Flewelling Data, Pages 12, 15; Reflex Circuits, 13

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

TRADE-MARK

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RADIO JOINS CRIME WAR

'RICH' FOR DAY, HAS PHONES INSTALLED

RADIO FOR WINNER IN "MILLIONAIRE" CONTEST

Lucky Boston Woman, Free to Have "Anything," Spurns All for Air Concert

BOSTON, MASS.—Mrs. E. W. Bickmore of 40 Brent street, Dorchester, had a Radio receiving set especially installed in her home for one day, on New Year's Day, and enjoyed a Radio concert throughout the day and evening. For some years Mrs. Bickmore has been in poor health, and when she won in the Boston Post's contest of "A Millionaire For a Day," she requested that the Post have a Radio set installed in her home, that she might hear a Radio concert.

The set was installed Saturday, tested out Sunday, and she heard the entire program, including the beautiful sermon, at St. Paul's Cathedral as well as if she were present there. On New Year's Day she listened into the holiday programs of the Shepard Stores and Amrad stations.

The Boston Post's "Millionaire For a Day" contest ran for a month and the winners of each day's answer to the questions propounded in the paper were given anything that they asked for, and allowed as guests of the Post, to do just as they imagined a millionaire might do, all expenses being paid. Expensive limousines, trips to New York, boxes at the opera, theaters, dinners at the finest hotels and all such things as people of means might enjoy, were on the card if the daily winner wished them. The program in each was laid out to suit the winners.

Mrs. Bickmore was the one who chose a Radio concert over a specially installed set, for one day.

WHY?

(Special to RADIO DIGEST)

WASHINGTON.—The Westinghouse Electrical and Manufacturing Company, which sells Radio apparatus through the Radio Corporation of America, plans to present new sets to several members of the Cabinet interested in Radio, according to E. L. Norcross, local representative, who has already installed a set for Secretary Weeks in the War Department.

SHIP-TO-SHORE RADIO SETS UP NEW RECORD

Vessel in Pacific Covers 4,050 Miles with 1KW Set

SAN FRANCISCO.—The most remarkable records yet made in ship-to-shore Radio telephony were hung up during the voyage of the S. S. Matsonia from Honolulu to San Francisco. The ship has a one-kilowatt, combination Radio telephone and telegraph set. With it the operator was able to talk with the operator of the station at Apia, British Samoa. The last conversation took place at 8:30 a. m., when the Matsonia was 4,050 miles from Apia. The following day she docked in San Francisco.

During the entire voyage the vessel was in constant voice communication with the shore, speaking directly to KPH at San Francisco, or with KHK, at Hawaii, whichever one was nearer. All the work was done on a 550-meter wave length.

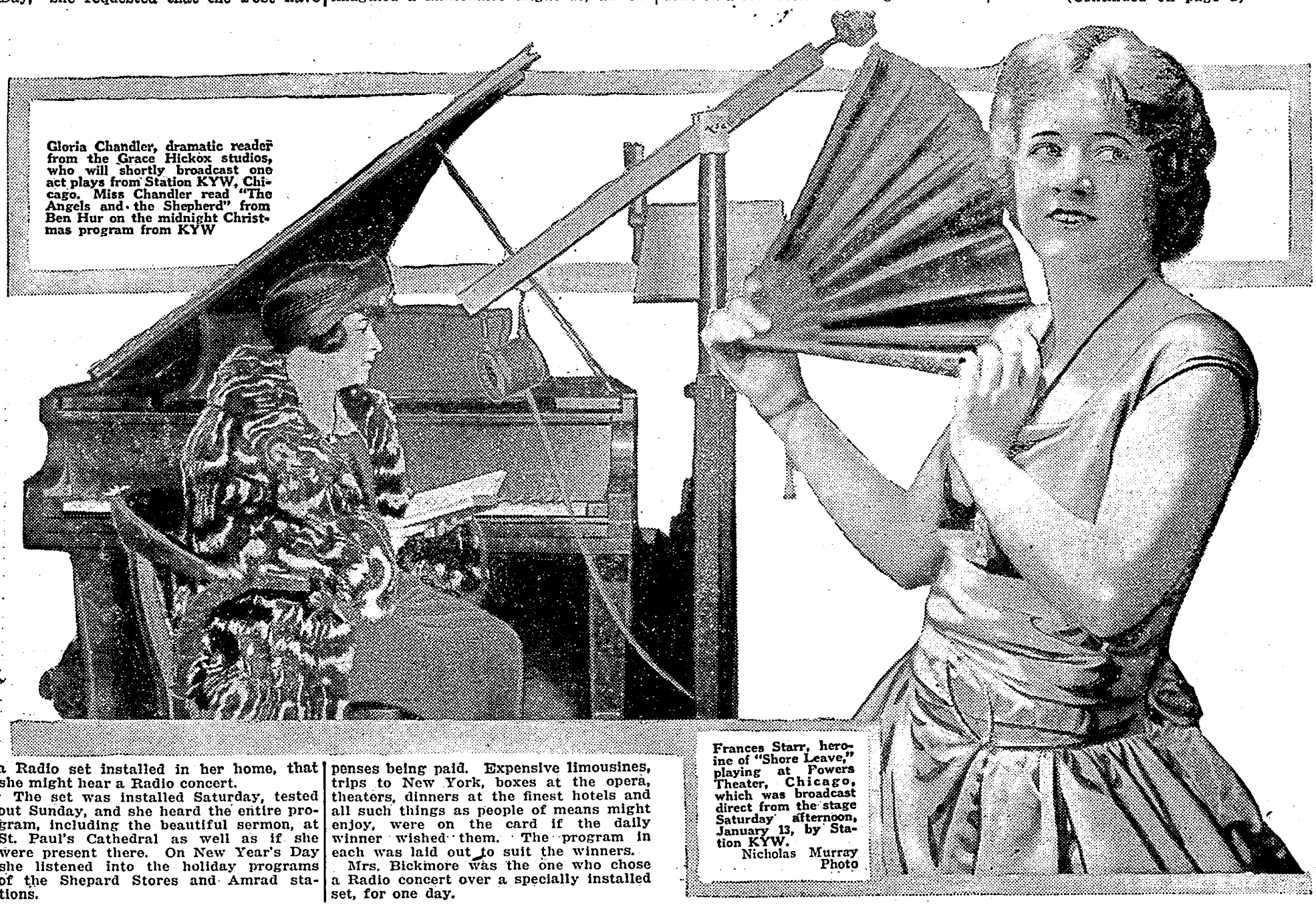
CHIEF BURNS TAKES STEPS IN BIG DRIVE

Daugherty Tells How Crooks Will Be Defeated by Air Waves

Plans National "Gallery"

WASHINGTON. — Attorney General Daugherty announces a plan for a national

(Continued on page 2)



Gloria Chandler, dramatic reader from the Grace Hickox studios, who will shortly broadcast one act plays from Station KYW, Chicago. Miss Chandler read "The Angels and the Shepherd" from Ben Hur on the midnight Christmas program from KYW

Frances Starr, heroine of "Shore Leave," playing at Powers Theater, Chicago, which was broadcast direct from the stage Saturday afternoon, January 13, by Station KYW.
Nicholas Murray Photo

RADIO JOINS CRIME WAR

(Continued from page 1)

bureau of identification and information in Washington with Radio as the means for broadcasting data on criminals and their activities to the whole country. The report has been verified by William J. Burns, Chief of the Bureau of Investigaton. This national gallery of rogues and crime, the idea of the attorney general, is believed to be something unique in criminal investigation as it will cover the whole country and be immediately available.

"In these days of preventative medicine, and fire and accident prevention," said Chief Investigator Burns, America's foremost detective, "we have now come to crime prevention. We plan eventually to have on file in this bureau photographs, finger prints, descriptions and histories of every known criminal in America, as well as data on his methods of operation."

First Real Crime Prevention Step

When legislation authorizes it and the system gets into operation with state, county and municipal police departments co-operating, Mr. Burns believes the country will have made the first practical step toward the prevention of crime and the apprehension of criminals.

If a local police department Radios to Washington the details of a crime, together with a description and name of the suspect, or asks for data on a man in the national rogues' gallery, the fugitive from justice can then be sure that a few minutes later his whole history will be broadcast throughout the United States. Within an hour after the commission of the crime he would be watched for at every possible point of departure. Mr. Burns believes this would greatly hinder the activity of criminals.

Rogues' Archives in Preparation

Already one police association has voted to turn over its criminal historical data to the Washington national headquarters, where the government records will be moved soon from Leavenworth, Kansas, to form the nucleus of the criminal archives to be kept by the new division under Mr. Burns. Co-operation of all the states is anticipated as well as from all large cities where Radio broadcasting is in popular use.

"A national bureau of identification will be of immense value to the country," Mr. Burns said, explaining that a criminal's psychology is such that when he is known, he is practically out of the game.

"Turn the light on him, and he is destroyed," Mr. Burns couched it. "Catch him, without his knowing how it was accomplished," he said, "and he becomes uneasy and is ever thereafter slow to take a chance." Sir Basil Thomson, formerly head of Scotland Yard and a recent visitor in Washington, was most interested in the scheme, Mr. Burns said. Sir Basil is also a firm believer in the value of Radio in general police work.

Radio Greatest Achievement in World

"I believe Radio is the greatest scientific achievement in the history of the World," declared the chief of the government's criminal investigation bureau. Within two years, he predicts every home, institution and establishment will be equipped with Radio receiving sets capable of receiving messages from all over the country and even abroad.

In New York, he added, the police broadcast warnings from headquarters when a crime is committed and the criminal is yet at large. These messages are not only picked up by all stations but by a fleet of scouting automobiles. They immediately scatter or assemble, so as to cut off the escape of the criminal. The system is also in operation in Chicago, and is applicable everywhere.

When asked if the criminals wouldn't get Radio sets and learn what the police were planning to do, Mr. Burns replied that it wouldn't do them any good, as they "couldn't dodge Radio broadcasts."

GROWTH OF PUBLIC HEALTH SERVICE

First Anniversary of Broadcasting Since It Was Inaugurated at NOF

WASHINGTON.—On the first anniversary of its broadcasting, the Public Health Service announces that since its inauguration on NOF, the service has grown, until today ten stations in nine states and one in Canada, are carrying its educational talks. It is unique, in that it is the only national Radio health service in the world. Its messages are not only heard by thousands, but are being used extensively in the foreign language press in both America and Europe. For the first time a call is being made for replies from listeners in to determine exactly how extensive is its scope and how its broadcasts are received.

A Radio club is being organized in Seattle, its members being amateurs who desire to become proficient in Radio telegraphy. The club proposes to establish a broadcasting station, to open a bureau for information on all Radio subjects and to undertake experimentation in the field of Radio.

FLEWELLING PRIZE CONTEST RULES

1. Contest is open to all Radiophans, whether or not they are subscribers to Radio Digest, Illustrated. The contest is open now and will close January 27 at midnight. Awards will be announced in the February 24 issue of this publication.

2. The object is to locate and award prizes on a competitive basis for the best Flewelling circuit receiving set entered.

3. Prizes are: First, $25.00; Second, $15.00; Third, $10.00; Fourth to Eighth (five prizes) inclusive, $5.00 each.

4. In event of a tie, equal prizes will be awarded both contestants.

5. Judges will be the Technical Staff of Radio Digest, Illustrated.

6. To enter the contest send working drawings and diagrams together with an article of from 1,500 to 2,500 words in length describing the making and operation of an actual Flewelling circuit receiving set. The contestant must build this set and test it before entering the contest. The article must tell: (a) how to make the set, (b) how to operate it, (c) helpful suggestions for getting maximum results, (d) actual airline broadcasting station receiving range using only one tube, first employing only an indoor aerial but no ground, second, using a ground but no aerial, and third, if available, using only a loop aerial. Other combinations and notations on the antenna system used will be considered in the award of prizes.

7. In sending material for consideration in the contest, exclusive publication rights are automatically given to Radio Digest, Illustrated. All articles published, but not awarded prizes, will be paid for at regular space rates. Unused manuscripts will be returned to contestants.

8. In deciding the winners of the contest the judges reserve the right to call for any set entered to be sent in for examination and test. Tubes, A and B batteries and phones will not be required in sets sent in for testing.

9. Manuscripts will be judged from the standpoints of neatness, clarity of expression, completeness, and actual tried success of the set described.

10. Originality in the use of various parts of apparatus other than shown by Radio Digest in the Flewelling circuit heretofore, is encouraged and even recommended. See Rule 6, however, for method to be used in determining the range.

Radiophone Arrives in Denmark

Washington, D. C.—The Radio telephone has arrived in Denmark, and experiments lately have been made with a view to bringing this method of communication to the attention of the public, according to a report from Consul General Letcher, at Copenhagen. The development of the Radio is being retarded, however, by laws forbidding the use of all amateur telephone and telegraph outfits. Many firms and institutions have endeavored to secure permission to operate sending and receiving stations but only certain schools, laboratories and educational institutions so far have been given the requisite authority and only for technical and educational purposes. It seems that nothing will be done until the proposed international conference on the regulations of Radio phone and telegraph communication, which will meet at Paris next month.

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Radio Digest, Illustrated, Volume 4, Number 2, published Chicago, Illinois, January 20, 1923. Published weekly by Radio Digest Publishing Company, 123 West Madison Street, Chicago, Illinois. Subscription rates, yearly, Five Dollars; Foreign, Six Dollars; single copies, Ten Cents. Entered as second-class matter April 27, 1922, at the postoffice at Chicago, Illinois, under the Act of March 3, 1879.

Looking Ahead

Answering Questions on Flewelling Circuit will be a feature of the January 27th issue of Radio Digest. Many of the difficulties encountered by experimenters with this wizard circuit will be explained simply in this article. Don't miss the next number.

Still More About Reflex Circuits will be given by Harry J. Marx, as a feature of the next issue. Many fans have reported good results with these double duty circuits. You will want to study them because they promise unusual possibilities of reception. Sure buy the January 27th number.

A-B-C Lessons for Radio Beginners, Chapter IV, in January 27th Digest, will give many interesting facts for the new and old fans. These articles by Arthur G. Mohaupt are proving popular because of their simplicity. Better order your copy from your newsstand today.

The Eighteenth Photo Diagram of the Standard Receiving Sets shown only by the Digest will appear next week. The Aeriala will be explained clearly in photo diagram. You'll want to see this one because of its simplicity.

Story of a Well Known Broadcasting Station will be part of the Digest next issue. A human interest tale of a station you have heard. Guess which one?

The Only One Sure Fire Broadcasting Schedule will be published as usual with part one in January 27th number. Many corrections have been made. Keep your list up-to-date. This service is original with Radio Digest. Imitation is the sincerest form of flattery.

IMPROVE CHECK ON WEATHER BY RADIO

MORE ACCURATE REPORTS BY FORECAST EXCHANGE

U. S. to Get Observations from Canada, Mexico, Europe, Pacific Islands and Far East

WASHINGTON.—More accurate weather forecasting is to be made possible this year through international exchanges of reports by Radio, it was learned at the Department of Agriculture.

"Arrangements have been made for exchanging observations from Canada, Mexico, 22 European countries, the Pacific Islands, and the Far East," said Charles F. Marvin, chief of the weather bureau.

Government statistics show that forecasts both of weather and temperature have averaged better than 90 per cent accuracy for the past 10 years. The rapid development of the Radio in the past year has made increasing certainty possible.

Radio Aids Disseminating Reports

"Radio telegraphy as a medium for the dissemination of weather forecasts, warnings and information to agricultural interests," said Mr. Marvin, "became a realization during the past year. With the introduction of Radiophony the broadcasting of information over the interior has increased enormously."

The introduction of Radiophony has made it possible for anyone to receive messages in spoken words instead of a code. A year ago the daily forecasts of the weather bureau were being broadcast from 12 Radio stations in only seven States, and principally by Radio telegraphy. On July 1, 1922, 98 stations in 35 States were broadcasting daily weather forecasts and warnings.

Weather Bureau Has No Stations

The weather bureau does not own or operate any Radio equipment. The distribution work is accomplished through plants operated by other government agencies, corporations and private individuals, and this without expense to the weather bureau.

To avoid unnecessary crowding of air and interference with schedules, only two stations are licensed to broadcast in any city or community.

Formerly many farmers were so located as to be inaccessible by newspapers or telegraph. Telephone lines extended into rural communities overcame some, but not all of this difficulty. To benefit by Radio telegraphy the code has to be learned. The marvelous advance in Radiophony has changed this situation, for thousands of farmers have installed receiving apparatus during the past year and are now obtaining forecasts and warnings easily and promptly.

Air to Transmit Motion Pictures

Time Is Near When We Will See a Movie at Home

Will moving pictures be transmitted by Radio? Will an event that is happening on one side of the world be reproduced simultaneously on the other side?

Back of these questions there lies one of the most astounding possibilities of the immediate future. The thought has not been conjured up by some imaginative brain, but as a matter of fact is based on some very careful experiments which show remarkable promise of success within a shorter time than is really popularly believed.

We are all more or less familiar in a general way with the fact that photographs can be transmitted over distances by means of telegraph lines, and even through the instrumentality of Radio. In this case, however, we need the invention of a camera to take the photograph in the first place. Moreover, the photographic plate has to be developed and a print made before the photo-telegraphic process can be put into operation.

Hungarian Performs Remarkable Results

The new art involves the transmission of a complete vision just as it is occurring at some distant point. In this connection some remarkable experiments have just been concluded by Nicholas Langer, a Hungarian scientist, who has probably produced the rudiments of a successful system. Although the practical development of this may take several years, there is no question that an auspicious start has been made.

His own views, after outlining the difficulties that will have to be overcome, were expressed in the following words: "Personally, I look forward with confidence to the time when we shall not only speak with, but also see, those with whom we carry on telephone or Radiophone conversations, and the distribution of motion picture films will be superseded by the direct transmission from a central studio."

PREMIER OF OPERA IN ENGLISH ON AIR

FANS HEAR "SNOW BIRD" SUNG FIRST TIME

KYW Broadcasts New Fanciful "Dream Production" Starring American Singers

By Vera Brady Shipman

CHICAGO.—The leading Radio feature of the ninth week of the Chicago Civic Opera association was the broadcasting Saturday, January 13, of a world premiere of an American opera in English, sung by Americans in the leading roles. The opera was "The Snow Bird," a fanciful dream opera in one act with a gorgeous ballet in which the little Snow Bird dreams of the conquest of Love by Hate.

The composer, Theodore Stearns, is an American, and the title roles were sung by Mary MacCormic, the former Texan protege of Mary Garden, and Charles Marshall, heralded as the greatest American tenor. Cotreuil, Mojica and Luka sang the lesser roles adequately, with Polacco conducting. The dream ballet was beautifully enacted under Adolph Bolm's artistic direction.

Opera Greeted with Ovations

Occasionally a new American opera rises and holds its head up for a while. Will it last? Will this "Snow Bird" last or are its lovely themes to fade like many predecessors? No one can tell. "The Snow Bird" is a pensive version of a pretty theme. It was acclaimed Saturday night as a new arrival in American opera. Ovations were given the singers and the composer. "The Snow Bird" was broadcast by Station KYW direct from the Auditorium theater. The invisible audience heard a world premiere for only the effort of tuning in.

Theme of Opera

The story is of a little Chinese shipwrecked girl rescued by a hermit on a lonely island. After his tales of the prince-owner of the amulet which he wears around his neck, she falls asleep and in her dream the lovely ballet is performed. When she awakens and comes forth, she is shot with an arrow by an archer mistaking her for the witch who had hidden the prince. The hermit discloses himself as the prince, but too late. The Little Snow Bird has reached her Land O' Dreams and is in perfect peace.

This one act fantasy was followed by a splendid performance of "Pagliacci" by Marshall and Mary MacCormic, as in the previous opera. Mary MacCormic's "Nedda" has been greatly feted and Marshall's "Canio" is a truly worthy presentation. Since the death of Caruso (this is a bromide but it is TRUE) Marshall is acknowledged by many to be the greatest living tenor. His "Lament" was true to the form of the magnificent Caruso.

HERO STORIES, FAIRY TALES FOR WGI KIDS

Special Hour Set Aside for Girl and Boy Scouts

MEDFORD HILLSIDE, MASS.—Now Radio has a children's hour. From 5 to 5:30 p. m., Eastern time (daily except Saturday) has been set aside at Station WGI here to entertain the children. On Monday there are hero and adventure stories for boys; on Tuesday, fairy tales for the little ones; on Wednesday, animal stories; on Thursday, stories of the world we live in are told, taking themes from land and sea that answer many questions in the minds of growing boys and girls; Friday evening is for the girls of Girl Scout age; Sunday afternoon finds Bible stories and various old myths and legends on the program. A unique feature of this broadcast is that organ music accompanies every reading except on Thursday. The younger members of the Radio audiences are delighted with this new feature of the program.

BRITAIN HEARS "FILM VOICE" OF COOLIDGE

WASHINGTON. — Vice President Coolidge has just received word from the General Electric company, which broadcast his Christmas speech by means of a new invention, the Pallophotophone, that the speech was heard in England, as well as at numerous points on the Pacific coast of this country. The speech was film-recorded several days before broadcasting, and then broadcast from the film.

ARTS BROADCASTS TO TAKE OPERA'S PLACE

CHICAGO.—After the close of the Grand Opera season at the Auditorium Theater, Westinghouse Station KYW will broadcast a series of talks by noted authorities on subjects concerning arts, literature, science, economics, civics and international relations. This service will be a new feature of KYW's broadcasting schedule and is intended to take the place of the opera productions.

SNOW BIRD FLIES IN ETHER

Mary MacCormic, American soprano of the Chicago Civic Opera Company, who sang the title role in "The Snow Bird," an opera in English by Theodore Stearns, in its world premier Saturday evening, January 13, at the Auditorium, Chicago. "The Snow Bird" is a fanciful one act opera with ballet. "Pagliacci" was the supplemented double bill with Miss MacCormic and Charles Marshall. The operas were broadcast by Station KYW

Geo. Marshall Hoole Photo

Give Antioch College Complete Transmitter

Rike-Kumler Company Donors of Set—Has Big Range

YELLOW SPRINGS, O.—The Rike-Kumler company, of Dayton, gave a complete Radio broadcasting station to Antioch college, of this place, the gift being a special Christmas present to President Morgan. The station call is WFO. The plant has a sending radius of between one and two thousand miles and has already been heard in Dallas, Texas, and in the western part of North Dakota.

Kelley Hall, of the college, has been fitted as a Radio studio and the outfit placed in charge of Professor Frayne, head of the school's physics department. An extension course is planned.

TO RADIO VOICE OF SINGER TO EUROPE

WOR WILL TRY TO SEND ENTIRE CONCERT ACROSS

Edith Bennett Will Sing in Three Languages for Unique Trans-Atlantic Program

NEWARK, N. J.—The very first concerted attempt to Radiophone a complete recital by an eminent artist to Europe will be made by Bamberger Station WOR of this city on or about January 30th.

On several recent occasions Radio operators on the Continent have reported that they were able to hear portions of the regular musical programs sent out by the American broadcasting stations and the possibility of sending Radio concerts from America to Europe has been pretty well proven. However, this will be the initial attempt to send over a classic program in its entirety with the co-operation of a score or more of the most important European receiving stations.

Continental Fans Co-operate

The leading Radio authorities of the Continent are to assist in the coming test and several French, Italian and Belgian Radio clubs expect to be able to receive the program for assembled audiences. Arrangements have been made to distribute elaborate souvenir programs at these affairs.

Several noted foreign music critics will make serious efforts to write regular musical criticisms of the world's first intercontinental musicale for their respective publications.

As the Bamberger station is heard distinctly in Panama and on the Pacific Coast, it is practically a certainty that the music will be plainly audible in all parts of North America. It is also believed that there will be a vast army of listeners in on board ships on the high seas.

To Adjust Set for But One Voice

Only one singer will be engaged for this memorable concert so that but one voice will have to be considered in making the necessary adjustments of the delicate, but powerful, sending apparatus. The artist to be so honored is Miss Edith Bennett, the young American soprano who was acclaimed as the greatest musical find of last season by the leading critics.

Miss Bennett was selected from a list of over three hundred recitalists of international reputation, because of the rare beauty, power and flexibility of her voice, her exquisite artistry and her perfect diction in all languages. The chairman of the judging committee stated that in his estimation Miss Bennett has the finest Radio voice in the world.

To Sing in Three Languages

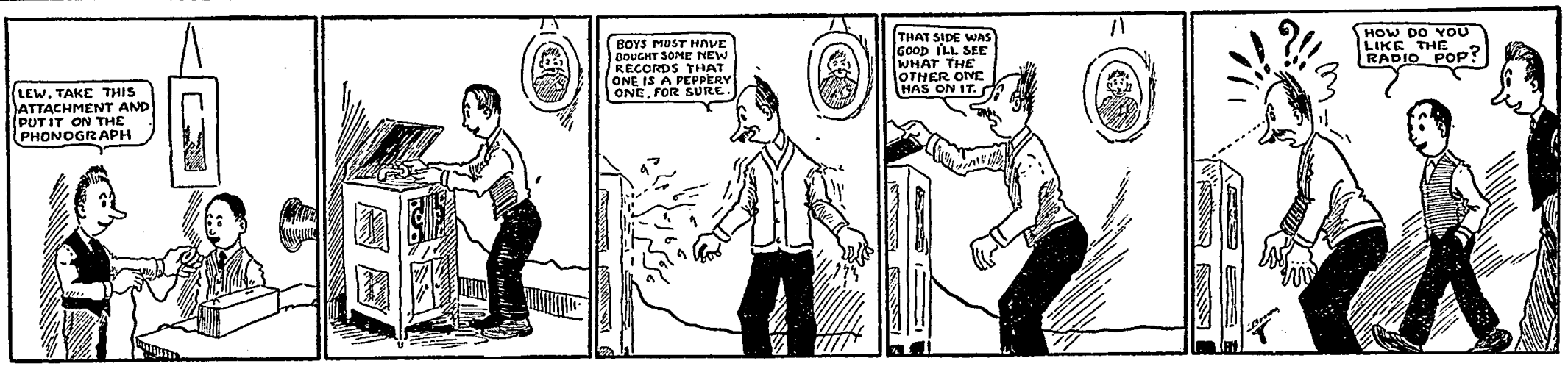
The exact date of the unique concert will be decided upon by the co-operating committee, early next week. The program will be sung in French, Italian and English.

The overseas test made by Sir Thomas Lipton at Station WOR some time ago was apparently a great success. Several French and English operators reported that they heard Sir Thomas' speech clearly and the eminent sportsman's voice has but very little natural carrying power. According to several able Radio experts here, Miss Bennett's coming concert will be heard as distinctly in Europe as it will be in Manhattan.

Wounded Vets Appreciate Set

SPRINGFIELD, O.—Members of the Radio committee of the Woman's Auxiliary of George Cultive Post of the American Legion, Springfield, have received much appreciation from the ex-service men in the National Soldiers' home in Dayton for the gift of a Radio receiving set which was sent the home on Christmas Day by the Legion women. "Please thank everyone who helped with this wonderful gift," writes one man. "It surely means a lot to know that we are not forgotten down here." The men in the home are all suffering from wounds, gas and shell shock.

THE ANTENNA BROTHERS — Spir L. and Lew P. — Call up the Announcer, Pa.



RADIO CORPORATION NOW GRABBING AIR?

KICK REGISTERED BEFORE HOUSE COMMITTEE

Alleges R.C.A. Is Becoming World-Wide Monopoly of Communication—Want Weak Law?

(By L. M. Lamm, Special Correspondent)

WASHINGTON.—Representations that Radio, communication in this country and between the United States and a number of important nations is likely to become a great monopoly dominated solely by the Radio Corporation of America have been made to the House committee on merchant marine, which is now considering the Kellogg-White bill for more efficient Radio regulation.

The Radio corporation, now headed by General Harbord, formerly assistant chief of staff of the army, is one of the most powerful aggregations of capital in the world.

Want Control of Air

The activities of the Radio corporation, are alleged to be in the directon of establishing a Radio communication monopoly through control of patents, through exclusive traffic agreements and through direct governmental grants and provisions, conferring exclusive rights to valuable bands of wave lengths.

The Radio corporation is reported to have concluded a large number of exclusive contracts which will prevent any serious competition in domestic and foreign Radio communication. In the case of a country where Radio is a government monopoly, such an exclusive contract would give the Radio corporation a monopoly of Radio communication from that country to the United States. The plans of the R.C.A. encircle the globe.

Law May Not Protect Against Grab

In the Kellogg-White bill there is a provision that the Secretary of Commerce may refuse a license to an applicant "monopolizing or seeking to monopolize Radio communication, directly or indirectly, through the control of the manufacture or sale of Radio apparatus or by any other means."

It is further provided that the granting of a license shall not stop the United States from prosecuting a license for "violation of the law against monopolies or restraint of trade."

It is contended that the provisions are not sufficiently broad to outlaw exclusive traffic agreements. Moreover, the R.C.A. "higher-ups" have proposed to the committee that the prosecution provision be narrowed by making it apply to "unlawful" monopoly only. At the present writing, it is said bare-faced indications are that the R.C.A. is making a direct attempt to gain a rigid monopoly of Radio communication traffic.

Egypt and United States to Swap Market Figures

WASHINGTON.—Arrangements have been made for the interchange of crop reports on cotton and wheat in the United States and Egypt. As rapidly as crop reports on acreage and forecasts are available in each country the news will be dispatched at once by cable or Radio to the other country. Immediately on receipt of the Egyptian news, the reports will be broadcast throughout the United States by telegraph and Radio. The new plan is expected to cut to a minimum the time formerly consumed in placing important crop news in the hands of American farmers.

WHAS, Proud of Record, Hints Transmission Secrets

LOUISVILLE, Ky.—Those in charge of WHAS, station of the Louisville Courier Journal and Times, which went into action July 18 of last year, are rather proud of the record of the station and of its reputation for clarity of reception which is a strong enough feature of this station to make it class as one of the leading stations of the country. It is claimed that while many other stations possess the same style 500-watt transmitter, there are secrets of transmission which have been developed at WHAS.

Open Plant to Students

COLUMBUS, O.—"Open nights" at which time Ohio State university students may volunteer to furnish part of the Radio broadcasting programs have been planned on every Thursday for Station WEAO, of the university. Singers, lecturers and all kinds of entertainers are desired.

RECEIVING RECORDS CONTEST

FORTY-SEVEN new records for DX reception were recorded in the Receiving Records Contest last week. To the uninitiated Radiophan "DX" is purely "bug" talk for "long distance." And the list of records becomes "DXer" and "DXer" every week.

In fact, unless the broadcasting stations quit increasing their power and the amateurs stop building extra-efficient sets, the great majority of records will soon reach over 2,000 miles. One thousand miles is hardly to be considered an unusual feat any longer.

Many enthusiasts using only single-tube regenerative sets, have written the Contest Editor complaining that they are at a disadvantage without some handicap being provided to equalize single-tube sets with extra-sensitive multi-tube sets. However, without giving detailed figures, it is safe to say that over ninety per cent of all the records published, are made on sets boasting only one tube.

The rules of the contest, together with all records made, appeared last week. To acquaint newcomers the rules are given again below.

Rules to Remember

The rules to follow in the contest are but few and easily followed. They are:

1. Amateurs who are able to beat the records given, or who can claim with good evidence, distance receiving records of 1,000 statute miles or more for Radiophone broadcasting stations found in the "Broadcasting Station Directory," page 8, of three consecutive issues, may send in such records.

2. Distances must be measured AIR-LINE and expressed in statute miles. Disregard of this rule may cause amateurs to be declared ineligible.

3. Call signals of station heard, its location and the mileage, as defined in Rule 2, must be given in reporting record. Otherwise record will not be considered.

4. Distances are verified by the contest department of this publication, using a Geo. F. Cram Co. standard Radio map of the United States. Owing to much variance in maps, the distances are only given to the nearest 25 miles and are claimed accurate only within 50 miles.

5. There are no prizes awarded. The only compensation record holders receive is the distinction of recognition through the columns of RADIO DIGEST.

The records made last week are as follows:

Station—Miles Away—Who Heard It

CFCF—1225, C. C. Sawyer, Liberal, Kans.
CHBC—2450, S. S. Florence B. Phillips.
CHCQ—1300, W. Easley, Enid, Okla.
CJCA—1650, Kenneth Meyer, Greensburg, Ind.
KDYR—2300, F. H. Peran, Oswego, N. Y.
KDZK—1300, Harold Canon, Storm Lake, Iowa.
KFAD—1125, Dr. W. C. Wolverton, Linton, N. D.
KFCF—1300, Chas. N. Schwab, Grinnell, Iowa.
KFDA—2200, John F. Dunn, Yonkers, N. Y.
KFDB—1850, J. C. Adamson, Chicago, Ill.
KFI—2150, M. C. Ridenour, Kingwood, W. Va.
KFV—1200, C. C. Sawyer, Liberal, Kans.
KGW—2325, Hugh Meetze, Manassas, Va.
KSD—1725, Wm. Schauer, Daly City, Calif.
KWH—2250, Hugh Meetze, Manassas, Va.
KYY—2250, W. Alan, Butler, Pa.
KZM—1475, Geo. L. Ritz, Rockwell City, Iowa.
WAAL—1550, Richard R. Martindale, Los Angeles, Calif.
WBAG—1125, M. L. Johnson, Atchison, Kans.
WBAM—1125, Dr. W. C. Wolverton, Linton, N. D.
WCAE—1100, Mrs. Nancy L. Wolverton, Linton, N. D.
WCAR—1200, Billy Withington, Jackson, Mich.
WCJ—1150, M. L. Johnson, Atchison, Kans.
WCK—1025, D. H. Harris, Marlboro, Mass.
WDAV—1075, W. H. Rhodes, Middletown, Pa.
WDY—2225, Nestor Barrett, Republic, Wash.
WFAF—1075, Harold Canon, Storm Lake, Iowa.
WGAD—2475, Geo. L. Ritz, Rockwell City, Iowa.
WHAZ—2200, Percy Severance, Pullman, Wash.
WKAL—1175, Mrs. Nancy L. Wolverton, Linton, N. D.
WKY—1250, F. H. Peran, Oswego, N. Y.
WLAG—1525, D. O. Wolfe, San Jose, Calif.
WLAL—1025, Hugh Meetze, Manassas, Va.
WLK—1950, Wm. Schauer, Daly City, Calif.
WLW—1875, Richard R. Martindale, Los Angeles, Calif.
WMAT—1600, Perkins Benneyan, Fresno, Calif.
WNAC—1275, C. M. Bennett, Aurora, S. D.
WOR—2100, H. H. McMullen, Prescott, Ariz.
WPAC—1075, Hugh Meetze, Manassas, Va.
WSAV—1125, Billy Withington, Jackson, Mich.
WVP—1150, C. M. Bennett, Aurora, S. D.

Light Keeper in Alaska Sends Phonograph Music

Transmits Tunes from Sound Box of Instrument

WASHINGTON.—The keeper of the Scotch Cap Light Station, Alaska, has written the following letter to the superintendent of lighthouses at Ketchikan, Alaska:

"I thought I would write and let you know how things are at the station. We have had some trouble with the phones here and at Cape Sarichef. For a while we got no signals from Cape Sarichef until we found and remedied the trouble caused by wrong connection. Some time afterwards our transmission got out of order. It took us a week to correct it, and now Cape Sarichef gets our signals O.K. It may interest you to know that I have done some successful broadcasting from here by putting the transmitter inside the sound box of the phonograph. They could hear the music very plainly on the cape."

COLUMBUS DISPATCH HAS MUSIC CONTEST

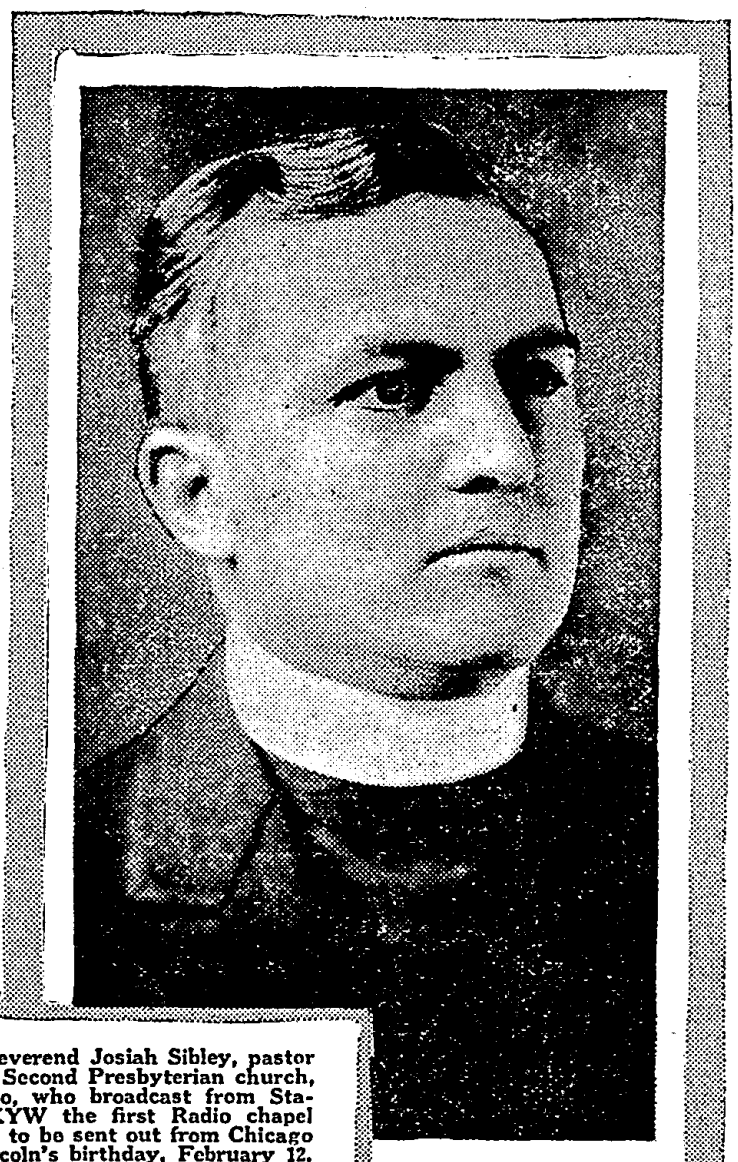
Broadcasts Selections for Fans to Guess Titles

COLUMBUS, O.—The Columbus Dispatch is conducting a series of Radio Music Memory contests in conjunction with Station WBAV of the Erner & Hopkins company. Now and then the station broadcasts a number of selections without announcing the titles. The Radiophans with receiving sets then guess the titles of the songs and selections given. Seventeen prizes are to be awarded when the contests close and fans who fail on one of the contests are eligible to compete in others. In a recent "Old Melodies" contest, the announcer gave a short resume of the history of each selection in an effort to aid the listener in-contestants.

Plans are on foot to distribute news in Sweden by Radiophone. Experiments are being made from Stockholm as a center.

AIR WAVES HELP SPREAD GOSPEL

Bishop Francis J. McConnell, head of the Pittsburgh area of the Methodist Episcopal church, who addressed the Sunday Evening Club on January 14. Bishop McConnell returned recently from the Orient. This service was broadcast direct from Orchestra Hall by Station KYW.



The Reverend Josiah Sibley, pastor of the Second Presbyterian church, Chicago, who broadcast from Station KYW the first Radio chapel service to be sent out from Chicago on Lincoln's birthday, February 12, 1922.

The Reverend Gardner A. MacWhorter, priest in charge of St. Edmund's Episcopal church, Chicago, broadcasting the Christmas midnight service from Station KYW. Reverend MacWhorter is in charge of the KYW studio chapel service every Sunday afternoon.

Chicago Clergy Joins in Recognizing Value of Radio Sermons

Fans Hear Huge Choir

Services of Famous Sunday Evening Club and KYW Wins Pastors' Praise

By Vera Brady Shipman

It was a Sunday afternoon in August in the north woods. The Radio was turned in on chapel services from WDAF, the Kansas City Star. An old Swedish farmer, who had probably not been inside a church for many years, came with his family a distance of thirty miles to make a call. As in the north woods the Radio was tuned, prayer came through the ether, the man who lived in the woods stood with hat in hand, with bowed head, his lips moving as though in his own supplication. His face was radiant. And the word of God that afternoon reached a depth which is fathomless. A soul of a man apart from his Maker, was in communion.

And Jesus said, "Inasmuch as ye do it unto the least of these, ye do it unto Me."

Chicago Sunday Evening Club on Air

And now Chicago's nation-famous Sunday Evening Club service is being broadcasted direct from Orchestra Hall each week. The audience of about 1,500 people listens to the word of God and supplication, to the great organ, to the choir of a hundred voices, to the speaker of the day—a man of international fame introduced by the club's president—in this church of the man downtown.

But the vast invisible audience which listens in from Kokomo, from Denver or from Plainville can never be counted. In every group listening in on a Radio set, the gospel is heard, religious spirit fills the air tempororily and the unbeliever who heards the Lord's prayer as he tunes in from a Dakota ranch house, recalls the prayer of his childhood.

KYW Begins Three Service-Sunday

Station KYW Chicago began broadcasting three services on Sunday, December 24. The plan includes the morning service direct from Central Church, Dr. Frederick Shannon officiating, chapel services at the broadcasting station at three o'clock in the afternoon, directed by some well-known ministers who bring their choir and organist with them, and in the evening, the Sunday Evening Club direct from Orchestra Hall. Somewhere, somehow, a soul is being reached by some bit of one of these services.

The man who ridicules, or the self asserted atheist who listens in to such a service, cannot but be impressed with its seriousness. There are those who will say: "You are not worshipping in your church when you direct services from a broadcasting station."

Defends Broadcast Church Service

The Reverend Gardner A. MacWhorter, priest in charge of St. Edmunds Episcopal church, Chicago, gives this portion of the prayer book service as his authority for conducting services of this kind:

"It is meet, right and our bounden duty that we should at all times and at all places give thanks unto Thee, Oh Lord Almighty and Everlasting God."

"And that 'IN ALL PLACES' is my church authority for doing what I think is a broader field of ministry than is often attempted," says Reverend MacWhorter.

The Reverend was one of the first chicago clergymen to be enlisted in the cause of Radio church extension. As former religious editor of the Chicago Tribune, for six years priest in charge at St. Chrysostom's and for the past year in St. Edmund's, Chicago, Reverend MacWhorter's valuable aid has been solicited and used advantageously many times, both for himself and enlisting the services of his colleagues in other churches.

Clergy Took Slowly to Radio

"It was very difficult," says Reverend MacWhorter, "in the beginning to arrange for ministers for services two Sundays ahead. The clergy was afraid of Radio. It would surely keep the congregation at home; it would take away completely the collection. The man who could hear it at home would not bother to come and would possibly keep others away. But the ministers who wavered began to see that that kind of man was in the minority. If he were interested at all, he would be helped by the service. If he were a scoffer, he wouldn't go to church anyway. If he were a church-going man, Radio would have no appeal as a substitution for the nearness of the house of worship."

The spark of interest in a service grows into a full fledged desire for more. The man may or may not attend church as a result of the service. But he may find something in it to apply to himself, and he tunes in for more.

Denomination Doesn't Count in Ether

The Reverend Josiah Sibley, pastor of the Second Presbyterian church, Chicago, was the first minister to broadcast a sermon from a Chicago station when KYW broadcasted on Lincoln's birthday, February 12, 1922.

Reverend Sibley says, "Radio sermons are an influence for good. Letters come from Tennessee to Dakota telling of the good it does the listener in. And the public is gradually interested in the novelty. The listener in can get an equally valuable message from Protestant, Catholic or Jewish ministers. The religious message to be broadcast today is that of Christianity, which is greater than any denomination."

Doubts Stimulating Effect of Broadcasts

The Reverend John Thompson, pastor of the First Methodist church, Chicago, the first denomination in the world to erect a church skyscraper, was an early Radio enthusiast.

"Whether it is stimulating church attendance," says Dr. Thompson, "may to some minds be an open question. I have already heard more than one man say that he could stay at home and hear the entire service. He thinks he has obviated the absolute necessity of attending church. Such men overlook all advantages of united and plural worship. Radio can never take the place in religious life of regular church service. I give it as my honest opinion, on the whole, broadcasting gives the invisible congregation listening in, a fine conception of what the church stads for, and a better idea of value of pulpit ministrations. I think it will convey to the minds of non church going public, a clearer vision of the larger place that worship and preaching are meant to fill in human life. It may absolutely stimulate interest in religion and church as to lead to their becoming regular worshippers and loyal supporters of the church in all its manifold ministries. This would be especially true if the type of service and characters of ministers could be varied as much as possible. It would furnish different angles of vision."

Is Unseen Power for Good

Dr. William H. Carwardine, religious editor of the Chicago Herald-Examiner, says, "The Radio will never take the place of church. But it will be more influential as an unseen power for good than any other factor outside the house of worship. The Radio, we must consider, is in many homes which are not religious. In these, listening in on church services is bound to have an effect upon thinking minds."

The Reverend Charles E. Shaw, pastor of the Woodlawn Park Presbyterian church, was slower to become a convert to this new phase of service. "I have debated it for a long time," says Reverend Shaw, "and I have concluded that the general influence is for good. Many non church going Radio listeners in, will tune in to hear church services from curiosity. If these services are not too long, great good can be derived from every one."

And so the larger service is carried on, and the message of God goes marching on through the air, caught at various points by some enthusiast who tunes his set in on a church service.

KGB Scores in Giving Entire Messiah Oratorio

Choir of 30 Sing Handel's Composition at Tacoma Station

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The choir was that of the Westminster Presbyterian church, one of the largest in Tacoma, and sang under the direction of Raymond D. Holmes, well-known musical director. Eight men and women were employed as incidental soloists. As far as can be ascertained, this is the first time on record that an entire oratorio of such size and caliber has been given via Radio.

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WASHINGTON.—The interest aroused by the announcement of the formation of an amateur Radio club in the Bureau of Lighthouses has been very gratifying. A number of responses have been received to date and more are coming in every mail. One member said that the amount invested in a Radio set "brings in more pleasure to oneself and family than the same amount spent in giving the movies the once over." Then, too, the "movies" are not readily available to men in the lighthouse service.

Harpist Performs at WOR

NEWARK, N. J.—Philip Sevasta, harpist, reappeared at L. Bamberger & Company's station here, WOR, Friday evening, January 12. Mr. Sevasta is one of the foremost harpists in this country and he plays, as music critics have said, "with a master's touch."

EXPLAINS FEDERAL R. F. RECEIVING SET

DX TYPE 58 UNIT BRINGS IN DISTANT STATIONS

Apparatus Comprises One Step Radio, Detector and One Step Audio Amplification

(See Photo-Diagram on Page Seven)

The standard receiving set illustrated on page seven is a Federal DX Type 58 Radio Receiver, manufactured by the Federal Telephone and Telegraph company of Buffalo, New York. It comprises a tuned primary and tuned secondary circuit, one stage of Radio frequency amplification, a detector and two stages of audio frequency amplification. Since the receiver is provided with properly designed coupled circuits it is extremely selective and, in addition, is very efficient. Other adjustments provide for change in coupling and control of signal strength.

While this receiver will operate with a wide variety of antennae, it is designed particularly for the average experimenter's antenna; for example, one comprised of from two to four wires fifty to sixty feet in length and at a height of thirty or more feet above the ground.

A low resistance lead direct to the ground is essential. Good electrical connection should be made to the water supply main, or equivalent grounding point, and contact should be made by means of a ground clamp securely bolted to the metal surface, which has previously been scraped clean of all dirt and corrosion.

Description of Connections

Since all the amplifying stages are included in the same cabinet with the detector, the description of the connections is considerably simplified. It will be noticed that all the battery connections are concentrated in four binding posts at the base of the panel. Starting from the left, the first is for the negative filament battery connection and is marked —A, the second is for the positive filament battery and the negative plate battery and is marked +A—B. The third post is for the positive plate battery tapped at 22.5 volts and is marked +B DET. The fourth post is for the positive plate battery with a total of 67.5 volts and is marked +B AMP.

The two binding posts on the left side of the panel are for the antenna and ground connections. The upper one is marked ANT and the lower one GND. The two posts in the upper right corner of the panel are for auxiliary output connections, operating in conjunction with the jacks.

Tuning Controls

The knob of the upper tap switch on the left side controls the rough adjustment of the primary wave length, while the one below it is for the fine wave length adjustment. The large lower dial in the center is used to adjust the wave length of the secondary circuit. The smaller dial just above it controls the coupling between the two circuits for obtaining the point of resonance and most distinct reception.

The knob to the right of the large dial marked AMP INCREASE controls the grid potential of the Radio frequency amplifier tube, and for this reason is one of the most important controls for the best reception of distant stations. The knob to the right and a little above, marked DET INCREASE, controls the detector tube filament and is also a rather critical control. The one to the right and a little below this, marked R.F. INCREASE, controls the filament of the Radio frequency amplifier tube, while the one on the extreme right controls the filament lighting of the two

(Continued on page 15)

NAT Gives More Forecasts

NEW ORLEANS.—Additional weather forecasts and warnings were given their initial broadcast recently from NAT, the naval Radio station at New Orleans. The new broadcasts, twice daily, on a wave of 1,832 meters, are for the district included in Louisiana, Arkansas, Oklahoma and Texas, and comprise weather forecasts, river conditions, and a summary of the conditions over the United States.

Book Reviews

Vacuum Tube Receivers. By O. F. Heslar. A book that tells how to make a simple set. How to make the cabinet. It includes a 27 by 36-inch layout blue print. 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. Prices, $1.00.

Radio Receivers for Beginners. By Snodgrass and Camp. Answers the universal question, "How can I receive Radio?" Price, $1.00.

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication serivce of the Navy. It is an instruction book for Radio schools. Price, $2.50.

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.

Radio Communication. By John Mills. The fundamental principles and methods upon which recent developments are based are emphasized. The vacuum tube is treated in a simple, fundamental and up-to-date manner. Present methods and tendencies of the art are explained in a chapter which is non-mathematical. Price, $2.00.

The A B C Vacuum Tubes. By E. H. Lewis. Is a book for beginners who have no knowledge of either Radio or electricity and sets forth the elementary principles of theory and operation of the vacuum tube. No attempt has been made in this book to describe all the possible circuit arrangements, but those shown may serve as suggestions to experimenters who desire to evolve their own circuits. Price, $1.00.

Experimental Wireless Stations. By S. E. Edelman. This book assumes that the reader has some knowledge of fundamental electricity and mathematics and is a readily understandable text for beginners in the art of Radio communication who desire to start with the elements. Earlier editions of this book were published during the war. The 1922 edition has been revised and enlarged so as to cover the progress made in the last few years. Price, $3.00.

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. Book Department, Radio Digest Illustrated, 123 W. Madison, St., Chicago, Ill.

New Broadcasters for Week

CHICAGO.—During the past week eight plants were licensed to broadcast on 360 meters' wave length. The list of new stations follows:

KFEL, Winner Radio Corp., Denver, Colo.; KFFQ, Markshoffel Motor Co., Colorado Springs, Colo.; KFFJ, Jenkins Furniture Co., Boise, Idaho; WQAE, Moore Radio News Station, Springfield, Vt.; WQAN, Scranton Times, Scranton, Pa.; WQAY, Gaston Music & Furniture Co., Hastings, Neb.; WRAO, Radio Service Co., St. Louis, Mo.; WSAT, The Plainview Electric Co., Plainview, Tex.

A card was recently received by Station WGY, of Schenectady, N. Y., from Maui, Hawaii, saying that signals from the former place had been clearly heard at the latter.

NAVY WILL FIGHT LICENSING: DENBY

"NO COMMERCIAL PERMITS FOR US," HE SAYS

Naval Stations Not Commercial, Secretary Declares in Stand Against Hoover

WASHINGTON.—"The navy will fight very vigorously any attempt to bring its Radio operators under commercial license."

This was Secretary of Navy Denby's declaration following the statement of Secretary of Commerce Hoover before the House of Representatives merchant marine committee, urging that all Radio operators, including those of the navy, be compelled to take out licenses from the commerce department under the proposed Radio bill.

Secretary Hoover declared that inasmuch as the navy department was accepting commercial business, it should not be an "outlaw" among other broadcasting agencies and should conform to the general regulations proposed in the Kellogg-White amendment to the Radio act of 1910.

To Be Settled Amicably

"If Secretary Hoover urged the licensing of naval Radio operators under any condition, he must have acted upon misinformation as to the status of such operators," said Secretary Denby. "We talked over the telephone about it and are to have a conference about it soon which will doubtless result in an agreement.

"We take commercial business only when it is necessary, and are gradually eliminating it, for we do not want it. Under no circumstances will we consent to the licensing of navy men by any other department of the government. They are part of the naval forces of the United States and subject to orders and regulation only by the navy department."

Bill in Committee Now

The Radio bill has been referred to a sub-committee of the House committee on merchant marine. The sub-committee is composed of the following:

Representative White, of Maine, chairman; and Representatives Chindblom, of Illinois; Rosenblum, of West Virginia; Hogan, of New York; Bankhead, of Alabama; Davis, of Tennessee, and Bland, of Virginia.

The sub-committee was to meet soon in an effort to get the badly needed quick action on the bill.

Washington Scribes Get Set

WASHINGTON.—One of the first of the latest type of Radio receiving sets made by one of the large electrical companies has been presented to the National Press Club in Washington. With this new set, which has a wide wave length range and long reception radius, many of the Washington correspondents whose papers broadcast, now tune in the "home station."

Broadcasters in the Middle West and South have been heard since the new set has been installed. Theodore Tiller, well-known representative of the Atlanta Journal, which operates WSB, was much disappointed recently when told that he was "paged" by Radio the night before. His paper put on a special program for him, announcing it by Radio and calling for him to listen in. He was not in the club, however, and missed out.

SHAKESPEARIAN STAR PERFORMS FOR RADIO

NEWARK, N. J.—Moffat Johnston, who is now playing the leading role in Brock Pemberton's production, "Six Characters in Search of an Author," well-known Shakespearian actor, made a broadcast from Station WOR on January 10. Mr. Johnston played at 14 Shakespearian Festivals at Stratford-on-Avon, before the World War. His first appearance in New York was in "Back to Methuselah."

MINERS ISOLATED IN ARCTIC GET AIR WAVES

Radio Entertains 185 Men Working 700 Miles North of "Circle"

GOTHENBURG, SWEDEN.—One hundred and eighty-five Swedish coal miners are now cut off from the world digging coal in a mine 700 miles north of the Arctic circle. They are on the island of Spitzbergen, north of Sweden in the Sea of Greenland, and the sun will not again appear above their horizon until next April. They have plenty of supplies and plenty of fuel, and their camps and mines will be lighted by electricity through the long arctic night. One of their principal diversions is the phonograph, and when they get tired of reading last year's newspapers, they can receive the latest world news through their own Radio station.

The Swedish company for which these men work shipped 72,000 tons of coal into Sweden from Spitzbergen during last summer. But now nothing can be moved until navigation opens again in the spring.

1923 to Be Good to Farmers

COLUMBUS, O.—Giving his first Radio address through Station WPAL of the Superior Radio & Telephone Equipment Company last week, Prof. B. A. Hibbard, of the department of agricultural economics of the University of Wisconsin, urged farmers of the Buckeye state to look forward with greater optimism for what 1923 will bring them.

For the first time in history, airplane races have been reported by Radio. The National Airplane Races, held in Detroit, were described from the cockpit of a high-powered flying boat, which had been equipped with a 50-watt transmitting set.

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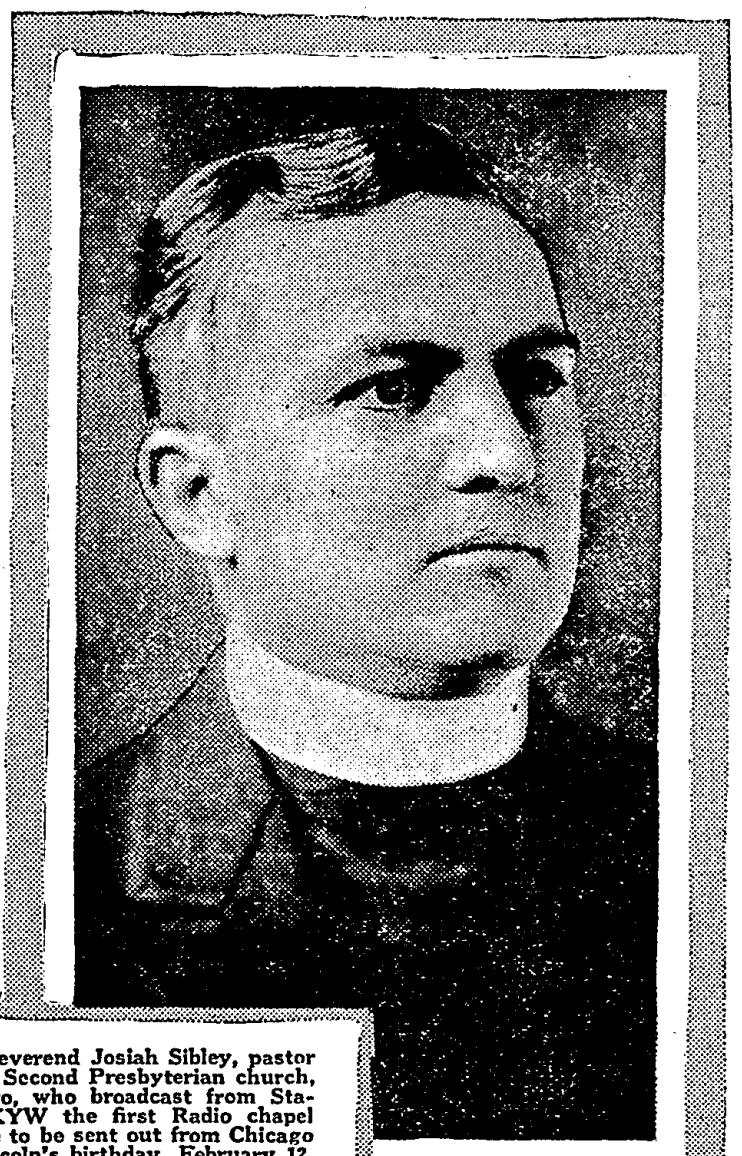

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A low resistance lead direct to the ground is essential. Good electrical connection should be made to the water supply main, or equivalent grounding point, and contact should be made by means of a ground clamp securely bolted to the metal surface, which has previously been scraped clean of all dirt and corrosion.

Description of Connections

Since all the amplifying stages are included in the same cabinet with the detector, the description of the connections is considerably simplified. It will be noticed that all the battery connections are concentrated in four binding posts at the base of the panel. Starting from the left, the first is for the negative filament battery connection and is marked —A, the second is for the positive filament battery and the negative plate battery and is marked +A—B. The third post is for the positive plate battery tapped at 22.5 volts and is marked +B DET. The fourth post is for the positive plate battery with a total of 67.5 volts and is marked +B AMP.

The two binding posts on the left side of the panel are for the antenna and ground connections. The upper one is marked ANT and the lower one GND. The two posts in the upper right corner of the panel are for auxiliary output connections, operating in conjunction with the jacks.

Tuning Controls

The knob of the upper tap switch on the left side controls the rough adjustment of the primary wave length, while the one below it is for the fine wave length adjustment. The large lower dial in the center is used to adjust the wave length of the secondary circuit. The smaller dial just above it controls the coupling between the two circuits for obtaining the point of resonance and most distinct reception.

The knob to the right of the large dial marked AMP INCREASE controls the grid potential of the Radio frequency amplifier tube, and for this reason is one of the most important controls for the best reception of distant stations. The knob to the right and a little above, marked DET INCREASE, controls the detector tube filament and is also a rather critical control. The one to the right and a little below this, marked R.F. INCREASE, controls the filament of the Radio frequency amplifier tube, while the one on the extreme right controls the filament lighting of the two

(Continued on page 15)

NAT Gives More Forecasts

NEW ORLEANS.—Additional weather forecasts and warnings were given their initial broadcast recently from NAT, the naval Radio station at New Orleans. The new broadcasts, twice daily, on a wave of 1,832 meters, are for the district included in Louisiana, Arkansas, Oklahoma and Texas, and comprise weather forecasts, river conditions, and a summary of the conditions over the United States.

Book Reviews

Vacuum Tube Receivers. By O. F. Heslar. A book that tells how to make a simple set. How to make the cabinet. It includes a 27 by 36-inch layout blue print. 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. Prices, $1.00.

Radio Receivers for Beginners. By Snodgrass and Camp. Answers the universal question, "How can I receive Radio?" Price, $1.00.

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication serivce of the Navy. It is an instruction book for Radio schools. Price, $2.50.

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.

Radio Communication. By John Mills. The fundamental principles and methods upon which recent developments are based are emphasized. The vacuum tube is treated in a simple, fundamental and up-to-date manner. Present methods and tendencies of the art are explained in a chapter which is non-mathematical. Price, $2.00.

The A B C Vacuum Tubes. By E. H. Lewis. Is a book for beginners who have no knowledge of either Radio or electricity and sets forth the elementary principles of theory and operation of the vacuum tube. No attempt has been made in this book to describe all the possible circuit arrangements, but those shown may serve as suggestions to experimenters who desire to evolve their own circuits. Price, $1.00.

Experimental Wireless Stations. By S. E. Edelman. This book assumes that the reader has some knowledge of fundamental electricity and mathematics and is a readily understandable text for beginners in the art of Radio communication who desire to start with the elements. Earlier editions of this book were published during the war. The 1922 edition has been revised and enlarged so as to cover the progress made in the last few years. Price, $3.00.

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. Book Department, Radio Digest Illustrated, 123 W. Madison, St., Chicago, Ill.

New Broadcasters for Week

CHICAGO.—During the past week eight plants were licensed to broadcast on 360 meters' wave length. The list of new stations follows:

KFEL, Winner Radio Corp., Denver, Colo.; KFFQ, Markshoffel Motor Co., Colorado Springs, Colo.; KFFJ, Jenkins Furniture Co., Boise, Idaho; WQAE, Moore Radio News Station, Springfield, Vt.; WQAN, Scranton Times, Scranton, Pa.; WQAY, Gaston Music & Furniture Co., Hastings, Neb.; WRAO, Radio Service Co., St. Louis, Mo.; WSAT, The Plainview Electric Co., Plainview, Tex.

A card was recently received by Station WGY, of Schenectady, N. Y., from Maui, Hawaii, saying that signals from the former place had been clearly heard at the latter.

NAVY WILL FIGHT LICENSING: DENBY

"NO COMMERCIAL PERMITS FOR US," HE SAYS

Naval Stations Not Commercial, Secretary Declares in Stand Against Hoover

WASHINGTON.—"The navy will fight very vigorously any attempt to bring its Radio operators under commercial license."

This was Secretary of Navy Denby's declaration following the statement of Secretary of Commerce Hoover before the House of Representatives merchant marine committee, urging that all Radio operators, including those of the navy, be compelled to take out licenses from the commerce department under the proposed Radio bill.

Secretary Hoover declared that inasmuch as the navy department was accepting commercial business, it should not be an "outlaw" among other broadcasting agencies and should conform to the general regulations proposed in the Kellogg-White amendment to the Radio act of 1910.

To Be Settled Amicably

"If Secretary Hoover urged the licensing of naval Radio operators under any condition, he must have acted upon misinformation as to the status of such operators," said Secretary Denby. "We talked over the telephone about it and are to have a conference about it soon which will doubtless result in an agreement.

"We take commercial business only when it is necessary, and are gradually eliminating it, for we do not want it. Under no circumstances will we consent to the licensing of navy men by any other department of the government. They are part of the naval forces of the United States and subject to orders and regulation only by the navy department."

Bill in Committee Now

The Radio bill has been referred to a sub-committee of the House committee on merchant marine. The sub-committee is composed of the following:

Representative White, of Maine, chairman; and Representatives Chindblom, of Illinois; Rosenblum, of West Virginia; Hogan, of New York; Bankhead, of Alabama; Davis, of Tennessee, and Bland, of Virginia.

The sub-committee was to meet soon in an effort to get the badly needed quick action on the bill.

Washington Scribes Get Set

WASHINGTON.—One of the first of the latest type of Radio receiving sets made by one of the large electrical companies has been presented to the National Press Club in Washington. With this new set, which has a wide wave length range and long reception radius, many of the Washington correspondents whose papers broadcast, now tune in the "home station."

Broadcasters in the Middle West and South have been heard since the new set has been installed. Theodore Tiller, well-known representative of the Atlanta Journal, which operates WSB, was much disappointed recently when told that he was "paged" by Radio the night before. His paper put on a special program for him, announcing it by Radio and calling for him to listen in. He was not in the club, however, and missed out.

SHAKESPEARIAN STAR PERFORMS FOR RADIO

NEWARK, N. J.—Moffat Johnston, who is now playing the leading role in Brock Pemberton's production, "Six Characters in Search of an Author," well-known Shakespearian actor, made a broadcast from Station WOR on January 10. Mr. Johnston played at 14 Shakespearian Festivals at Stratford-on-Avon, before the World War. His first appearance in New York was in "Back to Methuselah."

MINERS ISOLATED IN ARCTIC GET AIR WAVES

Radio Entertains 185 Men Working 700 Miles North of "Circle"

GOTHENBURG, SWEDEN.—One hundred and eighty-five Swedish coal miners are now cut off from the world digging coal in a mine 700 miles north of the Arctic circle. They are on the island of Spitzbergen, north of Sweden in the Sea of Greenland, and the sun will not again appear above their horizon until next April. They have plenty of supplies and plenty of fuel, and their camps and mines will be lighted by electricity through the long arctic night. One of their principal diversions is the phonograph, and when they get tired of reading last year's newspapers, they can receive the latest world news through their own Radio station.

The Swedish company for which these men work shipped 72,000 tons of coal into Sweden from Spitzbergen during last summer. But now nothing can be moved until navigation opens again in the spring.

1923 to Be Good to Farmers

COLUMBUS, O.—Giving his first Radio address through Station WPAL of the Superior Radio & Telephone Equipment Company last week, Prof. B. A. Hibbard, of the department of agricultural economics of the University of Wisconsin, urged farmers of the Buckeye state to look forward with greater optimism for what 1923 will bring them.

For the first time in history, airplane races have been reported by Radio. The National Airplane Races, held in Detroit, were described from the cockpit of a high-powered flying boat, which had been equipped with a 50-watt transmitting set.

Radio Receiving Sets

Federal DX Type 58 Radio Receiver

As the seventeenth of the series of standard receiving sets, Radio Digest presents herewith the Federal DX Type 58 Radio Receiver, manufactured by the Federal Telephone and Telegraph Company of Buffalo, New York. This receiving unit employs the use of a tuned primary and tuned secondary circuit, one stage of Radio frequency amplification, a detector and two stages of audio frequency amplification. The circuit is non-regenerative, extremely selective, and in addition, is very efficient. Full installation and operation instructions will be found on page six. Although the amateur may not possess this particular make of apparatus, it will be well for him to study the diagram and instructions carefully. The points of similarity in standard types of receiving sets will enable the beginner to benefit materially.

Radiophone Broadcasting Stations

Corrected Every Week—Part III

State, City, Call

Alabama:
Auburn, WMAV
Birmingham, WOAY, WSY
Mobile, WEAP
Montgomery, WKAN

Arizona:
Phoenix, KDYW, KFAD, KFCB
Tucson, KDZA, KFDH

Arkansas:
Fort Smith, WCAC, WGAR
Little Rock, WCAV, WEAX
Pine Bluff, WOK

California:
Altadena, KGO
Bakersfield, KDZB, KYI
Berkeley, KQI, KRE
Del Monte, KLN
El Monte, KUY
Eureka, KNI
Fresno, KDZH, KMJ
Glendale, KFAC
Hanford, KFBD
Hollywood, KFAR
Long Beach, KSS
Los Angeles, KDZF, KDZP, KFCL KFI, KHJ, KJS, KNN, KNV, KOG, KUS, KWH, KXS, KYJ
Modesto, KXD
Oakland, KFBN, KLX, KZM
Pasadena, KLB
Reedley, KMC, KFAZ
Richmond, KFCM
Sacramento, KFBK, KVQ
San Diego, KDPT, KDYM, KDYO, KFBC, KFFA, KON
San Francisco, AG1, KDN, KDZG, KDZW, KDZX, KFDB, KLP, KLS, KPO, KSL, KUO, KZY
San Jose, KFAQ, KQW,
San Luis Obispo, KFBE
Santa Ana, KFAW
Santa Barbara, KFHJ
Stanford Univ., KFGH
Stockton, KJQ, KWG
Sunnyvale, KJJ
Taft, KFEB
Venice, KFAV

Colorado:
Boulder, KFAJ
Colorado Springs, KFFQ, KFBV, KFCK, KHD
Denver, DD5, DN4 KDZQ, KEEP, KFAF, KFDL, KFEL, KLZ
Trinidad, KFBS

Connecticut:
Bridgeport, WKAX
Greenwich, WAAQ
Hartford, WDAK
Middleton, WOAS
New Haven, WGAH, WPAJ

Delaware:
Wilmington, WHAV, WOAT, WPAW

District of Columbia:
Anacostia, NOF
Washington, WDM, WEAS, WHAQ, WIL, WIAY, WJH, WMU, WPM, WWX

Florida:
Jacksonville, WDAL
Miami, WFAW, WIAZ
Pensacola, WGAN, WLAV
Tampa, WDAE, WEAT, WHAW
West Palm Beach, WKAH

State, City, Call

Georgia:
Atlanta, WGM, WSB
College Park, WDAJ
Decatur, WAAS
Gainesville, WKAY
Macon, WGAK, WMAZ
Savannah, WHAO

Idaho:
Boise, KFAU, KFDD, KFFJ
Moscow, KFAN
Thomasville, WPAX
Wallace, KFCC

Illinois:
Belvidere, WOAG
Carthage, WRAM
Chicago, KYW, WAAF, WBU, WDAP, WGAS, WJAZ, WMAQ, WNAJ, WPAD
Decatur, WBAO, WCAP, WHAP
Mattoon, WQAL
Peoria, WJAN
Quincy, WCAW, WCAZ
Rockford, WIAB
Springfield, WDAC
Tuscola, WDZ
Urbana, WRM

Indiana:
Anderson, WEAW
Evansville, WNAM, WOAU
Fort Wayne, WFAS
Greencastle, WLAX
Huntington, WHAY
Indianapolis, WLK, WOH
Marion, WIAQ
Mishawaka, WBAQ
Muncie, WJAF
Richmond, WOZ
South Bend, WGAZ
Terre Haute, WEAC
West Lafayette, WBAA

Iowa:
Ames, WOI
Burlington, WIAS, WLAT
Cedar Rapids, WJAM, WKAA
Centerville, WDAX
Council Bluffs, WPAF
Cresco, WNAG
Davenport, WHAI, WOC
Des Moines, WGF, WHX
Dubuque, WQAK
Fort Dodge, WEAB
Iowa City, WHAA
Le Mars, WIAU
Marshalltown, WLAR
Newton, WIAH
Shenandoah, WGAJ
Sigourney, WOAD
Sioux City, WEAU, WHAE
Vinton, WIAE
Waterloo, WHAC, WMAR, WRAN

Kansas:
Anthony, WBL
Atwood, WEAD
Beloit, WPAR
Eldorado, WAH
Emporia, WAAZ
Hutchinson, WLAS
Independence, WFAY
Liberal, WMAG
Manhattan, WNAK, WTG
Parsons, WOAJ
Salina, WFAD
Topeka, WJAQ, WPAM
Wichita, WAAP, WEAH, WEY

Kentucky:
Bowling Green, WNAB
Frankfort, WOAK
Louisville, WHAS, WKAG, WLAP
Paducah, WIAR

State, City, Call

Louisiana:
New Orleans, WAAB, WAAC, WCAG, WGV, WIAF, WWL
Shreveport, WGAQ

Maine:
Auburn, WMB
Houlton, WLAN
Portland, WJAL

Maryland:
Baltimore, WCAO, WEAR, WKC, WNAY
Frostburg, WPAQ

Massachusetts:
Boston, WAAJ, WEAU, WNAC
Dartmouth, WMAF
Medford Hillside, WGI
New Bedford, WDAU
Springfield, WBZ
Worcester, WCN, WDAS

Michigan:
Ann Arbor, WMAX
Bay City, WTP
Dearborn, WWI
Detroit, KOP, WCX, WWJ
East Lansing, WKAR
Flint, WEAA
Kalamazoo, WOAP, WLAQ
Lansing, WHAL
Laurium, WPAV
Saginaw, WIAW

Minnesota:
Duluth, WJAP, WMAT
Hutchinson, WFAN
Minneapolis, WBAD, WBAH, WCAS, WLAG, WLB
Moorhead, WPAU
Northfield, WCAL
St. Cloud, WFAM
St. Paul, WAAH

Missouri:
Butler, WNAR
Cameron, WFAQ
Columbia, WAAN
Independence, WPAG
Jefferson City, WOS
Joplin, WHAH
Kansas City, WDAF, WHB, WMAJ, WOQ, WPE
Marshall, WJAT
Rockport, WMAD
St. Joseph, WEAK
St. Louis, KSD, WCK, WEB, WEW, WMAY, WRAO
Springfield, WIAI, WKAS, WQAB
Tarkio, WIAT
Webster Grove, WOAL

Montana:
Billings, KFCH
Butte, KFAP
Great Falls, KDYS
Havre, KFBB
Polytechnic, KFED

Nebraska:
David City, WRAR
Fremont, WOAE
Hastings, WKAM, WQAY
Lincoln, WFAV, WGAT, WIAX, WJAB, WKAC, WLAF, WMAH, WQAP, WSAS
Norfolk, WJAG
Omaha, WAAW, WDV, WIAK, WNAL, WOAW, WOU, WOV
Rushville, WEAV
Tecumseh, WTAU
University Place, WCAJ

State, City, Call

Nevada:
Reno, KDZK, KFAS,

New Hampshire:
Laconia, WKAV

New Jersey:
Atlantic City, WHAR
Camden, WRP
Jersey City, WAAT, WNO
Moorestown, WBAF
Newark, WAAM, WBS, WJZ, WOR
N. Plainfield, WEAM
Ocean City, WIAD
Paterson, WBAN
Roselle Park, WDY
Trenton, WMAL, WOAX

New Mexico:
Roswell, KNJ
State College, KOB

New York:
Albany, WNJ
Amsterdam, WPAS
Binghamton, WIAV
Buffalo, WGR, WWT
Canton, WCAD
Cazenovia, WMAC
Ithaca, WEAI
Lockport, WMAK
Newburgh, WCAB
New York, KDOW, WBAY, WDT, WEAF, WJX, WLAW, WWZ
Poughkeepsie, WFAF
Rochester, WHAM
Ridgewood, WHN
Schenectady, WGY, WRL
Syracuse, WBAB, WDAI, WFAB, WLAH, WNAN
Tarrytown, WRW
Troy, WHAZ
Utica, WSL
Waterford, WFAG

North Carolina:
Asheville, WFAJ
Charlotte, WBT
Raleigh, WLAC

North Dakota:
Fargo, WDAY, WPAK
Grand Forks, WOAB
Wahpeton, WMAW

Ohio:
Akron, WOE
Canton, WWB
Cincinnati, WAAD, WHAG, WIZ, WLW, WMH
Cleveland, KDPM, WHK, WJAX
Columbus, WBAV, WCAH, WEAO, WMAN, WPAL
Dayton, WAI, WFO, WJAJ
Defiance, WCAQ
Fairfield, WL2
Granville, WJD
Hamilton, WBAU, WRK
Lebanon, WPG
Lima, WOAC
Marietta, WBAW
Springfield, WLAM, WNAP
Stockdale, WJAK
Toledo, WBAJ WJK
Warren, WLAZ
Washington C. O., WGAX
Wooster, WGAU
Youngstown, WAAY

Oklahoma:
Ardmore, WOAA
Enid, WNAF
Muskogee, WDAV
Norman, WNAD
Okemah, WKAK
Oklahoma City, WKY, WMAB
Okmulgee, WPAC
Tulsa, WEH, WLAL

Oregon:
Astoria, KFBM, KFGG
Corvallis, KFDJ
Eugene, KFAT
Hood River, KQP
Marshfield, KFBH
Medford, KFAY
Pendleton, KFFE
Portland, KDYQ, KFEC, KGG, KGN, KGW, KQY
Salem, KFCD

Pennsylvania:
Altoona, WGAW
Bridgeport, WBAG
Brownsville, WDAQ
Clearfield, WPI
Crafton, WAAX
Easton, WMAP
Erie, WOAV
Grove City, WSAJ
Johnstown, WTAC
Lancaster, WGAL
McKeesport, WIK
Parkesburg, WQAA
Philadelphia, WCAU, WDAR, WFI, WGL, WIP, WNAT, WOO, WWAD
Pittsburgh, KDKA, KQV, WCAE, WHAF, WJAS
Scranton, WLAO, WQAN, WRAY
State College, WPAB
Villanova, WCAM
Wilkes-Barre, WBAX, WKAZ, WNAH

Rhode Island:
Cranston, WKAP
Edgewood, WEAG
East Providence, WKAD
Providence, WEAN, WJAR

South Carolina:
Charleston, WFAZ, WNAQ, WOAH
Orangeburg, WGAM

South Dakota:
Rapid City, WCAT
Sioux Falls, WFAT
Vermillion, WEAJ
Yankton, WAJU, WNAX

Tennessee:
Knoxville, WNAV
Lawrenceburg, WOAN
Memphis, WKN, WPO

Texas:
Abelene, WQAQ
Amarillo, WDAG, WRAU WRAU
Austin, WCM, WNAS
Beaumont, WMAM
College Station, WTAW
Dallas, WDAO, WFAA, WRR
El Paso, WDAH, WPAT
Fort Worth, WBAP, WPA
Galveston, WHAB, WIAC
Houston, WCAK, WEAY, WEV, WGAB, WRAA, WSAV
Laredo, WWAX
Orange, WKAL
Plainview, WSAT
Port Arthur, WFAH
San Antonio, AS6, DM7, WCAR, WJAE, WOAI
Stanford, WOAZ
Tyler, WOAF
Waco, WJAD, WLAJ, WWAC
Wichita Falls, WKAF

State, City, Call

Utah:
Ogden, KDZL
Salt Lake City, KDYL, KDYV, KZN

Vermont:
Bellows Falls, WLAK
Burlington, WCAX
Springfield, WQAE

Virginia:
Blacksburg, WEAE
Fortress Monroe, WNAW
Portsmouth, WOAQ

Washington:
Aberdeen, KNT
Bellingham, KDZR
Centralia, KDZM
Everett, KDZZ, KFBL
Lacey, KGY
Pullman, KFAE
Seattle, KDZE, KDZT, KFC, KHQ, KJR, KTW, KZC
Spokane, KFDC, KFZ
Tacoma, BE1, KFBG, KFEJ, KGB, KMO
Walla Walla, KFCF
Wenatchee, KDZI, KZV
Yakima, KFV

West Virginia:
Clarksburg, WHAK
Morgantown, WHD

Wisconsin:
Beloit, WKAW
Kenosha, WOAR
Madison, WGAY, WHA
Milwaukee, WAAK, WCAY, WHAD, WIAO
Neenah, WIAJ
Superior, WFAC
Waupaca, WPAH

Wyoming:
Casper, KFCQ, KFDF
Laramie, KFBU

Alaska:
Fairbanks, WLAY

Hawaii:
Honolulu, KDYX, KGU, KYQ

Porto Rico:
Ensenada, WGAD
San Juan, WKAQ

Canada:
Calgary, CHBC, CHCQ, CFAC, CFCN, CJCY
Edmonton, CHCC, CJCA
Fort Frances, CFPC
Halifax, CFCE, CJCS
Hamilton, CKOC
Iroquois Falls, CFCH
Kitchener, CJCF
London, CFCX, CHCS, CJGC, CKQC
Montreal, CFCF, CFZC, CHCX, CHYC, CJBC, CKAC, CKCS
Nelson, CJCB
Ottawa, CHXC
Regina, CKCK
St. John, CJCI, CKCR
Toronto, CFCA, CFTC, CHCB, CHCZ, CHVC, CJCD, CJCH, CJCN, CJSC, CKCE, CKCZ, CKKC
Vancouver, CFCB, CFYC, CHCA, CHOC, CJCE, CKCD
Walkerville, CFCI
Winnipeg, CHCF, CJCG, CKCB, CKZC, CJNC

Cuba:
Havana, PWX

(NOTE.—The third and last part of the schedule list appears below. Next week the first part will appear.)

WLAS, Hutchinson, Kan. Hutchinson Grain Radio Co.

WLAT, Burlington, Ia. Radio and Specialty Co.

WLAV, Pensacola, Fla. 200 mi. Elec. Shop, Inc. Daily ex Sun, 8-9 pm, music, entertainment. Central.

WLAW, New York, N. Y. New York Police Dept.

WLAX, Greencastle, Ind. Greencastle Community Broadcasting Station. (Putnam Elec. Co.)

WLAY, Fairbanks, Alaska. Northern Commercial Co.

WLAZ, Warren, O. Hutton & Jones Elec. Co.

WLB, Minneapolis, Minn. Univ. of Minn. 100 mi. Daily ex Sun, 12-12:30 pm, 7:30-7:50. Central.

WLK, Indianapolis, Ind. 485 also. 500 mi. Hamilton Mfg. Co. Daily ex Sun, 11-11:30 am, 12-12:30 pm, 2-2:30, 3-3:30, 5-5:30, reports. Tues, Thur, 8:30-10 pm, concert. Sun, 2-4 pm, 8:30-10. Central.

WLW, Cincinnati, O. 485 also. 500 mi. Crosley Mfg. Co. Daily ex Sun, 10 am-3 pm, music, reports. Tues, Thur, Fri, 8-10:30 pm, music, news. Sun, 11 am, church service. Central.

WMAB, Oklahoma City, Okla. 500 mi. Radio Supply Co. Daily ex Sun, 9:30-10:30 pm, music. Fri, 11:30-12:30 pm. Central.

WMAC, Cazenovia, N. Y. 330, 250, 275 only. 500 mi. C. B. Meredith. No definite schedule.

WMAD, Rock Port, Mo. Atchinson County Mail.

WMAF, Dartmouth, Mass. Round Hills Radio Corp.

WMAG, Liberal, Kan. 75 mi. Tucker Elec. Co. Daily ex Fri, Sun, 7:30-8:30 pm, music, news. Fri, 8-9 pm, concert. Central.

WMAH, Lincoln, Neb. 100 mi. General Supply Co. Daily ex Sun, 2:15 pm, music, news. Mon, Thur, 7:30 pm, music. Central.

WMAJ, Kansas City, Mo. 485 also. 600 mi. Daily Drovers Telegram. Daily ex Sun, 8:15 am, 9:15, 10:15, 11:15, 12:15 pm, 2:15, weather, markets. Central.

WMAK, Lockport, N. Y. Norton Labs.

WMAL, Trenton, N. J. 100 mi. Trenton Hdwe. Co. Mon, Thur, 7:30-9 pm, music, lecture. Eastern.

WMAM, Beaumont, Tex. Beaumont Radio Equipment Co

WMAN, Columbus, O. 50 mi. First Baptist Church. Sun., 10:30-12 m., 7:30-9 pm, church services. Central.

WMAP, Easton, Pa. Utility Battery Service.

WMAQ, Chicago, Ill. 2,000 mi. Chicago Daily News. Mon, Wed, Fri, Sun, 7-7:30 pm. Sat, 4:35-5 pm. Tues, Thur, 9:15-10 pm. Central.

WMAR, Waterloo, Iowa. Waterloo Electrical Supply Co. Schedule not established.

WMAT, Duluth, Minn. Paramount Radio Corp.

WMAV, Auburn, Ala. Ala. Polytechnic Inst.

WMAW, Wahpeton, N. D. 50 mi. Wahpeton Elec. Co. Daily, 7-7:30 pm, music, sports, news. Central.

WMAX, Ann Arbor, Mich. K. & K. Radio Supply Co.

WMAY, St. Louis, Mo. 1,000 mi. Kingshighway Presbyterian Church. Sun, 11 am, 8 pm. Tues, 7-8 pm, church services. Central.

WMAZ, Macon, Ga. 250 mi. Mercer University. Daily ex Sun, 5:30-6 pm, 7-7:30, 8:30-9:30, music. Tues, Wed, Thur, 10:30-11 am, chapel. Eastern.

WMB, Auburn, Me. Auburn Elec. Co.

WMH, Cincinnati, O. 485 only. 500 mi. Precision Equipment Co. Daily ex Sun, 11 am, 4 pm, reports. Mon, Wed, Sat, 8:15 pm, entertainment. Central.

WMU, Washington, D. C. 100 mi. Doubleday-Hill Elec. Co. Daily, 4:30 pm, concert, sports. Thurs, 8.9, concert. Eastern.

WNAB, Bowling Green, Ky. 500 mi. R. D. Nichols. Daily ex Tues, 4-5 pm, 7:30-9, music. Central.

WNAC, Boston, Mass. 200 mi. Shepard Stores. Daily ex Sun, 4-5 pm, dance music. Tues, Thur, 7-8:30 pm. Wed, Sat, 9:30-11 pm, Fri, 8-9:30 pm. Sun, 11-12 am, 6:30-8:30 pm, church services. Eastern.

WNAD, Norman, Okla. 200 mi. Okla. Radio Engineering Co. Daily ex Sun, 7:45-8:15 pm, news. Central.

WNAF, Enid, Okla. Enid Radio Dist. Co.

WNAG, Cresco, Ia. Rothert Radio and Electric Shop.

WNAH, Wilkes-Barre, Pa. Wilkes-Barre Radio Repair Shop.

WNAJ, Chicago, Ill. Benson Co.

WNAK, Manhattan, Kans. Manhattan Radio Supply Co.

WNAL, Omaha, Neb. R. J. Rockwell.

WNAM, Evansville, Ind. 200 mi. 485 also. Ideal Apparatus Co., Inc. Mon, Wed, Fri, Sat, 10-11 am, music, reports; 3-4 pm, 7-8, entertainment. Sun, 3-4 pm, music. Central.

WNAN, Syracuse, N. Y. Syracuse Radio Telephone Co.

WNAQ, Charleston, S. C. Charleston Radio Elec. Co.

WNAP, Springfield, O. 200 mi. Wittenberg College.

WNAR, Butler, Mo. C. C. Rhodes.

WNAS, Austin, Tex. Tex. Radio Corp. (Austin Statesman).

WNAT, Philadelphia, Pa. 500 mi. Lennig Bros. Co. Daily ex Sun, 12:15-1 pm, Wed, Sat, 7:30-9:30 pm. Sun, 2:30 pm, 4:30, church services. Eastern.

WNAV, Knoxville, Tenn. People's Tel. & Telg. Co.

WNAW, Fortress Monroe, Va. Henry Kunzmann.

WNAX, Yankton, S. D. Dakota Radio Apparatus Co.

WNAY, Baltimore, Md. Shipowners Radio Service.

WNJ, Albany, N. Y. 60 mi. Shotton Radio Mfg. Co., Inc. Daily ex Sun, 10-10:15 am, market reports. Wed, 8:15 pm, concert. Eastern.

WNO, Jersey City, N. J. Wireless Telephone .Co of Hudson Co., N. J.

WOAA, Ardmore, Okla. Dr. Walter Hardy.

WOAB, Grand Forks, No. Dak. 50 mi. 485 also. Valley Radio. Daily ex Sun, 10-11 am, 2-2:30 pm, entertainment, reports. Sun, 3-4 pm, music, church service. Central.

WOAC, Lima, O. Maus Radio Co.

WOAD, Sigourney, Ia. Friday Battery & Elec. Co.

WOAE, Fremont, Nebr. Midland College.

WOAF, Tyler, Tex. Tyler Commercial College.

WOAG, Belvidere, Ill. Apollo Theatre.

WOAH, Charleston, S. C. 200 mi. Palmetto Radio Corp. Mon, Thur, Sat, Sun, 10 pm-1 am, music. Eastern.

WOAI, San Antonio, Tex. 485 also. 1,800 mi. Southern Equip. Co. Daily ex Sun, 10:30 am, 12:15 pm, 3, 6, news, markets. Wed, 7:30-8:30 pm, concert. Sun, 9:30-10:30 am, 7-8:30 pm, concert. Central.

WOAJ, Parsons, Kans. Ervin's Elec. Co.

WOAK, Frankfort, Ky. Collins Hardware Co.

WOAL, Webster Grove, Mo. William E. Woods.

WOAN, Lawrenceburg, Tenn. 1,000 mi. James D. Vaughan. Daily, 8-9 pm, concert. Central.

WOAQ, Portsmouth, Va. Portsmouth Radio Assn.

WOAP, Kalamazoo, Mich. Kalamazoo College.

WOAR, Kenosha, Wis. H. P. Lundskow.

WOAS, Middletown, Conn. 100 mi. Bailey's Radio Shop. Daily ex Sun, 4:15-6 pm, music. Sat, 9-12 pm, dance music. Eastern.

WOAT, Wilmington, Del. Boyd Martell Hamp.

WOAU, Evansville, Ind. Sowder Bowling Piano Co.

WOAV, Erie, Pa. Penna. Nat'l Guard.

WOAW, Omaha, Nebr. Woodmen of the World.

WOAX, Trenton, N. J. 342 only. 300 mi. F. J. Wolff. Intermittent schedule.

WOAY, Birmingham, Ala. John M. Wilder.

WOAZ, Stanford, Tex. Penick Hughes Co.

WOC, Davenport, Ia. 400 and 485 only. 1,000 mi. Palmer School of Chiropractic. Daily ex Sun, 10:55 am, time; 11, weather; 12 m, chimes; 2 pm, markets; 3:30, talk; 5:45 chimes, ex Wed; 6:30, sports; 7, concert; 10 pm, concert, Wed only. Sun, 9 am, chimes; 1:45 pm, 6, concert; 7, church services; 7, concert. Central.

WOE, Akron, Ohio. 100 mi. Buckeye Radio Service Co. Mon, Wed, Fri, 7-8:15 pm, music, agriograms, sports. Sat, 4-4:30 pm, music, sports. Eastern.

WOH, Indianaoplis, Ind. 1,000 mi. Hatfield Elec. Co. (Indianapolis Star.) Daily ex Sun, 10-11 am, music; 10:15, financial, markets; 1-2 pm, music; 1:20, markets; 4-5 pm, music; 4:15, police notes; 4:50, sports. Mon, Wed, Sat, 8:30-10 pm, Concert. Central.

WOI, Ames, Ia. 485 also. 200 mi. Iowa State College. Daily ex Sun, 9:30 am, 12:45 pm, 9:30, music, weather. Central.

WOK, Pine Bluff, Ark. 485 also. 500 mi. Ark. Light & Power Co. Tues, Fri, 9-10 pm, concert. Sun, 11-12 m, 7:30 pm, church services. Central.

WOO, Philadelphia, Pa. 400 and 485 only. 500 mi. John Wanamaker.

WOQ, Kansas City, Mo. 485 also. 1,000 mi. Western Radio Co. Mon, Tue, Wed, Thur, 9:45 am, 10:55, 11:30, 12:30 pm, 2, 7:30, time signals, reports, etc. Fri, 1:15 pm, sacred service. Sat, 8 pm, concert. Sun, 7 pm, concert.

WOR, Newark, N. J. 400 only. 2,000 mi. L. Bamberger & Co. Daily ex Sun, 2:30-4 pm, 6:15-7, music, talks. Tues, Fri, 8-10, music, entertainment. Eastern.

WOS, Jefferson City, Mo. 485 also. 1,500 mi. Missouri State Marketing Bureau. Daily ex Sun, first 15 min. of every hour from 8 am-2 pm, markets. Daily, 5 pm, music, markets. Mon, Wed, Fri, 8-9:30 pm, concert. Central.

WOV, Omaha, Neb. R. B. Howell.

WOU, Omaha, Neb. Metropolitan Utilities Dist.

WOZ, Richmond, Ind. 485 also. 300 mi. Palladium Printing Co. Daily ex Sun, 12-12:25 pm, 4-5, 6:30-7, music, markets. Central.

WPA, Ft. Worth, Tex. 485 also. 1,000 mi. Fort Worth Record. Daily ex Sun, 10:58-11 am, time, 2:30-3 pm, 6-6:30, 9-9:30. Sun, 3-3:30 pm, 9-9:30. Mon, 11-12 mid. Central.

WPAA, Waco, Neb. Anderson & Webster Elec. Co.

WPAB, State College, Pa. Pa. State College.

WPAC, Okmulgee, Okla. Donaldson Radio Co.

WPAD, Chicago, Ill. 1,000 mi. W. A. Wieboldt & Co. Daily ex Sun, 12:30-1:30 pm, 6:30-7, music. Central.

WPAF, Council Bluffs, Ia. Peterson's Radio Co.

WPAG, Independence, Mo. Central Radio Co., Inc.

WPAH, Waupaca, Wis. Wisconsin Dept. of Markets.

WPAJ, New Haven, Conn. Doolittle Radio Corp.

WPAK, Fargo, N. D. North Dakota Agricultural College.

WPAL, Columbus, O. Superior Radio & Tel. Equip. Co.

WPAM, Topeka, Kans. Awerbach & Guettel.

WPAP, Winchester, Ky. Theodore D. Phillips.

WPAQ, Frostburg, Md. General Sales & Engineering Co.

WPAR, Beloit, Kan. 50 mi. R. A. Ward. No definite schedule.

WPAS, Amsterdam, N. Y. J. & M. Electric Co.

WPAT, El Paso, Tex. Saint Patrick's Cathedral.

WPAU, Moorhead, Minn. Concordia College.

WPAV, Laurium, Mich. Tinetti & Sons.

WPAW, Wilmington, Del. Radio Installation Co., Inc.

WPAX, Thomasville, Ga. S-W Radio Co.

WPE, Kansas City, Mo. 300 mi. Central Radio Co. Sun, 6-7 pm, church services. Central.

WPG, New Lebanon, O. 485 also. 1,500 mi. Nushawg Poultry Farm. Daily ex Sun, 12-12:15 pm, news, 6-6:30 pm, markets Mon, Fri, 8-9:45 pm, music, farm program. Central.

WPI, Clearfield, Pa. Elec. Supply Co.

WPM, Washington, D. C. 200 mi. Thos. J. Williams, Inc. (Washington Daily News.) Daily ex Sun, 12:30 pm, news. Mon, 8 pm, concert. Eastern.

WPO, Memphis, Tenn. 100 mi. United Equip. Co. Daily, 7:15-8:15 pm, music. Central.

WQAA, Parkesburg, Pa. 1,500 mi. Horace A. Beale, Jr. Daily, 10:30 pm. Eastern.

WQAB, Springfield, Mo. Southwest Missouri State Teachers College.

WQAC, Amarillo, Tex. E. B. Gish.

WQAK, Dubuque, Ia. Appel-Higley Elec. Co.

WQAL, Mattoon, Ill. Cole County Tel. & Telg. Co.

WQAP, Lincoln, Nebr. Am. Radio Co.

WQAQ, Abilene, Tex. West Tex. Radio Co.

WRAA, Houston, Tex. Rice Institute.

(Continued on page 9)

STATION SCHEDULES

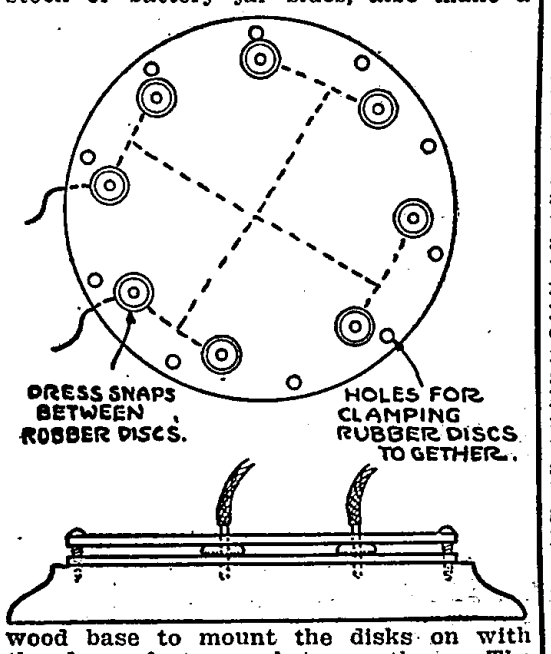
(Continued from page 8)

WRAM, Carthage, Ill. Robert E. Compton and Carthage College.
WRAN, Waterloo, Ia. 100 mi. Black Hawk Electrical Co. Daily ex Sun, 5 pm, 5:30, concert, news. Mon, Wed, Fri, 8:30-9:15 pm, concert. Sun, 11:15, church services. Central.
WRAR, David City, Nebr. Jacob Carl Thomas.
WRAU, Amarillo, Tex. Daily News.
WRAY, Scranton, Pa. 485 also. 100 mi. Radio Sales Corp. Daily ex Sun, 11 am, music; 12 m, reports; 3:30-5:30 pm, reports, music; 7:8:30, bedtime stories, music. Sun, 3 pm, chapel. Eastern.
WRK, Hamilton, O. 1,000 mi. Doron Bros. Elec. Co. Tues, Thur, 9-10:30 pm, music, lecture. Sun, 10:30 am, church service. Central.
WRL, Schenectady, N. Y. Union College Radio Club.
WRM, Urbana, Ill. 300 mi. Univ. of Ill. Mon, Thur, 8:30-8:50 pm, 9-9:30 news, talks, music. Central.
WRP, Camden, N. J. 250 mi. Federal Inst. of Radio Telg. Daily ex Sat, Sun, 10-10:45 pm, music, news, agriograms. Eastern.
WRR, Dallas, Tex. 485 also. 200 mi. City of Dallas. Daily ex Sun, 12-12:30 pm, weather; 3-3:30, sports, markets, news; 7-7:15, police news; 8-8:30, music. Sun, 11 am, church service; 7-8 pm, police news, church service. Central.
WRW, Tarrytown, N. Y. 1,000 mi. Tarrytown Radio & Research Laboratory. Daily ex Sun, 10:30-12 m. Mon, Thur, Sat, 6:15-7 pm, 7:30-8:30, 10:30-12 pm. Sun, 1-3 pm. Eastern.
WSAJ, Grove City, Pa. Grove City College.
WSAS, Lincoln, Nebr. 485 also. 700 mi. Nebr. Dept. of Agri. Daily ex Sat pm and Sun, 9:30 am, 9:45, 10, 10:30, 10:45, 11, 11:30, 11:40, 11:50, 12 m, 1:15 pm, 1:30, 1:45, reports.
WSAV, Houston, Tex. 300 mi. C. W. Vick Radio Const'n. Co. Mon, Tues, Fri, 8-10 pm, concert, entertainment. Central.
WSB, Atlanta, Ga. 400 and 485 only. 1,500 mi. Atlanta Journal. Daily ex Sun, 12-1 pm, music; 2:30, reports; 4-4:45 pm, music, reports; 5-6 pm, 7-8, 10:45-12 music. Sun, 10:45 am, 5-6 pm, 7:30-9, church services. Central.
WSL, Utica, N. Y. 500 mi. J. & M. Elec. Co. Daily ex Sat, Sun, 11-11:30 am, 2-2:30 pm, 3-3:30, 4-4:30, 5-5:30, music, news. Mon, Wed, 8-9 pm. Sat, 11-11:30 am, 5-6 pm, 8-9. Sun, 10:30-12 m, 7:30-9 pm. Eastern.
WSY, Birmingham, Ala. 2,000 mi. Alabama Power Co. Mon, Wed, Fri, 3-3:30 pm, 8-8:45, reports, concert. Sun, 11 am, 7:30 pm, church services. Central.
WTAC, Johnston, Pa. Penn Traffic Co.
WTAU, Tecumseh, Neb. Ruegy Battery & Elec. Co.
WTAW, College Station, Tex. Agricultural and Mechanical College of Tex.
WTG, Manhattan, Kan. 485 only. 75 mi. Kan. State Agri. College. Daily ex Sun, 9:55 am, weather (code). Central.
WTP, Bay City, Mich. 75 mi. Ra-Do Corp. Mon, Wed, Fri, 1:30-2 pm, reports, news; 6:30-7:30 pm, concert. Central.
WWAC, Waco, Tex. 485 also. 200 mi. Sanger Bros. Daily ex Sun, 10 am, weather, 1:30 pm, music. Mon, Wed, Fri, 8:45 pm, music. Central.
WWAD, Philadelphia, Pa. Wright & Wright, Inc.
WWAX, Laredo, Tex. 150 mi. Wormser Bros. Daily ex Sun, 4:30-5:30 pm, music. Mon, Sat, 8-9 pm, music. Central.
WWB, Canton, O. Daily News Printing Co.
WWI, Dearborn, Mich. 200 mi. Ford Motor Co. Wed, 10-11 pm, music, lectures. Eastern.
WWJ, Detroit, Mich. 400 and 485 only. 1,500 mi. Evening News. Daily ex Sun, 9:30-9:40 am, household hints; 9:40-10:25, health talks; 10:25-10:30 am, weather; 11:55-12 m, time; 13:05-12:45 pm, music; 3-3:30 music; 3:30-3:35, weather; 3:35-4:15, markets; 5-6, sports; 7:30-10, entertainment. Sun, November 11, and every other week, 11 am, 4 pm, church services. Sun, fill in weeks, 2 pm, 7:30, church services, special. Eastern.
WWL, New Orleans, La. Loyola Univ.
WWT, Buffalo, N. Y. 200 mi. McCarthy Bros. & Ford. Daily 3-4:30 pm, 7:30-9:30. Eastern.
WWX, Washington, D. C. 1,160 only. 600 mi. Post Office Dept. Daily ex Sun, 10 am, weather; 10:30, markets, 12:30, 2:15, 3:30, markets, 5 pm, 7:30, markets; 9:45, weather. Eastern.
WWZ, New York City. 200 mi. John Wanamaker. Daily ex Sun, 1:15-2:15 pm. Tues, 7:30-9 pm. Fri, 7:30-8:30 pm. Eastern.

(Note.—This completes the station schedule list. The first part will appear again next week.)

Multiple Phone Connectors

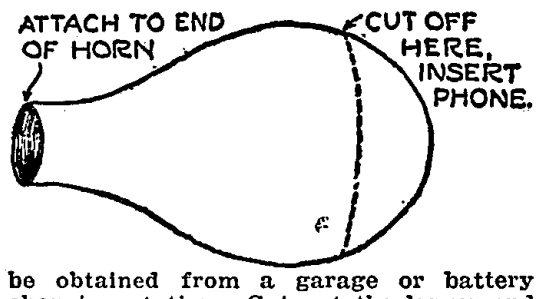
Dress fasteners make ideal devices for holding the tips of phone cords, and several of them connected together in a block make a multiple holder. Turn up or saw out two circular disks from panel stock or battery jar sides, also make a



wood base to mount the disks on with the dress fasteners between them. The wire connecting to the fasteners is shown by the dotted lines.—Dr. T. L. Morgan, Rome, Ga.

Horn Attachment

An inexpensive attachment for a loud speaker may be made of an old leaky bulb used on a battery hydrometer. One may



be obtained from a garage or battery charging station. Cut out the larger end and insert a receiver. The other end may be slipped over the end of the phonograph horn.—Knud Overgaard, Kimballtown, Ia.

Use Little Effort to Wind Honeycomb Coil

The satisfaction of proudly exhibiting the ordinary man's ability to make this or that as well or better than the "boughten article," is likely more pronounced in the Radio enthusiast than in any other hobby, and this article is to show how any kind of honeycomb coil may be made with very little trouble.

First of all, determine the number of turns you want, as this matter is important in selecting the size of wire to be used. Number 24 single cotton covered is about right for small inductances, and Number 28 S. C. C. for large ones.

If possible, secure a heavy cardboard box two inches in diameter and cut it into rings one inch across in the manner of a napkin ring. The start is made under auspicious circumstances. However, such a tube is not always at hand. Then take a piece of soft pine and work it down to a diameter of about 1⅞ inches, cut some heavy wrapping paper into long strips, the width being about equal to the length of the round pine stick, and with well-strained shellac coat one side of the paper, wrap it neatly around the stick until you have built up a tube of 2 inches diameter.

Some oil or waxed paper wrapped around the stick before laying on the paper tube will greatly aid in slipping the coil off the tube when the winding is completed.

After the tube is thoroughly dry, and has had another one or two coats of shellac, it is ready to cut into rings. Don't throw the stick away; it will be needed again. Cut about two inches off one end of the round piece of wood, drill a hole through the center of the small piece, and take a nail just a trifle larger than the drill hole and drive it through the drill hole up to the head, which will leave about an inch of the point of the nail protruding. Take the longer piece of round pine and set it on end and drive the nail into it, in the center, if you can, but this is a matter of little moment. This is your winding form. The nail is used to hold it in the vise, or if you have loaned that out, fasten it on the work bench. This allows one end to be revolved for your winding while the other end holds your work upright and in front of you.

Take a strip of paper and measure around the stick, marking the exact diameter on this strip, and mark off 24 equal spaces on it, numbering each mark from 1 to 24, so that if there were a line number 25 it would just fall under the lap of number 1. Now, in a straight row all the way around the stick, drive a pin through the center of each mark, into the wood as far as you can drive it without its bending. If you bend a pin pull it out and do better on the next one, as a bent pin will interfere with your winding.

After one row of pins has been put around the stick, slip one of the rings over the end of your stick down to where the row of pins will stop it, and then drive another row of pins around the stick, each pin to be as close to the end of the ring as possible, so that the ring will not slip. Now, if you have the 24 spaces marked and numbered so that the numbers are visible to you, you are ready to begin winding. Put the end of the stick that holds the work in the vise, hold your spool of wire in one hand, with a few inches of wire sticking out, wrap it around the pins 9 and 10, thence to 21 and 22, going laterally across, then back again to and around 8 and 9, then over and across to 20 and 21, then to 7 and 8, 19 and 20, 6 and 7, and so on, until you have returned to where you started from, which in the few minutes you have been at work, gives you exactly 24 turns. At this point, especially if making a large number of windings, it would be well to make a tally sheet, so that if interrupted, you have not lost count. After the desired number of turns has been made, it is well to cut the wire a few inches away from the coil, secure the loose end with a weight, or get Willie to hold it, while you drop a small gob of hot sealing wax on it to hold it in place.

Now, the coil is ready to apply a fixitive or coat of something to hold it rigid. Shellac can be used for this, putting on only enough to hold it in shape, but collodion is probably better for that purpose, and a couple of ounces will paint a good-sized coil, always remembering that collodion is very inflammable and will dry in a few minutes.

After this is dry, remove one of the rows of pins and slip the completed coil off the form and mark the coil inside with the size wire, date, and more important, the number of turns.

In starting your winding, especially a large coil, it is well to take a sheet of paper and map off each zigzag of your winding so you won't lose your place, as, for example,

9-10 to 21-22
8- 9 to 20-21
7- 8 to 19-20, etc,

When you have reached 10-11 to 22-23, you are ready to go.

The expense of constructing a multiple wire antenna may be reduced and its efficiency increased by placing one or two insulators in the rope connected to the bridle instead of inserting an insulator in each individual wire.

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Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, 2126 Broadway, New York
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Problems to be Solved

Will the Year Bring Changes Acceptable to All?

THERE is much speculation among Radiophans as to what the new year we are now just entering holds for them. There are many problems and some of them either will be solved and Radio will continue its march of progress, or else they will grow more menacing and the welfare of the whole Radio public will be jeopardized. Scientific men are not worrying much about some of the tasks, for they are not problems of the laboratory, but those of executives in control of Radio affairs.

At present the industry is in a period of uncertainty. There are still many questions as to ownership of and the control of certain essential parts. There are questions of merchandising and of manufacturing. The makers of outfits, with few exceptions, are not backing the retailers with advertising campaigns, such as photograph and automobile makers use to aid the local dealers. When this question is settled much will have been done to stabilize the business. The new year should bring a solution of this and other merchandising problems.

The manufacturer is interested in broadcasting because it helps him to sell his outfits. In a similar way the retailer is interested, and if it were not for broadcasting the public would not be interested in Radio.

Certain of the manufacturers are providing elaborate entertainments, but these benefit not only themselves, but also the manufacturers who do not broadcast or contribute in any way to the expense of broadcasting. There are broadcasters who neither make nor sell their equipment, but who are content to continue their services for no other reason than the upbuilding of that intangible asset called "good will." Others employ broadcasting as a means of indirect advertising, feeling that they are sufficiently compensated by the spreading of their names. In no cases, however, are the broadcasters of America compensated by the audiences which listen in to their programs. Will 1923 bring us closer to a solution of this big problem?

DeForrest on Radio Prophecies

America Is the World Leader in Electric Science

SO MUCH interest has been aroused by the press of the nation that the public now seeks information on the wonderful science everywhere it can be obtained. Consider what this widest diffusion of electrical knowledge, this arousal of universal interest in Radio and electrical technics, will mean to the American people, if continued. We shall rapidly become an electrical people—the elements at least of electrics and physics will inevitably become a daily thought and talk and custom of our masses. The man or woman who heretofore has complacently admitted 'all this Radio is absolutely beyond my grasp and comprehension,' will become a curiosity—as much of an ignoramus or mental 'mossback' as are those who know not what causes the tides, or that the stars are similar to our sun.

"A generation of such intimate familiarity with electrical apparatus and knowledge of the fundamental laws governing Radio phenomena must inevitably bring about a rapid development in all electrical lines, which, lacking this stimulus, would require perhaps a hundred years to equal.

"This is to be one of the lasting, far-reaching, wealth-producing products of the new American industry. Those who are listening in nightly to Radio entertainments and instruction surely will take to brief lectures on the principles involved in the apparatus. And this primary scientific education will be sugared with entertainment, made so easy of acquisition to the home that its seeds of knowledge cannot fail to fall on a myriad of receptive minds which could in no other way receive it, and where it grows it will awaken a hunger for new and deeper knowledge.

"America, already the world's leader in this field of invention and application, will thereby so far lead and surpass other nations as to defy comparison. This, at least, will continue to be the situation until foreign countries, following our enlightened example, will lift their governmental bans on broadcasting and exert the power to compete with us in universal electrical education for the home."

Condensed

By DIELECTRIC

The phonographic record has made it possible for future generations to hear the golden notes of Caruso's voice in many of his famous opera roles and in lyric songs. Will it not be possible to record speeches by notable men of science, art and statecraft, so that those yet unborn may, by means of Radiophone broadcasting, not only hear what great men of today said, but the very inflection with which it was spoken? Men at sea, on land, and even across the ocean, heard speeches by three of our Cabinet members through the instrumentality of a new invention produced in the laboratories of the General Electric company—the pallophotophone. The presence of none of these national executives at the broadcasting station WGY was required, for their voices had been recorded some time previously and could have been transmitted at any desired time. With the tremendously rapid growth of Radio audiences throughout the United States, one may easily conceive the importance of this late (I dare not say latest) discovery.

In speaking from Station WOR at Newark, N. J., recently, Dr. De Forest called attention to the marked increase in broadcasting by various newspapers in nearly every section of this country. They are rendering a valuable service to Radio audiences and are, naturally, peculiarly equipped to give up-to-the-minute news. But in musical entertainment many of them are contributing greatly to the pleasure of listeners-in, and at no saving of trouble to themselves. I am looking to them for incorporating in their programs noteworthy features, such as are not already in use. You know a member of the press is scouting pretty consistently for the things which will appeal to the general public and when you turn one loose on even a faint trail he is most likely to track to earth some bit of elusive news. Start him to ferreting out matters of interest, which might easily escape notice by untrained sleuths, and in all probability he will return to the broadcasting studio with material that is at once new and desirable. Yes, I have great faith in the press. They permitted me to enter their ranks some years ago, before Radio bugs were evolved.

You pioneers—old-timers—can renew your youth, as no doubt many of you do, by catching the new born enthusiasm of a beginner at the game and passing on a little advice from the storehouse of knowledge at your command. It is a very easy thing for the uninitiated to become discouraged and skeptical, if left alone to their own ofttimes aimless wandering in the mazes of Radio, and to let their ambition to learn something of the science lag. That is where we can step in and save the novice from losing many a joyful evening with the dials. I have just received the news of some pretty fair DX work from a member of the clan living in Pennsylvania, who, when his set was completed, heard nothing for three days. An experienced Radiophan suggested a simple addition to his hook-up and that very night he picked up a station in San Francisco. Is there any likelihood of this fresh "ham" giving up the sport? More than likely he will be looking about to see whom he may induce to enter the ranks.

The American Radio Relay League won many fresh laurels in the recent tests for amateur reception. The first French amateur station to be heard in this country was picked up by a young lad living in Brooklyn, N. Y., who as a bug is only a few months old. Whatever will encourage the amateur will help the science, for we must never lose sight of the remarkable things directly attributable to their painstaking efforts to discover the hidden mysteries, which leads me to call attention again to the fact that quite a few of the broadcasting stations are giving regularly lessons in code. If a station near to you is not doing so at present, ask them to, and have your friends who are interested follow your example. Without a knowledge of the code you are missing much that should be yours.

Even the fish which live in the sea are not free of the effects of Radio. In Sweden the fishermen are notified from the Gothenburg Radio central of the approximate location of schools of herring, a service tending to eliminate periods of long waiting and enhancing the chances of getting more fish. Think what a comfort it would have been to the whale, if he could have sent an SOS call to someone to relieve him of Jonah!

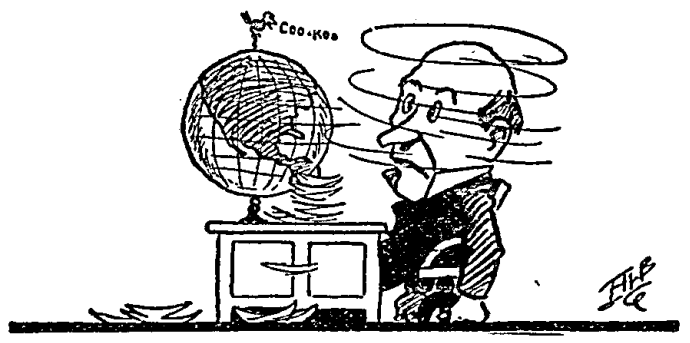
I rather imagine that Santa Claus is seeking the expert knowledge of some famed voice specialist at the North Pole, in order that he may be fully recovered from the taxing experience through which he has maintained his jovial characteristics and be ready to repeat the performance of speaking to millions of children when the Christmas season shall return again. Many a small boy has gulped his evening meal so as to miss no syllable uttered by jolly St. Nick, especially where he had addressed a letter seeking some favor from him. This has been a new delight to those who slept while Santa arranged the toys by the chimney side.

The Tiger has returned to his lair, but not before his voice had carried to more people than ever heard a native of France before, at one time. Regardless of your attitude toward the purpose of his mission, bear in mind that the broadcasting of his speeches to many thousands of American citizens points to the new era: the era of Radiophony. No important message from any source need be restricted to the printed page; broadcast it, and let the waiting listeners in hear at first hand what prominent men have to say. Public opinion will be the beneficiary of knowledge so gained.

RADIO INDI-GEST

The Contestants Use Elastic Consciences

The standard definition of a straight line is "the shortest distance between two points." A paragrapher



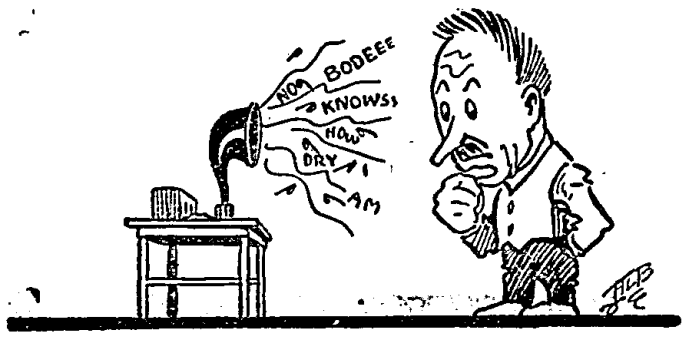
says that Radio has eliminated both the line and the distance. He should see some of the "Receiving Records" with which the Contest Editor often amuses us. The U. S. covers at least three-fourths of old Mother Earth if the said records are any criterion.

Yeh, We Gotta Stop These Wet Waves!

Dear Indi-Gest:

I think Secretary Hoover, Volstead, or maybe W. J. Bryan, should do something about this Canadian stuff that is coming across the U. S. border to disturb the morale and upset our nice New Year's resolutions. For instance, last night, I sat in on the watch services of several churches, enjoyed a fine sermon from Pittsburgh, and picked up the chimes of Old Trinity in New York. Everything was going well, and I decided to usher in the New Year with a nice glass of milk.

Then along comes CKAC broadcasting the New Year's celebration from the Mount Royal Hotel that immediately busted up all the serenity and peace of the evening with a lot of pre-Volstead jollification that would cause any good, liberty-loving, free-born American citizen to just rise up and bleat.



Not only was the jazz particularly jazzy, but it was punctuated too darn often with noises that sounded like the popping of corks, while the laughter of the men and women was loud and unseemly for so solemn an occasion, then there were a lot of strange explosions (vocal) that sounded like "hic." Finally some wretch yelled into the microphone, "Have one on me." With righteous indignation I jammed the coils around, twirled the knobs and picked up WOC, where the chimes were playing. But when I settled back to hear the airs appropriate to chimes and the occasion, they played, "The Gang's All Here," "How Dry I Am," and then "My Country 'Tis of Thee." With a vague feeling that the Palmer School had been listening in to Canada, I turned to WMAT at Duluth, and found them suffering too, for they were playing "The Early Morning Blues."

But alas! My set had probably been drinking in the too much Canadian stuff. Let us organize to dry out the damped waves from the Dominion. Quick, Hoover, a Radio law! Volstead will help you.

CHARLES H. NORTON.

All Right Now, Who Can Think?

A lecturer recently said, "Every cell in the human body is in a state of vibration; we can't think without creating an ether wave." It would require a mighty sensitive Radio frequency receiver to pick up the thinking that some people do.

He Tried to Two-Way It Once!

The Office Squirrel suggests that the two-way Radio

conversation will be a great thing for "Ma," but that "Pa" is not enthusiastic about it.

Call the Radio Doc and Capsule Crystal Set

One enthusiast writes to a broadcasting station: "We eat up your beautiful concerts every night." Most of the programs present something of a mixed diet. A program running from grand opera to the "Jim Jam Blues" is liable to give one musical indigestion.

A. B. C. Lessons for Radio Beginners

By Arthur G. Mohaupt

Chapter III

IN THIS chapter we will see how the electrical principles of the two previous chapters are employed in the construction and operation of Radio circuits. Very high frequency (twenty thousand cycles per second and higher) alternating currents are used in Radio communication; and to obtain these high frequency currents, special forms of circuits known as oscillating circuits are employed. The word oscillating means to move back and forth very rapidly, and hence an oscillating circuit is one in which an alternating current of very high frequency flows.

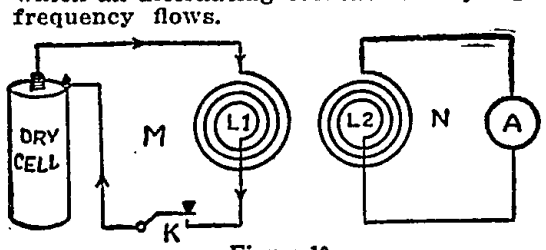


Figure 10

High frequency oscillating circuits involve two interesting and important electrical phenomena, namely inductance and capacity. Although these terms may sound highly technical, we shall presently see how easily they can be analyzed and understood.

Induced Currents

Not only is it true that a conductor through which an electric current is flowing is surrounded with a magnetic field; but the opposite condition is also true, that is, if in some way a magnetic field is established around a conductor, there will be generated within the conductor a voltage which will cause a current to flow when the circuit is closed.

For example, in Fig. 10 we have the coil L-1 connected in series with the dry cell and the key K. Near the coil L-1 is the coil L-2 connected in series with an ammeter A. As soon as the key K is closed, current at once begins to flow in the circuit M and a magnetic field expands outward around the coil L-1. This magnetic field (lines of force) cuts the turns of coil L-2 and generates in it a voltage which causes a current to flow as is indicated by the ammeter. If the current sent through L-1 is an alternating current, a corresponding alternating

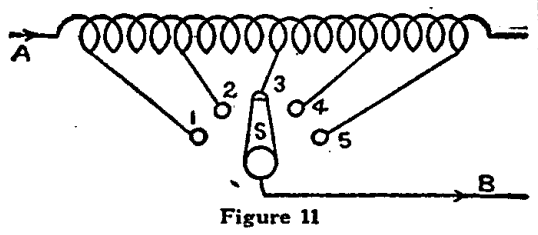


Figure 11

current of the same frequency will be caused to flow in coil L-2 and the circuit N.

The voltage set up in the coil L-2 is called an "induced" voltage and the current caused to flow in circuit N is called an "induced" current. The word induced means "due to the influence of," for the current in circuit N is a result of the influence of the current in circuit M. The process of setting up an induced current is known as induction, and the two coils L-1 and L-2 are said to be in "inductive relationship" or to be "inductively coupled." If the two coils are close together so that the induction is a maximum they are said to be closely coupled; while if they are separated somewhat, they are said to be loosely coupled. This principle of induction is employed in such pieces of Radio apparatus as loose-couplers, vario-couplers, and variometers. These will be taken up in a later chapter. The coil L-1 in which the inducing or influencing current flows is called the primary, while the coil in which the induced current flows is called the secondary. It is evident that in order to have induction take place, a variable current must flow through the primary in order to have a movable or pulsating magnetic field for cutting the secondary.

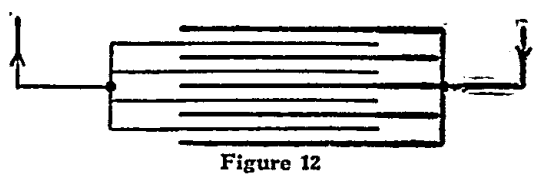


Figure 12

A variable current also has an inductive effect upon the coil in which it itself flows, besides its effect upon nearby conductors. Thus when a current begins to flow in a coil such as L-1, it sets up a magnetic field which rapidly expands and grows from zero to its full value. In doing so, these lines cut all the turns of the coil and induce in them a voltage which tends to prevent or oppose the growth of current. This is known as the voltage of self-induction because it takes place within the coil itself. If the circuit is opened and the current decreases to zero, the magnetic field again collapses; and in doing so it again cuts the turns of the coil in such a direction that a voltage is induced which tends to keep the current flowing. The effect of self-induction is thus to oppose any change of current in a circuit. It manifests itself only when the current varies or changes.

This inductive or opposing effect is employed in such coils known as choke coils which merely consist of a number of turns of wire wound either around an air or iron core. The choking effect depends upon the number of turns of wire and the nature of the core. The greater the number of turns the greater is the choking effect; also with an iron core the choking effect is greater than with an air core. For a given coil the choking effect is much greater for a higher frequency current than for a lower frequency current. Air core coils are commonly known as Radio-frequency choke coils, because they are used to choke out or prevent a high frequency current from flowing through a certain part of a circuit.

Inductance

Inductance is the general term applied to the property or ability of an electric circuit to generate an electromotive force (volts) when the current in the circuit changes or varies. This inductive effect, we just learned, is due to the variable or pulsating magnetic field which is set up by the current.

Inductance is measured in a unit known as the henry, in honor of an American scientist and investigator, Joseph Henry, who made important electromagnetic discoveries. A henry is a rather large unit,

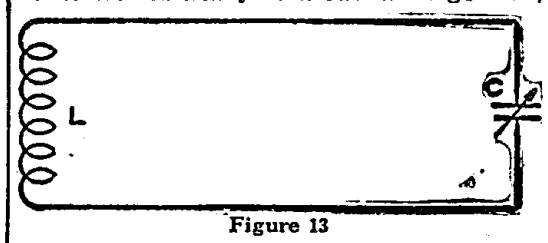


Figure 13

and hence in Radio practice, in which smaller measurements are generally made, a subdivision known as the millehenry is often used. A millehenry is 1/1000th part of a henry. For still smaller measurements the microhenry is used, a microhenry the 1/1000th part of a millehenry or one-millionth part of a henry.

For many purposes a variable inductance is needed. A variable inductance can be prepared by winding a coil so that a series of taps are brought out at regular intervals. Such a variable inductance is illustrated in Fig. 11. Here he have a coil of wire with taps brought out at every fourth turn. These taps are connected to a series of switch points over which the switch lever S moves. If the lever stands at point No. 1, the current enters at A and flows directly through the switchlever and out to B. If the lever stands on point 4 as shown, the first twelve turns of the coil are cut into the circuit and hence inductance to this amount has been introduced into the circuit.

A "loading coil" is merely a form of variable inductance coil used to introduce a certain amount of inductance into a circuit in order to obtain the desired operating characteristics. A little later we will see how such loading coils are used

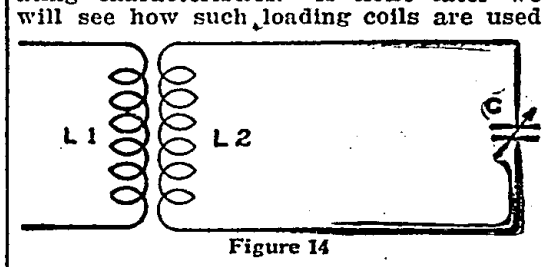


Figure 14

in Radio antenna circuits in case the antenna itself is not of the proper dimensions in order to be able to receive the desired signals.

Condensers and Capacity

Capacity is the second important electrical effect necessary to set up an oscillating cicuit. Capacity is obtained by means of a device known as a condenser. A condenser consists essentially of two sets of metal plates separated by an insulator known as the dielectric. The plates of each set are electrically connected, but the two sets are thoroughly insulated from each other. The function of a condenser is to store up electricity in the form of an electric (electrostatic) field between the metal plates.

The general principles of construction of a condenser are illustrated in Figure 12. The plates are odd in number and are arranged so that one set fits in between those of the other set. Variable condensers have one set of plates fixed and the other set capable of being rotated in and out between the others. Such condensers are used very extensively in Radio work.

The capacity of a condenser is a measure of the amount of electricity that can be stored up in it. The unit of capacity is the farad; but since this is a rather large unit, the microfarad, which is one millionth of a farad, is more commonly used. The capacity of a condenser depends upon the area of the metal plates, upon the nature of the dielectric, and upon the distance between the metal plates. The "dielectric constant" or "specific inductive capacity" of an insulator is the number of times the capacity of a condenser is greater when this material is used than when air is used as the dielectric. Air is thus used as the basis for comparison and is said to have a dielectric constant of 1. The dielectric constant K for other materials is given in the following table:

Air	-1
Mica	4-8
Glass	5-10
Hard rubber	2-4
Paraffin	2-3
Shellac	3-4
Treated paper	3-4

From this table it can be seen that a condenser with glass as a dielectric will have a capacity of from 5 to 10 times as great as it would have if air were used.

A variable condenser has maximum capacity when the movable plates are completely enclosed within the fixed plates, and can have its capacity decreased to any desired amount by rotating the movable plates partially out from between the fixed plates. The two sets of plates must not touch each other at any point while in any position, or the condenser will be rendered inoperative. The variable condensers in common use have the plates made of hard aluminum about 1/32 of an inch thick with an air space of 3/32 of an inch between the plates. The following are the sizes and capacities of the variable condensers in general use in receiving apparatus.

Type	Cap. in Mfds.
3-plate vernier	.00004
11-plate	.00025
23-plate	.0005
43-plate	.001

Oscillating Circuits

An oscillating circuit, it will be remembered, is one in which an electric current if once started will continue to flow back and forth very rapidly, that is, oscillate at a high frequency. An oscillating circuit combines the two electrical effects just described, inductance and capacity, and is set up by connecting an inductance coil of some form in series with a condenser. The inductance can be said to have a retarding effect upon the flow of the electric current, while the capacity tends to accelerate its motion. The result is that by introducing both effects into the same circuit, the current is caused to oscillate, the frequency of oscillation depending upon the relative amount of inductance and capacity in the circuit.

Inductance is always represented by the letter L and capacity by the letter C.

A typical high frequency oscillating circuit as used in modern Radio practice is illustarted in Figure 13, in which we have the coil L connected in series with

(Continued on page 12)

Rectifier for Charging B Batteries

Four-Jar Electrolytic Rectifier and Hook-up

A storage B battery is a nuisance unless ready charging means are at hand. The four-jar electrolytic rectifier is old, but the hook-up is always puzzling and requires a lot of fussing with connections. Such a rectifier can be made as follows:

Procure four pieces of sheet lead having the dimensions indicated in the illustration and four pieces of sheet aluminum of the same size. Both metals should be as pure as possible. Make two saw slots in each piece as shown. Procure four one-quart fruit jars and hang the strips over the edge of the jars. This will leave the center strip standing vertical.

Make up a wiring "harness" as per diagram using snaps on the wire ends for each connection to the lead and aluminum strips as well as to the B battery terminals. Small notches can be filed in the lead and aluminum strips for better connections. Ordinary flexible lamp cord is good wire for this work. Ordinary lamp sockets, represented by H, with plug-in extensions are used. Instead of light bulbs for resistance, use the family flat iron as shown at F. With a medium sized flat iron the resistance is about right. The other connections are obvious. Lump ammonium carbonate will be found good to use as electrolyte. Make a saturated solution of this chemical.

If two- 24-volt trays are to be put on charge, start them in parallel, but when about half charged, change over to series as shown. This will cut down the charging rate to about the right amount for finishing—less than .5 amperes. The parallel connection will run about one ampere.

An ammeter for these low currents is usually a problem. The Westinghouse company makes a small automobile ammeter that has no terminals. A loop extends on the back through which it is necessary to pass one turn of the wire which conducts the current to be measured. The dial of the ammeter reads up to 20 amperes charge and 20 amperes discharge.

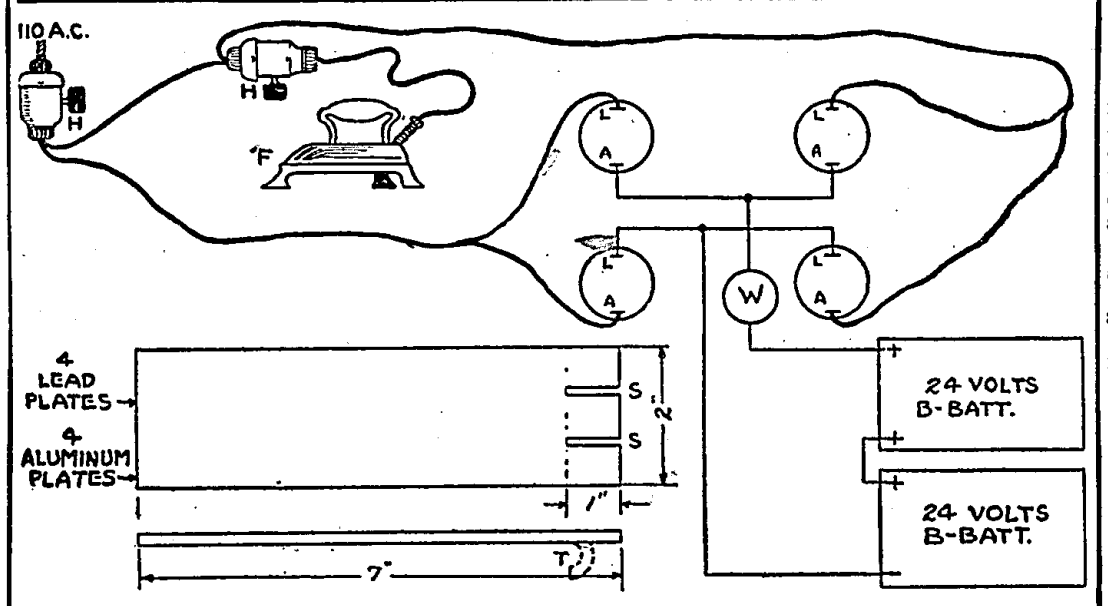
Apply ten turns of small insulated wire around this loop and the reading 20 will really mean 2 amperes and the intermediate readings will also be in proportion. I have calibrated one of these ammeters treated in this manner against a fine laboratory ammeter and have found it extremely accurate. Connect this meter in series at W in the wiring diagram, and it will be perfectly easy to read down to tenths of an ampere.—J. G. Utz, Detroit, Mich.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only 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 securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
RADIO DIGEST,
123 West Madison St., Chicago, Ill.

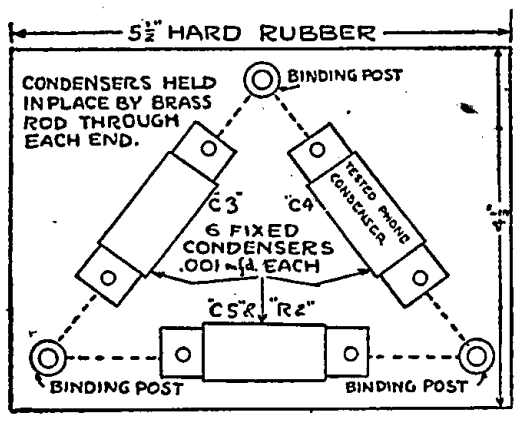
CONNECTIONS TO JARS AND IRON



Flewelling Condenser Bank

In making a super-regenerative set using the Flewelling circuit described in the October 21, 1922 issue of RADIO DIGEST, the amateur may be undecided as to just what condensers to use and how to arrange them, for there are three .006 mfd. condensers, which appear in the illustration as C3, C4 and C5, and also the grid leak R2, which is shunted across the condenser C5. My condenser bank is made up as shown.

The materials needed are as follows: A small piece of insulating material approximately 4½ by 5½ inches, which in my case was cut from an old storage battery cell. Seventeen tested fixed condensers of .001 mfd. capacity each and one combination leak condenser (all of which may be bought cheaply) three binding posts



and six brass bolts 1½ inches long and of a size (2/32 should do) to pass through the holes in the fixed condensers.

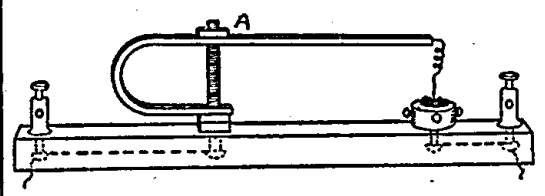
The condensers are set on the hard rubber base so as to form a triangle with six condensers together, held by a bolt at each end. Condenser C5, of course, holds the leak and condenser combination as well as five phone condensers.

The binding posts may be placed one at each corner, as shown, or on the edge of the base, or they may be left out altogether and the wires lead direct to the other instruments of the set.

The connections may be made with wire or copper strips. In any case all the connections are made on the under side.—Chas. J. Curran, El Paso, Tex.

Crystal Detector Mounting

Many crystal detector stands have been described but for simplicity coupled with efficiency the following is my idea



of the best stand. The materials needed are a piece of thin brass or copper 8 inches long and at least ¼ inch wide; two binding posts; a brass or copper 3/16 inch bolt at least 1½ inches long, three nuts to fit it; a piece of wood 8 inches long, 4 inches wide and ½ inch thick; a crystal detector and its receptacle.

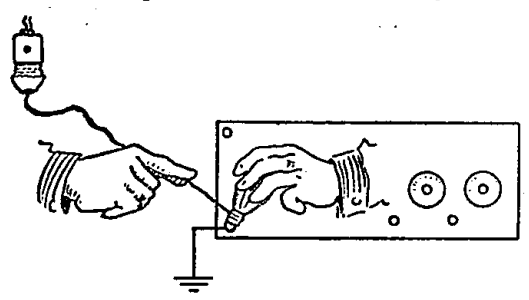
Four holes are bored in the wood, one a ½ inch, 1½ inch, 6½ and 7½ inches from the end on which the receptacle is mounted and half way between the edges. These holes are enlarged in the bottom so that the bolt heads are out of the way. Two holes are bored in the brass or copper strip, ½ inch and 4 inches from the end. The cat whisker is soldered to the other end of the strip and the whole is assembled as shown in the illustration.

The pressure of the cat whisker is regulated by tightening or loosening the nut A, and the cat whisker can be moved from side to side by moving the whole arm.—Vernon Hagelin, Geneseo, Ill.

Electric Light System Used as Ground Tester

To ascertain whether a ground connection is good or not I have used the following method with much success. It is commonly known that generally one wire of the electric lighting system—the return wire—is grounded. If the ground connection in question is good, it will also answer as a return circuit for the current in case the return wire is grounded.

Take a common reversible screw plug and attach one wire to one of the connections. To the other end of this wire fasten a brass bolt or a nail, and tape it so that it can be held without touching the bolt. Screw the plug into a lamp socket and place an electric bulb upon the



ground connection to be tested so that the base of the terminal of the bulb will rest on the ground, then touch the side of the bulb with the bolt, the current being turned on. If the globe lights as bright as when in the regular socket, the ground connection is good. If this does not work, try reversing the plug. Be careful not to touch the bolt to the ground connection as this will very likely result in much fireworks and a burned out fuse. —Laurence Wingerter, Wheeling, W. Va.

Howling Eliminated

Grounding the cores of the amplifying transformers and the negative side of the A battery to the shield of the panel will sometimes aid in eliminating squealing and howling.

Don't Crowd Wires

Wires connecting parts of sets should be run as far apart as possible. Wherever necessary these should cross at right angles. This will help to eliminate many of the noises.

A. B. C. LESSONS

(Coninued from page 11)

the condenser C. The slanting arrow extending through the condenser C indicates that condenser is a variable one, and that by adjusting the plates any desired amount of capacity can be introduced into the circuit.

The frequency with which the current oscillates is known as the natural frequency of the circuit. This frequency depends upon the relative amounts of inductance and capacity in the circuit. If either the inductance or capacity is decreased, the oscillating frequency of the circuit is increased; while if either is increased, the frequency is decreased. But if one is increased and the other at the same time decreased so that the product of their values remains unchanged, then the frequency of the circuit will not be affected. These facts are generally expressed in the form of an equation, such as the following:

$$F = \frac{5033}{\sqrt{L \times C}}$$

In the above equation F stands for the frequency of the circuit expressed in cycles per second, L is the inductance of the circuit expressed in millehenries, and C is the capacity of the circuit expressed in microfarads.

In Figure 14 we have illustrated another oscillation circuit, the righthand section of which resembles that in Figure 13. If by some means electrical oscillations are set up in coil L-1, these will try by influence or electromagnetic induction to cause a current to oscillate with the same frequency in the circuit L-2C. If the oscillation frequency of the circuit L-2C is different from that of the current flowing through the coil L-1, the inductive influence will not be very effective. But if the variable condenser C is adjusted so that the frequency of the circuit is the same as that of the current in coil L-1, then the inductive influence will be very pronounced and a strong current will be caused to oscillate in the circuit L-2C.

The process of adjusting the inductance or capacity of a circuit so that it will have the same frequency as that of another circuit, is called tuning. When two circuits have the same oscillation periods they are said to be in resonance. This condition exists when the product of the inductance and capacity of one circuit is equal to the product of these two effects in the other circuit.

Chapter Four

In the next chapter the discussion will continue with the method of sending Radio messages through space and the application of the principles of oscillating circuits for receiving these messages and converting them into audible sounds. It will be a most interesting and important chapter, and will form a valuable link in the complete story of effective Radio reception.

Three New Reflex Circuits for Experimenters

A Continuation of the Discussion of "Trick" Circuits

By H. J. Marx

THERE is a very common error made by most Radiophans when Radio frequency amplification is considered. Many a man who has a single detector tube set, wonders whether he should use Radio or audio frequency amplification.

The distinct value of audio frequency amplification lies in its ability to increase the volume of the signals that can be received by the detector unit. It is usually used in conjunction with loud speaking devices. On the other hand, the function of Radio frequency amplification is to build up a signal (usually long distance) that is too weak for the detector. It will be found that there is little or no amplification of strong local reception possible through the use of Radio frequency amplification.

Limited to Two Audio Stages

Now in addition it has been found impractical to add more than two stages of audio frequency amplification in reflex circuits. The accumulative effect of the audio frequency amplification becomes so strong otherwise that it paralyzes the tube so far as the Radio frequency operation is concerned.

Now, considering the effects of the above conditions, it will be found quite simple to understand that the value of the reflex receiver is located distinctly in its possibility of long distance reception.

The most popular form of reflex circuit is a four-tube circuit with three stages of Radio frequency, detector, and two stages of audio frequency amplification. For the beginner in reflex circuits, the simpler form is to be recommended. A crystal detector instead of the tube is often substituted because of its absence of distortion and also because it avoids the rather critical adjustment of the filament rheostat. When the simpler form of circuits have been mastered, then the further stages can be added.

Base Mounting Best

To the amateur who does considerable experimenting with new circuits, the base mounted sets are distinctly most advantageous as the connections are easily made and altered as desired. It is really an unnecessary waste of time and money to begin immediately with panel mounting of instruments until every detail of the reflex set has been decided.

Another point that is often disregarded is the tuning devices. If the set is to be used with a loop aerial, then the tuning is affected through a condenser in shunt with the loop, but if outdoor aerial and ground connections are to be used, then some better form of tuning device must be incorporated. This may be in the form of a single or double slide tuning coil, a variocoupler, or even a variometer.

Because loose couplers are usually constructed for large ranges of wave lengths, they are not considered practical for use with Radio frequency amplification since the effect of dead end and other losses is much more serious under these conditions.

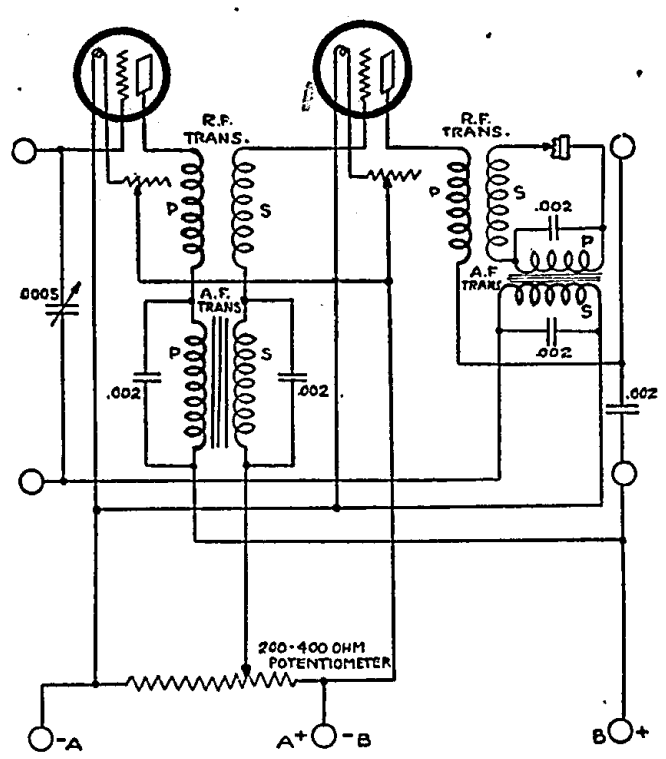


Figure 1

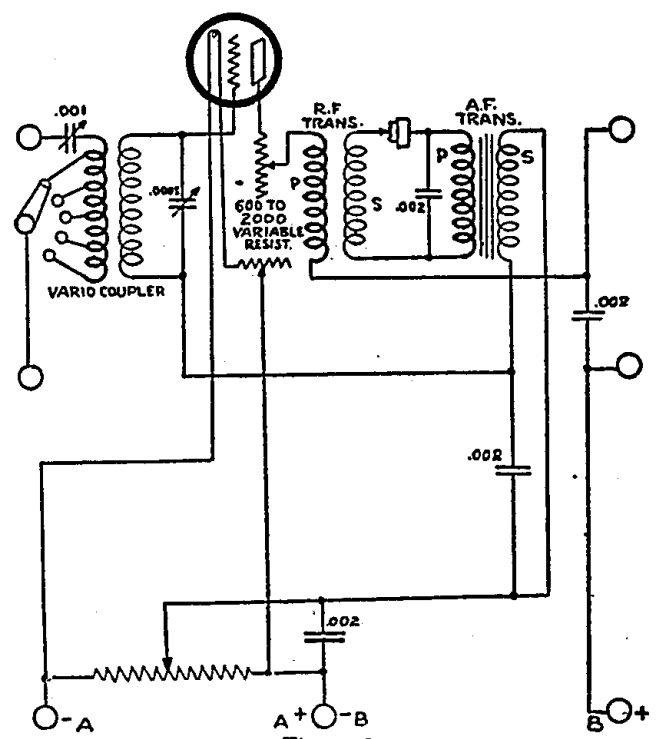


Figure 2

Circuit Figure 1

Figure 1 is a simple form of reflex circuit using two tubes and a crystal detector. It is equivalent to an ordinary circuit having two stages of Radio frequency, detector and two stages of audio frequency. Two Radio frequency and two audio frequency transformers are required. Both the primary and the secondary windings of the two audio frequency transformers are shunted with .002 mfd. fixed condensers. These act as by-pass condensers for the Radio frequency currents. Another condenser of the same capacity is shunted across the phone binding posts. The variable condenser used for tuning should have a capacity of .001 mfd.

A 200 or 400-ohm, potentiometer is used across the filament battery for the control of the grid potential of the second tube only. The first stage of Radio frequency works with a positive potential on the grid.

Sixty to 80 volts should be used on the plate circuits of both tubes.

The rheostats for filament control will not be found very critical in operation and any sort of automatic control can be used instead. All connection leads naturally should be kept as short as possible.

Circuit Figure 2

This circuit is primarily intended as the introductory step of a fan to reflex type of circuit. A variocoupler is incorporated so that the outdoor antenna and ground connections can be used. A .001 mfd. variable condenser is added in series in the antenna, and a .0005 mfd. variable condenser is used in shunt across the secondary.

As in the previous circuit a potentiometer is connected across the A battery for the control of the grid potential of the tube. The fixed condensers used all have a capacity of .002 mfds. As in the previous circuit, .60 to 80 volts are used on the plate circuit. An additional piece of apparatus is a high variable resistance from 600 to 2,000 ohms. between the plate and the primary of the Radio frequency transformer. This helps stabilize the Radio frequency amplifications and acts as a check on oscillations.

The circuit will be found very selective, one of the main characteristics required for long distance reception. After this circuit has been thoroughly mastered, the amateur can try the addition of another tube using the same type of coupling.

Circuit Figure 3

The circuit shown in this figure is that of Marius Latour, a man who has devoted considerable time and study to the development of reflex circuits. Four tubes are used, one of which is the detector. The circuit is equivalent to three stages of Radio frequency, detector and two stages of audio frequency amplification. Three Radio and two audio frequency transformers are required. The fixed condensers across the windings of the audio frequency transformers and also the headphones are all of .002 mfd. capacity. No potentiometer control is used. The detector tube has the usual grid leak and condenser combination.

A single slide tuning coil with a .0005 mfd. variable condenser shunted across it, permits a marked degree of selectivity in tuning. Sixty to 80 volts are used in the plate circuits. Taken as a whole, this circuit will be found a rather simple one of its type, and presents no difficulty in tuning operations.

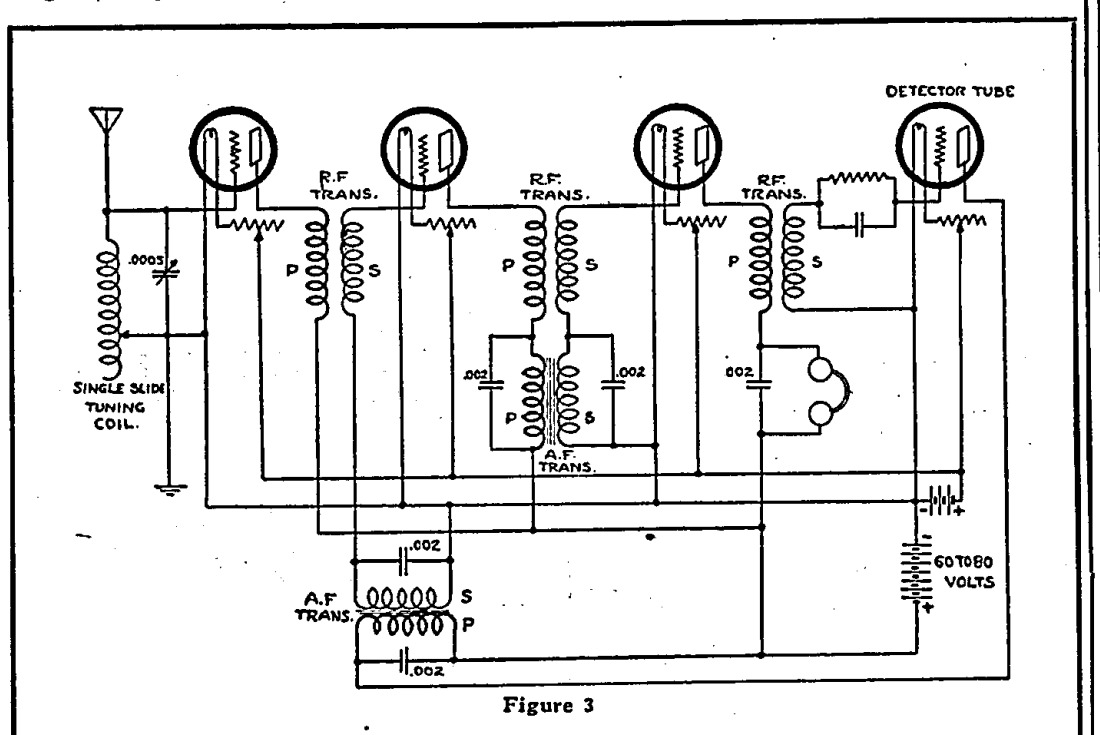
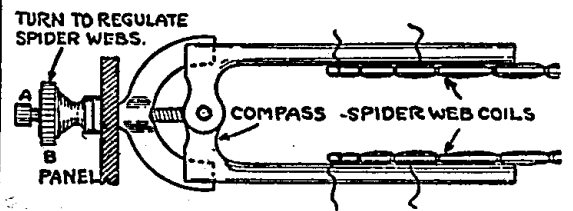


Figure 3

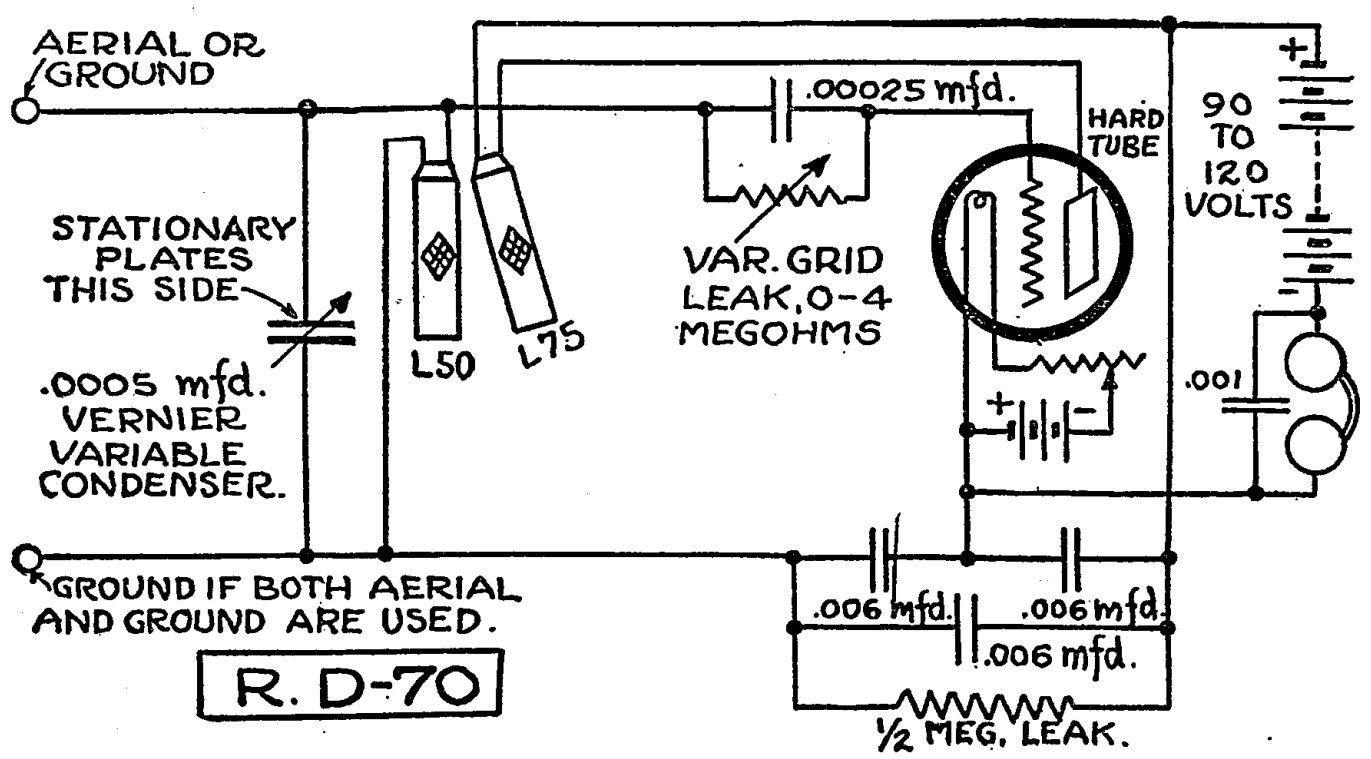
Spider Web Coil Mounting

An ordinary pencil compass will make a good variable coupling mount for a spider web coil. The ends of the compass are pulled out and pieces of wood are inserted. The coils are fastened to the



wooden parts. The position of the two coils mounted in this manner can be varied easily obtained by turning the adjusting screw on the compass.—Leo P. Moskowitz, Omaha, Nebr.

FLEWELLING CIRCUIT SHOWN AS R.D.-70



COMPLYING with the requests of the many new readers of RADIO DIGEST, who are anxious to enter the Flewelling Circuit Contest, the famous hook-up is again repeated as Diagram R.D.70. The values of all the pieces of apparatus are given in the illustration so that the drawing is completely self explanatory.

It has been found from experience that but very loose coupling is necessary. For this reason the use of a three-coil mounting is suggested, leaving the center mount empty. This will permit looser couping, as it allows the angle between the coils to be increased.

Some of the diagrams show the phones between the A and B batteries, while others show the phones between the B battery and the plate coil. This is immaterial, as both methods will operate successfully.

A Chicago fan reports that his Flewelling set will receive WGY, WHB and WGM as loud as local broadcasting plants heard on a single tube regenerative set. He uses a VT-2 or "E" tube with 120 volts on the plate, but NEITHER AERIAL NOR GROUND.

In order to reduce body capacity effects to a minimum the maker is cautioned to connect the variable condenser as directed in the diagram.

School Slate Affords Good Low Cost Panel

Many Radiophans find that in building their set they cannot afford a good composition panel. This was my difficulty, which was overcome by the use of a thirty-cent, 8 by 12 inch school slate. The pretty red cloth border was removed and the slate mounted on the front of the cabinet.

Holes may be drilled in this material very easily. Use an ordinary iron drill with no lubricant and drill slowly with little pressure, making sure to firmly block the back of the slate to prevent it chipping. The slate will take a fine polish by using powdered pumice stone and water. Be sure to dry thoroughly.

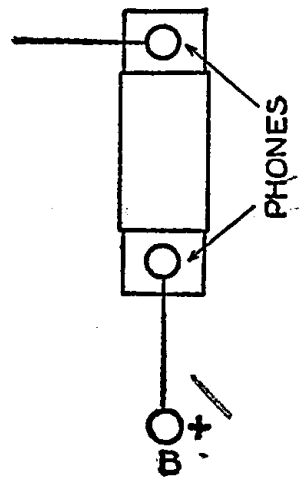
Not being sure of the dielectric properties of the slate, no connections or binding posts were mounted on the panel. The tap switch points were mounted on a small piece of bakelite and mounted inside the cabinet, the switch arm shaft being extended through the panel. A bakelite terminal board, 1 by 8 inches, was mounted inside the cabinet and all battery leads, ground and aerial connections are brought to this terminal board, the outside ends of the leads being equipped with test clips. The set works very well, 1,000 and 1,500 mile stations being tuned in with little difficulty.—E. H. Rankin, Lakewood, Ohio.

Grounding Condenser Shaft

There seem to be a great many complaints made about the capacity effect of the condensers in the antenna or ground circuits. By using the variable condenser in the ground circuit with the shaft and rotor plates connected direct to the ground, the body capacity effect is eliminated, as the shaft and the metal bushing the dial is a direct ground. This is a great help when tuning for distance. —G. W. McKee, Chicago, Ill.

Reinartz Diagram Correction

In the last issue, page 13, the article describing the construction of the Reinartz receiving set had two illustrations. In the upper right corner of Figure 2 (the top three binding posts), the connection between the positive B battery, and the lower phone and phone condenser binding posts, was omitted. With the correction made, this part of Figure 2 would appear as in the accompanying illustration.

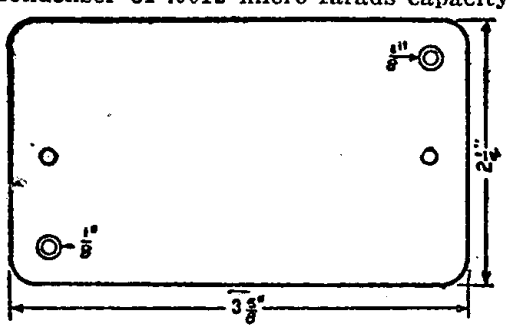


In order to prevent the burning out of amplifier transformer windings never employ greater plate potential than that with which the transformer is designed to be used. Most transformers are designed for use with plate potentials of from 40 to 60 volts.

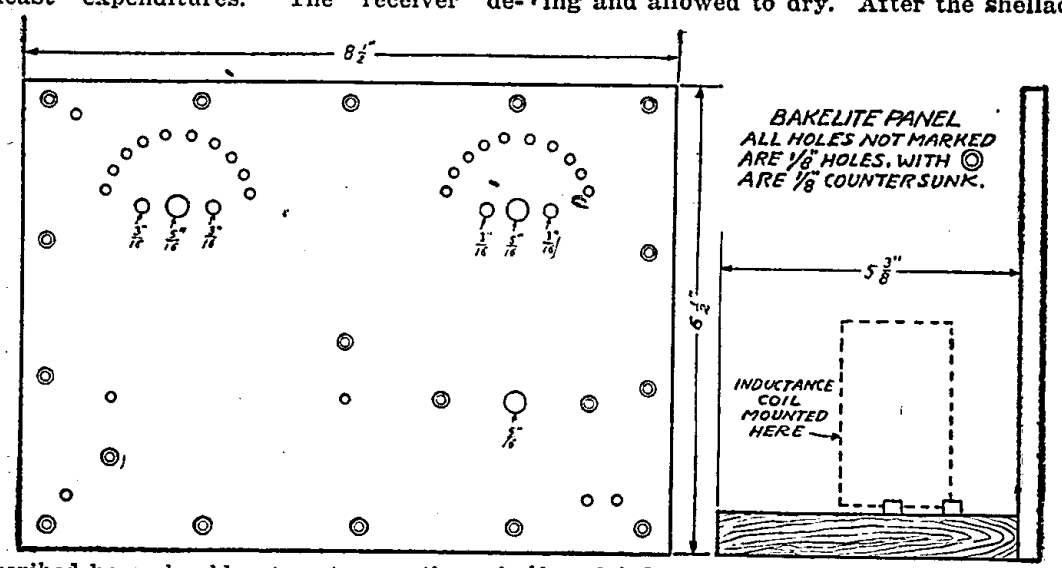
How to Make Efficient Crystal Set for $6.00

The important points to take into consideration in building a Radio receiver, are efficiency and cost. Every amateur wants the best possible results with the least expenditures. The receiver described here should not cost more than six dollars. The material necessary for a receiver of this type is as follows:

One cardboard tube 4 inches in diameter, ⅛ inch thick and 6 inches long; 130 feet of No. 23 S. S. C. magnet wire; 20 brass switch points; 4 switch stops; 2 switch levers and knobs; 1 variable condenser of .0001 micro-farads capacity; 1 telephone condenser of .0012 micro-farads capacity;



1 bakelite panel 8½ inches long, 6½ inches wide by ⅛ inch thick; five pieces of good wood, oak or mahogany, ¼ inch thick, for the cabinet; dimensions as follows: 1 bottom, 8½ inches by 5⅜ inches; 2 sides, 6½ inches by 5⅜ inches; 1 back, 8 inches by 6¼ inches, and 1 top, 8 inches by 6¼ inches. In addition to the above material, will be needed a detector stand with cup, a piece of galena or silicon, four binding posts, three small blocks of wood 1½ inches long, 1½ inches wide and 1 inch high, a few wood screws and some solder.



Winding the Inductance Coil

The cardboard tube should be given a coat of shellac before beginning the winding and allowed to dry. After the shellac has dried, punch two small holes, about ½ inch apart, ¼ inch from one end of the tube with a nail, and insert one end of the wire, pulling about 1 foot through for connections, and begin winding. Take a tap off for each turn, until ten turns have been wound; thereafter taking one tap off for each ten turns, until one hundred turns have been wound.

There will then be twenty taps altogether. The end should be fastened as at the start, by punching two holes in the cardboard tube and inserting the wire through one hole and then through the other, then bending it over. This will keep the wire fast. The coil should now be given a good coat of shellac or dipped into hot paraffin, and allowed to dry.

Drilling the Panel

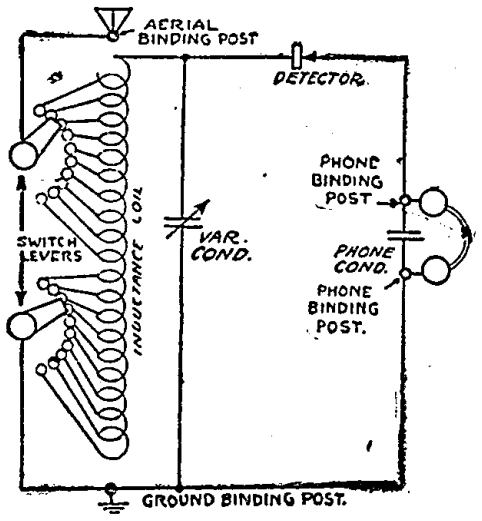
Drill the bakelite panel as shown in the diagram, countersinking holes as illustrated, and screw the panel to the bottom piece of wood, measuring 8½ inches by 5⅜ inches, with small wood screws. Take the three small blocks of wood and saw a slit in the center of each about ½ inch deep. Fasten these blocks to the bottom piece of wood with small brads. The coil should now be inserted vertically into the slits in the blocks of wood, and a small brad tacked through horizontally to hold the coil firmly in place. Solder the first ten taps of the coil to the screws of the switch points, which should be inserted in the ten holes on the left of the panel (looking at the front) before soldering. Then do likewise with the other ten taps, soldering them to the switchpoints on the right of the panel. Insert the knob and lever and solder the inside rod to the top binding post on the left of the panel. The other switch lever is inserted in the hole of the panel and soldered to the bottom binding post. The four switch stops are screwed on each side of the two switch levers.

Assembling the Parts

Next screw the variable condenser to the panel and solder the movable plates to the end of the coil where the winding was started; the fixed plates to be soldered to the bottom binding post on the left of the panel. Screw the detector stand to the panel, leaving the crystal cup on the outside, the telephone condenser can be screwed down on the bottom piece of wood near the coil.

Solder one connection from the detector to one terminal of the telephone condenser, the same terminal of the condenser being soldered to one of the telephone binding posts. Solder the other terminal of the telephone condenser to the other telephone binding post; a connection from this same binding post is to be soldered to the fixed plates of the variable condenser. Solder the other terminal of the detector to the movable plates of the variable condenser.

The two sides and top, for the cabinet, are fitted against the panel and fastened with wood screws, the back being screwed to the sides, bottom and top. The cabinet should then be sandpapered with a very fine grade of sandpaper, and given two coats of varnish. When dry a final polish can be given by rubbing it with a piece of canvas.



The detector base is shown in the illustration. The base is of insulating material, preferably bakelite, with the holes drilled as illustrated, but countersunk underneath to permit the small washers to make connection. The bottom is also slit to allow connections and keep the bottom level.

The wavelength range of the receiver is from 200 to 600 meters. Greater wavelengths may be obtained by inserting loading inductances in the aerial circuit.

Questions and Answers

Wants to Improve Set

(1286), SW, San Jose, Calif.

I have picked up KGW, Portland, Oregon, several times and also KOG, Los Angeles. KGW is 580 miles away airline, and KOG, 300 miles. I also hear Salt Lake City, Seattle and other Los Angeles stations regularly. Are these good results? I am using a detector tube without amplification. My set is single-circuit regenerative with a bank wound inductance coil and 23-plate variable condenser for tuning.

Would a honeycomb set be better? How can I increase selectivity? Will Radio frequency amplification work successfully without audio frequency, and if so, how much would my range be increased by two stages of Radio frequency? Would a set using two variometers and a variocoupler have greater range? Have you any suggestions for improving set?

A.—It is a question whether you would achieve as good results with a honeycomb set as you are now enjoying.

Vernier adjustments on all controls will increase the selectivity of your set.

While Radio frequency will work successfully as suggested, you would lose the regenerative feature which is equal to about three steps of Radio frequency.

A set using two variometers and a variocoupler is about the best known and doubtless would increase your range.

Your description of present set is not specific so that it is not possible to advise where it might be improved.

R.D.-52 Questions

(1285), WES, Middletown, O.

I have a single-circuit set with detector and one stage of amplification with which I have received phone stations 750 miles distant. This set is not very selective but is very susceptible to interference from spark stations and other phone stations than the one tuned in.

I am interested only in Radiophone reception and would like to try hook-up R.D.-52, if that will overcome my troubles.

Is R.D.-52 an efficient hook-up for Radiophone reception?

If the loading coil is necessary how should it be made?

What values should the honeycomb coils have?

How much plate voltage should be used, and how arranged?

A.—Yes, R.D.-52 is an efficient circuit.

A loading coil is not necessary unless your antenna falls short of fifty feet in length.

Honeycomb coils should be L75 secondary, L50 on primary and L35 on tickler.

Use from 45 to 90 volts plate voltage, with a fairly hard tube as a detector.

Make it Regenerative

(1284), RBC, Crystal Lake, Ill.

What will be the range of the following: Loose coupler, 43 and 23-plate variable condensers, grid leak, fixed condenser and detector unit complete?

Would the addition of one step of amplification prove worth while?

Will it be necessary to have another battery to supply current to a Magnavox?

A.—The range of your apparatus should be approximately two hundred miles, although it may attain even greater distance under favorable conditions.

We believe that you would find a regenerative detector of greater advantage than a step of amplification.

The same battery may be used for both tubes and Magnavox.

Radio Frequency Amplification

(1274) LVP, Owensboro, Ky.

How many steps of Radio frequency amplification would be necessary to bring in stations whose carrier wave I can now just hear? What happens when you place Radio frequency before the detector? Does it give more interference, or less?

A.—Two or more stages of Radio frequency will increase your receiving range. However, it will also increase interference. To bring in more clearly the present audible stations, you should go over your set to lower the resistance at various points.

Critical Filament Adjustment

(1262) JF, Steubenville, O.

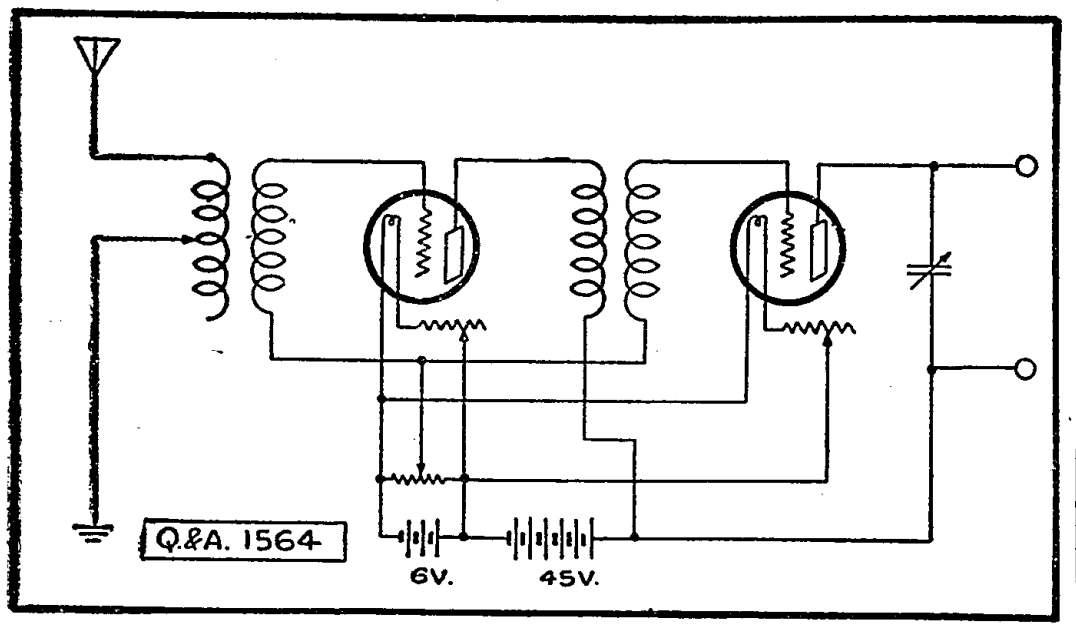
I have a regenerative receiving set. When I try to listen in on the concert, I have to get the music on one spot on the rheostat. I have tried all ways to find out, but it seems to me that nobody knows the trouble. Another thing I want to mention is that I hear a humming noise like high tension and I think that is what the hum is. If you can help me in any way I will be much obliged.

A.—The plate or B battery on your detector tube is probably of too high a voltage. Advise reducing it with potentiometer, or taps on battery, if any. The interference you experience may be due to tube noises from the high voltage on your detector, although these may result from high tension lines in close proximity. If your antenna is not constructed at right angles to the electric service lines, it should be.

Allen Circuit with Two R. F.

(1564), HH, Los Angeles, Calif.

I beg to inform you that I am the proud owner of an Allen selective long distance receiver as described in RADIO DIGEST some time ago, and I am getting very splendid results from its use.



I do not care to add the three stages of audio frequency as recently shown in the Digest, as the one tube gives me plenty of amplification, but I do want to add two stages of Radio frequency, and my dealer says it can't be done as the set is regenerative. Admitted, but I believe RADIO DIGEST can show me how, and I ask you to give me the hook-up.

Again, can you tell me how to overcome this fault? I have great difficulty in bringing in my distant stations from the fact that there is a great amount of whistling and howling right at the critical point. Sometimes I lose the station. I presume body capacity causes much of this. I am using Micadons, .00025 mfd., with Kellogg 1.5 and 2 megohm. leaks. A .001 mfd. condenser seems better than a .00025 and a 1.5 megohm. leak seems better than the 2.

A.—To be more fully deserving of the confidence you express in RADIO DIGEST we are taking time to make a sketch showing the employment of two stages of Radio frequency. These can be connected to your present receiver in the manner desired, as shown by diagram Q. & A. 1564.

Body capacity is very pronounced in your receiver. Give careful attention to adjustment of grid leak, although even this does not always effectively overcome it.

PHOTO DIAGRAM SET

(Continued from page 6)

audio frequency amplifier tubes and is marked A.F. INCREASE.

Use of Jacks and Plugs

The jack to the left does not take advantage of the last tube, while the one to the right throws in the full amplification power of the set. If the headset is connected to a telephone plug, then it is inserted in the desired stage. If binding posts are to be used, a plug made of an insulating material is furnished. This is inserted like a receiver plug, and automatically operates the filament control, throwing the two binding posts into the plate circuit.

Tuning Operations

When all connections are made, the set is ready for operation. Set the primary inductance switches on the last contact to the left. Place the secondary condenser scale on the highest division. Set the coupling adjustment on the zero division mark. Put the amplification control pointer a quarter to a half way to the left. Adjust the filament rheostats until all tubes are burning brightly.

The audio frequency amplifier filament rheostat—A.F. FIL—and the Radio frequency amplifier filament rheostat—R.F. FIL—should be rotated as far to the right as possible and the detector filament rheostat rotated to the right until a loud hiss is heard in the phones.

If this is not heard, the wire from the +B DET terminal should be changed in its connection to the B battery until the hiss is heard. Then the detector filament rheostat is rotated to the left until the hiss barely dies away. Then adjust the tuning circuits as follows:

With the upper button on the far left tap, move the secondary condenser dial through half a circumference. Continue adjusting the upper switch on consecutive buttons to the right and move in conjunction, the condenser dial over its scale. When signals are heard, adjust for maximum intensity first with the secondary condenser, second, with the lower primary inductance switch, and third, with the amplification control. All filament rheostats should be adjusted carefully for clear reception.

Winding Information

(1278) DG, Chicago, Ill.

How many turns should I have in the rotor of a variocoupler? What size wire for winding primary and secondary?

What size grid condenser and what kind of grid leak should I use?

Can you suggest the best tube for my detector set, hard or soft?

A.Thirty turns on rotor of a variocoupler will give satisfactory results. For winding primary and secondary, use the largest size of wire that can be put on and still accomplish the required number of turns.

Use a .0005 mfd. fixed condenser and rather heavy pencil line between terminals for a grid leak. Experimentation will determine proper weight of the line.

Any standard tube, preferably soft, will do.

Tube Trouble

(1282), PHS, Hattiesburg, Miss.

What I want to know is why my tubes go dead so quick. When I say dead, I do not mean that they are burned out, for they are not, but they refuse to bring in the signals except when I first put them in and then only for a few seconds. I turn the rheostat on full and then they begin to make an awful noise like static, but it is that for I disconnect the antenna.

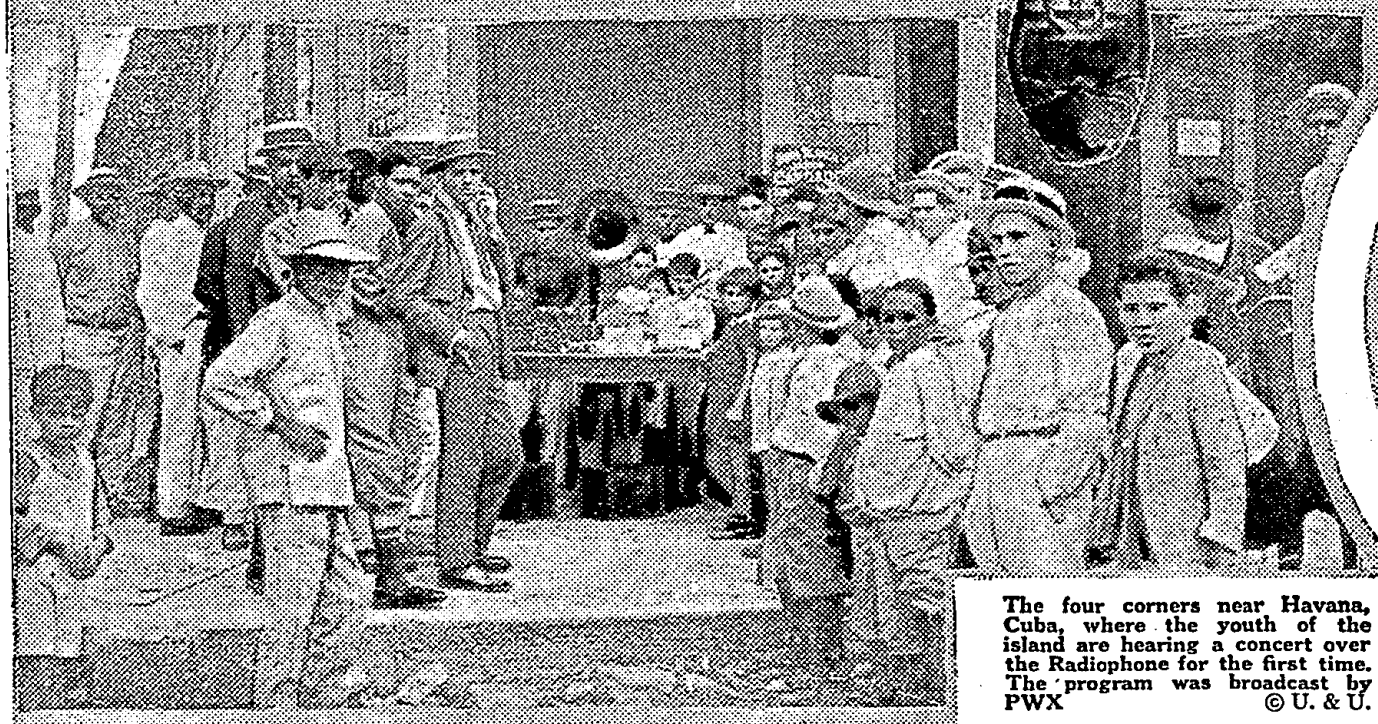
I am using UV-200 tubes on the receiver and they will not last more than twelve to fifteen hours. I have brought in baseball scores over a thousand miles on my set, but buying a new tube every week is a little too costly for me.

A.—Your difficulties suggest battery trouble. Determine by use of voltmeter if your A battery maintains a steady voltage, and the same with your B battery. If not, recharge the A, or buy a new B whenever the trouble is indicated in either of these sources of current. Be sure you are not using over 22½ volts on the plates of any of the UV-200 tubes. They are "gassy" and won't stand much B battery without paralyzing.

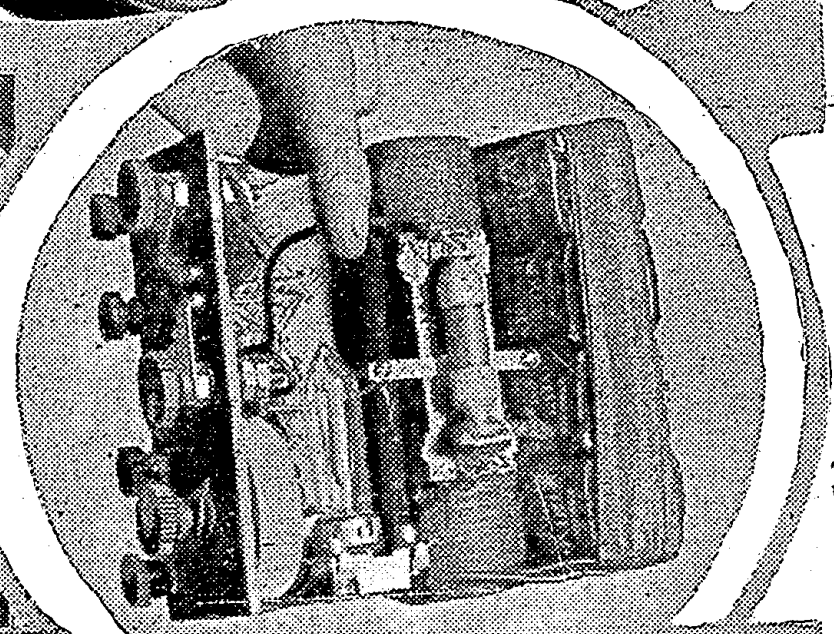
Loud speakers can be made of sea shells, by cutting off the stem and attaching a receiver to the small opening.

Radio Illustrated

In recent years the ladies at home had no means of entertainment while doing the housework or mending the clothing. The phonograph was a great help, but it required attention. Now that we have everything electrical, there is little or no housework to do, and not much mending. Therefore fancy work predominates. The entertainment is by Radiophone and the stitches may be made in time with the music. Besides, there's no "cranking" to do; just listen in. The Radiophone, like many other electrical household devices, has taken its place in the home, and its utility is not only for entertainment but it is instructive as well as a source of news and market reports. Miss Dorothy Knapp, recent winner of first prize as America's most beautiful girl, listening in while embroidering © Kadel & Herbert



The four corners near Havana, Cuba, where the youth of the island are hearing a concert over the Radiophone for the first time. The program was broadcast by PWX © U. & U.



The interior of a miniature transmitting and receiving set that fits into a camera case. Note the neat arrangement of coils, batteries, etc., also the miniature vacuum tube © K. & H.