago, Ill. (Central, 447.5), 4:20 p. m., Items of interest to women; 4:30, Pupils of Bush Conservatory; 7:00, "Wide Awake Club," Mrs. Frances M. Ford; 7:30, Music Memory Contest, Mrs. Marx E. Oberndorfer; 9:00, George Washington Program, Union League Club of Chicago.

WMC, Memphis, Tenn. (Central, 500), 8:30 p. m., Concert, Carl Metz Saxophone Band; 11:00, Frolic, Britling's Orchestra, Frank Bracciante, director.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:30 p. m., "Structure of the Hair, Skin and Nails," R. G. Maybach; 5:45, Chimes; 6:30, Sandman's visit; 7:20, Sunday School Lesson, Dr. Frank Willard Court, pastor; 8:00, Musical program, Erwin Swindell, director; Program, Chamber of Commerco of Rock Island.

WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt; 7:30 p. m., Adelphia Hotel Concert Orchestra; 8:30, Special Washington Birthday program; 10:10, Hotel Adelphia Dance Orchestra.

WOS, Jefferson City, Mo. (Central, 440.9), 8:00 p. m., Washington's Birthday program, E. S. Emerson, director of the Miller Theater Orchestra.

[illegible] Riley Ehrhart Orchestra; 6:00-7:00, School of the Air: Piano tuning-in number on the Duo-Art: Travelogue, Edgar A. Linton; Children's story and information period; Fritz Hanlein's Trianon Ensemble; 11:45-1:00 a. m., Nighthawk Frolic: "Merry Old Chief" and the Coon-Sanders Novelty Singing Orchestra.

WDAP, Chicago, Ill. (Central, 360), 7:00-8:30 p. m., Drake Concert Ensemble and Blackatone String Quintet; 10:00, Harry E. Ehrhart, "The Original Dream Daddy," and Carl Zorns, both of WDAR; Harmony Girls, Bob Brown, Viola Tascott; 10:10-10:25, Barton Organ played by Ralph Emerson; Jack Chapman's Orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 11:45 a. m., Daily Almanac; 12:02 p. m., Arcadia Cafe Concert Orchestra; Organ recital, Stanley Theater; 2:00, Arcadia Cafe Concert Orchestra; 4:30, Bobbie Lee and his Cotton Pickers; 7:30, Dream Daddy's bedtime stories.

WEAF, New York, N. Y. (Eastern, 492), 4:00 p. m., Bob Fridkin's Orchestra; 5:00, Kitty Borchman, lyric soprano, and Edna Rieater, mezzo soprano; 7:30, Sara Sharkey, mezzo contralto; 8:00, American Chicle Quartet and Trio; 9:00, Orange County (Florida) Chamber of Commerce; 9:10, Rata Present, pianist; 9:30, Marie A. Kiraly, pianist; 10:00, James McKinley Rose, tenor; 10:30, Fan O'Brien, soprano; 11:00, Vincent Lopez Orchestra, courtesy Gimbel Brothers.

[illegible] Sarkozi, director.

WEAF, New York, N. Y. (Eastern, 492), 2:45 p. m., N. Y. Federation of Churches; 3:45, Dr S. Parkes Cadman; 7:20, Capitol Theater Orchestra and staff of artists; 9:00, Skinner organ recital.

WFAA, Dallas, Texas (Central, 476), 6:00-7:00 p. m., Radio Biblo Class, Dr. William M. Anderson, Jr.; 9:30-10:00, "Christianity and Modern Education," Dr. Paul B. Kern; 10:00-11:00, Lee's Fox Trotter's Orchestra.

WFI, Philadelphia, Pa. (Eastern, 395), 10:30 a. m., Arch Street Presbyterian Church services; 4:30 p. m., Studio chapel services.

WGI, Medford Hillside, Mass. (Eastern, 360), 4:00 p. m., Twilight program, "Adventure Hour," Youth's Companion; Musicale, Corine Schlagel, contralto; Jacquelyn Bickford, soprano; 8:30, "World Unity," auspices of the Greater Boston Federation of Churches; Evening's musicale.

WGR, Buffalo, N. Y. (Eastern, 319), 3:00 p. m., Vesper service, the Rev. W. F. Salisbury, St. Clement's Episcopal Church; 4:00-5:00, Robert Munn, organist.

WHAS, Louisville, Ky. (Central, 400), 9:57 a. m., Organ music; 10:00, Church service; 4:00-5:00 p. m., Sacred concert, St. Peter's Evangelical Church Choir, George C. Cannon, director.

WHK, Cleveland, Ohio (Eastern, 283), 3:00 p. m., Concert program by the WHK Trio; Ben Silverberg, violinist; Ben Burtt, pianist; Max Schmitt, cellist and director; Vocal numbers by popular entertainers.

[illegible] Rowland Lamm's Arcadia Cafe Orchestra.

WEAF, New York, N. Y. (Eastern, 492), 4:00 p. m., Francis May, violinist; 4:10, Marion Christian, mezzo-soprano; 4:40, Phil N. Darby, tenor; 5:00, Mother's program; 7:30, Thornton Fisher; 7:40, Samuel Furedi, cellist; 8:00, "Watches," Mears & Co.; 8:10, Sara Alter, pianist; 8:40, Max Brick, tenor; 9:00, Friendly Sons of Saint Patrick Glee Club.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Piano solos, Caroline Hoffman; 6:00, Bedtime stories; 6:30, Meyer Davis Bellevue Stratford Orchestra.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes; 3:30 p. m., Lecture; 5:45, Chimes; 6:30, Sandman's visit; 8:00, Musical program, Erwin Swindell, director; 10:00, Musical program.

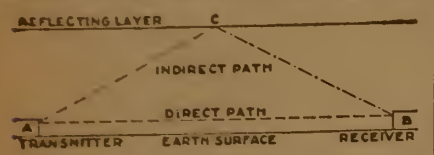
WOO, Philadelphia, Pa. (Eastern, 509), 11:00 a. m., Organ recital, Mary E. Vogt; 12:00 m. Wanamaker Crystal Tea Room Orchestra; 4:45 p. m., Organ recital, Mary E. Vogt; 7:30, Adelphia Hotel Concert Orchestra; 9:15, Erno Rapee and Orchestra from Fox Theater; 10:30, Kentucky Kernels Dance Orchestra from Hotel Adelphia.

WOS, Jefferson City, Mo. (Central, 440.9), 8:00 p. m., Program, band of the Missouri State Prison, Virgil E. Combs, bandmaster.

WSB, Atlanta, Ga. (Central, 429), 8:00-9:00 p. m Elk's Royal Purple Band; 10:45-11:45, Back-stage frolic, scene-shifters of Atlanta Local, International Association Theatrical Stage Employes.

Upper Conducting Air New Theory for Fading

Many of us have experienced a feeling of great disgust, when listening to a good concert from a broadcasting station, at hearing the music gradually die out. Frequently the regularity with which the signals die out at the crucial point leads one



to think that something has control of this phenomenon and is using this control with diabolical intent.

The periodical dying out of Radio signals is known as fading. There have been many attempts to make measurements on Radio transmissions to determine the exact cause of fading, but few of these measurements have produced any worthwhile data. The best explanation of fading seems to be a theoretical one. It is believed that at a height of 30 or 40 miles above the surface of the earth the air becomes so rarefied that it becomes a conductor of electricity. As such it acts like a reflector of the electromagnetic waves by which Radio communication is effected. The result is that the waves reach the receiving antenna not by one definite path but by a number of paths of different length. This is illustrated in the diagram.

A Radio transmitting station sending out electromagnetic waves which radiate in all directions is shown at A. Some of them go directly to the receiving station B, while others go by an indirect route up to the conducting layer and then down again. If the difference in length of these two paths is right, that is, a multiple of the wave length, the waves will add and the effect produced will be greater than by the direct transmission alone. But the difference in length may also be such that the waves do not add and thus the effect may be less than it would be by direct transmission. The reflecting layer is constantly shifting so that the reflection varies momentarily between the limits described, resulting in varying intensity of the signal received, or fading.

This simple explanation leads to several interesting things. The reflecting layer is very indefinite during the day. Hence there should be less fading during the day and this seems to be the case. On account of the lack of reflection, the range of a station is much less during the day than at night and this we all know to be the case. It would also appear that it is impossible to send Radio signals away from the earth.

Super-Sensitive Crystal Set

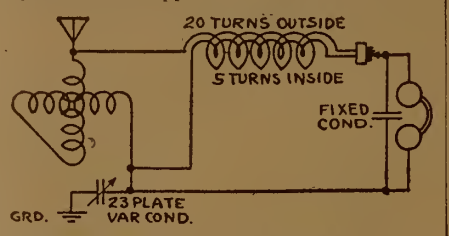
In my experience with crystal sets I have found that when you take off a number of taps from either the primary or the secondary you are losing considerable signal strength that you can save if you go about it in a simple way. Not many parts or tools are required to make a first-class receiving set that will surprise you in the way it will pick up distant stations. The feature of this hook-up is that you have but one adjustment to make, and that goes for all the stations within your range. Another fine point is that you can cut out almost all interference. I have found that the indoor antenna acts the best in that respect, although it can be accomplished with the outside antenna using a little care in tuning the set.

All the parts you will need for making this set are one variometer, a 23-plate condenser, a few fixed condensers and a good crystal detector.

The illustration shows the assembly of the different parts, and if they are followed out closely, you will have no trouble. To make the fixed condensers procure some tinfoil and tissue paper, and a few pieces of ½ or ¾-inch glass tubing, cut 2 inches long.

Cut several strips of tinfoil ½ inch wide and 8 inches long, if you use ½-inch tubes, and 12 inches long, if you use ¾-inch tubes. Cut some tissue paper 2 inches wide and about 2 inches longer than the tinfoil. Soak the paper strips in melted paraffin and hang them up to drain. Lay a piece of tinfoil on the paper and with a warm iron stick the tinfoil to the paper. Make two of these strips and roll them up as if rolling a cigarette until you have about 1 inch extending.

Scrape the ends of two pieces of number 22 or 24 copper wire which should be



8 inches long and weave the end of the tinfoil and the wire back and over each other until you have a good electrical contact. Do the same on the other side and lead that end of the wire to the opposite end of the roll. It is understood that the tinfoil pieces must not touch each other or the wire. When you have the roll all fixed, slip it into the tube and see that the wire comes out at each end of the tube. Then run some sealing wax in the ends to keep the wire in place, and you will have a good condenser.—Wm. J. Albin, Alameda, Calif.

Radiodyne

"The Voice of the Nation"

NO LOOPS — — NO ANTENNA

THE RADIODYNE is operated by simply grounding to a water pipe or radiator, and throwing a few feet of wire on the floor. Uses any standard tubes—dry cell or storage battery. Extremely selective. Simple to operate—*only two controls.*

Stations within a radius of 2000 miles can be picked up on the loud speaker; any wave length from 200 to 700 meters. You can select the best programs with the Radiodyne.

PRICE $150.00

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

When interference, strays, static, etc., make other types of reception utterly useless, the RADIODYNE picks up broadcast programs clear and distinct.

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

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

EVERY SET—

Should Have the Protection of a Walnart Variable Grid Resistance

YOU can't get the best results unless you can vary your grid resistance. Each tube is different. It brings in distant stations clear and loud. Walnart Variable Grid Resistance will last a lifetime. Works equally as well with all tubes. Complete with Knob and Pointer.

$1.00

Send for catalog of Walnart Radio Parts

The base of this instrument is genuine Condensite CeloroN, the perfect dielectric insulation. (Licensed under Bakelite Patents.)

WALNART ELECTRIC MFG. CO.
1249 W. Van Buren St., Dept. 423, CHICAGO
In Canada: Wright Radio Co., Overbrook, Ottawa, Can.
CANADIAN DISTRIBUTOR

2-LO, LONDON, ENGLAND ON ONE TUBE

Another Record for the

ELGIN SUPER-REINARTZ

Tuesday, November 27, during the test period between 9 and 9:30 P. M., Rev. E. A. Cole in the residence of J. A. McIver, of Roodhouse, Ill., while operating a set made of materials and in accordance with the hookup furnished by the ELGIN RADIO SUPPLY CO., tuned in 2-LO, London, England, using receivers and but one tube. Later another tube was lighted and the loud speaker used, so that four people could hear the program and concluding announcement. The numbers, time, and the order in which they were played were

Officially Confirmed

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

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

ELGIN RADIO SUPPLY CO.
207 Chicago St. ELGIN, ILL.

For

Better Tuning

The New B-T Synchrodyne Circuit Surpasses Any Other 4 or 5 Tube Hook-Up Known.

It Has Everything You Have Been Seeking

It employs the B-T 3-Circuit Transformer, the latest development of the organization that gave to Radio the original vernier condenser and vernier tuner. No potentiometer. No critical adjustments. None of the troubles of neutralization.

Write for circular and full information

New B-T Oscillator Coupler
Price $4.00

From letter just received from a leading jobber.

"We have been waiting to test a number of these new 'low-loss' 'high efficiency' Condensers we have been reading so much about. After completing these tests, we will catalog the B-T Vernier, as we find none that equals it.

Premer Fully Manufacturing Company
532 S. Canal Street
CHICAGO

King Miloplex New Trick Circuit Detailed

Part XX—Amplification of the Wizard Miloplex

By the Mystery Man

And as God's golden sun is setting,
In that great beyond, the West,
While the rattler takes me to her,
That cook, I love the best,
Oh pshaw! I'm getting softy,
For I'm thinking of another
Who won't welcome me with kisses,
'Cause He Likes to Sleep With Mother.

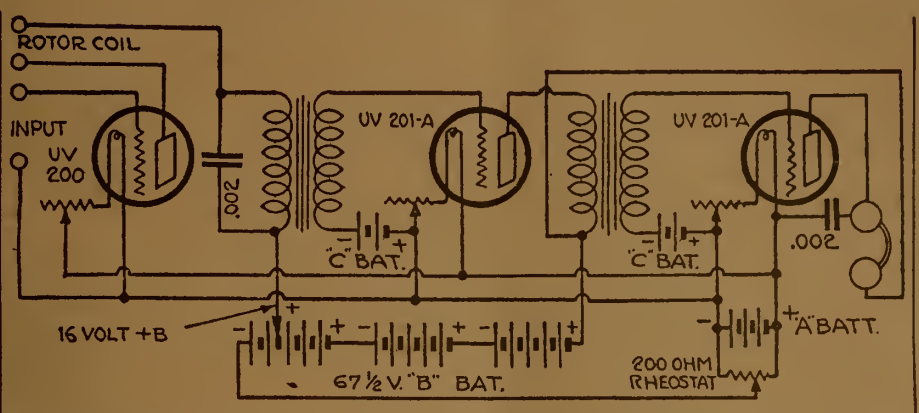
When I enter through the doorway,
Hear the welcome, "Daddy Here,"
Does it bring a hug from this guy,
And a smile from ear to ear?
Not from that twelve years of manhood,
As great tears he tries to smother,
Bawls me out, "Why back so early?"
'Cause "He Likes to Sleep with Mother."

MERCY girls! Or is it girls, have mercy! Please don't think I'm a cookbook just because I gave you a scheme for building a salad that would keep "him" at the table overtime. I can cuss food, and eat it, but far be it from me to discuss it. My best little "vodivil" stunt is licking the platter clean and fighting with my boy Jack over who's going to smile Maggie out of the biggest piece of pie, and when we get started we simply "Maggie, Yesmam" her to a frazzle, or is it frawsel? And our best little repartee is voiced trying to convince her that she needn't think we are a multitude and try to feed us on six fishes, because we want pie.

I know how it is. A lot of you bugs think eating is one of the easiest ABC tricks to put over on a cook, but you don't know my cook. Eating with her is a pastime—with me it's a business. Mercy I'll say it is, and I know. Just ask that waiter who slipped me two medium rare in Omaha and watched me do the disappearing act. Say, man, I done (or did) such a fine job he up and tells me that he would like to be my valet—what's a valet got to do with eating? Anyway, I told him we didn't have any hills in our part of the country so couldn't use him but would advise Maggie of his desire.

And now that most of you have received my picture (also Maggie's) as promised, and the simple reflex circuit which didn't use a Radio frequency transformer, supposin' we show you how to amplify the Wizard shown last week. But before doing so I realize there is one ambitious fan in Chicago that I am deathly afraid of who will read all my article just to see if his "Burn-up" letter reached me. Yes, it did, and Maggie almost had a tummy ache laughing.

Mercy, mercy, what he said about me! Even went so far as to threaten that if I didn't stop giving "My Gang" circuits he would spring his "super-reflex" and drive me out of the country. Golly, I'd like to take the ride; but what I want to know is, can we take Maggie along and one of his super-reflexers so we can BCL once in a while? The only trouble is he took up a lot of time writing me seven or nine pages then didn't have nerve enough to sign his name, so, methinks, his effort was the zero of occupations. But I sent his letter on to Major Armstrong, the super king, so he would be frightened also.



Amplifying the Wizard

In amplifying the Wizard I have dodged all trick schemes, as an investigation indicates nearly 2,600 people have built it to date. Therefore, any changes I have made are only those which would allow you who have built it to make the corrections or rather improvements in your present set without disturbing its arrangement, which I am believing will be good news.

By carefully studying the drawing it will be noted that the filament rheostat for the detector tube is in the positive A battery leg, while for the amplifiers it is in the negative leg, and one should be careful to connect these rheostats as shown. The second important feature is the use of the potentiometer for minute plate current control on the detector tube, while the third and possibly most important addition, or change, is the use of a C or grid biasing battery in the amplifier circuits.

Just why anyone ever used that little C battery "duflicker" in amplifying circuits appears clear as mud to a great many, so a couple of terrible English explanations may help "My Gang" a little. Atta baby!

What C Battery Does

Well, listen! It says on the box and you know an A tube can be used either as an amplifier or a detector; quite so. Well seeing as how in this case we only want them to act as amplifiers, we stick a C battery in series with the grid return, or as some say the grid filament circuit, and the little C "doodad" maintains the grid at a negative potential. Now, in order for a tube to act as a rectifier (detector) the grid must have a slight plus or positive voltage, therefore, with this C battery cop standing there to keep those "not wanted" positive guys out, our little reduced price A tube can only act as an amplifier, and we thus eliminate much of the so-called distortion evident when C batteries are not used. By golly, that's a good idea—let's do it—and, "Gang," listen, a C battery will last so long and make your B batteries also last so much longer that you'll agree they are darn good Radio and the best of it is—they work. But, man, be certain the positive or + terminal of the C connects to minus filament. You know me C battery manufacturers should buy me a Henry Special for them kind words, but me knows they never heard of Billy Kesands and I'm not he or his brother, though I have been known to give away ice in the winter time.

What voltage should the C battery be? Oh, say, anywhere from 3½ to 4½; I ain't going to be particular about a volt or two.

Connecting Up the Wizard

Again, neighbor, see that the wire running from the center contact of your potentiometer goes to minus filament; the wire from plus 22½ on this battery to minus on the next battery, while the P-2 or + battery terminal on your audio frequency transformer has a connection running to the 16-volt plus terminal on your first B battery, and when you so do it or do it so, "Gang," you then have 16 volt + on your detector tube plus the 6 volts on your A battery, or a total of 22, and minute control from 16 to 22 with your potentiometer. Therefore, if your detector tube works best at 17⅞ plate battery, by adjusting your potentiometer, you can have exactly 17⅞. (By golly, that fellow has read a book some place.) And that's that. Build your Wizard, send in your DX records to the Digest and try and win the self-acting automatic wave trap.

About Wave Traps

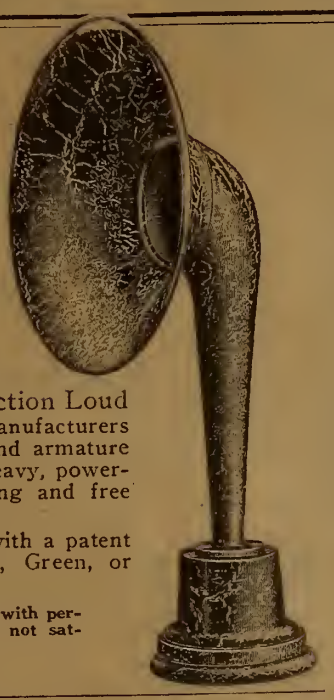
Oh, yes; you know 16 states and several foreign countries, including Omaha, have written in asking me to quit eating until I write a couple hundred thousand words on wave traps, or station eliminators, or whatever you call them. Anyway, here's the big idea, they want some kind of a "dox whopper" that they can use on their set so they can tune out their local station and get long distance. Course, they don't tell me what kind of a set, they might just as well be like the fellow I met at the depot in a Texas town who when I said, "Bill, where's the hotel?" said, "How did you know my name was Bill?" And when I told him I just guessed he said, "Well, you're so darn smart and such a good guesser, guess where the hotel is!" So I'm going to guess what your set is and write on wave traps, but before you build or buy one cut that antenna down to 100 feet. Give the set a chance and many of you won't need a trap, but will have a lot of wire for sale.

Well, a wave trap is a little stunt that looks like a combination primary and secondary tuning inductance bolted onto a variable condenser. Its purpose in Radio life is just like a mouse trap; you set it at a certain dial setting which conforms to the wave length of the station you don't want to hear, and as its waves come tripping merrily along, the length of the hole in the trap is so great that when they try to jump it they fall in and drown. In case it's spark interference, the wave trap is automatic and simply chokes each spark to death or at least knocks it unconscious; therefore you are not bothered with either the station or sparks. Some call it a filter, 'cause I presume the sparks get so dirty, but anyway I'm going to give Maggie's artist a couple of ideas so he can draw some diagrams of wave traps.

Next week the story begins on these Mysterious Real Helpers.

(TO BE CONTINUED.)

Perfection Loud Speaker



$9.50 PREPAID

SUPERIOR in every detail, the Perfection Loud Speaker is an instrument which other manufacturers would sell at $15 or $20. The best coils and armature that can be designed are used to actuate a heavy, powerful diaphragm. The action is non-distorting and free from blast.

The horn is of heavy non-resonant metal, with a patent surface composition and finished in Black, Green, or Brown, as you select.

We guarantee each loud speaker to render music with perfect tone reproduction—your money refunded if not satisfied.

Dealers Write for Proposition

NEUTRODYNE 5-TUBE SET

The Neutrodyne Circuit is the last word in Radio and is the best set made today. Works without aerial or ground. Will receive any American station.

1 Formica Panel 7x24	1 "A" Battery Switch	8 Binding Posts with Names	1 Condenser, .006 Dubilier
5 Bakelite Sockets	3 Dials, 4-inch	3 Jacks, 12 ft. Spaghetti	1 Grid Leak and Condenser, Freshman
3 Neutroformers	1 Amsco Rheostat	22 ft. No. 14 Gold Plated Wire	1 Dubilier Condenser, .002
2 Neutrodons	1 Amsco Power Rheostat		
2 Franco Audio Transformers			

Special price for complete licensed parts for 5-tube Neutrodyne set **$32.50**

PERFECTION RADIO CORP'N 24 MURRAY ST. NEW YORK, N.Y.

Thrills from Radio

No. 13 of a Series Featuring Experiences of "ALL-AMERICAN" Users

Volume, Distance—But No Distortion

By Ensign A. M. Martinson, Milwaukee, Wis.

"Using All-American Transformers in Circuit 15 in your Book of Radio Hook-ups, I find the range of reception as high as 900 meters. I use UV-199 tube with dry cells. Have received 1,175 miles using only 22.5 volts on second stage plate voltage with good volume.

"The amplification is all that can be desired. There is no distortion and the volume is sufficient for a loud speaker. Have heard over 800 miles with a Magnavox, type M-1, using 45 volts.

"I want to express the satisfaction I have felt using your transformers and hints from your book."

Satisfaction from the use of All-Americans has made them the most popular and most widely used of all transformers.

All-American Audio Frequency Transformers. 3:1, 5:1, 10:1—$4.50 to $4.75. The best—no necessity to pay more.

Special Offer

All-American Power Amplification diagram - circular and Book of 22 Tested Hookups sent for 4c in stamps to cover mailing.

All the better dealers sell the "ALL-AMERICAN"

RAULAND MFG. CO., 2650 Coyne St., CHICAGO

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Audio and Radio Frequency: Power Amplifying (input and output)

More than 500,000 in use Standard on the better sets

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AMPLIFYING TRANSFORMERS

Largest Selling Transformers in the World

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Radio and the Phonograph

Found to Be a Stimulator for the Sales of Records

A HAPPY relation is rapidly being established between the Radio broadcasting interests and the phonograph industry. In some quarters, when the Radio sprang into prominence, there was a feeling that the phonograph industry would be unfavorably affected, but the experience of more than two years has proved that Radio may become a great aid to the phonograph industry. In the end, anything that helps to increase the popularity of music helps the sale of phonograph records. Radio serves to popularize music, but as soon as a number is rendered at the Radio broadcasting studio no record of it remains. The Radio audience is not satisfied with one reproduction. This is indicated by the many request programs which are arranged in an attempt to meet the demand for a permanent record of successful numbers.

Wonders of Radio

Reception Heard at Bulkhead in Tunnel

IN THE domain of Radio broadcasting one sensation flashes in upon the heels of another. It would seem the possibilities of the science are absolutely limitless. One of the first things accomplished in the year 1924 was underground reception under unusual conditions in the new vehicular tunnel under the Hudson river in New York. There it was demonstrated by Radio and electrical experts that steel, iron, mud and water are no bars to Radio waves. These irresistible currents, which have already annihilated space, have now shown that practically all matter is the same as the free air to them.

The party of experimenters entered the tunnel and selected a point for the test in the center of the great iron tube 80 feet beneath the surface of the river. To reach the ears of the listeners the Radio waves had to either enter through the mouth of the tube on the New York side and then, leaving the orifice through the earth, would have to travel 1,000 feet under the river, or they would have to pierce the water directly overhead and travel through a heavy layer of mud and the thick iron walls of the tube itself.

The thing was done, simply, clearly and beyond all question. As it is, the receiving device will serve to keep those imprisoned in coal mines or submerged submarines, constantly in touch with the movements of rescuing parties.

High Powered Stations

Owners Are Not Gaining Favor, Just Making Enemies

ONE of the chief thrills the Radiophan gets from his set is many stations. It is his main delight to see how many stations can be picked up. If he were compelled to listen to one station night after night, how long would he be interested in his set? Surely not a week.

Owners of high-powered stations persist in choking the air with their programs. Many complaints come in from those who have put in a large sum of money into the best that Radio engineers can turn out, and find, when located in the vicinity of such a station, nothing else can be heard.

One station tries to outdo the other, just like the backyard jumble talk of the boys' gang. All want to be heard and all scream at the top of their voices. Applying more power does not gain favor with the public, in fact, it hinders the progress of Radio.

Apparently the power back of this high powered stuff is still the old wolf in sheep's clothing, who desires to sell high-powered and high-priced transmitting sets and supplies. High power also means new receiving sets to meet the complications.

Station WEAF, in spite of the public vote against it, persists in using more than 1,000 watts in its antenna. The station, it might be noted, is owned by the American Telephone and Telegraph Company, which also owns 98 per cent of the Western Electric Company. By its agreement with the R.C.A., Western Electric makes and sells the broadcasting transmitters used almost universally, except by stations with ambition enough to build their own.

RADIO INDI-GEST

Our Own Idiotorial

STATION WTAY opened the other night. Had a big hullaboo and everything out in Oak Park at the Oak Park Arms hotel, where they *hide* their set. We, the Indi of Indi-Gest, were invited to attend. The gorgeous black and white invite had the announcement that food would be served. Free food?

So we attended the opening. It was a great party. Yes, indeed, the food was wonderful. Must have had two hundred people invited out for dinner.

We, Indi, finished the dinner. Then the waiter presented the bill for two (we took a lady contributor) dinuers, $4.12. We gave them $5 just to show them there was one sport in the crowd.

After reflection, we must amend our former statement. The food was rotten. The service was punk. The crowd—eh, now we know why they "invited" such a crowd—must have netted $412.

Well, anyhow, we can thank the ether WTAY opened at the Oak Park Arms instead of the Blackstone, and we can still wish that WTAY had opened at some nice, cheap dairy lunch. INDI.

No Evidence

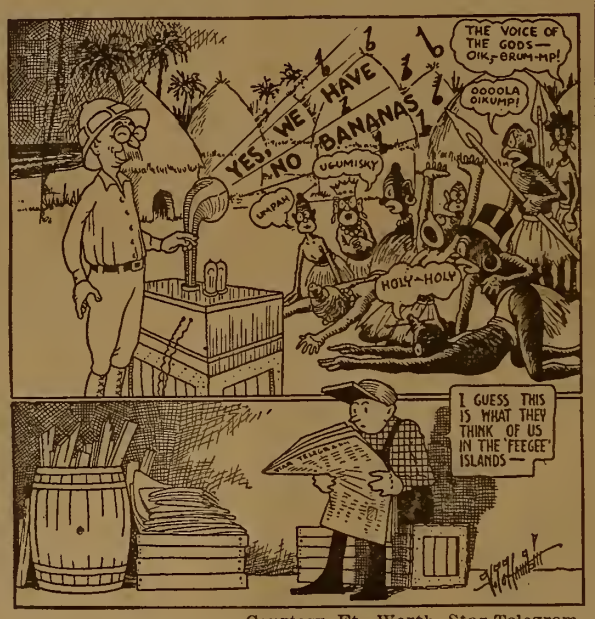
Well I'll be-gum-jinged,
I tuk a piece o' string
'Nd wrapped it round a soup can
'Nd the dinged thing sing-ed.

About a gal, "Marchita",
A-comin through the rye,
A-raisin' no bananas
For the sweet bye and bye.

But the neighbors sez: "Yer Bughouse"
'Nd the cops come rushun' in
'Nd The Jedge sez: "FIFTY DOLLARS'
'Cause he couldn't tune 'er in.

CACTUS JACK.

The Hired Hand of WBAP Meditates



Courtesy Ft. Worth Star-Telegram.

Our Own A. & Q. Dept

Dear Indi: Why do they call 'em Neutrodyne sets?
FIDDLE D. DIAL.

Answer.—Probably because they aren't malodyne or femalodyne sets. INDI.

Wise Sir: Is Charlie Erbstein really "illuminated" when he announces from WTAS, Elgin, or is that his normal state?
HAD 2. MANY.

Answer.—Charlie has never given us a drink, but that doesn't prove anything. More than likely it's the intoxicating (?) "trust" music our little lawyer playmate persists in playing with. INDI.

Soul of Wit: Being a confirmed 1st class Radioknut, I am quite disgusted with myself for being so puzzled over the same tune as stumped Mr. Fiddle D. Dial in your recent column. The tune went something like this, "Tra-la-la-la, tra-la-la-la, ditto, ditto." Are you sure J. Nelson wrote that song? I'm quite positive it was Wendell Hall.
BLUE ICE.

Answer.—No. Wendell Hall's is, "Tra-la-la-la, ditto, ditto, ditto, ditto." Mr. Hall's rain song also should contain a few "pitty-pats." INDI.

It Works Even on Blonds

Dear Indi: Since you will accept my check on the 11th Natl. Bank of Condensers, here is the dope on "How to cut out interference with a 10c Wave Trap." Go to your favorite dime store and buy a hair net. INS U. LATION.

It's Cold but the Sassiety's Hot!

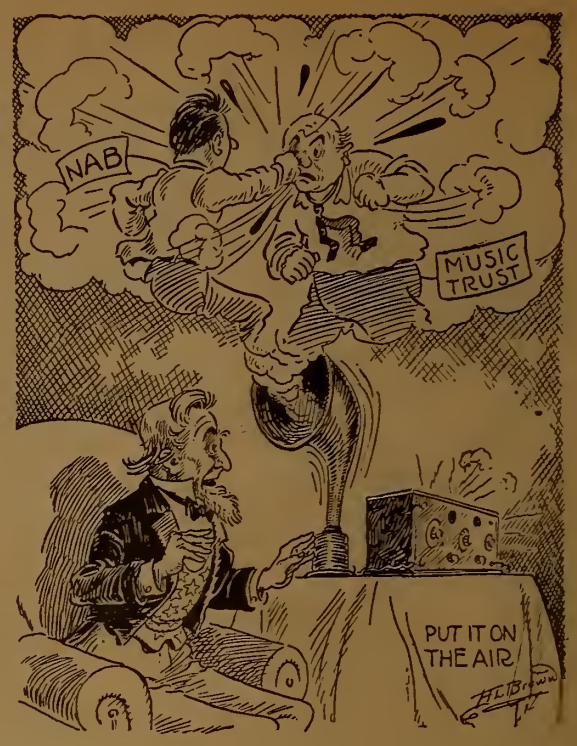
Dear Indigestion: The lady down stairs was singing last night, on the back porch, just to make me mad. Would you call this broadcasting for profit? Please report to the A. S. C. A. P. Anyway it's too cold to sing outside.

Pardon me. I just noticed you won't tolerate any more cold air jokes. But you dared me. DORA MEFAH.

One's Two Too Many!

Dear Indi: Lady in our town applied for a divorce 'tother day, because her husband wouldn't install a Radio.

Judge refused decree on ground that one loud speaker in the house was sufficient. How 'bout it, Indi?
MAMA HAYMES.



Condensed

By DIELECTRIC

Radio has always made a very decided appeal to the youth of this land and, indeed, much has come of the boy who grew to manhood with the knowledge gained through years of contact with this great branch of science. It was to be expected that the Boy Scouts would find plenty of opportunity for delving into the mysteries of transmitting and receiving; learning to construct receiving sets and adding knowledge of code to their many other accomplishments. Just how well representative scouts have made use of instruction in all branches of the subject was plain to be seen when WJZ turned over that station to the able care of nine of them. The "regulars" made very complimentary remarks at the end of the evening's program about the way they managed.

No informed person could possibly deny the value to publishers of operating Radio stations for sending and getting news. Several of them in New York city are desirous of securing such rights and the author of the bill bearing his name, Congressman G. C. White, is likely to aid in the matter. What need is there for intervention on the part of Mr. White? Well, it's the same old story again. The city of New York wished to have a broadcasting station of its own, you may remember, and snags aplenty were encountered. The publishers wish to have their own plants and the result is the same. It will certainly be a tragedy, if the American people are to allow a monopoly to flourish in this, one of the most important aids to the comfort and enlightenment of men everywhere.

We are seeing a decided tendency on the part of broadcasters to begin special programs at the hour of midnight. This may be due to a desire to accommodate those who listen in at that hour and to provide entertainers unable to appear in the studio earlier in the evening. The question of extending this policy is being agitated at the present time by those who would like to hear stations ordinarily off the air by the time they settle down for an evening's enjoyment tuning in. Some gauge of the number wishing these late concerts should be found in the letters coming to stations like KYW, in Chicago, and WNAC, Boston. From the latter, fans were presented with their first midnight broadcast of an entire theatrical performance, when the musical comedy hit "Up She Goes" was put on at the Wilbur Theater for the benefit of many unable to secure seats for the regular performance. Is the request that listeners in the West want such a feature great enough to warrant its continuance? Your letters to the station are the only means of finding out. Write.

There is a lot of animated discussion pro and con about broadcasting musical selections, which has become so persistent the ordinary Radiophan is beginning to think there is a "nigger in the wood pile." An editorial in a recent issue of Musical America claims the right for composers and publishers to exact a fee from broadcasters, on the ground that they receive revenue from the sale of sets and parts and that their use of these musical numbers hurts the sale of sheet music. Figure that out for yourselves. While you are doing it, let me interrupt to mention something interesting. Radio broadcasting so damaged the sale of phonograph records that the Victor Talking Machine company has decided to do its own throat cutting by having a broadcasting station of its own at Camden, N. J. Knowing the records will not be sold [illegible], they propose letting us hear the artists in the act of recording. Help, or they perish!

How to Make a Lighthouse Keeper's Receiving Set

Part III—Portable Set Suitable for Everyday Use

By S. R. Winters

THE apparatus for the reception of Radio signals is hooked up for operation except for the addition of the grid leak. This is made by obtaining a strip of photographic film or heavy paper and cutting it to the size of the grid condenser S. A hole is perforated in each end to correspond with the holes in the condenser where the connection wires are attached. If a photographic film is used for this purpose, first scrape off all traces of the picture. Then roughen the surface of the film and, using a soft pencil, draw a heavy wide mark around both holes, and a heavy line from one hole to the other. Fasten the film or heavy paper to one side of the grid condenser by the screws with which wire connections have already been made, making sure that head or nut of each screw touches the pencil mark.

Once the receiving equipment is adjusted in resonance with a broadcasting station, give the grid leak a trial by adding to the density of the pencil lines or erasing them partially until the maximum strength of signals is obtained. The use of the grid leak depends on the quality of the vacuum tube employed for detecting the incoming wireless signals. Some types of tubes require no grid leak, while others do not function satisfactorily without a heavy, broad pencil mark.

Trace the Connections

Before placing the WD-11 or other detector tube in its socket, examine carefully the electrical connections. Then the headphones are linked to the binding posts T_1 and T_2, and the proper wires are connected to the B battery. That is to say, connect one to the binding post identified as negative and one to the binding post marked 22½.

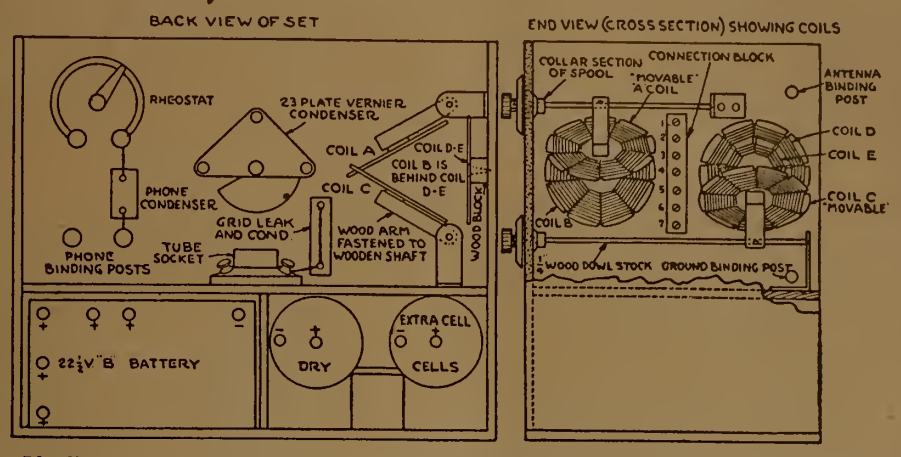
Connect the proper wire to the binding post of the dry-cell battery, but do not connect the center binding post until the following test has been made: Twist the rheostat to full on position; take a small strip of tinfoil, about ⅛ inch wide, and touch one end to the F_1 binding post and the other to the F_2 binding post on the lamp socket. If the 22½-volt battery has been rigged up so that it is across these terminals, the tinfoil will melt immediately. If no tinfoil is available, place a piece of bare wire across the terminals and then elevate one end and observe whether or not there is any sparking.

If there is a spark, a wiring connection has been improperly made. Under this condition, if the detector vacuum tube is inserted in the socket, the high-voltage electric current at once burns out the filament and a $6.00 investment is wasted.

Testing Set

If this test fails to reveal a spark or does not melt the tinfoil, disconnect one wire to the B battery, connect the wire from F_1 to the center binding post of the dry-cell battery, twist the rheostat to off position, insert the WD-11 or other type of detector tube and slowly turn the rheostat to on position. A faint red glow should be evident when the rheostat is about three-fourths on. (Letters in preceding paragraph refer to illustration in Part II of this article, published in February 16 issue.)

If this does not happen, examine the hook-up from the dry-cell battery to the rheostat and to the tube for loose connections. If there are no such, rig up the B battery, clamp the headphones on your ears and turn the rheostat until a faint glow in the filament element of the vacuum tube is observed. Then tap the vacuum tube lightly on the side with your finger, so as to produce a very slight jar.



If all the connections have been properly made, this slight tapping will cause a discernible ringing sound in the headphones. Keep both coils wide open, 90 degrees apart, when making the test just indicated. Then hook on the antenna and connect with the ground, and with the rheostat about one-half on or a little more, bring coil C gradually toward coils D and E. This move should introduce a gradually increasing hissing or popping in the telephones, provided the electrical connections are properly adjusted. This test, preferably, should be made after 8:00 p. m. when the ether is fully charged with song and story. The condenser is turned so that only a small portion of the movable plates are between the fixed plates when this test is made. If no hitch has developed, the set is ready.

Adjusting for Resonance

The following procedure is outlined for those who experience difficulty in tuning in the instrument: The antenna and ground wire, of course, should be both connected. That both batteries should be connected to the receiving instruments is self-evident, as well as the time-honored caution that the headphones should be connected to the binding posts.

The two coils or spider web variometers should be set at about 45°, or one-fourth open. The variable condenser with the movable plates is set about halfway between the fixed plates. The rheostat is turned until a slight hissing noise is heard in the headphones, or until the filament element of the vacuum tube sheds a faint red glare. In the absence of a hissing noise, move coil C in the direction of coils D and E until a sound is heard. Then, turn the knob of the condenser slowly back and forth as far as possible.

If Radio signals are in the air which may be intercepted by this apparatus, two whistles resembling the chirp of a bird will be heard as the point is passed on the dial where you should stop turning the condenser. Make an effort to set the condenser between these two little whistles.

Tuning In Set

After attaining this desirable point, put into action the vernier knob of the condenser which shifts the single plate, or move coil A a bit one way, then the other. If music or voice is heard, turn the rheostat controlling the filament of the vacuum tube as a means of reducing the consumption of electric current. Moreover, squeals and hissing are caused by excess of current in the filament. If a clear Radio signal is not received by these means, open the coil C a little farther; or, if the signal is extremely faint or no signal or whistle is audible, close up coil C a bit more. Other changes suggested include variation of the B battery voltage by linking the positive connection to the other battery taps. Some vacuum tubes operate satisfactorily on 16½ volts, while others do not function well on less than 40 volts. This latter voltage is obtainable by connecting two B batteries in series. Movements of coil A will alter the tuning of this wireless set completely. Thus this coil may be employed in conjunction with the condenser for tuning. The wider you open coil A the more you will have to throw in the condenser. That is to say, the more it will be necessary to turn the movable plates between the fixed plates.

Testing Out Circuit

If you have followed instructions for wiring this electrical circuit, and then find it is as unresponsive as King Tut, the engineering division of the Lighthouse Service is likely to blame loose wire connections or even the omission of a tiny wire for the trouble. Hence, a method of testing the hook-up and locating the difficulty is suggested:

First, remove the vacuum tube, then disconnect the B battery, but leave the dry-cell battery in its position.

Connect a wire, about 15 inches long, to the negative binding post of the B battery and another to the 22½-volt binding post. Secure the end of one wire to the antenna binding post. Then, when each of the following points is touched, a spark should be produced. Connections 1, 2, 3 and 4 on the connection block, the fixed plates of the condenser, the positive or central binding post of the dry-cell battery, and the F_1 terminal on the socket of the tube. If there is no sparking at these points, there is an open circuit which must be remedied.

If, however, sparking occurs, keep one wire touching the antenna binding post and continue the test at the following points, which should fail to spark: Connections 5, 6 and 7 on the connection block, the movable plates of the condenser, the ground connection binding post M, telephone binding posts T_1 and T_2, the P binding post and the G binding post on the tube socket.

Sparks Show Poor Connections

Sparking from any of these points is indication of an improper wire connection, or there may be a short circuit through either the variable condenser or the telephone or grid condenser. Each of these condensers should be tested separately.

Not infrequently the movable plates of the variable condenser are carelessly assembled, so that in some positions they form contact with the fixed plates. This will spoil the proper functioning of the receiving instruments. Apply the sparking test to both ends of the grid and telephone condensers. If a spark is produced by either, they are worthless and should be replaced by others.

The variable condenser, however, may

(Continued on page 22)

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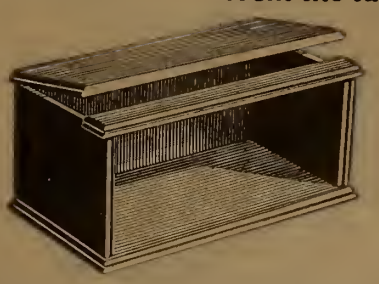

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LIGHTHOUSE RECEIVER

(Continued from page 21)

be corrected by carefully bending any movable plates that touch the fixed plates. These circuits having been proven properly arranged and no signals coming through, there is the possibility of a poor connection in the telephones. Touch one end of the telephone wires to one terminal of the dry cells and the other telephone wire to the other terminal. This should produce a loud, sharp click in the telephones.

Test for Reversed Connections

Finally, one other error may beset the person who builds "his own," namely, the possibility of reversed connections in the coils. For this test, open both coils as wide as possible. With the coils in this position, if all the coil connections are reversed, and the other wiring is correct, broadcasting or spark stations in proximity to this receiver should be heard. Turn on the rheostat about three-fourths, or until there is a perceptible glow in the filament of the vacuum tube, then, with the coils wide open, turn the condenser until a hiss or whistle is heard. Bring coils A and B as close together as possible and make another attempt to intercept Radio signals with the condenser. If no signals or noises are heard, reverse the connections to coil A. The signals should be stronger with the coils closed than with them open.

If you are convinced that coils A and B are properly located, tune in again as before and bring coil C towards coils D and E. The signal should become louder. If the signal is weaker, reverse the connections on coil E. Still experiencing trouble, restore the connections as they were and reverse connections on coil C.

If again the signal fails to become stronger, keep connections of coil C reversed and again reverse connections of coil E. Do not change connections of coils B or D, as this is unnecessary. The changes suggested exhaust the combinations possible, and difficulties will doubtless be located and remedied.

Body Capacity

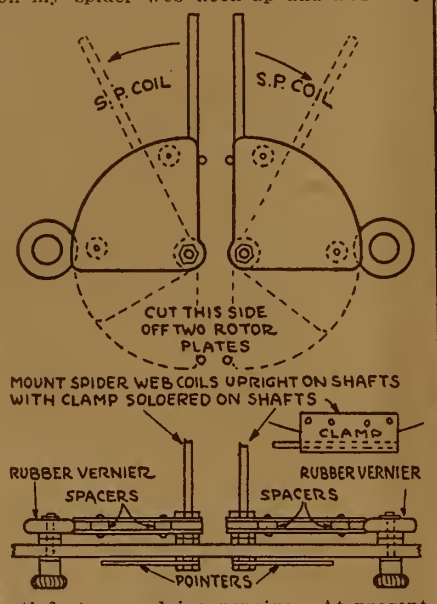
Body capacity effect is one obstacle encountered by the use of this one-tube receiver. This, however, may be eliminated for the most part by placing the variable condenser at the back of the case and providing a non-metallic extension shaft extending through the front panel to which the knob and dial may be attached. This addition necessitates a change of the position of the tube as already outlined. A vernier condenser is not necessary with this receiving outfit, as the A coil is adaptable to fine tuning. The connections are not to be soldered to the fixed condensers. The equipment is best adapted to an overhead antenna having a length of approximately 100 feet.

While Mr. Tupper does not claim priority of discovery or originality in devising this compact receiver, to him is due the credit for a remarkably efficient hook-up or combination of the simpler forms of regenerative circuits. He, on his part, gives acknowledgment to the published articles in Radio magazines, such as Radio Digest, for the key to the clever combination he has successfully devised. With this one-tube set located in Washington, he has been able to intercept concerts and speech from broadcasting stations in Boston, Chicago, Detroit, Kansas City, Atlanta, Davenport, and occasionally pick up signals from Havana, Cuba.

(TO BE CONTINUED.)

Spider Web Mountings Satisfactory and Cheap

The illustration shows a plan I use on my spider web hook-up and find very



satisfactory and inexpensive. At present I am using the front panel mounting, and did so rather than use the back panel mounting on account of the wires running on the back of the panel. As I used the lever spider web control I experienced some difficulty in close tuning and the following is my method of remedy:

The shafts on which the spider webs are fastened were made from number 8 copper wire, which I threaded at one end, the other end being soldered to the clip on the spider web. The threaded end was run through the panel. A nut was run on this shaft so that it just touched the panel. A small washer may be placed on the shaft first, and would in all probability be better. A threaded bushing, as used on inductance switches, could be put through the panel.

Two condenser rotor plates were cut on the dotted lines in pairs and then drilled as shown. Then the plates were riveted together, spacing them with condenser washers and using one washer between each pair of plates. Two of these assembly rotors are required. A washer was slipped between the plates and the assembly slipped on the spider web shaft. A nut was placed on and turned down, making sure that the spider web was in a vertical position when the rotor is in the position shown.

A rubber vernier was mounted so that it just snugly fitted against the edges of the rotor plates. This gives the required friction for turning the spider web and also holding it in any position desired. Stops are placed to keep the rotor from going too far.

The back panel mounting is similar to the front panel mounting, except that the shaft is threaded farther back and the rotor plates are clamped in the same manner, only back of the panel. The shaft is then run through the panel and a pointer clamped on the front of the panel, as shown. The pointer is held to the shaft between two nuts like the rotors. If an insulated knurled nut is placed outside of this on the end of the shaft, it

(Continued on page 26)

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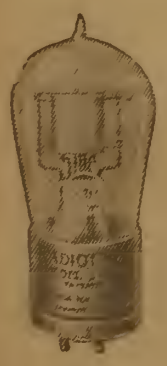

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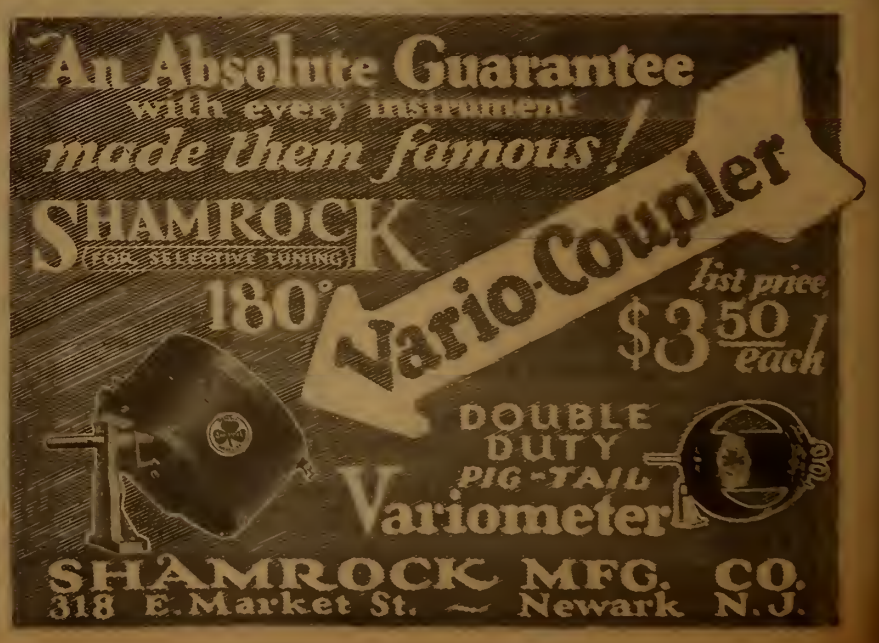

Simple Explanation of Radio for Everybody

Chapter XI, Part II—Dry Cells and Storage Batteries

By M. W. Thompson

THE following article is the twenty-second of a series for Radio beginners, written by Marvin W. Thompson, well known in airphone circles for his understandable style of approaching his subject. The remaining chapters will be:

Chapter XII—Radio Frequency Amplification.

Chapter XIII—The Neutrodyne Receiver.

THE second type of storage cell was brought out by Edison some years ago and is known as the Edison cell. One of its chief advantages is its ruggedness, both mechanically and electrically.

Figure 82—Positive plate of an Edison cell, showing the tubes in which the nickel hydrate and flaked nickel are placed.

The Signal Corps and the Air Service both used it extensively during the war for this reason. It can be dropped, kicked, left standing for long periods of time in any position, and given the roughest usage. It can be short-circuited, not merely once but repeatedly; such treatment would ruin a cell of the lead-sulphuric acid type. The reason for this is that its current on short circuit is but a fraction of that obtainable on short circuit from the lead battery.

Charging the Edison Cell

Overcharge will not injure the Edison cell. It can be charged at any ampere rate that will not heat it above 115 degrees. The positive active material is nickel hydroxide and the negative plate material is iron oxide. The electrolyte is a solution of potassium hydroxide. The case is of rolled steel, corrugated horizontally to strengthen it and, usually, nickelplated. Seams are welded.

The nickel hydroxide of the positive plate is contained in a series of perforated tubes which are held in a suitable framework of nickelplated steel. These tubes are formed from a nickeled steel strip, finely perforated, and wound spirally so that the tube formed is about ¼ inch in diameter and 4 inches long. It is made rigid by eight steel rings which are slipped over it and regularly spaced.

Filling the Tubes

Filling these little tubes is quite an undertaking. While nickel hydroxide is the active material, it cannot, owing to its high resistance, be put in by itself. It is inserted, therefore, in thin layers, each layer being separated from or, to be more exact, connected to the next adjacent layer by a layer of finely flaked metallic nickel. These layers are tightly compressed and in a 4-inch tube there are over 300 pairs of layers.

The tubes, once filled, are placed in a steel framework, and the capacity of a positive plate depends on the number of standard size tubes it holds. The risk of distortion of these tubes from abnormal electrical or mechanical treatment is lessened by the insertion of alternately right and left-hand spirals in the frame.

The negative plate consists of a similar nickeled steel frame having mounted in it a number of pockets containing the active material, iron oxide. Here again, the active material is a poor conductor, and to improve the conductivity, mercury is introduced into the mass. The pockets are made of finely perforated nickeled

Figure 83—Negative plate of an Edison cell; the iron oxide is held in the small perforated steel pockets.

steel strips such as are used in the positive plate.

Positive and Negative Sections

Positive and negative "sections" are formed by the bolting together of a number of similar plates, the plates being spaced by washers. These separators between positives, negatives and opposite polarity plates are strips of Para rubber, which material is also used to keep the end plates from coming in contact with the steel case and as blocks on which the plates rest.

The action which occurs within the cell is as follows: Prior to receiving its first charge, a new cell consists, as described, of green nickel hydrate positive material, an electrolyte of potassium hydrate solution, and the negative plate material, iron oxide. On the first charge, the positive nickel hydrate becomes more highly oxidized and turns black, while the negative iron oxide is reduced to pure iron. The electrolyte apparently remains unchanged. The charge, therefore, has had the effect of transferring oxygen from the negative to the positive material. On discharge, the oxygen travels back from the positive plate to the negative, oxidizing the latter, and again the electrolyte seemingly is unchanged. The positive material, it should be noted, never again reaches the

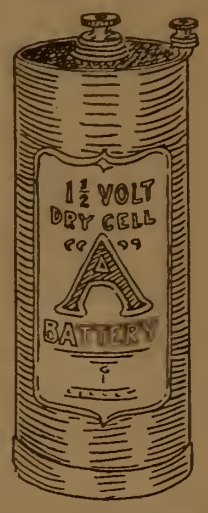

Figure 84—The outward appearance of a typical number 6 dry cell used as an A battery.

low state of oxidation of the green hydrated state in which it existed before the first charge. The pressure of an Edison cell averages 1.2 volts.

Dry Cells

For many years the source of current known as the dry cell was confined, in the

(Continued on page 24)

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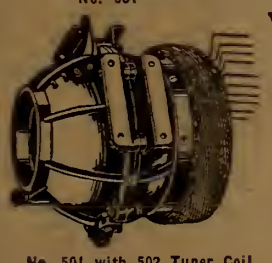

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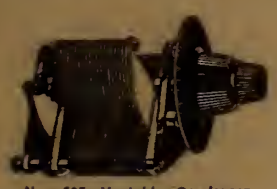

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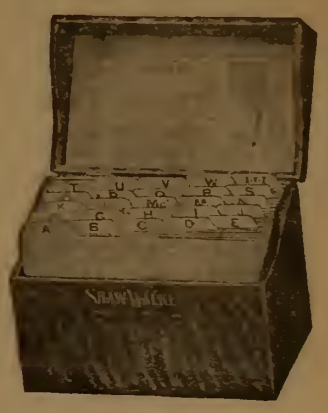

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RADIO FOR EVERYBODY

(Continued from page 23)

radio field to use as the B battery. Vacuum tubes were all designed for a filament source voltage of 6 and drew from .75 to 1.5 ampere which could be supplied only by a storage battery. Then tubes were produced which operated at

Figure 85—The outward appearance of a typical 22½-volt B battery containing 15 small dry cells.

1.2 volts and .25 ampere; next, a 6-volt tube appeared which drew but .25 ampere; and, finally, the 199 and 299 class were put on the market requiring but 4 volts and drawing .06 ampere. Dry cells could be used to supply these requirements and a second use for them had been found.

The new tubes, however, brought with them a third need for dry cells, the C battery. When the 201A, 301A or 199 and 299 tubes are operated as amplifiers with more than 45 volts on the plates, the difference in the potential between grid and filament which could be obtained from the rheostat was insufficient. A third battery, connected in the grid return leads of amplifiers, was necessary.

Compactness of Dry Cells

Dry cells are compact, efficient, clean and without odor. At this point it should be pointed out that a single dry cell is not a battery. In the artillery, a single fieldpiece is a gun; a group of them is a battery. Just so, a single dry cell is not a battery; two or more are known by that term. Prior to the need of dry cells in Radio, they were practically all made in one size called the "Number Six." This size is the one used as the A battery.

The electrical energy obtained from a dry cell is generated within the battery itself from chemical reactions which should take place only when an electrical circuit is completed between the terminals of the battery. A dry cell consists of an outer zinc can without a top, in which is contained an electrolyte in paste form surrounding a carbon rod held vertically in the center. The electrolyte is sal ammoniac and zinc chloride in water, and with it is mixed manganese dioxide, pulverized carbon and graphite. The first two are the active chemicals while the last three are "depolarizing agents" and current-carrying materials. The action within a dry cell is as follows (see Figure 86):

Electrolyte of the Cell

The electrolyte is absorbed by the pulp paper with which the can is lined and so brought in even all-over contact with the zinc. The electrolyte eats the zinc, this action producing electrical energy; this energy is carried back through the paper by the electrolyte to the mixture of manganese dioxide, carbon and graphite. It is the carbon and graphite which conduct the current inward from all sides to the carbon rod.

The manganese dioxide takes no active part in the production of current. The chemical action between the electrolyte and the zinc results in gaseous products being formed which, if permitted to collect and remain, would soon render the cell inoperative and prevent its rapid recovery after long use. This undesirable action is termed "polarization"; the manganese dioxide "oxidizes" these gases, forming harmless products and the cell can continue, for a long time, to produce a potential of above 1 volt. For that reason, the manganese dioxide is a "depolarizer."

Filling the Can

As may be seen in Figure 86, the zinc can is filled, for about 5 of its 6 inches, with the mix described above; it is then covered with the pulpy paper, a thin layer

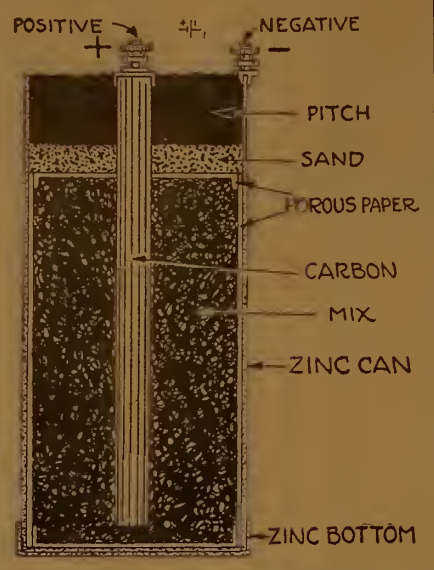

Figure 86—Cross section of number 6 dry cell, showing the relative position and size of the component parts.

of sand and sawdust and finally sealed with the pitch. To facilitate connections, the carbon rod is provided with a brass cap and binding post while another binding post is soldered to the zinc can.

The open circuit (not connected to a load) voltage of a dry cell, regardless of its size, is 1.5 to 1.6, depending on the percentages of the materials in the mix and the grade of these materials. The size of the cell merely determines the amount of current that may be drawn from it or the number of hours the cell will function on a certain load.

Series Connection

It is possible, by connecting up dry cells in various ways, to meet a wide variety of requirements in both current and voltage. When dry cells are connected in series, that is, the plus or center post of one to the minus or outer post of another, the voltages are added. This adding may be continued almost indefinitely; in B batteries, usually 15 cells are soldered together in series (see Figure 87) and the total available voltage is 22½ with taps at

(Continued on page 28)

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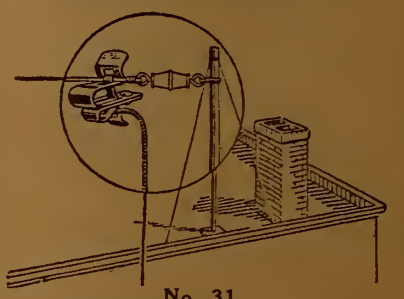

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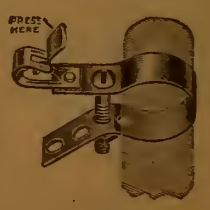

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2.50 Signal	1.60
2.75 Admiral	1.65
2.75 Comsco	2.25
2.30 17-Pl. Amsco	1.65
2.50 Amsco	1.95

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2.75 Signal	1.65
3.25 Admiral	1.80
3.50 Comsco	2.85
3.50 Amsco	2.75

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4.50 U. S. Tool	3.50
3.50 Comsco	2.85
5.00 Sexton	4.25
4.50 U. S. L.	3.10
4.00 Amsco	2.95

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6.50 Hammarlund	5.85
5.00 U. S. Tool	3.75
4.50 Comsco	3.75
5.50 Sexton	4.50
5.00 U. S. L.	3.45
4.50 Amsco	3.35

43-PLATE

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5.50 U. S. Tool	4.25
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6.50 Sexton Automatic	$ 5.45
5.00 Amsco	3.95
4.50 Amsco 17-Pl.	3.35
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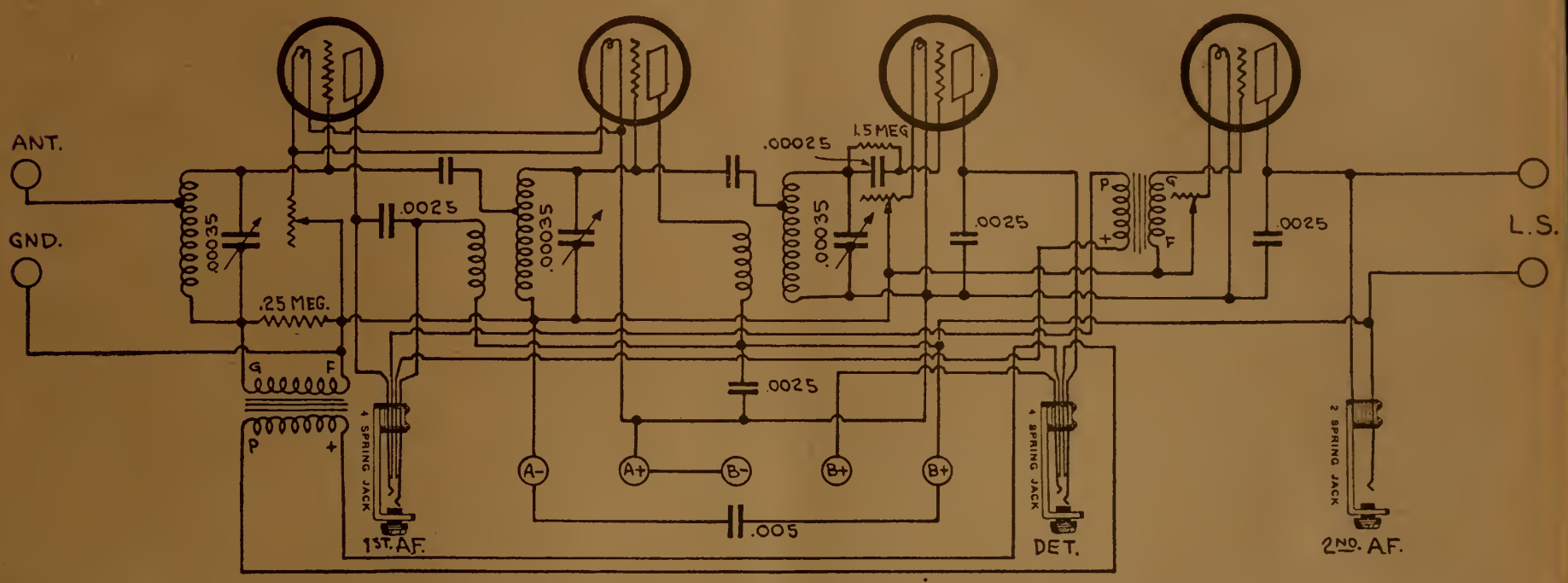
Construction of a Four Tube Reflex Neutrodyne

Part I—Hook-Up Diagram

By H. J. Marx



ONCE again the reflex circuit is coming into its own, but this time it rides with its competitor in glory—the neutrodyne. The circuit consists of two stages of tuned Radio frequency, detector and two stages of audio frequency.

LIST OF PARTS REQUIRED

3 Variable condensers, .00035 mfd.
3 Air core Radio frequency transformers.
4 Tube sockets.
2 Rheostats, 25 ohms.
1 Rheostat, 6 ohms.
2 Double circuit jacks.
1 Single open circuit jack
2 Audio frequency transformers, low ratio.
9 Binding posts.
3 Dials for condensers.
2 Neutralizing condensers.
1 Grid leak, 1.5 megohms.
1 Grid condenser, .00025 megohms.
1 Grid leak, .25 megohms.
4 Fixed by-pass condensers, .0025 mfd.
1 Fixed by-pass condenser, .005 mfd.
1 Panel 9 by 14 inches.
1 Subpanel 4½ by 13 inches.
1 Cabinet to fit.
50 ft. Wire for connections.
10 ft. Spaghetti.

One stage of this audio frequency is reflexed back into the first tube, after which a separate stage of audio frequency amplification is added. The efficiency of tuned Radio frequency amplification requires no discussion. Neutralization helps avoid the bugbear of all Radio frequency stages and of reflex circuits, namely, tube oscillation.

A complete balance for total elimination of tube oscillation not only is almost impossible but, as fans are now beginning to realize, is, indeed, not entirely desirable.

The elimination of capacity effects, selection of quality apparatus, compactness of layout, and perfection in the numerous so-called minor points of design and construction, all help toward making a better circuit. The omission of one tube by reflexing cuts down not only the total cost of the receiver but also saves current.

Use of Shielding

The use of shielding, which is optional, will improve the selectivity but is attended with a slight loss in volume. To the fan who craves lots of volume, a separate stage of power amplification in another cabinet is recommended.

The total cost of the parts at list prices was about $80. Engraving the panel and a few other refinements will bring this up to about $90. This cost can be reduced, but if quality of apparatus is to be considered, material reductions are of dubious value. Naturally, the list of apparatus given need not be exactly followed, provided cheap and poor-quality material is not substituted.

Condenser Capacity

The capacity value of the condensers is given as .00035 mfd., but this depends on the air core transformers used. If the number of turns in the secondary winding is small, a 23-plate or .005-mfd. variable condenser can be used, but if the ratio of the secondary winding to the primary is very high, then it may be advisable to substitute a .00025 variable condenser. In either case it is advisable to consult the manufacturer of the air core Radio frequency transformers, to get his advice for the condenser capacity required in order to cover the broadcasting range.

For those who care to calculate the range themselves the following formulas are given:

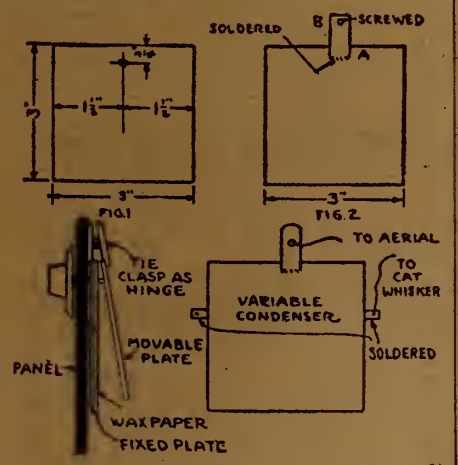
Wave length = L × C.

where L is inductance of secondary in centimeters, and C capacity of variable condenser across the secondary.

(Continued on page 26)

Simple Variable Condenser

A good variable condenser may be constructed easily and cheaply at home. When properly made this condenser will equal any 23-plate variable. The parts needed are two plates of aluminum, 3 inches square, one piece of waxed paper, also 3 inches square, and one tie clasp.



Drill a hole in one of the plates ¾ inch from the top and in the center for length, Figure 1; also make a hole in the waxed paper to match the one in the aluminum plate. The remaining plate is soldered to the tie clasp as shown in Figure 2. Fasten the tie clasp to the panel with a brass screw. A brass machine screw is used to vary the distance between the plates. The operation of the condenser is plainly shown.—Melvin Kennard, Millersburg, Pa.

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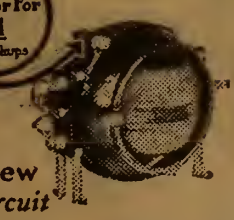
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TABLE CORRECTION FACTOR K

2r/l	K	2r/l	K	2r/l	K	2r/l	K
0.00	1.000000	0.40	0.849853	0.80	0.735079	2.00	0.525510
0.01	0.995769	0.41	0.846583	0.81	0.732593	2.10	0.513701
0.02	0.991562	0.42	0.843335	0.82	0.730126	2.20	0.502472
0.03	0.987381	0.43	0.840110	0.83	0.727675	2.30	0.491782
0.04	0.983224	0.44	0.836906	0.84	0.725240	2.40	0.481591
0.05	0.979092	0.45	0.833723	0.85	0.722821	2.50	0.471865
0.06	0.974985	0.46	0.830563	0.86	0.720419	2.60	0.462573
0.07	0.970903	0.47	0.827424	0.87	0.718033	2.70	0.453686
0.08	0.966847	0.48	0.824307	0.88	0.715663	2.80	0.445177
0.09	0.962815	0.49	0.821211	0.89	0.713308	2.90	0.437023
0.10	0.958807	0.50	0.818136	0.90	0.710969	3.00	0.429199
0.11	0.954825	0.51	0.815082	0.91	0.708647	3.10	0.421687
0.12	0.950868	0.52	0.812049	0.92	0.706339	3.20	0.414468
0.13	0.946935	0.53	0.809037	0.93	0.704047	3.30	0.407524
0.14	0.943026	0.54	0.806046	0.94	0.701770	3.40	0.400840
0.15	0.939141	0.55	0.803075	0.95	0.699509	3.50	0.394401
0.16	0.935284	0.56	0.800125	0.96	0.697262	3.60	0.388192
0.17	0.931450	0.57	0.797195	0.97	0.695030	3.70	0.382203
0.18	0.927639	0.58	0.794285	0.98	0.692813	3.80	0.376421
0.19	0.923854	0.59	0.791395	0.99	0.690611	3.90	0.370834
0.20	0.920093	0.60	0.788525	1.00	0.688423	4.00	0.365433
0.21	0.916356	0.61	0.785675	1.05	0.677697	4.10	0.360206
0.22	0.912643	0.62	0.782844	1.10	0.667315	4.20	0.355147
0.23	0.908954	0.63	0.780032	1.15	0.657263	4.30	0.350249
0.24	0.905290	0.64	0.777240	1.20	0.647527	4.40	0.345503
0.25	0.901649	0.65	0.774467	1.25	0.638094	4.50	0.340898
0.26	0.898033	0.66	0.771713	1.30	0.628951	4.60	0.336431
0.27	0.894440	0.67	0.768978	1.35	0.620086	4.70	0.332098
0.28	0.890871	0.68	0.766262	1.40	0.611487	4.80	0.327890
0.29	0.887325	0.69	0.763565	1.45	0.603144	4.90	0.323800
0.30	0.883803	0.70	0.760886	1.50	0.595045	5.00	0.319825
0.31	0.880305	0.71	0.758225	1.55	0.587182	5.50	0.301504
0.32	0.876829	0.72	0.755582	1.60	0.579543	6.00	0.285410
0.33	0.873377	0.73	0.752958	1.65	0.572119	6.50	0.271146
0.34	0.869948	0.74	0.750351	1.70	0.564903	7.00	0.258406
0.35	0.866542	0.75	0.747762	1.75	0.557885	7.50	0.246949
0.36	0.863158	0.76	0.745191	1.80	0.551057	8.00	0.236582
0.37	0.859799	0.77	0.742637	1.85	0.544413	8.50	0.227152
0.38	0.856461	0.78	0.740100	1.90	0.537945	9.00	0.218532
0.39	0.853146	0.79	0.737581	1.95	0.531647	9.50	0.210618

REFLEX NEUTRODYNE

(Continued from page 25)

The inductance of the secondary in centimeters can be calculated by means of the following formula:

$$L = 39.47\ Kr^2n^2,$$

where r is the radius of the tubing in centimeters, n the number of turns of wire, and K is a variable depending on the quotient obtained when twice the radius, or the diameter of the tube, is divided by the length of the winding on the tube (l), (not wire length) in centimenters (1 inch equals 2.54 centimeters), for which see the table above.

From these calculations the fan can easily solve the condenser problem.

Two 25-ohm rheostats are called for; these control the A tubes which are used in the amplifying stages. The 6-ohm rheostat takes care of the detector, which should be a soft tube for best selectivity.

In spite of the reflex circuit, jacks are used for plugging in on any stage of audio frequency desired.

No high-ratio audio frequency transformers should be used. Five to one is the maximum ratio recommended.

A good grade of by-pass condenser is necessary; only mica type should be used.

The remaining parts are not as important as those mentioned and can be selected according to availability.

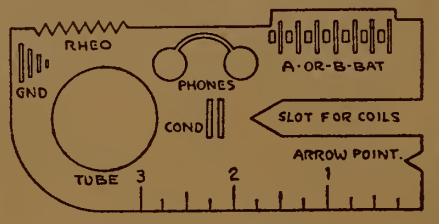
(TO BE CONTINUED.)

List of Parts

Any of the standard air core transformers can be used. The tube-wound type will be found to give the least trouble.

Template for Drawing Circuits

The illustration shows a very handy template tool for the use of the draftsman



in drawing circuits and hook-ups. The most used parts are placed on the tool so that they can be drawn quickly.—Robert Kahlo, Oklahoma City, Okla.

Shellac for Fastening Tinfoil

Tinfoil for shielding a panel can be fastened with shellac, but should not be used in places where moisture will interfere with good insulation, such as fastening wires of a coil or the tubing.

SPIDER WEB MOUNTING

(Continued from page 22)

presents a much more finished appearance.

The vernier on the back of the panel mounting works in the same manner as the front mounting. The pointer works on a quadrant and the readings can be taken as desired.

In the front mounting the rotor plate can be cut a little longer and a nickel-headed screw set just below the vernier. The rotor plate is then graduated and the reading taken opposite the slot in the screw.—James T. Way, Lincoln, Neb.

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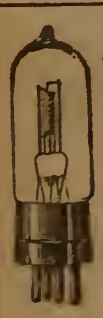

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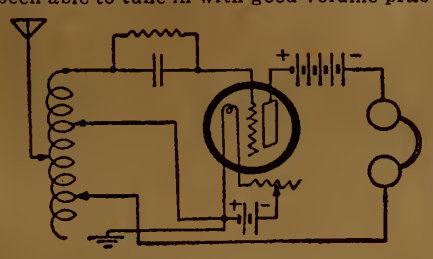
Four-Tube Armstrong Circuit Variation

Regenerative Feedback through the First Tube

The accompanying illustration shows a variation of the Armstrong circuit. This hook-up may be a pet of mine, but I have had unusual reception with it. I believe it to be a little out of the ordinary, although it is just an idea applied to the old single tube feedback circuit which departs from the original in some respects. I can always depend on it to cover the distance as well as to bring out the signals.—Charles L. Ross, Urbana, Ohio.



WORKSHOP KINKS? EARN A DOLLAR—

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

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

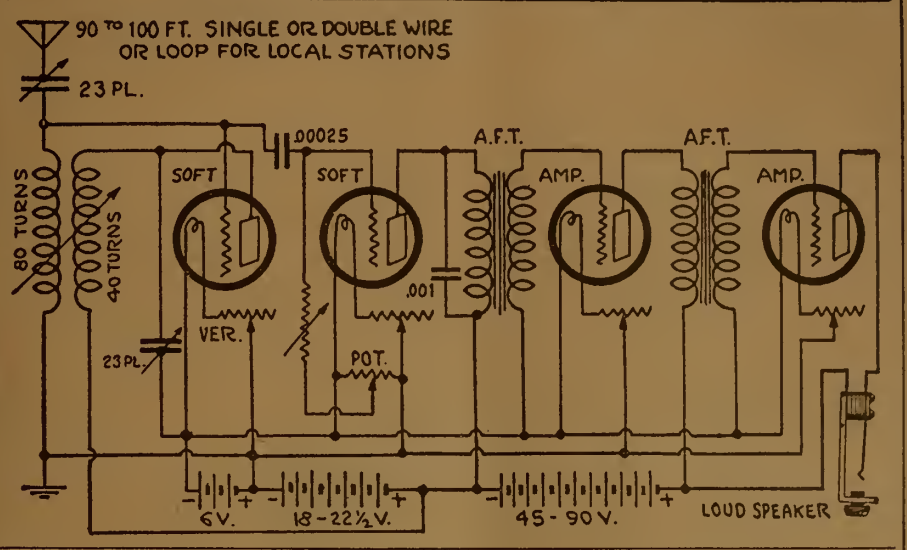
Slide Tuning Coil in Tube Set

A fact not generally known is that the slide tuning coil is a highly efficient tuning element in a regenerative hook-up. Being a Radiophan with limited funds forced me to experiment with various hook-ups, using a tuning coil as the tuning inductance. While they all gave results, the hook-up that is shown, a combination of two circuits, gave most unusual results. With a receiver employing this hook-up with a WD-11 tube, I have been able to tune in with good volume practically every high-power Radio broadcasting station within a radius of a thousand miles of my home.

While the efficiency of a two-slide tuning coil is not doubted in a circuit employing a crystal detector, still very few Radiophans know that with the addition of a third slide the two-slide tuning coil becomes a very efficient tuning element for a regenerative set.

The circuit given is self-explanatory. The instruments needed are a three-slide tuning coil, grid-condenser of .00025 mfd., grid leak of about 2 megohms, though a variable grid leak would be better, a rheostat with vernier adjustment, a dry-cell for A battery, a 22½-volt B battery, pair of good phones, WD-11 dry-cell tube and socket, and a board on which to mount the instruments.

CIRCUIT DIAGRAM OF SET



The mounting and wiring being finished, the slide connected with the filament should be placed in the center of the coil, then when the filament is adjusted to its operating temperature the tuning is accomplished with the other two slides. The filament slide should be tried in various places on the coil until the place giving the best results is found, after which it should be left stationary. The set will operate with the filament slide in any position on the coil, but will operate most efficiently at a certain place on the coil, which can be found only by experiment.

The three-slide tuning coil can be bought very cheaply or made easily. It should have sufficient inductance to tune up to at least 700 meters in order to comply with the new assignments of wave lengths. If you already have in your possession a two-slide coil, an additional slide can be added very easily.

In tuning this set it should be remembered that the slide connected to the aerial controls the wave length, the slide connected to the phones and B battery the plate circuit, and the rheostat controls the amount of regeneration and the volume of the signal to a large degree.

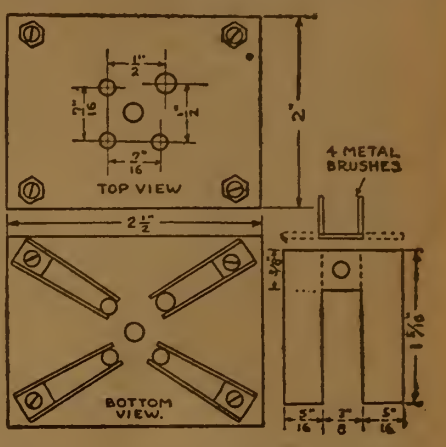
When the receiver is constructed it should have a broadcast range of about 500 miles, if used with a good aerial.—Bowden Ward, Birmingham, Ala.

In Experimental Stage

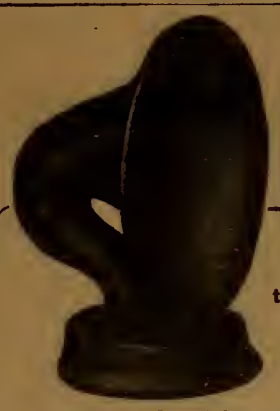
Using the house lighting current to run the filament and act as B battery for a vacuum tube is, at present, far from a practical thing. Experimenters who have tried this have ruined many good tubes in their attempt.

Good Tube Sockets Made of Broken Battery Jars

Cut a piece of fiber, or a piece cut from a broken battery jar, 2 inches wide and 2½ inches long. Drill holes as indicated in the top view for the prongs and ream them out to take the posts on the tube to be used. Make four clips from short brass to the dimensions given and bend them into a U-shape. These are fastened on the fiber in the positions shown in the bottom view. To raise the socket from the baseboard, a piece of insulating material of the right thickness is used and the holding down screws are run through both the fiber base and the pieces.—B. F. Lacey, Sioux Falls, S. D.



A plug and jack, or a double pole switch can be used to change from detector to one step.



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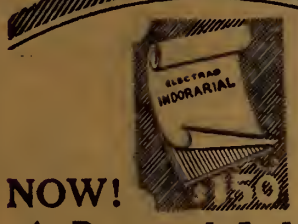
Price $1.25
A sure cure for catwhiskeritis.
Easy to attach to any crystal or reflex set.
Positively cannot jar out of adjustment.
Increases the pleasure of your set 100%.
The logical successor to the open cat whisker and crystal.
Sold with a positive GUARANTEE TO SATISFY THE PURCHASER WHEREVER BOUGHT.
Never anything like it produced before the STARS came out.
MADE ONLY BY THE
STAR CRYSTAL COMPANY
525 Woodward Ave., Detroit, Mich.
Chicago Branch, 53 W. Jackson Blvd.



NOW!
A Practical Indorarial
Ideal for sharp tuning, reduces static to a minimum. Cuts out interference, gives wonderful directional effects. Hang it on door or wall, behind portieres, lay under rug. One used as antenna and one as ground gives remarkable coupling effect.
On sale at most good dealers, or direct. Price $1.50.
Satisfaction guaranteed or money back.
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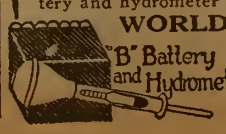
World's Greatest BATTERY BARGAIN
FREE
Written 2-Year Guarantee Your Proof of Performance
Save 50%
Thousands of Radio Digest Readers will profit by this amazing offer. They will buy the famous 2-year guaranteed World Battery at the lowest price ever quoted. They will get a hydrometer and a "B" Battery FREE. And they get the best battery built.
Compare These Prices
Five Per Cent Discount for Cash with Order

	For UV-199 Tubes. Same features as 2 Volt.
Special 2 Volt Storage Battery $5.00	
For WD-11 and WD-12 Tubes. Will run 200 hours on one charge. Rechargeable. Special 4-v. Storage Battery $8.00	6 Volt, 60 Amps..$ 8.50 6 Volt, 80 Amps.. 10.00 6 Volt, 100 Amps. 12.50 6 Volt, 120 Amps. 14.50 6 Volt, 140 Amps. 16.00

Send No Money. Just clip this ad and mail with your name and address. The battery you specify will be shipped to you the day your order is received. When the battery arrives, inspect it—read our 2-year guarantee before you pay one penny. Get the "B" Battery and hydrometer FREE. Order today.
WORLD BATTERY CO.
Dept. "L,"
60 E. Roosevelt Road
Chicago, Ill.



Infinite Adjustment for ALL TUBES!

DESIGNED to permit infinite adjustment of currents used in vacuum tube. Gives absolute control of electronic flow and finest tuning possible. Fil-Ko-Stat will bring in DX you never heard before and shut out noise.
30 ohms full resistance.
No adjustment to puzzle.
No discs to break.
No Carbon Powder.
$2 AT ALL DEALERS
FIL-KO-STAT
Made and Guaranteed by
DX Instrument Co. Harrisburg, Pa.
Radio Stores Corp.. 218 W. 34th St., New York
Sole International Distributors

DISTANCE on ALL wave lengths

REACH OUT!
Use TRI-COIL Radio Frequency Transformers and get those distant stations you've been fishing for! Use TRI-COIL and make ONE tube operate a loud speaker with the "TRI-COIL Reflex." YOUR DEALER HAS TRI-COIL.....
FREE "How to Build The TRI-COIL Reflex" free at your dealer's or direct from us.
BROOKLYN METAL STAMPING CO.
718 Atlantic Ave.
Brooklyn New York

RADIO FOR EVERYBODY

(Continued from page 24)

16½, 18, 19½, 21 and 22½. Series connection has no effect on the amount of current which can be taken out at the leads as the current must flow through each cell in turn, and is limited by the cell containing the smallest amount of zinc in

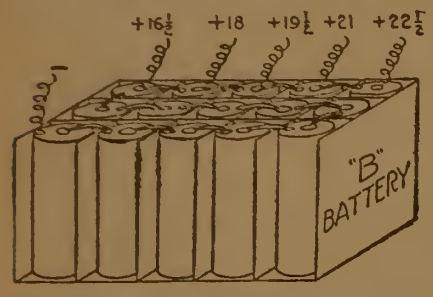


Figure 87—A B battery with top and side cut away, showing cells and series connection.

active use. Remember: Series connection adds voltages and does not affect the current capacity.

Parallel Connection

Parallel connections are made by connecting the plus of one cell to the plus of another and the minus of each to the minus of the other. In parallel connection, there is no change in the available voltage but this arrangement is equivalent to increasing the amount of zinc surface, which results in an increase of the total available current. By connecting dry cells in parallel, the necessary current is divided between the cells. If a .25-ampere current tube is connected to two cells in parallel, each furnishes .125 ampere; to three cells, each supplies but .0833 ampere. Since a battery that would supply .25 ampere for 76 hours would furnish .125 ampere for 160 hours, it can be seen that the unit cost over a period of time would be reduced. Parallel connection adds to the available current capacity but does not affect the voltage.

Combination Known as Series-Parallel

The third method of connecting dry cells is a combination of the two described above and is known as "series-parallel." It is used where a voltage of more than 1½ is desired and the load will be greater than .25 ampere. Figure 88a shows three dry cells connected in series to provide 4½ volts for one, two or three 199 or 299 tubes where the current drain will be .06, .12 or .18 ampere. Figure 88b is a parallel connection for three WD or C-11 tubes requiring but 1½ volts and a total current draw of .75 ampere. Figures 88c and 88d are two methods of getting a series-parallel hook-up to supply three 201A or 301A tubes, the current required being .75 ampere and the voltage 6.

Asking, "How long will a battery last?" is like asking, "How far can one go on a gallon of gas?" To answer the question on gasoline one would have to know the type and size of the car, the skill and experience of the driver, the air-to-gas ratio of the carburetor adjustment, the "test" or grade of the fuel itself and the condition of the roads. Each of the above

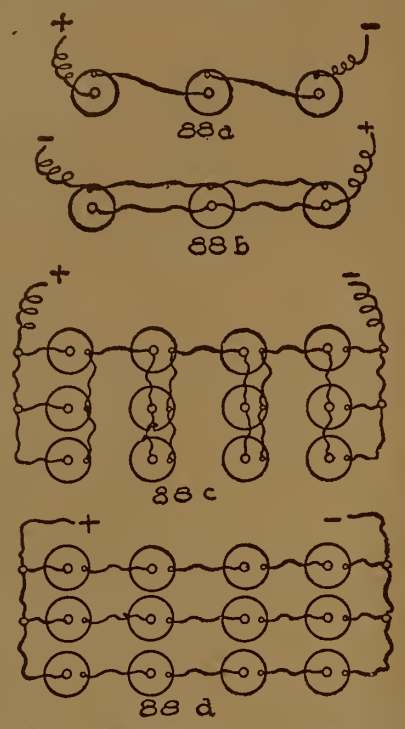


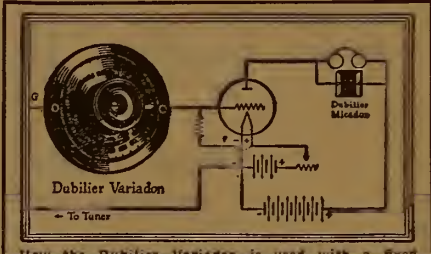
Figure 88—The three ways of connecting dry cells: Series, parallel and series-parallel (two variations).

points has a parallel in the use of dry cells as A batteries: What make and model set; is a novice or an "old-timer" to operate it; what tubes will be used; what make is the battery and will the set be used steadily or intermittently? If the Radio salesman appears a bit vague on that point, refer to the pamphlets put out by the leading battery manufacturers which include tables answering this question for all possible requirements.

Test for B Batteries

The correct test of a B battery is that of measuring its voltage. While dry cells are usually tested with an ammeter, this test is worthless on a B battery. The important thing to know is the voltage which the battery will deliver to the plates of the tubes, and the voltage test is of value only when made with a high grade, high resistance voltmeter. The resistance of a vacuum tube is from 10,000 to 30,000 ohms and unless the voltmeter simulates the load offered by the tube, an accurate measurement of the battery's worth in use cannot be had. The minimum working B voltage of a detector tube is about 17 volts; a B battery may be used in the detector circuit until its voltage drops to that figure. Even then it need not be discarded; it may be connected in series with other batteries and used on the amplifier tube. Here, it should be serviceable until its voltage has dropped to about 10 volts. This plan has certain limits, however. When a certain age is reached, B batteries become noisy and signals weak.

(TO BE CONTINUED.)



How the Dubilier Variadon is used with a fixed grid-leak to control the capacity of a grid-circuit.

The Dubilier Variadon— A Variable Grid Control

It is difficult to control the resistance of a grid-circuit with the average variable grid-leak, but certain and easy to control the capacity with a fixed grid-leak and a Dubilier Variadon, the new compact variable mica condenser.

Volume and selectivity are thus increased.

The Duratran will fit inside any cabinet, because it is no thicker than a dial. Price $2.50.

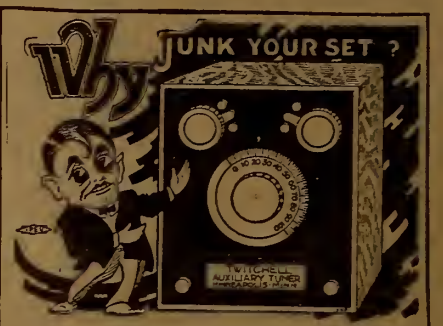
Dubilier Condenser and Radio Corp.
44-50 West Fourth Street New York

Corroded Aerial Joints Cause Fading of Signals

Copper wire as used in an aerial will soon corrode at the joints, and many fading signals are blamed on the transmitter when the real trouble is in these faulty joints. Every joint should be carefully soldered inside of the set as well as outside. Do not forget the ground wire also.

Proper "Loading" Method

It is more efficient to rewind coils to reach higher wave lengths, or to purchase new units, than to "load" each circuit with extra coils.



The new **TWITCHELL AUXILIARY TUNER** connected to your present set will enable you to bring in the long and short wave stations which your present set cannot get. It also cuts out all local stations so you may bring in distance any time without local interference. Copyrighted diagram of this tuner 50c, or with all parts $9.00. Complete instrument in walnut cabinet, ready to use, $15.00. Transportation prepaid.

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

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

My W. D. 11 Circuit is especially designed for use with the "Pickle" tube and brings out the full value of that little tube as no other circuit can. Stations 1000 miles away come in clearly on one tube. This set is small, complete, portable. For the man who wishes the highest efficiency, this is the set to build. Price of blueprint and specifications, 50c, or with complete and perfect windings, $3.00. Photo of set with every order. Sets built from these copyrighted plans will receive all broadcasting stations operating under the new laws. Their wave length range is from 170 to 800 meters.

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

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

YOU DON'T NEED TUBES

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

LEON LAMBERT
501 South Volutsia, Wichita, Kan.

Guaranteed Head-Sets

"RED-HEADS" are *guaranteed* radio phones. You run no risk when you buy them. Money back if, after 7 days' trial, you're not satisfied that they're the *best* receivers on the market at the price. Why not act *right now* and get a pair? It'll mean getting the *maximum* from broadcasting from the day you put them into use.

RED-HEAD RADIO RECEIVERS

NOW READY

The new 1924 Model F $6.50 Per Pair Complete | The new "Red-Head" Jr. $5.00 Per Pair Complete

"Red-Heads" sent prepaid on receipt of price if you are unable to get them at your dealer's.

THE NEWMAN-STERN COMPANY
Dept. R. D., Newman-Stern Bldg., Cleveland

Improved again!

THE MAGNATRON DC-201A—you'll find this tube better for every circuit and in every set. It and the MAGNATRON DC-199 have taken the tube market by storm.

When you consider that the list price of these tubes is only $5, you will realize that you can no longer afford to use inferior tubes.

Your Dealer Has Them!

Dealers: Write at once!

CONNEWEY ELECTRIC LABORATORIES
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DEALERS

PROMPT SHIPMENTS
LIBERAL DISCOUNTS

"ERLA"
New Type
Reflex
Transformers

All Erla reflex parts in stock including Hilco Variocouplers and Rathbun Condensers.

Dealers send for Catalog and discounts

Note !!
We are the largest exclusive Radio Jobbers in the Middle West

HUDSON-ROSS
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Don't Waste Your Time

Looking for stations you already had. When you get a station simply copy the readings in a KASPER RADIO RECORD BOOK, then when you want it—IT'S THERE. This book can be used with any set and it is so arranged and printed that each day's broadcastings are kept separate; also contains full illustrations and instructions HOW TO RECORD STATIONS. 25 cents—or 6 for $1.00, postage paid—don't send stamps.

Write Today
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317 Lorain St. Bank Building
Cleveland, Ohio
Dealer or Agents Wanted Everywhere

CARTER

Jack Switch

$1.00

Made in four styles

Two springs—three springs, four springs—six springs.

No unreliable sliding contacts. All connections positive. Leads soldered. Mounts like a Jack.

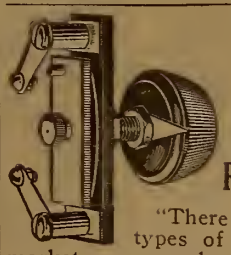
There is no switch on the market to equal the Carter Jack Switch.

Positive—Reliable—Convenient.

Made from best materials by skilled workmen.

Write for catalog of other well liked Carter Radio Products.

Carter Radio Co.
205 S. STATE STREET
CHICAGO



CRL

How Do YOU Select Your Radio Apparatus

"There are many different types of grid leaks on the market, some good ones and some poor," says the National Radio Engineering Co. of Atlanta, Ga., in a recent report to the Association of Railway Electrical Engineers, Chicago, "but the public accepts anything that is called a grid leak and then blames other parts of the set for unsatisfactory results because few people realize the importance of this little instrument.

The grid leak and condenser selected for your work is of the variable type and has been accurately tested. It is manufactured by the Central Radio Laboratories, Milwaukee.

Use the C R L Trademark as your guide when buying grid leaks and you cannot go wrong.

No. 106 (without condenser) $1.50
No. 107 (with grid condenser).... 1.85
(Plus 10c for postage)

Central Radio Laboratories
312 16th Street Milwaukee, Wis.

Duo-Reflex

Tube for Tube-the Most Powerful Circuits Ever Built. Write for free Bulletin No. 16

Electrical Research Laboratories
CHICAGO.
ERLA

Neutralizing Circuit Quickly

Critical Adjustment of Neutrodons Made Easily

By John P. Davis

AS YOU know, practically everyone who has assembled a neutrodyne receiver has had trouble with the heart of the set—the neutralizing condensers.

After my own experience, I am sending a simplified and much more critical method of obtaining the correct value of the neutrodons.

Do not select too powerful a sending station to adjust on. I should say a 50-watt station at 10 miles or a 500-watt station at 50 or more miles.

Carefully tune in this station; if the R. F. tubes oscillate, turn down the rheostats until the music is clear and be sure that the volume is strong. Start on the second R. F. tube, put a piece of paper under the positive filament pin of the tube, or if you have separate rheostats (which is best), turn it back until the filament is cold. The music will still be heard, probably in good volume. Unless the second neutrodon is already adjusted, you will find that the middle dial has a tuning value. At one point on the dial the music will come in much stronger.

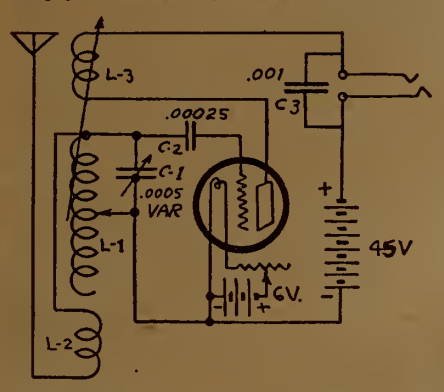
Adjust the neutrodon until the middle dial has no tuning value. The music will come in at an even volume at all points on this dial when the neutralizing has been accomplished. You can even spin the dial without hearing a click. This adjustment will then be positively correct on the second neutrodon.

Beware of neutrodons on the market in which the inherent capacity between the parts making up the condenser is too great, or perhaps the adjustment is too coarse.

I have adjusted quite a few neutrodyne sets by the above method and know that it is infallible. It can be done in five minutes.

A Portable Set Hook-Up That Gives Good Results

The circuit shown in the illustration is that of a portable set which has given remarkable resuits. At first glance it looks like a three-circuit set with an untuned primary. However, the extra connection from the grid lead to the dead end of the primary allows the primary to be tuned sharply. As shown, no ground is used.



In fact, signals are about twice as loud as when one is used.

The main inductance L-1 is wound on a bakelite tube, 3½ by 4½ inches, using number 24 scc. wire for first tap to the grid, and then at 5, 10, 15, 30, 45 and 60 turns. A space ½ inch wide is left at turn 15 for the tickler shaft.

On the same tube and ½ inch below, D-2, the primary is wound. This consists of from 5 to 10 turns (space wound) of litz wire made as follows: Open up an old Ford coil and remove a good secondary section. This is about 36 to 38 scc. Drive two nails about 20 feet apart and string the wire from one nail to the other, making three strands of 20 wires each, or 60 in all, which will be about right for the primary. Make a small hook of a piece of bus wire and insert this in your hand drill and the other end in the loop of the wire, then turn the drill to twist the wire. This makes a litz wire at almost no cost.

The tickler, L-3, is a standard wood rotor, wound with 40 turns of number 24 scc. The whole is mounted on a 6 by 8-inch bakelite panel so that it is really portable.

Using an old A-and-P detector tube which had already been burned 2,000 hours and with 40 volts on the plate, no grounds and 25 feet of wire hung around the room, I can receive broadcasts from Chicago, 550 miles distant, and at times I can pick up Kansas City, 900 miles. This is with one tube and aerial, but no ground.

With the winding as shown, a range of from 75 to 600 meters is covered, and thus the new 100-meter range is within easy reach. The selectivity is wonderful, and I can tune out 400-meter stations 60 miles away and bring in others at a distance of 1,300 miles.

Using a UV-201 with 145 volts on the plate, our local station KDKA, 50 miles distant, is plainly audible on a loud speaker. My antenna is one wire 400 feet in length, average height 100 feet.—Philip N. Emigh, Indian Creek, Pa.

Review of Books

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, $2.

Radio First Aid. Illustrated with working drawings and complete data as to the necessary equipment and cost of constructing from the simplest to the most modern Radio outfits at home. Price, $1.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75 cents.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

The Radio Amateur's Handbook. By A. Frederick Collins. A new revised edition of this book is just out. It is a complete, authentic and informative work on Radio. Fully illustrated. Price, $1.50.

Experimental Wireless Stations. By P. E. Edelman. Simple directions are given in this book for making Radio equipment for the transmission of messages over long distances. Price, $3.

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

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

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

Ideas for the Radio Experimenter's Laboratory. By M. B. Sleeper. This book tells in a simple way the how and why of Radio apparatus. Comprehensive data are given on such necessary laboratory instruments as the oscillator, wavemeter, direction finder, Radio compass, vacuum tube, characteristic measuring set and detailed advice given on the winding of various kinds of standard inductance coils. Price, 75 cents.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payment for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.

Flewelling Variation

As an electrician and student of Radio when a boy, I have today some Radio knowledge. I find that many fans who try the Flewelling circuit without success are satisfied with results obtained from grounding the positive side of the B battery and run the aerial to the grid to decrease the resistance until suited to the circuit. This also reduces body capacity. I have tuned in KHJ on one amplifier tube using 45 volts on the plate. The coils, as shown on the second diagram, have a variometer effect in the circuit.—W. J. P., Detroit, Mich.

Why Distant Reception?

While amplification is desirable to bring in signals from stations within a hundred miles or so in order to fill a room with music, there is no advantage in trying to hear a station a thousand miles away in this manner when a similar program is rendered within reasonable range.

CODE MADE EASY

Just Published **$1.** Radio Alphabet

in THREE simple and fascinating FIVE MINUTE PICTURE LESSONS which you cannot forget.

A boy of eight learnt ten consecutive letters in five minutes. $1.00 buys complete confidential course from Dept. D., KWIKKODE, 724 Beresford Avenue, Winnipeg, Man.

RADIO TUBE REBUILDING

ALL TUBES REPAIRED Guaranteed Like New Detectors or Amplifiers **$2.75**

One Amp., 6 Volt Tubes Changed to ¼ Amp. Tubes

AGENTS WANTED

Write for Circular Today

AMERICAN RADIO TUBE WORKS

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Instruments of Excellence

Langbein & Kaufman Variocouplers and Variometers	$ 7.00
Malone-Lemmon Condensers	7.50
Control-O-Meters	12.50
Ballantine Tuned Radio Frequency Transformers	9.60
Units	15.00
Curcoids—The Supreme Inductance by Means of Precision Coupling Coils.	7.50

PARTS FOR ACMEDYNE NOW IN STOCK

Amperites	$1.10
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Mr. Dealer!!

Cash in on the

FanSteel BALKITE BATTERY Charger

Here's the best charger made—no moving parts—can't get out of order. FanSteel Balkite is a rare metal that acts as a valve—lets current flow in but not out. Price $18.00—liberal discount to dealers.

Dealers only write for catalog A1001

WAKEM & McLAUGHLIN INC

225 E. ILLINOIS ST., CHICAGO

EVEREADY Radio Batteries *—they last longer*

Conspicuous for vitality and endurance —the right batteries by test and proof for every radio use.

NATIONAL CARBON CO., INC.

Headquarters for Radio Battery Information

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Factory and Offices: Toronto, Ontario

Worksman Radio Service

"THE ACCENT IS ON SERVICE"

14-16 Vesey St. NEW YORK

VARIOCOUPLERS

$3.50 Workrite 180° Silk Wound	$2.95
3.50 Fisher, Large, 90°	2.75
2.75 Fisher, 180°	2.25

VARIOMETERS

$3.50 Workrite	$2.95
5.00 Pathé Moulded	2.25
3.50 Fisher, Large	2.85

CONDENSERS

$2.00 R. C. 11 plate	$1.05
2.35 R. C. 23 plate	1.35
2.75 R. C. 43 plate	1.65

VERNIER CONDENSERS

$4.00 R. C. 23 plate	$2.25
5.00 R. C. 43 plate	2.95

PHONES

$18.00 DR. SEIBT IMPORTED "SUPER HEADSET"	$5.90
$12.00 N. & K., Imported	$5.90

We specialize in the FAMOUS AMBASSADOR LONG DISTANCE CIRCUIT. Write for list of parts for this set. Either single or three tube set.

Price of parts for single tube set $15.60

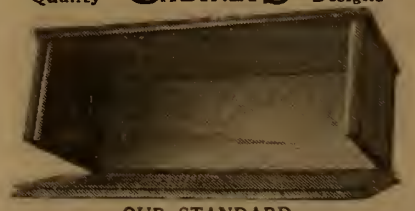
Price of parts for THREE TUBE SET 28.90

Mail orders promptly attended to. All orders amounting to $5.00 or more will be shipped prepaid. Will ship C. O. D. unless remittance accompanies order.

The above items are just a few of our numerous attract' priced articles, which are contained in our BULLETIN OF RADIO PARTS. Gladly sent to you upon request.

The Cabinet You Are Looking For

Highest Quality CORBETT CABINETS Latest Designs



OUR STANDARD

Note cabinet hinged to base for convenience.

Loose pin hinges used, permitting removal for adjustments, etc. Top and base molded, latter being raised to allow clearance for wiring and screws underneath. Panels to be fastened to base, and no sub-base required.

Panel	Depth	Price	Panel	Depth	Price
6x10½	7	$2.60	7x21	8	$4.35
6x21	7	3.85	7x24	8	4.90
7x10	8	3.15	7x26	8	5.10
7x12	8	3.30	7x30	8	6.15
7x14	8	3.50	7x40	8	7.75
7x18	8	3.80	12x14	10	4.50

All sizes also furnished in usual style hinged top and grooved front, requiring no screws. Price 10% off above list.

Genuine dark oak and Adam Brown Mahogany finish. Odd sizes to order. Dealers write us—our cabinets will sell over the counter.

CATALOG FREE—SHIPMENTS C. O. D.

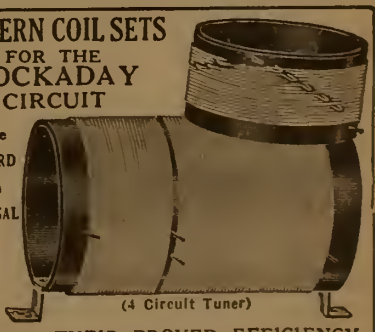
Corbett Cabinet Mfg. Company

5323 N. Carlisle St. Philadelphia, Pa.

5814 Forbes St. Pittsburgh, Pa.

EASTERN COIL SETS FOR THE COCKADAY CIRCUIT

Are the STANDARD and in UNIVERSAL USE



(4 Circuit Tuner)

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Made as per specifications of Mr. Cockaday. "D" Coil bank-wound.

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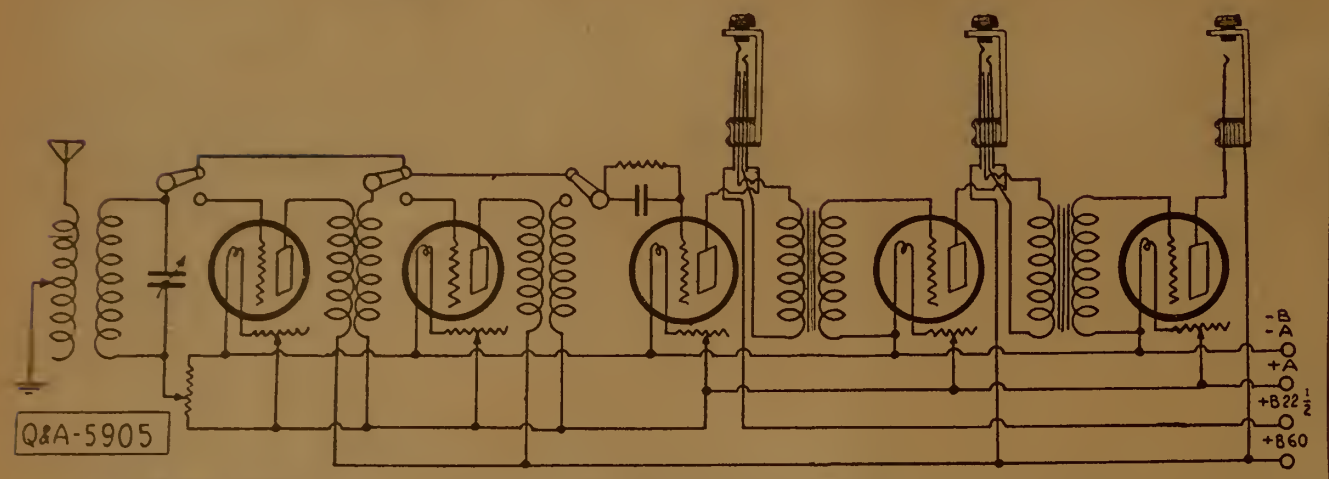

Five-Tube Circuit

(07965) AWB, Traverse City, Mich.

I have two R. F. transformers and two A. F. transformers and want to assemble a set using UV-199 tubes. Can you give me a hook-up covering the two stages each of R. F. and audio frequency amplification? If possible give some method for switching on and off the various stages as required.

A.—The hook-up is shown in the illustration. Some form of cushion mounting of sockets is essential. Five UV-199 tubes will give a lot of trouble otherwise, due to their microphonic action. We trust that this adequately covers your requirements.

Three Tube Reflex

(05866) JLW, Hudson, N. Y.

In a three tube reflex set using a crystal detector, how is the proper size fixed condenser on the audio frequency transformers determined? What would be the effect if too large a condenser was used? What would be the effect if too small a condenser was used?

A.—The exact value of fixed condenser on audio frequency transformer in a single tube Reflex circuit is not critical.

The purpose of this condenser is to provide a path around the transformer for Radio frequency. Because of resistance of this winding, very little current would flow through it.

If too large a condenser is used in this position absorption losses will deaden the signal; if too small, signals will be weakened because all of the Radio frequency will not be permitted to flow through the path provided.

Neutrodyne or Reflex

(5208) JEB, Chicago, Ill.

Do you consider the Reflex hook-up preferable to the Neutrodyne?

Will the hook-up of the Reflex and Neutrodyne as given recently in the Digest by your technical editor bring in Honolulu on a single wire aerial, 50 foot high and 75 feet long, with a lead-in of about 50 feet?

A.—Answering your inquiry with reference to Reflex and Neutrodyne circuits, we are advising that reception range cited is possible of accomplishment with either under favorable conditions. However, we would not state that such reception would be possible at all times.

With good construction and apparatus it is entirely within the range of possibility that during periods of cold weather the desired locations can be reached. The aerial of your description would be a desirable system for long range reception; 150 feet including lead-in is recommended.

Hissing Sounds

(05818) HP, Cincinnati, Ohio.

What causes a hissing sound on a single circuit regenerative set? It does not disappear by turning tube down. I cannot find any loose connections. Could this be caused by grid leak? Does the UV-199 perform as well as the larger tubes? What are the filament and plate voltages recommended for this tube?

A.—The action of tube may be due to the grid leak, or, in all probability, to too high B battery potential.

The UV-199 tube is quite effective although not comparable with the 6-volt type. It operates on 3-volt filament and 45-volt plate potential.

Receiving Range

(05854) HT, Chicago, Ill.

I have been a continuous reader of Radio Digest and wish to ask you a question. Will you please tell me the receiving distance of the Armstrong circuit, 1 det. and 2 amp. tubes?

A.—The receiving range of the circuit of your description is rated at 1,500 miles. However, as in any type of circuit, this is dependent upon many favorable factors, such as construction, location, operation, etc.

Much greater range has been accomplished under all such conditions.

Superdyne

(06174) REP, Bloomington, Ill.

I have a new superdyne receiver which I built myself. When I operate the reverse feedback coil (rotor of coupler) against the grid coil, the signals snap off if I turn it too far in one direction. Then I turn it back in the other direction, and the signals and oscillations jump in again after four to six seconds. Is this because I overload the grid of the Radio frequency tube and the energy has to drain off before it becomes audible again? What is usually the correct voltage for Radio frequency tube, using one Radio frequency tube, one detector, and two steps of audio frequency?

A.—The action encountered would indicate that you charge grid of detector, possibly both detector and amplifier. Try using a 1-megohm grid leak between the grid of the detector and the negative A battery. Use from 60 to 90-volt plate potential on Radio frequency amplifier.

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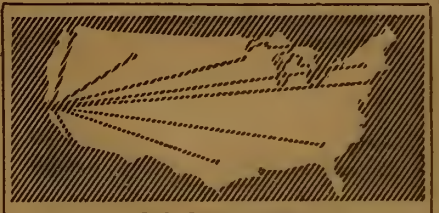

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Radiophone Broadcasting Stations

Corrected Every Week—Part III

CHALLENGE SUPPORTS LIST'S CORRECTNESS

ONE DOLLAR will be paid to the first Radiophan reader of Radio Digest sumitting the most errors in any one station's listing in the Directory of Radiophone Stations, which appears in four parts, serially continuously, on page 18. Letters must reach Radio Digest's office not later than one week from date of issue corrected. Readers are not limited to correcting one station. Turn in corrections for as many stations as you can find—if you can find errors! Use separate sheet of paper for each station submitted and place name and address on each sheet.

[NOTE.—The third part of the schedule list appears below. The fourth part consists of the remainder of the list and the complete state, city-station index and appear next week.)

WHAV, Wilmington, Del. 360 meters. 50 watts. Wilmington Elec. Spec. Co. Slogan, "The First Broadcasting Station of the First City of the First State." Sun, 10-11 pm. Eastern.

WHAZ, Troy, N. Y. 380 meters. 500 watts. Rensselaer Polytechnic Inst. Slogan, "Transcontinental and International Broadcasting Station Located at the Oldest College of Engineering." Club, R. P. I. students. Mon, 9-10:30 pm, concert, educational talks. Trnscontinental second Monday of each month, 12-1:30 am, music. Eastern.

WHB, Kansas City, Mo. 411 meters. 500 watts. Sweeney Auto & Electric School. Slogan, "Heart of America." Daily ex Sun, 8:25 am, 9:25, 10:25, 11:25, 12:25 pm, 1:25, 3, reports. Dally, 12:30-1, 2-3, 7-7:45 pm, music. Tues, Thurs, Sun, 8-10 pm, concert. Central.

WHK, Cleveland, O. 283 meters. 100 watts. Warren R. Cox. Daily ex Sun, 12:30-1:00 pm, music; 6-6:30, news, music. Fri, 9-11 pm. Dance program. Sun, 8-9:30 pm, concert. Eastern.

WHN, New York, N. Y. 360 meters. 100 watts. Loew's State Broadcasting Station. Daily ex Sun, 9:30-11 am, 2:15-3:15, 3:45-5:30. Mon, Wed, Sat, 7:30-12 pm. Tues, Thurs, Fri, 9:30-12:00 pm. Sun, 3-6 pm, 9:30-12 pm. Eastern.

WHT, Rogers, Mich. 300-600-706 meters. Michigan Limestone & Chem, Co.

WIAB, Rockford, Ill. 252 meters. 50 watts. Joslyn Automobile Co. Mon, Fri, 8-9 pm, music. Central.

WIAC, Galveston, Tex. 360 meters. 100 watts. Galveston Tribune. Daily ex Sun, 12:35 pm, reports, Tues, Sat, evening concert. Central.

WIAD, Philadelphia, Pa. 254 meters. 100 watts. Howard R. Miller.

WIAF, New Orleans, La. 234 meters. 10 watts. G. A. DeCortin. Tues, 8-9:30 pm. Sun, 10-11:30 am. Central.

WIAI, Springfield, Mo. 252 meters. 100 watts. Heer Stores Co. Daily ex Sun, 10:30-11 am, reports, news, weather. Tues, 7:30-8:45 pm. Sat, 6:30-7:30 pm, music entertainment. Central.

WIAJ, Neenah, Wisc. 224 meters. 100 watts. Fox River Valley Radio Supply Co.

WIAK, Omaha, Neb. 278 meters. 200 watts. Daily Journal-Stockman. Daily ex Sun, 7:45 am, 9:10, 10:20, 12 m, 1:30 pm, 3:50, markets, weather. Central.

WIAO, Milwaukee, Wis. 360 meters. 100 watts. School of Engineering of Milwaukee. Slogan, "In the Land of the Sky Blue Water." Mon, Tues, Thur, Fri, 10-10:30 am, 11:30-12 m, music, news; 5-6 pm, music, news; 7-7:30, music, apeechea. Central.

WIAQ, Marion, Ind. 226 meters. 10 watts. Chronicle Pub. Co. Daily ex Sun, 4:30-5 pm; Tues, Thurs, 8-9. Central.

WIAS, Burlington, Ia. 360 meters. 100 watts. Home Elec. Co. Slogan, "Burlington, On The Missiasippi." Tues, 8-9 pm, concert. Thurs, 7:15-8:15 pm, concert. Central.

WIAU, Le Mara, Ia. 360 meters. 20 watts. Am. Trust & Savings Bank.

WIK, McKeeaport, Pa. 234 meters. 500 watts. K & L Electric Co.

WIL, Washington, D. C. 360 meters. 10 watts. Continental Elec. Supply Co. Discontinued temporarily.

WIP, Philadelphia, Pa. 509 meters. 500 watts. Gimbel Bros. Slogan, "Watch Its Progress." Daily ex Sun, 1-2 pm, 3-4:30, 6-6:45, music; 7-7:30 pm, bedtime stories. Tues, Thurs, 8-10 pm, concert. Tues, Sat, 10:10-12 pm, concert. Sun, 4-6 pm; 9:30-12. Eastern.

WJAD, Waco, Tex. 360 meters. 150 watts. Jackson's Radio Engineering Lab. Dally ex Sun, 4-4:30 pm, news, music. Mon, Fri, 8-9, concert. Sun, 11-12 am, church service. Sun, 7:30-8:30 pm. Central.

WJAF, Muncie, Ind. 360 meters. 10 watts. Muncie Press and Smith Pub. Co. Daily ex Sun, 3:30-4 pm, news, music. Mon, Wed, Fri, 7-8 pm; Sat, 6-7 pm, music. Sun, 10-12 am, 2-3:30 pm, church services. Central.

WJAG, Norfolk, Nebr. 283 meters. 250 watts. Norfolk Daily News. Daily ex Sun, 12:15 pm, 5, 5:30, reports. Sun, 3:30-6 pm, music. Central.

WJAK, Greentown, Ind. 254 meters. 25 watts. Rev. Clifford L. White. Slogan, "The Radio Parson." Daily ex Sat, Sun, 6-7 pm. Thurs, 8 pm, music. Sat, 7 pm, sermonette, music. Central.

WJAM, Cedar Rapids, Ia. 268 meters. 20 watts. D. M. Perham. Slogan, "Cereal City of the World." Daily ex Sun, 10 am, 11:30, 1:30 pm, markets, reports. Tues, Wed, Fri, 7:15 pm, music. Sun, 2:45 pm, music. Central.

WJAN, Peoria, Ill. 280 meters. 100 watts. Peoria Star. Slogan, "The Grandview City of Illinois." Daily ex Sun, 9 am, 9:15, 11:30, 1:30 pm, markets, weather agriograms. Tues, Thurs, 9:15-10:45 pm, concert. Sun, 11:30 am, 7:45 pm, church services. Central.

WJAQ, Topeka, Kan. 360 meters. 100 watts. Capper Publications. Schedule not regular. Central.

WJAR, Providence, R. I. 360 meters. 500 watts. The Outlet Co. Slogan, "The Gateway of Southern New England." Daily ex Sun, 10-11 am. Housewives' talk, music. 1:05-2:15 pm, weather, reports, music; 7, weather. Tues, Wed, Fri, 7-8 pm, music. Wed, 10:30-12 midnight, dance. Fri, 8:15 pm, concert. Sun, 7:20-10:20 pm, concert. Eastern.

WJAS, Pittsburgh, Pa. 250 meters. 500 watts. Pittsburgh Radio Supply House. Daily ex Sun, 11:30-12 m, 2:30-3 pm, Mon, Wed, Fri, 7:45-9 pm. Eastern.

WJAT, Marshall, Mo. 360 meters. 10 watts. Kelley-Vawter Jewelry Co. Daily ex Sun, 5:15-5:45 pm, concert, Central.

WJAX, Cleveland, O. 390 meters. 500 watts. Union Trust Co. Slogan, "The Wave From Lake Erie." Daily ex Sat pm and Sun, 9-9:45 am, 10-10:45 2-2:45 pm, 3-3:45, music, financial reports, news. Tues, 7:30-9:30 pm; Thurs, 8-10:30 pm, entertainment. Eastern.

WJAZ, Chicago, Ill. 448 meters. 1,000 watts. Zenith-Edgewater Beach (Chicago Radio Lab.) Daily ex. Sun. and Mon. 10 pm-2 am, music, entertainment. Sun, 6-9 pm, concert. Central.

WJD, Granville, O. 229 meters. 50 watts. Denison Univ. Fri, Sat, 5-6 pm, music, educational lectures. Central.

WJH, Washington, D. C. 273 meters. 100 watts. Wm. P. Boyer Co. Daily ex Sun, 3, 4 pm, markets, reports, music. Sun, 8 pm, church services. Eastern.

WJX, New York, N. Y. 360 meters. 500 watts. De Forest Radio Telephone & Telegraph Co.

WJY, New York City. 405 meters. 500 watts. R. C. A. Tues, Thurs. Fri, 7:30-11:30 pm, concert, Sun, 2:30-5 pm, 8-10:30. Eastern.

WJZ, New York City. 455 meters. 500 watts. R. C. A. Daily ex Sun, 3-6 pm, entertainment; 7-11:30 pm, special program, Sun, 11:00 am-1 pm, church service; 7-10:30 pm. Eastern.

WKAA, Cedar Rapids, Ia. 268 meters. 100 watts. H. F. Paar. Dally ex Sun, 12:45 pm, reports; 5:30, reports, agriograms; 6-7, music. Thurs, 11-12 pm, music. Sun, 4-5 pm, church service. Central.

WKAD, East Providence, R. I. 240 meters. 10 watts. Charles Looff.

WKAF, Wichita Falls, Tex. 360 meters. 100 watts. W. S. Radio Supply Co.

WKAN, Montgomery, Ala. 226 meters. 20 watts. United Battery Service Co. Mon, Wed, Fri, 6:30-7 pm, music, news. Central.

WKAP, Cranston, R. I. 360 meters. 200 watts. Dutee Wilcox Flint.

WKAQ, San Juan, Porto Rico. 360 meters. 500 watts. Radio Corp. of Porto Rico. Slogan, "The Island of Enchantment, Where the World's Best Coffee Grows." Tues, Fri, 9-10:30 pm, Wed, 8-9, entertainment. Intercolonial.

WKAR, East Lansing, Mich. 280 meters. 500 watts. Mich. Agri. College. Wed, 8 pm, college events. Central.

WKAV, Laconia, N. H. 254 meters. 50 watts. Laconia Radio Club.

WKAY, Gainesville, Ga. 280 meters, 20 watts. Brenau College. No definite schedule. College activities. Thurs, 8:30 pm, concert. Eastern.

WKY, Oklahoma City, Okla. 360 meters. 100 watts. WKY Radio Shop. Daily 9 pm, weather. Mon, Wed, Fri, 9-10:30 pm, concert. Central.

WLAG, Minneapolis and St. Paul, Minn. 417 meters. 500 watts. Cutting & Wash. Radio Corp. Slogan, "The Twin City Radio Central in the land of Ten Thousand Lakes." Clubs, "Tooth Bruch," "Postcard." Daily ex Sun, 9:30 am, 9:40, 10, 10:30, 10:45, 11:35, 2 pm, 2:30, 2:35, 4, 4:30, 5, 5:30, 6, 7:30, 9:15, lectures, music; 5:30-6 pm, children's program; 9:30, music. Wed, Sat, 11-12:30 am., music. Sun, 10:30 am, 3:30 pm, 7:45, church services. Central.

WLAH, Syracuse, N. Y. 234 meters. 100 watts. Samuel Woodworth. No regular schedule.

WLAJ, Waco, Tex. 360 meters. 50 watts. Waco Elec. Supply Co. Daily ex Sun, 9:30 am, 10:30, 2:30 pm, music, reports. Tues, Thur, 7:45-8:45 pm, music. Sun, 3 pm, church service. Central.

WLAK, Bellows Falls, Vt. 360 meters. 100 watts. Vermont Farm Machine Co.

WLAL, Tulsa, Okla. 360 meters. 100 watts. Naylor Elec. Co. Sun, 7:30 pm, church services. Central.

WLAP, Louisville, Ky. 360 meters. 15 watts. W. V. Jordon.

WLAQ, Kalamazoo, Mich. 283 meters. 20 watts. Arthur E. Schilling. Daily ex Sun, 11:30-12:30 pm. Thurs, 10:30-12:30 pm. Sun, 2:30-5 pm. Central.

WLAV, Pensacola, Fla., 254 meters. 15 watts. Elec. Shop, Inc. Daily Mon, Tues, Fri, 8-9 pm, music, entertainment. Central.

WLAW, New York, N. Y. 360 meters. 500 watts. New York Police Dept.

WLAX, Greencastle, Ind. 231 meters. 10 watts. Greencastle Community Broadcasting Station. (Putnam Eleo. Co.). Tues, 7:30 pm; Thurs, 7:30. Sun, 7:45 pm, church services. Central.

WLB, Minneapolis, Minn. 360 meters. 5 watts, U. of Minn. Dept. of Elec. Eng.

WLW, Cincinnati, O. 309 meters. 500 watts. Crosley Mfg. Co, Slogan, "WLW, In the Queen City of the West." Daily ex Sun, 10:30 am, 1:30 pm; daily ex Sat, Sun, 3, 4, reports. Mon, Wed, 8-10 pm, entertainment. Tues, Thurs, 10-12 pm, music. Sun, 9:30 am, S. S. services; 11, church services. Central.

WMAC, Cazenovia, N. Y. 261 meters. 100 watts. C. B. Meredith. No definite schedule.

WMAF, Dartmouth, Mass. 360 meters. 500 watts. Round Hills Radio Corp. Slogan, "The Voice from 'Way Down East." Temporarily discontinued.

WMAH, Lincoln, Neb. 254 meters. 100 watts. General Supply Co. Club, "Lincoln Hoot Owls." Mon, Fri, 9-10:30 pm, orchestra. Sun, 10:30-12 m; 7:30-9 pm, church services. Central.

WMAJ, Kansas City, Mo. 275 meters. 250 watts. Kansas City Daily Drovera Telegram. Daily ex Sun, 8:15 am, 9:15, 10:15, 11:15, 12:15 pm, 1:15, 2:15, weather, markets, news. Sat, 8-9 pm, music. Central.

WMAK, Lockport, N. Y. 360 meters. 500 watts. Norton Labs. Daily ex Sun, 11 am, weather, farm reports. Tues, 8-9 pm, music. Eastern.

WMAL, Trenton, N. J. 256 meters. 50 watts. Trenton Hdwe. Co. Slogan, "The Home of Good Music." Mon, Thurs, 7:30-9 pm, music, lecture. Eastern.

WMAN, Columbus, O. 286 meters. 100 watts. First Baptist Church. Sun, 10:30-12 m, 7:30-9 pm, church services. Central.

WMAP, Easton, Pa. 246 meters. 50 watts. Utility Battery Service Co. Irregular schedule. Eastern.

WMAQ, Chicago, Ill. 448 meters. 500 watts. The Chicago Daily News. Dally ex Sun, Mon, 7-8 pm, 9:15-10. Daily ex Sat, Sun, 4:30-5 pm. Wed, 1-2 pm, Assn. of Commerce Luncheon. Central.

WMAV, Auburn, Ala. 250 meters. 250 watts. Ala. Polytechnic Inatitute. Tues, Thurs, Sat, 8 pm, music.

WMAW, Wahpeton, N. D. 254 meters. 50 watts. Wahpeton Elec Co

WMAY, St. Louis, Mo. 280 meters. 100 watts. Kingshighway Presbyterian Church. Slogan, "May Every By-Way Hear Kingshighway." Sun, 11 am, 8 pm, Tues, 7-8 pm, church services. Central.

WMAZ, Macon, Ga. 268 meters. 50 watts. Mercer University.

WMC, Memphis, Tenn. 500 meters. 500 watts. The Commercial Appeal. Slogan, "Station WMC, Memphis. "Down in Dixie." Club, "Midnight Frolic." Daily ex Sun, 9:30 am, 12 m, 3 pm, weather, markets. Daily ex Sun, Wed, 8:30 pm, program. Tues, Fri, 11 pm. Midnight frolic. Central.

WMU, Washington, D. C. 261 meters. 100 watts. Doubleday-Hill Elec. Co. Daily, 4:30-5:30 pm, concert, sports. Thurs, 8-9, concert. Eastern.

WNAC, Boston, Mass. 278 meters. 100 watts. Shepard Stores. Daily ex Sun, 1-2 pm, 4-5, 8-10. Mon, Wed, Fri, 6-8 pm. Sun, 11-12 m, church services; 3-4 pm, concert; 7:30-9:30, church and concert. Eastern.

WNAD, Norman, Okla. 360 meters. Univ. of Okla. Daily ex Sat, Sun, 10-10:30, news. Mon, Wed, Sun, 9-10 pm, program. Central.

WNAL, Omaha, Nebr. 242 meters. 100 watts. R. J. Rockwell. Temporarily off air.

WNAN, Syracuse, N. Y. 286 meters. Syracuse Radio Tel. Co. Mon, Wed, Sat, 7:30 pm, concert, agriograma, etc. Eastern.

WNAP, Springfield, O. 231 meters. 100 watts. Wittenberg College. No regular hours.

WNAQ, Charleston, S. C. 360 meters. 10 watts. Charleston Radio Elec. Co.

WNAR, Butler, Mo. 231 meters. 20 watts. C. C. Rhodes. Fri, 7:30 pm; Sun, 11 am, 7:30 pm. Central.

WNAS, Austin, Tex. Tex. Radio Corp. (Austin Statesman.)

WNAT, Philadelphia, Pa. 360 meters. 100 watts. Lennig Bros. Co. Irregular schedule. Eastern.

WNAV, Knoxville, Tenn. 236 meters. 500 watts. People's Tel & Telg Co. Temporarily discontinued.

WNAW, Fortress Monroe, Va. 360 meters. 5 watts. Henry Kunzmann. Sun, 2-4 pm, 7-9. Eastern.

WNAX, Yankton, S. D. 244 meters. 100 watts. Dakota Radio Apparatus Co. Daily, 11:30 am, reports; 4:30 pm, reports, music. Wed, Sat, 9-10 pm, music. Central.

WNJ, Albany, N. Y. 360 meters. 55 watts. Shotton Radio Mfg. Co., Inc. Wed, 8:15 pm, concert. Eastern.

WOAC, Lima, O. 266 meters. 50 watts. Maus Radio Co.

WOAD, Sigourney, Ia. 360 meters. 10 watts. Friday Battery & Elec. Corp. Friday evening program.

WOAE, Fremont, Nebr. 360 meters. 20 watts. Midland College.

WOAF, Tylor, Tex. 360 meters. 10 watts. The Tyler Commercial College. Daily ex Sat & Sun. 12 m, weather, markets; 8 pm, weather, sports, codes; 10:15, U. S. Navy press. Sun, 11 am, 7:30 pm, church service. Central.

WOAG, Belvidere, Ill. 224 meters. 200 watts. Apollo Theater. Fri, 5:30-6:30 pm.

WOAH, Charleston, S. C. 360 meters. 100 watts. Palmetto Radio Corp. Mon, Thur, Sat, Sun, 10 pm-1 am, music. Eastern.

WOAI, San Antonio, Tex. 385 meters. 500 watts. Southern Equip. Co. (Evening News-Express.) Daily ex Sun, 10:30 am, 12:15 pm, 3, 6:15, news, markets. Tues, 9:30-10:30 pm, concert, Thurs, 7:30-8:30 pm, concert. Sun, 11 am, church services; 9:30-10:30 pm, concert. Central.

WOAL, Webster Groves, Mo. 286 meters. 100 watts. W. E. Woods. Sun, 3-5 pm. Central.

WOAN, Lawrenceburg, Tenn. 360 meters. 150 watts. James D. Vaughan. Irregular schedule.

WOAO, Mishawaka, Ind. 360 meters. 50 watts. Lyradion Mfg. Co. Daily, 12:15-12:45 pm, music; 5:30-6:15, police reports, news. Tues, Thurs, 6:30-8 pm, program. Fri, 9:30-12:30 am, "Rumhounds Hunt Club." Sun, 10:45-12 m, church services. Central.

WOAP, Kalamazoo, Mich. 240 meters. 50 watts. Kalamazoo College. Mon, Wed, Fri, 6:30-7:00 pm. Central.

WOAR, Kenosha, Wis. 229 meters. 50 watts. H. P. Lundskow. Wed, 7 pm. Sun, 6 pm, Central.

WOAT, Wilmington, Del. 360 meters. 50 watts. Boyd Martell Hamp. Temporarily discontinued.

WOAV, Erie, Pa. 242 meters. 50 watts. Pennsylvania National Guard. Slogan: "Wayne Rangers. Club: "Neversleep Club." Tues, 6:30 pm; Thurs, 8 pm, Sun, 9:30 pm, music. Sun, 1-4 am, Milkman's matinee. Sun, 10:30 am, 7:45 pm, church services. Eastern.

WOAW, Omaha, Neb. 526 meters. 500 watts. Woodmen of the World. Slogan, "Gateway to the West and to the East." Mon, Tues, Thurs, Sat, 6-7:30 pm, 9-11, concert. Fri, 6:30-8 pm, 9-11. Sun, 9-11 am, 9-11 pm, church services. Central.

WOAX, Tronton, N. J. 240 meters. 500 watts. F. J. Wolff. Intermittent schedule.

WOC, Davenport, Ia. 484 meters. 500 watts. Palmer School of Chiropractic. Slogan, "Where the West Begins and In the State Where the Tall Corn Grows." Dally ex Sun, Tues night, 10 am, markets; 10:55, time; 11, weather; 12 m, chimes; 2 pm, markets; (Sat, 12:30), 3:30, talk; 5:45, chimes, ex Wed, 6:30, Sandman, 6:50, scores, weather. Wed, 10 pm, concert. Sat, 9 pm, concert. Mon, Wed, Thurs, Fri, 8 pm, music. Sun, 9 am, chimes; 1:30 pm, orchestra; 7, organ; 7:30, sports; 8, church servicea; 9, concert. Tues, silent. Central.

WOI, Ames, Ia. 360 meters. 100 watts. Iowa State College. Daily ex Sun, 9 am, 9:45, 10:15, market, weather, reports; 12:45 pm, markets, weather, educational talks; 9:30, weather, music. Central.

WOO, Philadelphia, Pa. 509 meters. 500 watts. John Wanamaker. Daily ex Sun, 11 am, organ recital; 11:30, weather; 11:55, time; 12-1 pm, concert; 4:45 pm, organ recital; 5, sports, police reports; 9:55, time; 10:02, weather. Mon, Wed, Fri, 7:30-11 pm, music, concert. Eastern.

WOQ, Kansas City, Mo. 360 meters. 500 watts. Western Radio Co. Daily ex Sun, 9:50 am, markets; 10:30-11, music, time signals; 11:50 am-12:30 pm, markets; 2:45-3:15, music; 7-7:20 market. Mon, Wed, Fri, 7:30-8, music. Tues, Thurs, Sat, 8-9:30, music. Sun, 11 am-12:15 pm, 7-7:45, church services. Central.

WOR, Newark, N. J. 405 meters. 500 watts. L. Bamberger & Co. Daily ex Sun, 2:30-4 pm, 6:15-7:30, music, talks, Mon, Wed, Sat, 8-11 pm, music, entertainment, lectures. Eastern.

WOS, Jefferson City, Mo. 441 meters. 500 watts. Missouri State Marketing Bureau. Slogan, "Watch Our State." Daily ex Sun, first 15 min. of every hour from 8 am-2 pm, markets. Dally, Sun, 5 pm, music, markets. Mon, Wed, Fri, 8-9:30 pm, concert. Sun, 7:30-8:30 pm, church service. Central.

WPAB, State College, Pa. 283 meters. 500 watts. Pa. State College. Mon, Wed, Fri, 8-9:30 pm. Eastern.

WPAC, Okmulgee, Okla. 360 meters. 200 watts. Donaldson Radio Co.

WPAH, Waupaca, Wis. 360 meters. 650 watts. Wiscousin Dept. of Markets. Daily ex Sun, 9:30 am, 10:30, 11:30, 12:30 pm, 2:30, 4:30, markets, weather, news, etc. Mon, 8-11 pm, music. Central.

WPAJ, New Haven, Conn. 268 meters. 30 watts. Doolittle Radio Corp.

WPAK, Fargo, N. Dak. 360 meters. 250 watts. North Dakota Agricultural College. Daily, 10 am, weather. Mon, Wed, Fri, 7:30-8:15 pm, music, lecture, address. Central.

WPAL, Columbus, O. 286 meters. 100 watts. Avery & Loeb Elec. Co.

WPAM, Topeka, Kans. 360 meters. 100 watts. Auerbach & Guettel. Daily ex Sun, 1 pm, markets; Wed, 9:30-10:30 pm; Sat, 8-9 pm, music. Central.

WPAQ, Frostburg, Md. 360 meters. 10 watts. General Sales & Engineering Co.

WPAT, El Paso, Tex. 360 meters. 20 watts. Saint Patrick's Catbedral. Temporarily discontinued.

WPAU, Moorhead, Minn. 360 meters. 20 watts. Concordia College.

WPAZ, Charleston, W. Va. 273 meters. 20 watts. Dr. John R. Koch. Mon, Wed, Fri, 7-8 pm. Sun, 3-4:15 pm. Eastern.

WPG, New Lebanon, O. 234 meters. 30 watts. Nushawg Poultry Farm. Slogan, "The Pulse of Miami Valley." Daily ex Sun, 12-12:15, news; 6-6:30 pm, markets. Mon, Fri, 8-9:45 pm, music, farm program. Central.

WQAA, Parkesburg, Pa. 360 meters. 500 watts. Horace A. Beale, Jr. Temporarily discontinued.

WQAC, Amarillo, Tex. 360-268-200 meters. 200 watts. E. B. Gish. Irregular schedule.

WQAD, Waterbury, Conn. 242 meters. 50 watts. The Whitall Elec. Co. Mon, Wed, Fri, 5:30-6:45 pm, music, Boy Scout news. Eastern.

WQAE, Springfield, Vt. 275 meters. 50 watts. Moore Radio News Station. Slogan, "Among the Green Hills of Vermont." Dally, 7-7:30 pm. Sun. 2:30-4:30 pm. Eastern.

WQAF, Sandusky, O. 240 meters. 5 watts. Sandusky Register.

WQAH, Lexington, Ky. 254 meters. 10 watts. Brock-Anderson Elect. Eng. Co.

WQAL, Mattoon, Ill. 258 meters. 20 watts. Coles County Tel. & Telg. Co. Slogan, "The Buckle on the Corn Belt." Wed, Sat, 9-10 pm, music, lecture; Sun afternoon, special program. Central.

WQAM, Miami, Fla. 360 meters. 100 watts. Electrical Equip Co. Slogan, "It is Always June in Miami." Daily ex Sun, 12-12:30 pm; 3-4:30, 7:30. Sun, 10-11 pm. Eastern.

WQAN, Scranton, Pa. 280 meters. 100 watts. Scranton Times. Slogan, "The Voice of the Anthracite." Daily ex Sun, 12:30-1 pm, 4-4:30, 7:30-8, news, reports, music. Tues, Fri, 8 pm, entertainment. Eastern.

WQAO, New York City, N. Y. 360 meters. 100 watts. Calvary Baptist Church. Sun, 10:30 am, 7:45 pm, church services. Eastern.

WQAQ, Abilene, Tex. 360 meters. 100 watts. West Texas Radio Co.-Abilene Daily Reporter. Slogan, "The Capital of West Texas." Tues, Thurs, Fri, 8-9 pm. Sun, am, pm, church services. Central.

WQAS, Lowell, Mass. 266 meters. 100 watts. Prince-Walter Co. Dally ex Sun, 10:45-11 am, 2:30-3 pm, music. Mon, Wed, Fri, 6-7 pm, news, concert. Thurs, silent, Eastern.

WQAV, Greenville, S. C. 258 meters. 15 watts. Huntington & Guerry, Inc. Slogan, "The Textile Center of the South." Tues, Thurs, 7:30-8:30 pm, music. Sat, 7:30-8 pm, music. Eastern.

WQAW, Washington, D. C. 236 meters. 5 watts. Dept. of Elec. Eng., Catholic University of America.

WQAX, Peoria, Ill. 360 meters. 100 watts. Radio Equipment Co. Mon, Wed, Fri, 7:15-3 pm. Central.

WRAA, Houston, Tex. 360 meters. 200 watts. Rice Institute. Mon, 8-9 pm, concert, college activities. Sun, 4:30 pm, extension lecturers. All games broadcast. Central.

WRAD, Marion, Kan. 248 meters. 10 watts. Marion Radio Shop. Daily, 12-12:45 pm, 5:15-5:45 markets, weather. Mon, Thurs, 8 pm, concert. Sun, 5-6 pm. Central.

WRAF, La Porte, Ind. 224 meters. 20 watts. Radio Club, Inc. Wed, Thurs, 8 pm, talks, music. Sun, 2 pm, religious and musical program. Central.

WRAH, Providence, R. I. 231 meters. 10 watts. Stanley N. Head.

WRAL, St. Croix Falls, Wis. 248 meters. 180 watts. Northern State Power Co. Slogan, "The Dalles of the St. Croix Club, Royal Order of Interstate Knob Twisters." Wed, 10-11:30 pm, concert. Central.

WRAM, Galesburg, Ill. 244 meters. 250 watts. Lombard College.

WRAN, Waterloo, Iowa. 236 meters. 10 watts. Black-Hawk Elec. Co. Slogan, "We Radiate all news." Temporarily off the air.

WRAO, St. Louis, Mo. 360 meters. 20 watts. St. Louis Radio Service Co. Dally ex Sun, 4:15-5 pm, music, sports. Sun, 3:30-5 pm, music, sports. Central.

WRAV, Yellow Springs, O. 242 meters. 100 watts. Antioch College. Irregular schedule.

WRAW, Reading, Pa. 238 meters. 40 watts. Avenue Radio Shop. Thurs. 10 pm. Eastern.

WRAX, Gloucester City, N. J. 268 meters. 100 watts. Flexon's Garage. Mon, Wed, Fri evenings, program.

WRAY, Scranton, Pa. 280 meters. 100 watts. Radio Sales Corp. Mon, Wed, Sat, Sun, 8:30-10 pm, concert. Eastern.

WRAZ, Newark, N. J. 233 meters. 100 watts. Radio Shop of Newark. Irregular.

WRC, Washington, D. C. 469 meters. 500 watts. Radio Corp'n of America. Daily ex Sun, 10 am, reports; 5:15 pm, code practice; 6 pm, children's hour. Mon, Wed, Fri, 8-10 pm, music. Tues, Thurs, Sat, 3-4 pm, music. Eastern.

WRK, Hamilton, O. 360 meters. 50 watts. Doron Bros. Elec. Co. Slogan, "The Oldest Station in Existence." Fri, 8:15 pm, music, lecture. Sun, 2:15 pm, music. Central.

WRL, Schenectady, N. Y. 360 meters. 500 watts. Union College Radio Club. Irregular schedule.

WRM, Urbana, Ill. 360 meters. 500 watts. Univ. of Ill. Tues, 7-8 pm, music. Tues, Thurs, 8:30-9:30 pm, Univ. news, talks, music. Irregular schedule of University events. Central.

WRR, Dallas, Texas. 360 meters. 20 watts. City of Dallas. Daily ex Sun, 11:30-12:30 pm, weather; 2:45-3:30, sports, markets, news; music. Sun, 11 am, 7:30, church service. Central.

WRW, Tarrytown, N. Y. 273 meters. 150 watts. Tarrytown Radio Research Laboratory. Slogan, "Everything in Radio." Mon, Wed, Fri, 7:30-11:30 pm, music, lectures, entertainment. Sun, 8-9 pm, church services. Eastern.

WSAB, Cape Girardeau, Mo. 360 meters. 100 watts. Southeast Mo. State Teachers College. Mon, Wed, 3:30 pm, lecture, 9, concerts. Central.

WSAC, Clemson College, S. C. 360 meters. 500 watts. Clemson Agri. College. Mon, Wed, Fri, 7 pm. Eastern.

WSAD, Providence, R. I. 261 meters. 500 watts. Fosters-Jewelers. Dally, 2:30-4 pm. Tues, Thurs, Fri, Sat, 6-7 pm. Wed, 8:15 pm, music, entertainment. Sun, 2-3:30 pm. Eastern.

WSAG, St. Petersburg, Fla. 244 meters. 10 watts. Loran V. Davis, George Prestman, Sr.

WSAH, Chicago, Ill. 248 meters. 500 watts. A. G. Leonard, Jr. Daily ex Sun, 5:30-6:30 pm. Fri, 8:45-10. Central.

WSAI, Cincinnati, O. 309 meters. 500 watts. United States Playing Card Co. Tues, Thurs, 8-10 pm Sat, 10-12 pm. Central.

WSAJ, Grove City, Pa. 360 meters. 250 watts. Grove City College. College activities. Wed, 7:30-9 pm, music. Fri, basket ball. Eastern.

WSAL, Indianapolis, Ind. 246 meters. 50 watts. Franklin Elec. Co.

WSAN, Allentown, Pa. 229 meters. 10 watts. Allentown Radio Club.

WSAR, Fall River, Mass. 254 meters. 10 watts. Doughty & Welch Elect. Co. Daily ex Sun, 12-1 pm. Tues, Thurs, Sat, 7:15-8:15 pm. Eastern.

WSAT, Plainview, Tex. 268 meters. Donohoo-Ware Hardware Co.

WSAW, Canandalgua, N. Y. 275 meters. John J. Long, Jr.

WSAY, Port Chester, N. Y. 233 meters. 100 watts. Irving Austin, Chamber of Commerce.

WSAZ, Pomeroy, Ohio. 258 meters. 50 watts. Chase Elec. Shop.

WSB, Atlanta, Ga. 429 meters. 500 watts. Atlanta Journal. Slogan, "The Volco of the South." Dally ex Sun, 12-1 pm, music, weather; 2:30, reports; 4-4:30, music; 5-6, news, sports; 8-9, concert (ex Wed); 10:45-12, concert. Sun, 10:54-12:15 pm, 5-6, 7:30-9:15, church services. Central.

WSL, Utica, N. Y. 273 meters. 100 watts. J. & M. Elec. Co. Dally ex Sat, Sun, 11-11:30 am, 5-6 pm, music, news. Mon, Wed, Sat, 8-9 pm. Sun, 10:30-12 m. 7:30-9 pm. Church services. Eastern.

WSY, Birmingham, Ala. 360 meters. 500 watts. Loveman, Joseph & Loeb. Tues, Fri, 8 pm, music. Sun, 11 am, 8 pm, church services. Central.

WTAB, Fall River, Mass. 248 meters. 10 watts. Fall River Daily Herald. Daily ex Sun, 7-8 pm. Eastern.

WTAC, Johnstown, Pa. 360 meters. 150 watts. Penn Traffic Co. Daily ex Sun, 4 pm. Sun, Thurs, 7:30 pm. Eastern.

WTAF, New Orleans, La. 268 meters. 10 watts. Louis J. Gallo. Daily, 6:45-7 pm, police reports. Tues, Sat, 8-9:30 pm, music.

WTAG, Providence, R. I. 258 meters. 10 watts. Kern Music Co.

WTAJ, Portland, Me. 236 meters. 20 watts. The Radio Shop. Wed, Sun, 7:45 pm. Eastern.

WTAL, Toledo, Ohio. 252 meters. 10 watts. Toledo Radio & Elec. Co. Tues, Thurs, 8:45 pm. Sat, 8 pm. Sun, 7:30 pm. Eastern.

WTAM, Cleveland, Ohio. 390 meters. 1,000 watts. Willard Storage Battery Co. Slogan. "The Voice from the Storage Battery." Wed, 8-10:30 pm, concert. Sat, 9-11 pm, dance music. Eastern.

WTAN, Mattoon, Ill. 240 meters. 100 watts. Orndorff Radio Shop.

WTAP, Cambridge, Ill. 242 meters. 100 watts. Cambridge Radio & Elec. Co. Daily, 12:15-1:15 pm, 9:30-10:15. Central.

WTAQ, Osseo, Wis. 226 meters. 100 watts. S. H. Van Gorden & Son.

WTAR, Norfolk, Va. 280 meters. 50 watts. Reliance Electric Co. Mon, Fri, 8 pm. Eastern.

WTAS, Elgin, Ill. 286 meters. 500 watts. Chas. E. Erbstein. Daily ex Sun, 8 pm, music. Sun, 2-5 pm, music. Central.

WTAT, Boston, Mass. 246 meters. 100 watts. Edison Elec. Illuminating Co. (Portable Station).

WTAU, Tecumseh, Neb. 360 meters. 10 watts. Ruegg Battery & Elec. Co. Tues, 8:30 pm. Central.

WTAW, College Station, Tex. 280 meters. 50 watts. Agricultural and Mechanical College of Tex. Wed, Fri, 8-8:30 pm, music, talks. Sun, 11 am, church services. Central.

WTAX, Streator, Ill. 231 meters. 50 watts. Williams Hardware Co. Mon, 9-10 pm. Thurs, 10-12 midnight. Central.

WTAY, Oak Park, Ill. 226 meters. 500 watts. Oak Leaves.

WTAZ, Lambertville, N. J. 283 meters. 15 watts. Thomas J. McGulre.

WTG, Manhattan, Kan. 360 meters. 75 mi. Kan. State Agri. College. Daily ex Sun, 9:55 am, weather (code). Central.

WWAB, Trenton, N. J. 226 meters. 10 watts. Hoenig, Swern & Co. Wed, 7:30-10:30 pm. Eastern.

WWAC, Waco, Tex. 360 meters. 100 watts. Sanger Bros. Daily ex Sun, 11 am, we

Radio Illustrated

Will Radio rob the dental chair of its terror? So it seems, judging by the expression of the young patient above. In any event that is the aim which inspired the construction of this special set recently exhibited at a dentists' convention.
Int. Photo

Interference from regenerative sets was such a nuisance that Miss Helen Dickinson, a New York Radiophan (seated on the table in the picture above), prevailed upon Radio owners in her neighborhood to sign a pledge not to be a "Squeal Hound."
K. & H. Photo

In order that the chorus in the "Topsy and Eva" company, now playing in Chicago, may keep in good physical condition Station KYW broadcasts a daily physical exercise program and the girls use it to limber up before "doing their stuff." © U. & U.