

Radio Digest

EVERY WEEK

Illustrated

TEN CENTS

TRADE-MARK

Vol. III

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CHICAGO, ILL., SATURDAY, NOVEMBER 25, 1922

No. 7

TUBE MONOPOLY ENDS

"AIDA" FIRST ETHER OPERA SEASON HIT

THOUSANDS OF FANS HEAR IT—EXPRESS APPROVAL

Three Operas Opening Week—Second Week's Program—How Music Is Picked Up at Theater

CHICAGO.—Beginning with the opening opera "Aida" instead of the second night's offering, "Carmen," Station KYW began one night earlier than announced to broadcast the productions of the Chicago Civic Opera Association here Monday, November 13. On the two following nights in order, "Carmen" and "La Boheme" were broadcast.

The successful transmission of the first three operas was beyond all expectations. Supported by their experience in broadcasting the Chicago Opera during all of last year's season, Westinghouse Station KYW engineers reproduced the orchestra and singers to perfection. Modulation and clarity could hardly have been better.

Many thousands of phone calls, telegrams and post cards received by Manager Weatherbee of Station KYW indicated that Radiophans in all parts of the country appreciated the musical treat afforded.

Operas of Second Week

The operas which were on the program for the second week at the Auditorium Theater were: Sunday afternoon, November 19, "Parsifal"; Monday night, "Tosca"; Tuesday night, "The Snow Maiden"; Wednesday night, "Il Trovatore"; Thursday night, "Carmen"; Saturday matinee, "La Boheme"; Saturday night, "L'Amore Del Tre Re" (The Love of Three Kings).

At the time this announcement goes to press, Mr. Weatherbee, manager of KYW, was unable to say what operas would be broadcast during the second week. There was to have been at least two, and perhaps three of the operas go on the air.

How It Is Done

The evening operas, always begin at eight o'clock, Central time, while those

(Continued on page 2)



DE FOREST IS FREE TO USE HIS INVENTION

Unjust Deadlock Ends with Expiration of Fleming Valve Patent November 7

New Audions on Market

President Charles Gilbert of De Forest Company Gives Inter-viewer Pertinent Facts

CHICAGO.—"The ending of an unjust monopoly," said Charles Gilbert, president of the DeForest Radio Telephone and Telegraph Company, when he promised a representative of RADIO DIGEST that more than one make of receiving vacuum tubes would be on the market in a few days. The expiration of the Fleming two-electrode vacuum valve patent November 7 was the occasion of Mr. Gilbert's recent visit and consequent interview.

"Now, after many years of litigation and other hindrances, Dr. Lee de Forest will finally receive what is due him. He will be able to manufacture his own invention for the first time in many years," said Mr. Gilbert.

Shows New De Forest Tubes

"You wanted to see the new tubes we are now manufacturing and for which we are taking orders," he continued. "Here they are. The large one is a 6-volt detector-amplifier tube. The smaller one is a 1½-volt or dry battery tube with a coated filament." (Continued on page 2)



Here we have Mary Garden in the leading role of the opera "Tosca." Miss Garden leaves the Chicago Opera after November 25 and will not return until the last two weeks. Left insert is Forest Lamont as Turridu in "Cavalleria Rusticana." Right insert is Giacomo Rimini in "Rigoletto." Photos of Garden and Lamont by Moffett; of Rimini by Fernand de Gueldre

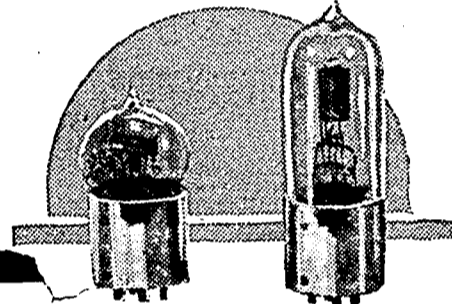
TUBE MONOPOLY ENDS

(Continued from page 1)
ment." (See photograph below on this page.)
"In point of fact, the expiration of the Fleming patent," continued Mr. Gilbert, "gives to the inventor of the three-electrode tube—Dr. Leo de Forest—the right to make free use of his own invention, heretofore denied him—the De Forest Audion lamp under which the big Radio corporations and telephone companies have been enabled to bring about transcontinental telephony and the whole art of Radio communication and Radio broadcasting."

Radio Development Delayed
"Litigation first started by the British Marconi Company can in all fairness be said to have delayed the development of Radio in America for many years," said Mr. Gilbert. "It is unfortunate in a way that whole fortunes had been spent upon such litigation in this country, the net outcome of which was the foisting upon the public of a monopoly whereby the inventor of the Audion, the device that has revolutionized the entire Radio art, was stopped from further development of his invention, which was put into the hands of a foreign-owned corporation whose two-electrode device, as every schoolboy knows, was entirely valueless in actual Radio work."

"Shorn of all legal and technical terminology, Dr. Fleming had in his valve a mere rectifier of high frequency currents perhaps of less value in a commercial way than even the crystal detector. It is conceded that the Fleming valve was never in any sense a good Radio detector for practical purposes."

Used Patent to Dominate Field
"The effect of the Fleming ruling in this country, however, can be best described by saying that it was used in an attempt to dominate the Radio field, to not allow the use of the De Forest Audion lamp for the purpose of public broadcast-



The small tube is a dry battery or 1½-volt type and consumes from .2 to .3 amperes. It has a coated filament and is especially fine for Radio frequency amplification. The large tube draws from .5 to .6 amperes and requires a 6-volt battery. Both tubes are made for the standard 4-prong base, take from 45 to 150 volts on the plate, have very low internal capacitance on account of the efficient design, and are made for use either as detectors or amplifiers. One distinct, patented feature of the two tubes is the spring tension filament mounting which absorbs all shocks and takes up the expansion of the filament as it heats and lengthens

ing, and otherwise to hamper the Radio development in general as well as to duplicate the 'Edison effect' the discovery of which preceded the Fleming valve by many years.

"In general, the situation is not like that which might have happened to Alexander Graham Bell, had someone prevented his own development of the telephone by digging up the iron diaphragm and through patent litigation prevented Bell from using the diaphragm for the purpose of telephone communication. Altogether there need be no true American tears shed therefore upon the expiration of the Fleming patent."

Marconi Company Blocks Basic Patent
"The first of the De Forest Audion patents to which the Marconi Company, later succeeded by the Radio Corporation of America, took exception on the ground of infringement were issued as far back as 1907. In general, it may be said that the De Forest basic Audion patents will expire in about two years. These are the patents upon Dr. De Forest's original device, the three-electrode tube, which he called the Audion."

"The De Forest Audion patents, which number over twenty, are the sole property of the De Forest Telephone & Telegraph Company and it should be known that no individual or company is permitted to make use of the three-electrode vacuum tube except under special licenses granted by the De Forest Company or through companies licensed by the De Forest Company. Rights to manufacture the Audion and to use it in long distance telephone communication as well as in the Radio field have been granted under the form of a lease to the Western Electric Company and also through an exchange of patents to the following additional companies—General Electric Company, Westinghouse Corporation and the Radio Corporation of America. It is through their use of the De Forest Audion that the present modern Radio system has been developed."

Surveyors at work in Washington state, using a ground made by running a two-chain tape under the aerial and an aerial consisting of a single wire 150 feet long stretched to a tree about eighty feet high, received news and music from stations as distant as Los Angeles.

DIGEST FIGHT MAKES PROGRESS, CONTINUES

Metropolitan Attitude Negative—Relay Broadcasts of Chicago Opera Next in Line

Playing against overwhelming odds the RADIO DIGEST is still campaigning for the release of the Metropolitan Opera for the fans of the East. That powerful influence both for and against the project are arrayed in New York is seen by many indications coming to the attention of RADIO DIGEST.

One report brings the information that a well-known governor of a powerful Eastern state is fighting for the broadcasting of Metropolitan Opera and with his assistance comes the assurance that all obstacles in the way will be torn aside. It will be only a matter of days until the air of the East is flooded at night with the soul-stirring strains of the great operas.

Fight Negative Attitude
Other powerful interests in the East are working night and day to overcome the negative attitude of the officials of the Metropolitan Opera Company. That this attitude is more than negative is evidenced by the cryptic telegram received from the private secretary of the powerful newspaper publisher, William Randolph Hearst. Hearst's secretary, R. C. Fairchild, wired as follows:

"Mr. Hearst does not think we could be of any service in that matter, although he would like to be. The opera people have their own ideas and reasons for acting as they do."

Whatever the reasons for the Metropolitan's flat stand against broadcasting, whether it be alleged contracts with the opera divas or other reasons, hundreds of thousands of fans in the East are being deprived of the great privilege of hearing the masters. The RADIO DIGEST has left no stone unturned to change this attitude.

Wrote Herbert Hoover
Since the last issue wires have been sent to Herbert Hoover appealing to this

great friend of the amateur and the Radphoan to use his good offices in influencing the opera officials to broadcast. In addition telegrams have reached the Radio editors of all the leading newspapers in the Metropolitan district asking them to join the movement to secure opera.

To Attempt Relay
RADIO DIGEST's interests have not only been with securing opera for the Eastern fans but also to fill the air all over the country with Chicago Opera. Appeals were made to the large and powerful 400-meter stations situated strategically over the country, to relay the Chicago opera if possible. Replies indicate that many of the stations will respond and attempt relaying KYW's original opera broadcasts.

Francis F. Hamilton, manager of WLK, the powerful station of the Indianapolis News and L. S. Ayres & Company wired as follows:

"Will attempt rebroadcast KYW opera. Mail all particulars."

H. A. Trask, manager of KSD, Post Dispatch station at St. Louis, wired:

"Thanks for suggestion. Only difficulty is that St. Louis is almost a dead spot so far as Chicago is concerned. We get Schenectady, Newark, Havana, even Los Angeles and all other stations very well in St. Louis, but Chicago broadcasters come in poorly. Big problem is to receive and then relay when each station is on four hundred meters. Will experiment with radio frequency and loop aerial. When will next opera be broadcast?"

As the paper goes to press many other stations are showing an interest in relaying Chicago opera. Perhaps when this edition reaches the readers, RADIO DIGEST will have been successful not only in influencing the Metropolitan to broadcast, but also in supplying the entire country with the wondrous symphonic strains of the Chicago Opera.

SANCTION OF TRADE TO NEW YORK SHOW

American Radio Exposition Dec. 21-30 in Grand Central Palace Interests Big Manufacturers

NEW YORK.—That the American Radio Exposition to be held in Grand Central Palace the week of December 21st to 30th promises to be an unqualified success, is emphasized by the caliber of some of the large companies exhibiting who have pledged their co-operation. The exposition has the support of the National Radio Chamber of Commerce and is sanctioned by the Associated Manufacturers of Electrical Supplies as well. It will be one of New York's big features in connection with National Radio Week and the slogan, "This is a Radio Christmas," has caught on throughout the industry, and many connected with the wholesale and retail ends of the business feel that the combined movement will result in a remarkable trade stimulus.

First Big Annual
The exposition to be held in the Palace is the first one of a series of annual shows which will be national in scope and analogous to such exhibitions as an Annual Automobile Show, Motor Boat Show, Silk Show, Flower Show, etc. All of the exhibitions prove a wonderful stimulus in their respective industries. Dealers from many parts of the country visit them, as well as the consumer public.

The show at the Palace is purely a manufacturers' official exhibit. Dealers and jobbers are invited as visitors, but not as exhibitors. Special hours will be arranged for dealers in the morning, at which time the general public will not be admitted.

Big Manufacturers Exhibit
With the show enjoying the support of such exhibitors as the De Forest Telephone & Telegraph Company, Radio Corporation of America, Western Electric Company, National Carbon Company, and others, the attractiveness of the various exhibits is positively assured. In addition to the above mentioned, there will be a host of others, all manufacturers of high grade goods, many of whom will introduce absolutely new things.

The management of the forthcoming exposition, of which Mr. L. F. Byers is executive secretary, is arranging to eliminate some of the bad features noted at many other Radio shows, such as all unnecessary station noises and disturbances, which antagonize the prospect rather than convince him of the good points of Radio. All devices producing noise will be

controlled in a manner which will be satisfactory to exhibitors and visitors alike. Only one loud speaking device will be permitted to operate at one time, an arrangement for this having been worked out by the management.

Radio Week National
"Radio Week" throughout the country will be celebrated during the period of the New York exposition. In practically every city there will be some big feature, the show in New York, of course, being the contribution of the Metropolitan district. Special programs, including features that will appeal to both old and young will be broadcasted from the different stations during the period.

WORK PROCEEDS FAST ON COLUMBUS PLANT

New Ohio Broadcasting Station Heard Out of Town

COLUMBUS O.—Work on the broadcasting station of the Superior Radio & Telephone Equipment Company, is fast nearing completion and fans of Columbus and Ohio may expect to hear a program from this new addition to the Radio directory by the closing week in November. H. V. Akerberg, Radio engineer of this company, has practically completed the actual construction of the transmitting apparatus and the new studio is being decorated at this time. The set will use three 50-watt tubes.

Columbus amateurs already have heard the few tests conducted and reports from out of town are that the early experiments are successful. Officials of the company now are awaiting the arrival of a government license to operate and the designation of call letters.

'AIDA' FIRST ETHER HIT

(Continued from page 1)
given in the afternoon start at two o'clock. Preceding each one the announcer at KYW gives a history of the particular opera, the story, and the cast of the performance. The ether "prologue" is a distinct aid to the listeners in, who, although able to enjoy the music in its entirety, must necessarily miss the action, costumes, and scenic effects.

The audience at the Auditorium is totally unaware of the pick-up microphones which are hidden in acoustically strategic positions. One operator, controls the microphones from a position in the audience. From the theater the opera is carried by special wires to the broadcasting studio of KYW in the Commonwealth Edison building. From here it is converted into the modulated electromagnetic waves.

Radio Digest Illustrated

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Looking Ahead

The much talked of articles by Letson Balliet will soon appear in the most interesting form that he can write them. Considerable comment was made on the recent short series to enable us to see that the forthcoming series will be read with a great deal of interest.

The Panel Units for Receiving Sets Series were unavoidably broken, but the next issue they will be taken up again and carried on to completion. These articles are written by Thomas W. Benson, a well known authority on Radio.

Broadcasting Directory. Gets better and larger each week. The only convenient reference to aid you in finding a station heard.

"How to Make Department." Many kinks every week are interchanged here.

Radio Illustrated. The picture page is the best of its kind.

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CLAIM DEVICE ENDS NAVIGATION PERILS

NAVY EXPERTS APPROVE NEW INSTRUMENT

Makes Possible Taking of Three-Point Bearings at Any Point on Earth—Safens Sea Travel

NEW YORK.—A new invention, or rather an improvement on an invention, which in the opinion of experts in the United States Navy will take all the dangers out of ocean navigation, was exhibited here last week. It is an addition to the Radio compass which permits a three-point bearing to be taken, no matter where on the earth's surface the observer may be.

One free arm is swung above the dial of the compass which is an aerial, and this, of course, receives at the greatest intensity when pointing directly at a sending station ashore. When the navigator then desires to get his "fix" all he has to do is to circulate the arm slowly in azimuth and note the intensity shown. Directly a maximum is registered, and direction of the arm over the compass card shows where the station is located.

Second and Third Bearings

This bearing being recorded, and the name of the station being ascertained by call and answer, the arm is swung again until another bearing is found by similar maximum intensity and call. A third is similarly found, and then it is easy to locate the "fix."

Navigators have an instrument called "Three arm protractor." It consists of three long straight edge rulers fastened at one end with a head at the middle of which is a hole large enough to insert a pencil. This hole is directly in line with each of the inside edges of the three rulers and clamp screw fixes one or all so that the swing is stopped.

Locate Ship's Position

Laying this protractor on the chart so that the outside ruler reaches to the Radio station first found, the second ruler finds the second station, and the third finds the third. Where the pencil sent through the hole in the head of the instrument touches the chart, is the exact position of the ship.

Thus for the first time in the history of navigation, since the Astrolabe was discovered and used in Columbus' time, the earth variation and the ship's deviation may be disregarded, and the possibility of errors in computation and consequent shipwreck is eliminated. No longer do clouded skies and fog make observation for latitude and azimuth dreaded.

Threaten to Halt Daytime Service

WOAI Seeks Number of Listeners-In on Market Reports—Finds Many Interested Fans

SAN ANTONIO, TEX.—The owners of Station WOAI threatened to cease daytime broadcasting of market reports and news bulletins recently unless there were enough listeners-in to warrant continuance of the work. The Evening News Radio editor, who furnishes news and markets direct from the editorial rooms of the Evening News, suggested that the announcer ask those listening in to write whether or not they appreciated the service. Nothing was announced in the newspapers about the proposed discontinuance of the day-time service. There were more than 700 enthusiastic letters asking that the day-time broadcasting continue. Persons within 1,000 miles of San Antonio have learned to depend on Radio for their first-hand information.

MAN DEAF 27 YEARS, GETS BACK HEARING

PHILADELPHIA, PA.—Morris Keyser, of this city, recently heard the spoken voice without an ear-trumpet, for the first time in twenty-seven years. A week before he heard music for the first time on a receiving set, using headphones. He believes the Radiophone has stimulated his hearing so that he will eventually hear without artificial help.

ELECTION BROADCAST CUTS 'WATCH' CROWD

COLUMBUS, O.—The Columbus Dispatch broadcasted election results on election night and found a notable decrease in the downtown crowd. The interested folks evidently preferred to stay at home and get the returns by Radio. Despite the intense interest in the returns, the crowd on the streets watching lantern slide results was the smallest in years.

BROADCASTING A "PEASANT GIRL"



At any rate, you could imagine you saw the peasant girl when Mary McCormic sang the role of Micaela in the popular French opera "Carmen," broadcasted direct from the Auditorium, Tuesday, November 14, by Westinghouse Station KYW. "Carmen" was the second of the presentations of the opening week of the Chicago Opera Association season, and also the second to be broadcasted by KYW, "Aida" having first honors

Chicago Opera Photo

Kiwanis Club to Give Receivers to Hospital

MERIDIAN, MISS.—The gift of a Radio receiving outfit has been pledged to the Meridian Tuberculosis Hospital by the Kiwanis Club of Meridian. The club pays costs of installation and upkeep.

Erection of Shanghai Plant to Begin Soon

SHANGHAI, CHINA.—President Schweirin of the Federal Wireless Company, who arrived here recently, says that he will begin work on a Radio station here within thirty days.

TRY TRANSMISSION ON SHORT WAVES

LENGTHS BELOW TWENTY METERS USED

Bureau of Standards Experiments Obtain Good Directional Effects—May Cut Interference

WASHINGTON.—The enormous increase in the use of Radio telegraphy and telephony has created a demand for apparatus capable of being operated with a minimum of interference. Wherever the need is not for broadcasting but for point-to-point communication, the case seems hopeless unless directive transmission can make it possible. Directional transmission on very short wave lengths (below 20 meters) may offer a solution of this problem.

Recent reports by Marconi, Franklin, and others show that interesting and valuable data have been obtained on directive Radio transmission using wave lengths below 20 meters. The Bureau of Standards has just completed a series of similar experiments, the preliminary results of which confirm the work of these investigators.

Experiments at Bureau

The experiments conducted at the bureau were made with a parabolic reflector (cylindrical type), which was designed for a 10-meter wave length. It was made by constructing a parabolic wooden frame with an aperture of one wave length. This frame was suspended in the air and 40 wires spaced one foot apart were suspended from it. The source, located at the focus, consisted of a 50-watt triode tube. The output from this tube was coupled to an antenna which was a linear oscillator of the Hertzian type, which was tuned to a wave length of 10 meters. The complete reflector system was arranged so that it could be rotated.

Numerous polar curves were obtained by rotating the reflector and taking readings of the received current at every 10 degrees position of the reflector. The receiving apparatus was located 170 feet from the reflector. Most of the work consisted of a loop antenna (single turn) with a thermoelement in the loop circuit. A portable galvanometer was connected to the thermoelement.

Obtain Good Directional Effect

With all adjustments correctly made at the reflector, good directional transmission was obtained. With the reflector turned 20 degrees from the direct line of the receiver, the received current dropped off to one half of what it was with the reflector directed to the receiver. There was practically no radiation over an angle of 270 degrees while the majority of the radiated power was confined to an angle of 30 degrees. A few experiments were made with receiving apparatus at a considerable distance and good Radiophone transmission was obtained over a distance of 3 miles.

The report to be issued on this work will present the results of these experiments and give details regarding the apparatus and circuits used so that others may duplicate or continue this line of investigation.

Radiophans Hear Banquet

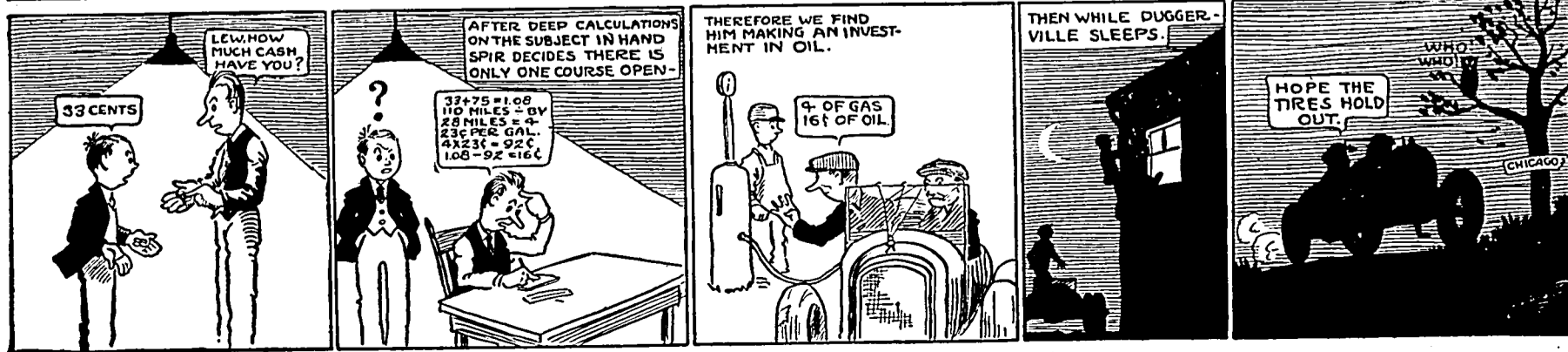
Speeches of Postal Chiefs

WASHINGTON.—Radiophans throughout the country had an opportunity on November 11th, to hear speeches made by Postmaster General Work and Assistant Postmaster General Bartlett. Special arrangements were made by Postmaster Baylis Steele of Kansas City, Missouri, for the broadcasting of their addresses delivered before the conference-convention of the postal employees of Missouri. Radio apparatus was rigged up in the big hall at Kansas City where the gathering was held.

THE ANTENNA BROTHERS

Spir L. and Lew P.

"Fading Out" or "Close Coupling"



NEW OUTFIT ADDS TO EASE OF TUNING

SET ATTRACTS INTEREST OF
GEN. SQUIER

Dr. F. L. Satterlee's Invention Makes
Greater Amplification Possible With-
out Use of Armstrong Patents

NEW YORK.—Recently Dr. Francis Leroy Satterlee, noted X-ray expert, of Flushing, L. I., surprised Radio engineers by announcing the invention of an "inductive amplifying receiver," which gave great amplification without the use of the Armstrong patents. Although a few details as to how this is accomplished by Dr. Satterlee have been learned, detailed information is not yet obtainable.

The name "inductive amplifying receiver," was given to this set by Gen. George O. Squier, chief signal officer, U. S. A. Gen. Squier, when asked to test the receiver, said he could give fifteen minutes to it and, as a matter of fact, passed three hours studying its possibilities.

Coils Are Secret of Set

The novelty in Dr. Satterlee's set lies in the character of winding and arrangement of the inductances. The inventor uses three flat spiral wound coils similar in appearance to small talking machine records. Two coils operate with a "book" or "butterfly" motion. The third moves through an arc between the other two coils with a course similar to that made by a book-mark when slipped between the pages of a book. The action is like that of a three-honeycomb-coil mounting, except that the center coil can be moved toward or away from the operator.

Rough tuning is accomplished by a variable condenser and finer tuning of varying the positions of the three coils until the maximum signal is heard. The one-bulb set is enclosed in a cabinet measuring only eight by eleven inches.

Signal Corps Test

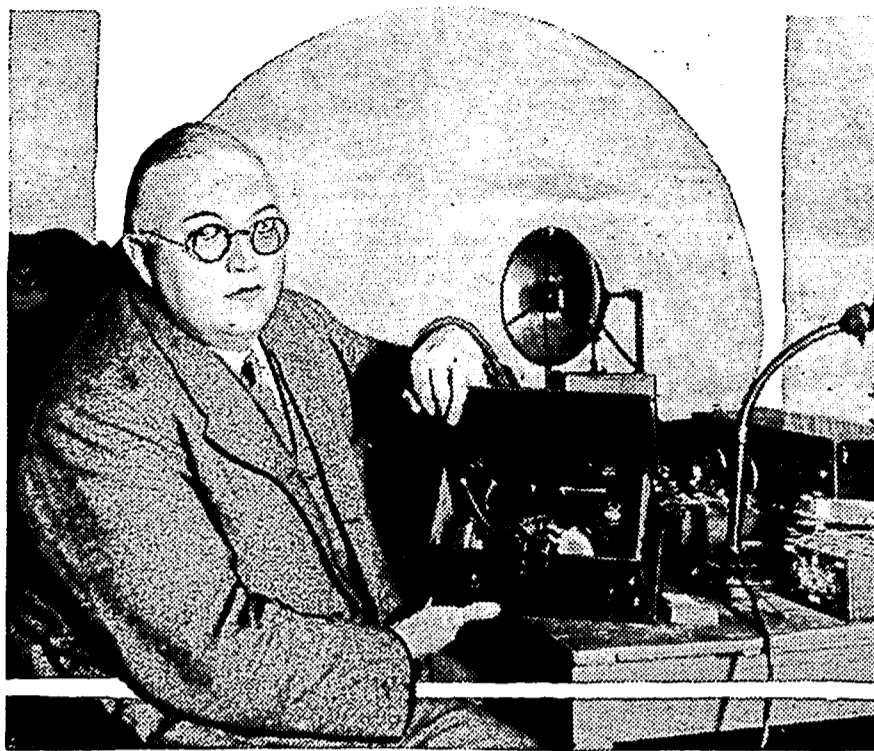
A test of Dr. Satterlee's set was made at the signal corps laboratory of Fort Wood by Capt. C. W. Chadbourne and Sergeant George M. Dusenbery, foreman of the laboratory. This test showed that the spiral wound coils have higher inductance value, lower distributed capacity and lower high-frequency resistance, as well as lower direct current resistance than duo-lateral coils of the same number of turns.

Using WJZ, twelve miles from Flushing, as a test station, the investigators obtained an audibility of 400 with the spiral wound coils, as compared to 200 obtained with the duo-lateral coils.

"During the test," the army men said, "two inherent features of the receiver impressed themselves strongly. These were the ease of manipulation, or tuning, and the freedom from distortion. This freedom from distortion is accounted for by the fact that the circuit employed is non-regenerative. It is only necessary to pick up the desired station with the condenser and then increase the volume by use of the coupling knobs, and in passing, it might be of interest to note that the coupling device is so flexible that it can cover different wave lengths almost as readily as the condenser in the antenna circuit."

A transmitting station which the British Government proposes to erect at Bourne, in Lincolnshire, in connection with the Imperial Wireless Chain, will be the largest yet constructed in England. There will be eight steel masts, each 800 feet high.

DOCTOR VIES WITH ARMSTRONG



Dr. Franklin Leroy Satterlee, noted X-Ray specialist, claims his newly invented one tube, non-regenerative, "inductive amplifier" set does the work of two stages of Radio frequency amplification. The set so strongly interested General Squier, Chief Signal Officer, U. S. A., that he gave three hours to make a test of it, whereas he had promised only fifteen minutes of his time. © K. & H.

Bureau Issues Booklet on Tests of Radio Apparatus

WASHINGTON.—The Bureau of Standards has prepared a pamphlet, "Fees for Testing Radio Apparatus," for the information of those who desire to have tests performed. The bureau limits its tests of Radio materials to tests for the government, tests of importance to the bureau for research, tests in which the bureau is to act as referee, and a few other special tests in which special reason is shown why these tests should be undertaken by the bureau. Before an article is submitted for test, it must be preceded by a written request for test, and if it cannot be undertaken, the applicant is furnished, if possible, with the name and address of

one or more laboratories which may make the test if requested. Such request should enumerate the articles, giving serial numbers or other identification marks, if any, should state the nature of the test desired, and the conditions under which the apparatus is used.



Carter "TU-WAY" Radio Plugs

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Phantom-Circuit

BUILD YOUR OWN. This marvel of mystery with no aerial, no loop, no ground, brings in music instead of static showers. We consistently hear concerts on Magnavox from stations over 850 miles distant, audible 100 feet from horn. The simplicity of this hook-up will surprise you. No Radio frequency used, just one tuning control. Complete instructions, including photo of circuit, prepaid for 60c. VESCO RADIO SHOP, Box 704, Vacaville, Calif.

MYERS TUBES

CUNNINGHAM—RADIOTRONS

WD-11

Dealers, Send for Our Discount Sheets

Hudson-Ross, 123 W. Madison, Chicago

If you have \$500 to \$10,000 and want to make money read this

An Illinois Radio Corporation needs \$10,000 more capital to extend its operations. It is a Radio enterprise that is making money now. To secure the maximum profits with the opening of the Radio season and the boom Opera has given Wireless additional capital is necessary.

If you have faith in the future of Radio and want to make money out of this big new industry here is your opportunity.

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American RADIO Exposition

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Apparatus Section of the

ASSOCIATED
MANUFACTURERS of
ELECTRICAL SUPPLIES

Grand Central Palace
New York

December 21st to 30th

(Sunday excepted but Christmas Day
included)

This first really comprehensive
Exposition to be staged in a
manner worthy of a great in-
dustry includes such represen-
tative exhibitors as:

Western Electric Company, Inc.

Radio Corporation of America

National Carbon Company

C. Brandes, Inc.

Sleeper Radio Company

General Insulate Company

Executive Radio Council

Coto-Coil Company

Weston Electrical Instrument Co.

American Radio Relay League

Stromberg-Carlson Mfg. Co.

Holtzer-Cabot Company

Clapp-Eastham Company

Dubilier Condenser Company

DeForest Radio Telephone &
Telegraph Co.

All of the above and other
leading manufacturers have
contracted for space and many
more are at present negotiating
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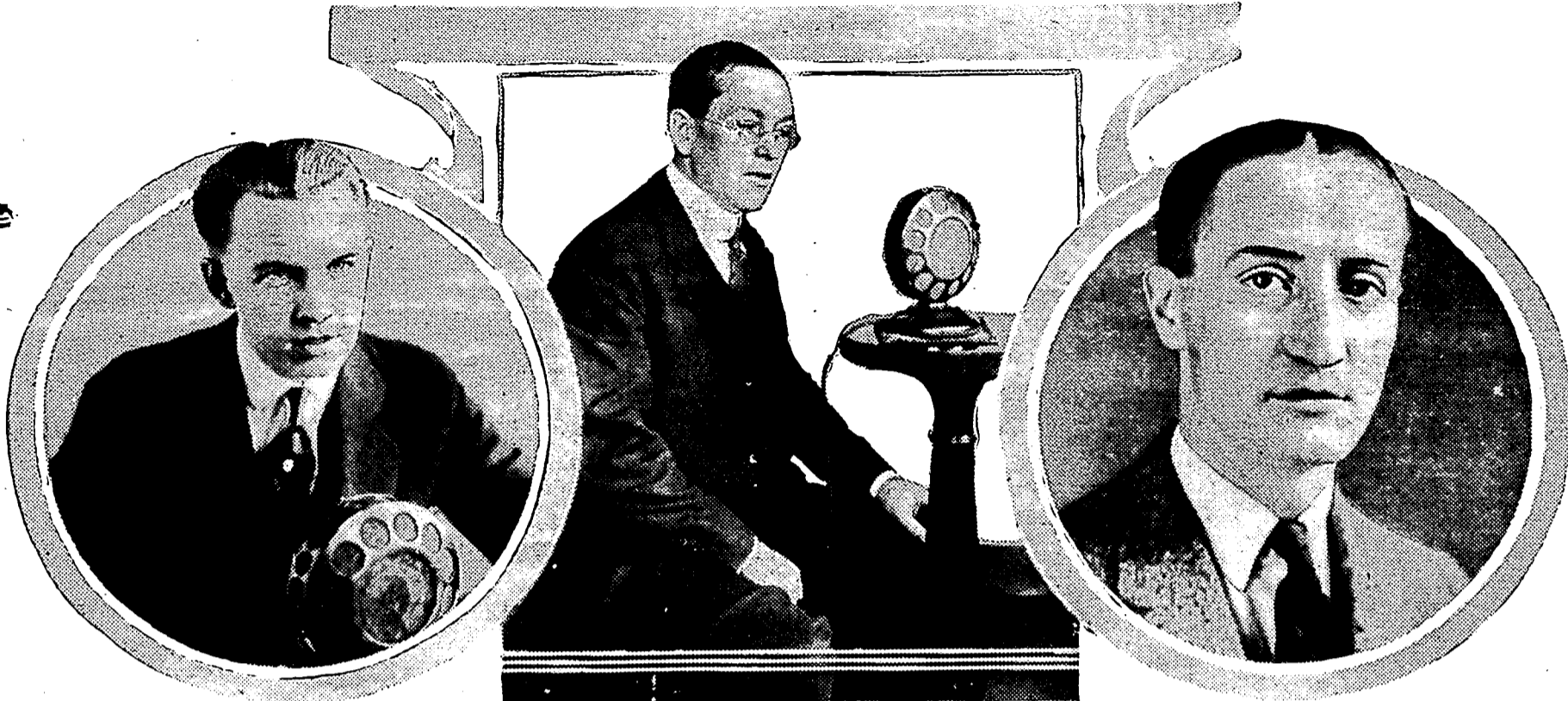
"THE wise man looks into space, and knows there is no limit
to dimension." Said Chuang Tzu.

The wise Radioist bridges the greatest distances with a Grebe
Receiver.

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RICHMOND HILL, N. Y.

Doctor M. H.

EVER HEARD THEM? HERE THEY ARE



INITIATE AIRPHONE ELECTION RETURNS

Press Associations Resort to Radio When Land Wires Become Crippled

NEW YORK.—For the first time in history Radio was utilized election night to transmit a full press association news report across the American Continent. Owing to severe sleet, snow, and wind storms in the Rocky Mountain region and the crippled service on land lines, the International News Service, and the United Press transmitted a full election service from New York to San Francisco by Radio through the co-operation of the Radio Corporation of America. While the usages of Radio have increased greatly in the development of recent months, never before has trans-continental transmission been attempted on such a scale. Under the stress of a great emergency, the International News Service report was transmitted efficiently to the newspaper office in San Francisco and was as fast as that obtained over land lines under ordinary conditions.

Send 6,000 Words

In this connection something like six thousand words on the election returns were exchanged between New York and San Francisco. The Radio Corporation diverted one of its high-powered Trans-Atlantic circuits to the news service. Some use also was made of Radio by the Universal Service.

The managements of both the International News Service and the United Press were high in the praise of the way Radio helped them out in the emergency. The election news was relayed from the news service offices by wire to the Radio Corporation's sending station in New York as fast as it came in. It was instantly flashed across the continent to San Francisco and thereupon relayed again by wire to the newspapers taking the service. It was handled in this way, despite the more numerous relays, as quickly as land wires would have transmitted it. The news associations received constant word from clients that the service was satisfactory and messages indicated as late as 2 a. m. that crowds were still around newspaper offices and extras were being issued throughout the night, based on the combination wire and Radio reports.

Congregation Gives Second Church Set in Washington

TACOMA, WASH.—The second church in the state of Washington has installed a Radio transmitting set. The 100-watt Radiophone transmitting outfit at the First Presbyterian church in Tacoma went in operation recently. The entire services in the morning and evening on Sunday are broadcasted, arrangements having been made with other local stations to leave those hours free for the church.

The call letters KFBG have been assigned to the station. The entire outfit is the gift of six leading members of the church.

The "Man Behind the Voice" that tells "what's next" on the program can no longer remain in hiding. RADIO DIGEST'S "Announcers' Album" exposes 'em all—and mercilessly! This week we show on the left "WCX" of the Detroit Free Press. "WCX" is Edward F. Harrington. Mr. Harrington informs us in strict confidence that at times he has been, and is, called by other names. This gentleman has the edge on most announcers, for, being himself an organist, pianist and whistler, can put on a program all his own if his talent fails him. He is 25. V. A. Randall, shown in the center photograph, is not only chief announcer of WEA, Western Electric Company, New York, but is also manager. In last week's album was a picture of one of Mr. Randall's aids. To the right is a gentleman who claims never to have had more than three weaknesses. Volstead removed one. He is Edwin Lloyd Tyson—"Ty"—of WWJ, Detroit News. "Unmarried," sezze, "but not discouraged!" (The spirit we all admire!) Center Photo © K. & H.

Tunes of French Canuck on Ether

Montreal, Newspaper Plant, CKAC, Broadcasts Quaint Songs of Farmers—To Reach New Orleans

MONTREAL, CAN.—One need not now go to Quebec to hear the quaint, musical and charming songs of the habitant farmers of French Canada. If you live within 500 or 600 miles of Montreal, you can hear the best concert artists of that moist and cheerful Canadian metropolis singing the old favorite lines of "Allouetta" and "The Sweet Apple Tree Behind Dad's House" (Derriere Chez Mon Pere), just by listening in on your Radiophone.

"La Presse," an easy claimant to the largest circulation of any daily newspaper published in Canada, has installed a new high-power broadcasting station, capable of reaching Radiophans throughout the greater part of the province of Quebec and the New England states where there are a great many French-Canadians. The call of the station is CKAC.

"La Presse" has decided that English is not to be the only important language of Radio communication in North America and plans eventually to install a broadcasting outfit strong enough to reach even to New Orleans, uniting by familiar "voices through the air," the creole and the habitant in remembered kinship of common ancestors from la belle France, long centuries ago.

44 JOIN ARGENTINA'S RADIO ORGANIZATION

South American Fans Buy Small Sets for \$38

WASHINGTON.—A Radio organization is being formed in Rosario with forty-four members, according to the American consul at Rosario, Argentina. It is proposed, among other things to obtain Board of Trade quotations from Buenos Aires by Radio. Small Radio receiving outfits are now made in Rosario, selling at about \$38.00 each, United States currency. There is difficulty with regard to patents, since one company in Buenos Aires has a monopoly by concession of all Radio devices. The manufacture of outfits is only experimental thus far, and it is probable that there is infringement of the basic concession of the original Radio company in Buenos Aires.

Large demands are reported by manufacturers for copper wire, sheet, tube and bar stock and copper in one form or another, for use in Radio apparatus.

Old-Time Election Night Dies

DETROIT.—The old-time election nights, in Detroit and vicinity at least, with all the outdoor excitement and crowds about bulletin boards, has gone

forever. This was evident at the recent election. Radio is given credit for a large part of this great change. Most of the theaters, amusement places, restaurants and hotels, had established receiving stations in their places where the crowds were invited to assemble. All of these places were crowded until late into the night listening to Radio election returns. The police declare that never before in their experience have they experienced such an orderly election night.

The postoffice department has added its sixteenth Radio station for the air mail service.

The BIG Games

are to be played in the next four weeks. You may not be able to make the trip to the various stadiums, but you can hear at home everything that is going on at the games. The cheers, the songs, and then follow the game play for play. All you need is the



Price Complete \$35.00

(Including Phones, Tube, Aerial and Batteries)

one of the most famous radio receiving sets on the market. It made a name for itself in one day.

AERIAL-A is a vacuum tube detector set, compactly and efficiently built, that will stand rough usage when necessary and is a decoration to any home.

With its perfect construction and simplicity of operation the AERIAL-A is the ideal receiving set for you.

There are two dials for tuning and one rheostat for lighting bulb. The wiring connections are placed at the back of the machine, first for ease in connecting, and second, to increase the beauty of the set and eliminate confusion.

The AERIAL-A has been awarded the certificate of Excellence by the New York Evening Mail, and is guaranteed by the New York Tribune Institute. Nothing more need be said.

Don't buy a Radio Set until you have seen and heard this one

We are developing and perfecting two new vacuum tube sets to be known as AERIAL-B and AERIAL-C. Watch for our announcements soon.

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COLIN B. KENNEDY OUTFIT EXPLAINED

DETAILED DESCRIPTION OF STANDARD RECEIVER

Design Assures Maximum Effectiveness
on All Wave Lengths from
175 to 3,000 Meters

(See Photo Diagram, Facing Page)

The standard receiving set illustrated on page 7 is the Colin B. Kennedy Type 220 Intermediate Regenerative and Type 525 Two Amplifier. It operates with high efficiency over a tuning range of 175 to 3,000 meters. Maximum effectiveness with a high degree of selectivity on all wave lengths within its range is assured by the design of this receiver, which makes use of the accepted principles of the best Radio engineering practice, including the use of inductively coupled circuits.

The circuit is the fundamental Armstrong regenerative, combining tuned and tickled plate circuit. The antenna circuit is inductively coupled to the secondary circuit. Coupling may be progressively varied over a 180 degree range. A wide latitude of antenna design is permitted by means of a continuously variable antenna condenser which may be placed in shunt or series by a multiple switch. The inductances are bank wound coils, and are handsome specimens of perfect workmanship.

Regardless of what type receiver is employed, where the distance from a broadcasting station is more than a few miles, it is necessary to use an amplifier if a loud speaker is desired. The amplifier unit produces clear amplification without the usual attendant distortion of sound.

Description of Tuning Unit

The unit shown to the left (front view) is the tuner. The two binding posts on the left side are for the antenna and ground connections. There are four posts at the base of the detector panel. The two at the left are for the filament storage battery connections, while the two to the right are for connection to a 22½-volt plate battery. This plate battery should be of the type equipped with taps with variations from 15 to 22½ volts, in order to control the plate potential for maximum audibility and clearness of reception. If the receiver alone is used, the two binding posts on the right side are for the phone connections, but if the amplifier is added, they are connected to the input binding posts of that unit as indicated in the illustration.

The two tap switches in the center of the tuning panel control the windings in the primary and secondary circuits. The one to the left is for the primary coil and the right for the secondary. This permits rough or approximate adjustment to wave length range. The two dials in the lower corners of the panel are the primary (left side) and secondary (right side) variable condensers, which control the fine adjustment for wave length.

The small knob in about the center of the left side of the panel is the switch for throwing the primary condenser in the antenna circuit in series or parallel as desired.

The dial in the upper left-hand corner controls the coupling of the secondary circuit, while the dial on the right controls the coupling of the plate or tickler, thus regulating the feed-back or regenerative effect.

The knob at the center of the lower part of the panel is the control over the flow of battery current to the filament of the detector tube.

Description of Amplifier Unit

In the amplifier unit the four binding

DUTCH PREPARE FOR SCHEVENINGEN PHONE

WASHINGTON. — The Netherlands Government is preparing to enlarge the present Radio station at Scheveningen with apparatus purchased from the Telefunken Company. The station, which will be ready for operation in the early part of 1923, is designed to communicate with all parts of continental Europe and will be equipped also for broadcasting.

posts at the base are for the batteries as before, but the plate voltage should have an additional tapped 45-volt battery added. The taps will permit control for maximum potential before signals begin to mush up.

The two binding posts on the right-hand side are for phone or loud speaker connection. These two posts are connected to the plug, which hangs at the front of the panel. The three jacks at the center are for detector, and first and second stages of amplification respectively, starting from the left side. This plug is inserted in the particular stage desired and thus connects the phones or loud speaker as desired, at the same time operating the filament control. If the phones or loud speaker are equipped with slugs, they can be plugged in direct and the set plug left out. This avoids the necessity of binding post connections. The two dials are for rheostat control of the amplifier tubes filament current.

Tuning Principles

Tuning a regenerative Radio receiver consists primarily of four principal operations. The four steps necessary are:

- 1.—Lighting the tube filament.
- 2.—Tuning the secondary.
- 3.—Tuning the primary.
- 4.—Making the final adjustments necessary to obtain the best signals.

It is simpler to tune the receiver without the amplifier in use. If the amplifier unit is connected to the tuner the plug is inserted in the first jack, marked D.

Lighting the Filament

To light the filament of the detector tube, turn the rheostat knob so the arrow is horizontal and pointing towards the right. The small circular screen above the knob is for the purpose of observing the brilliancy with which the detector tube is burning. With a little practice the brilliancy becomes a rough indication of the proper adjustment, although the really correct adjustment can only be obtained through judging by the audible sounds produced in the phones.

Tuning the Secondary

In tuning the secondary for the reception of signals from broadcasting stations using 360 meters, the proper settings of the various knobs and dials will be found to be as follows:

Secondary tap switch, left-hand lever on the second contact point as shown in the illustration.

(Continued on page 9)

Book Reviews

Radio Experimenter's Hand Book. By M. B. Sleeper. This book will help in the selection and the construction of simple apparatus for transmission and reception of Radio telegraph and telephone signals. Price, \$1.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, \$2.

Radio First Aid. Illustrated with working drawings and complete data as to the necessary equipment and cost of constructing from the simplest to the most modern Radio outfits at home. Price, \$1.

Radio for the Amateur. By A. H. Packer and R. R. H. 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.

Elements of Radio Telephony. By William C. Ballard, Jr., M. E. A reliable, authoritative discussion, in simple form, of the essential principles of Radio telephony and their application. The use of mathematics has been almost entirely avoided. Price, \$1.50.

Radio Reception. By Harry J. Marx. Technical Editor RADIO DIGEST ILLUSTRATED, and Adrian Van Muffling. A simple treatise on Radio reception. Beginning with the elementary principles of electricity it carries the reader on into the essentials of Radio telephony. The most successful methods of Radio reception are explained and special reference given to practical tuning. 230 pages, with 130 illustrations. Price, \$2.

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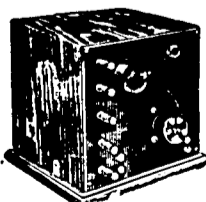
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PLANET POWER AMPLIFIER

This unit is frequently essential with a receiving set that does not produce sufficient volume. Constructed so that either a 5 Watt Power tube or an ordinary amplifying tube can be used, depending on volume desired. Equipped with potentiometer. Price \$27.50 without tube.

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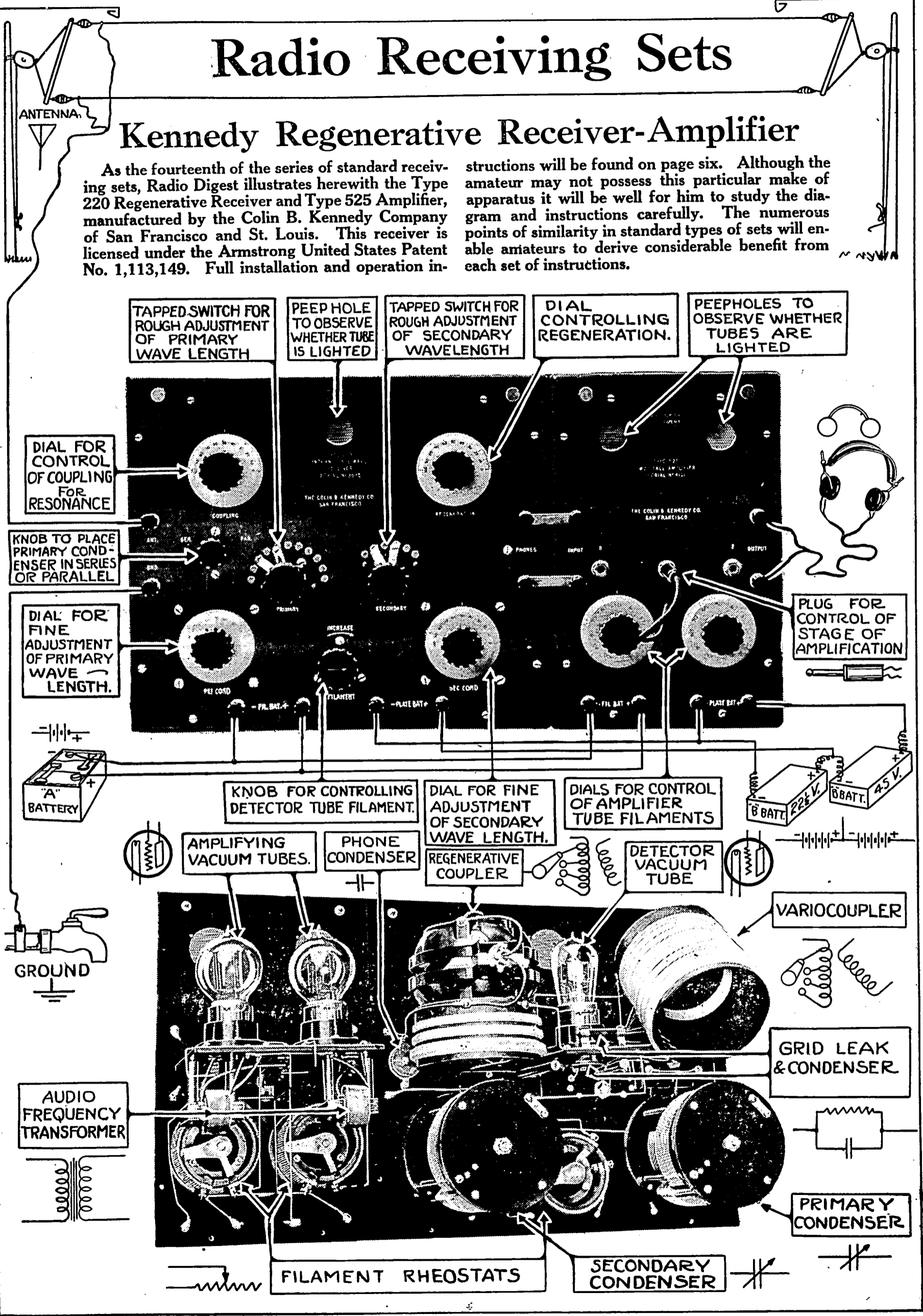
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Radio Receiving Sets

Kennedy Regenerative Receiver-Amplifier

As the fourteenth of the series of standard receiving sets, Radio Digest illustrates herewith the Type 220 Regenerative Receiver and Type 525 Amplifier, manufactured by the Colin B. Kennedy Company of San Francisco and St. Louis. This receiver is licensed under the Armstrong United States Patent No. 1,113,149. Full installation and operation in-

structions 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 numerous points of similarity in standard types of sets will enable amateurs to derive considerable benefit from each set of instructions.



Radiophone Broadcasting Stations

Corrected Every Week.

(NOTE.—The second half of the schedule list appears below. The first half appeared last week.)

WDAY, Fargo, N. D. 485 also. 300 mi. Daily ex Sun, 12:15-12:30 pm, 7:30-8:15, reports, news, music. Central.

WDM, Washington, D. C. 50 mi. Church of the Covenant Sun, 10:30 am, church service; 3 pm, lecture; 7:30, church service. Eastern.

WDT, New York, N. Y. Ship Owners Radio Service.

WDV, Omaha, Neb. 100 mi. John O. Yelner, Jr. Daily 7-8 pm, Tues, Sat, 12-1 am, Fri, 10-10:45 pm, Sun, 2-4 pm, music. Central.

WDY, Roscoe, Ark. N. J. Radio Corp. of America.

WIZ, Tuscola, Ill. 70 mi. James L. Bush. Daily ex Sun, every half hr., 8:30 am-12:15, Chicago Board of Trade quotations, Tues, Fri, 7-8 pm, concert, entertainment. Central.

WEAA, Flint, Mich. Fallain & Lathrop.

WEAB, Fort Dodge, Ia. 400 mi. Standard Radio Equip. Co. Daily ex Sun, 9:40 am, 10:40, 11:40, 1:40 pm, 5:15, market reports; 6:30 pm, sports; 7:30-8:45 pm, music. Sun, 10:45 am, church service; 7:30-8:45 pm, music. Central.

WEAC, Terre Haute, Ind. Baines Elec. Service Co.

WEAD, Atwood, Kan. 485 also. 150 mi. N. W. Kansas Radio Supply Co. Daily ex Sun, 11-11:30 pm, markets; 12, markets; 1:45 pm, markets; on half hour 3:15 to 5:45, news reports, Tues, Wed, Thurs, Sat, 7:30-9, concert. Sun, 11 am, church service; 3 pm, sacred music; 7:30, church service. Central.

WEAE, Blacksburg, Va. Polytechnic Inst.

WEAF, New York City, N. Y. 400 mi. Central N. Y. Tel. & Tel. Co. Daily ex Sun, 4:30-5:30 pm, Mon, Tues, Thurs, Sat, 8-10 pm, concert. Eastern.

WEAG, Edgewood, R. I. Nichols-Hindline-Bassett Lab.

WEAH, Wichita, Kan. 485 also 500 mi. Lander Radio Co. Daily ex Sun, 9:40 am, 10:40, 11:40, 12:30 pm, 1:30, 3:15, reports, Wed, Sat, 8 pm, concert. Every third Sun, 8 pm, concert. Central.

WEAI, Ithaca, N. Y. Cornell Univ.

WEAJ, Vermillion, S. D. 300 mi. Univ. of S. D. Mon, Wed, Fri, Sat, 7:30 pm, music, lectures. Central.

WEAK, St. Joseph, Mo. 100 mi. Julius B. Abercrombie. Thurs, 8-9:45 pm, concert. Central.

WEAM, North Plainfield, N. J. 75 mi. Borough of N. Plainfield. Daily, 7:30-8 pm, music, police news, etc. Eastern.

WEAN, Providence, R. I. 50 mi. The Shepard Co. Daily ex Sun, 3-5 pm, 6-8, music, bedtime stories. Mon, Wed, 8-10 pm, concert. Eastern.

WEAO, Columbus, Ohio. Ohio State Univ.

WEAP, Mobile, Ala. 485 also. 50 mi. Mobile Radio Co. Daily, 4-5 pm, 8-8:55, Central.

WEAR, Baltimore, Md. Balt. American & News Pub. Co.

WEAS, Washington, D. C. 150 mi. The Hecht Co. Daily ex Sun, 3-4 pm, Wed, Sat, 7-8 pm, Eastern.

WEAT, Tampa, Fla. John J. Fogarty.

WEAU, Sioux City, Ia. 50 mi. Davidson Bros. Co. Daily ex Sun, 9 am, 10, 11, 1 pm, reports, news. Mon, Wed, Fri, 8:30 pm, concert. Central.

WEAV, Rushville, Nebr. 200 mi. Sheridan Elec. Service Co. Wed, Fri, Sun, 8-9 pm, concert, news, etc. Mountain.

WEAW, Anderson, Ind. Arrow Radio Lab.

WEAX, Little Rock, Ark. T. M. Daily.

WEAY, Houston, Tex. 100 mi. A. C. Sweetman. Mon, Thurs, Sat, 7-8 pm, news, concert, lecture. Central.

WEB, St. Louis, Mo. 800 mi. The Benwood Co., Inc. Daily ex Sun, 9-9:40 am, 12-12:45 pm, 3-4, Wed, 7-9 pm, Central.

WEH, Tulsa, Okla. (300 E. Main St., Eldorado, Kans.) Midland Radio Co. 485 also. 500 mi. Hurlburt-Still Elec. Co. Daily ex Sun, 10 am, 5:30 pm, weather, roads. Tues, Thurs, 8 pm, concert. Central.

WEW, St. Louis, Mo. 485 also. 100 mi. St. Louis Univ. Daily ex Sun, 9 am, 10, 2 pm, reports. Central.

WEY, Wichita, Kan. 485 also. 500 mi. Costrado Co. (Wichita Beacon.) Daily ex Sun, hourly, 8:40 am, 12:40 pm, stock markets. Daily, 10:45 am and 4:30 pm, weather; 8-10 pm, sports, concert, lecture; 10:45 weather. Sun, 8:10 pm, church service, concert. Central.

WEA, Dallas, Texas. 400 and 485 only. 250 mi. Dallas News and Dallas Journal. Daily, 10:15 am, reports; 12:30-1 pm, address; 6:45-7, bedtime story; 8-8:30, music. Tues, Thurs, Sat, 11-12 pm, music. Central.

WFAB, Syracuse, N. Y. 100 mi. C. F. Woese. No definite schedule.

WFAC, Superior, Wis. 400 mi. Superior Radio Co. Daily, 7-7:45 pm, news. Central.

WFAD, Salina, Kan. 250 mi. Watson-Weldon Motor Supply Co. Daily ex Sun, 8:45 am, 9:45, 10:45, 11:45, 1:30 pm, reports, Tues, Thurs, Fri, 8 pm, concert. Sun, 11 am, church service; 8 pm, concert. Central.

WFAP, Poughkeepsie, N. Y. 200 mi. H. C. Sprattley Radio Co. Daily ex Sun, 10:30 am, 11:30-11:45, 1:30-2 pm, 4-4:15, Tues, Thurs, Sat, 8:15 pm, feature program. Eastern.

WFAG, Waterford, N. Y. 340 only. 300 mi. Radio Engineering Lab. Wed, Sat, 8:45-10 pm, concert. Sun, 2-4 pm, church service. Eastern.

WFAH, Fort Arthur, Tex. Elec. Supply Co.

WFAJ, Asheville, N. C. Hi-Grade Wireless Instrument Co.

WFAL, Houston, Tex. Chronicle Pub. Co.

WFAM, St. Cloud, Minn. 485 also. 100 mi. Granite City Elec. Co. Daily ex Sun, 3:30-4:00 pm, markets; 7:30-9, entertainment. Central.

WFAN, Hutchinson, Minn. 485 also. 500 mi. Hutchinson Elec. Service Co. Daily ex Sun, 1 pm, markets etc. Central.

WFAP, Peoria, Ill. 200 mi. Radio School of Browns Business College. Daily ex Sun, 10:25 am, reports; 12-12:15 pm, concert; 1:40, reports; 4:25, business lessons; 7:45, concert. Central.

WFAR, Cameron, Mo. Cameron Radio Co. and Mo. Wesleyan College.

WFAS, Sanford, Me. Hall & Stubbs.

WFAT, Fort Wayne, Ind. United Radio Corp.

WFAT, Sioux Falls, S. Dak. 485 also. 400 mi. Argus Leader. Daily ex Sun, 10:15-12:15 pm, 2:15, reports; 7:30 pm, music. Tues, Thurs, Sat, 8:15 pm, concert. Central.

WFAU, Boston, Mass. Edwin G. Lewis.

WFAV, Lincoln, Nebr. 485 also. 300 mi. Univ. of Nebr. Daily ex Sun, 10-10 am, weather, markets. Sat, 9:00 pm, concert. Central.

WFAW, Miami, Fla. Daily Metropolis.

WFAZ, Birmingham, N. Y. 75 mi. Arthur L. Kent. Daily, 5-5:30 pm, music. Eastern.

WFAZ, Independence, Mo. 500 mi. Daniels Radio Supply Co. Daily ex Sun, 12 m, 4 pm, news. Mon, Tues, Wed, 7:30-8 pm, entertainment, Thurs, Fri, 7:30-8:30 pm, Sat, 7-9 pm, music. Sun, 11 am, church services. Central.

WFAZ, Charleston, S. C. 400 mi. S. C. Radio Shop. Daily ex Sun, 12 m, reports, news, music. Tues, Thurs, 8-10 pm, Eastern.

WFB, Philadelphia, Penn. 400 and 485 only. 350 mi. Strawbridge & Clothier. Daily ex Sun, 1:16 pm, news; 3:30-4:30, concert; 5:30-6, sports. Mon, Fri, 6:30-7 pm, Radio talk. Wed, Fri, Sat, 7:30-8:30 pm, concert. Fri, Sat, (alternate weeks) 7:30 pm, concert at 8:30 pm. Sun, 4 pm, church service. Eastern.

WFO, Dayton, O. 485 also. 300 mi. Rilke-Kumler Co. Daily ex Sun, 9 am, 11, 4 pm, music, news, reports. Mon, Wed, Fri, 8 pm, concert. Sat, 11:30 pm, concert. Central.

WGAB, Houston, Tex. 250 mi. QRV Radio Co. Daily ex Sun, 8:30-9 am, police reports; 1:30-2:30 pm, concert, agriograms; 4-5, concerts, police reports. Central.

WGAD, Ensenada, Porto Rico. 250 mi. Escuela Hispanica do Radio Telegrafia, Inc. Sat and Sun only.

WGAF, Tulsa, Okla. Goller Radio Service.

WGAG, New Haven, Conn. New Haven Elec. Co.

WGAI, Shenandoah, Va. W. T. Gass.

WGAK, Macon, Ga. Macon Elec. Co.

WGAL, Lancaster, Pa. 35 mi. Lancaster Elec. Supply & Construction Co. Mon, Wed, Fri, 7-8 pm, concert, lecture. Sun, 3-3:30 pm, church service. Eastern.

WGAM, Orangeburg, S. C. 150 mi. Orangeburg Radio Equipment Co. Daily ex Sun, 10 am, markets, weather; 11:55, time, 4 pm, Radio talk, markets, weather; 11:55, time, 4 pm, lecture; 10, time, weather, cn-baseball; 6, music, lecture; 10, time, weather, cn-

tainment. Sun, 11 am, church service; 11:55, time; 10 pm, time, weather, music. Eastern.

WGAN, Pensacola, Fla. Cecil E. Lloyd.

WGAP, Shreveport, La. 500 mi. Glenwood Radio Corp. Daily ex Sun, 8 pm, music. Sun, 11 am, 7:30 pm, church service. Central.

WGAR, Fort Smith, Ark. Southwest American.

WGAS, Chicago, Ill. 1,000 mi. Ray-di-co Organization, Inc. Daily ex Sun, 9-9:20 am, 11:15-11:30, 1:30-1:45 pm, 2:45-3, 5-6, music. 7:15-12:30 pm, 4-4:15, 4:30-4:45, reports, Wed, Fri, 10-11 pm, music. Central.

WGAT, Lincoln, Nebr. 100 mi. Am. Legion, Dept. of Nebr. Mon, Wed, 9 pm, announcements. Fri, 9-10 pm, patriotic program. concert. Sun, 3-5 pm, sermon. Central.

WGAU, Wooster, O. Marcus G. Limb.

WGAW, Altoona, Pa. Ernest C. Albright.

WGAZ, Washington, D. C. H. O. 75 mi. Radio Elec. Co. Daily ex Sun, 9 am, 2 pm, music, news. Mon, Wed, Fri, 9:30 pm, concert, news. Sun, 10:30 pm, sermon. Central.

WGB, Madison, Wis. 100 mi. North Western Radio Co. Daily ex Sun, 9-10 am, financial news; 11:30, news, opening markets; 4 pm, news, closing markets. Mon, Wed, Thurs, Sat, 7:30-8:30 pm, concert. Sun, 10:30-12 am, sermon. Central.

WGBZ, South Bend, Ind. 200 mi. South Bend Tribune. Daily ex Sun, 9-9:30 am, household hints, menus; 2-3 pm, music, 7-8 pm, music. Central.

WGF, Des Moines, Iowa. 485 also, 500 mi. Register and Tribune. Tues, Fri, 7:30 pm, entertainment. Sun, 5 pm, church service. Central.

WGI, Medford Hillsdale, Mass. 485 also. 200 mi. Am. Radio and Research Corp. Daily ex Sun, 7 am, setting up exercises; 9:30, 11:30, 3:25 pm, music; 10:30 am, 1:30 pm, 3, 6, 6:30, reports, news. Mon, Wed, 7 pm, entertainment. Tues, 8:30 pm, fashion talks, concert. Thurs, Fri, 9 pm, concert. Sat, 8 pm, concert, church service; 8:30 concert. Eastern.

WGL, Philadelphia, Pa. 2,000 mi. Thos. F. J. Howlett. Tues, Thurs, Sat, 7:45-11:30 pm, concert. Eastern.

WGM, Atlanta, Ga. 400 only. Atlanta Constitution.

WGR, Buffalo, N. Y. 485 also. 300 mi. Federal Tel.

WHAW, Tampa, Fla. 50 mi. Pierce Elec. Co. Daily ex Sat, Sun, 12-1 pm, 4-5, music, agriograms. Sat, 12-1 pm, 8-10, music, entertainment. Eastern.

WHAY, Huntington, Ind. 75 mi. Huntington Pub. Co. Daily ex Sun, 12 m, 3 pm, music; 1:30 pm, 6, reports, sports. Mon, Wed, Sat, 8 pm, concert. Central.

WHAZ, Troy, N. Y. 400 only. 500 mi. Rensselaer Polytechnic Inst. Mon, 8:15-9:30 pm, music. Eastern.

WHB, Kansas City, Mo. 400 and 485 only. 1,000 mi. Sweeney Auto & Tractor School. Daily, 10 am, 3 pm, 5, weather. Daily ex Sun, 2 pm, ladies' hour; 7, bedtime stories. Tues, Thurs, Sun, 8-10 pm, concert. Central.

WHD, Morgantown, W. Va. 100 mi. W. Va. University. Daily, 4-6, 7-7:30, news etc. Eastern.

WHK, Cleveland, O. 300 mi. Warren R. Cox. Daily ex Sun, 1:30-2 pm, 4-4:30, 6-6:30. Tues, Thurs, Sun, 8-9:30 pm, concert. Eastern.

WHN, Ridgewood, N. Y. Times Printing & Pub. Co.

WHW, East Lansing, Mich. 485 only. 150 mi. Stuart White and markets. Eastern.

WHX, Des Moines, Iowa. 50 mi. Iowa Radio Corp. Daily, 12:30-1 pm, 6-6:30. Sat, 3 pm, sports. Central.

WIAA, Waupaca, Wis. Waupaca Civic & Commerce Assn.

WIAB, Rockford, Ill. 50 mi. Joslyn Automobile Co. Tues, Fri, 8:30-9:30 pm, music. Central.

WIAC, Galveston, Tex. 485 also. 100 mi. Galveston Tribune. Tues, Thurs, Sat, 7 pm on, bedtime story, evening prayer, concert. Central.

WIAD, Ocean City, N. J. 200 mi. Ocean City Yacht Club. Fri, Sat, Sun, 8-12 pm, Eastern.

WIAE, Vinton, Ia. 75 mi. Zimmerman Radio Co. Tues, Thurs, Sat, 9 pm, music, news. Wed, 8 pm, band concert. Sun, 2:30 pm, music. Central.

WIAF, New Orleans, La. 300 mi. Nola Radio Co. Sun, 10-11 am, music, lecture. Central.

WIAH, Birmingham, Ala. Mathews Elec. Supply Co.

WIAI, Newton, Ia. 200 mi. Continental Radio & Mfg. Co. Daily 12:30-1 pm, music, news. Mon, 7:30-8 pm, concert. Central.

WIAT, Springfield, Mo. 100 mi. Heer Stores Co. Daily

WJAK, Stockdale, O. 485 also. 250 mi. White Radio Lab. Daily ex Sun, 10:30-10:50 am, music; 11:05-11:20, reports, news; 6-6:30, music, news. Wed, 8-9 pm, concert. Sun, 2-2:45 pm, church service. Central.

WJAL, Portland, Me. Victor Radio Corp.

WJAM, Cedar Rapids, Ia. 100 mi. Evening Gazette. Daily, 7-8 pm, musical program. Central.

WJAN, Peoria, Ill. 300 mi. Peoria Star and Peoria Radio Sales Co. Daily ex Sun, 11:30 am, markets, weather; 1:30 pm, closing markets, agriograms, bond news; 6:15, sports. Tues, Thurs, Sat, 9:15-9:45 pm, concert. Central.

WJAP, Duluth, Minn. 200 mi. Kelley Duluth Co. Mon, Thurs, 8-9:30 pm, music. Sun, 11-12 m, pipe organ, 12-1 pm, church service.

WJAQ, Topeka, Kans. Capper Publications.

WJAR, Providence, R. I. The Outlet Co.

WJAS, Pittsburgh, Pa. 150 mi. Pittsburgh Radio Supply House (Pittsburgh Leader). Daily ex Sun, 11-11:30 am, 2:30-3 pm. Mon, Tues, Fri, 7-8 pm, Eastern.

WJAT, Marshall, Mo. 100 mi. Kelley-Vawter Jewelry Co. Daily ex Sun, 2-2:30 pm, 5:35-6, concert. Central.

WJAX, Cleveland, O. 485 also. 500 mi. Union Trust Co. Daily ex Sat pm, Sun, 9-9:45 am, 10-10:45, 2-2:45 pm, 3-3:45, music, financial reports, news. Eastern.

WJAZ, Chicago, Ill. Chicago Radio Lab.

WJD, Graniteville, O. 100 mi. Dennison University. Daily, 5-6 pm, concert, lecture. Central.

WJH, Washington, D. C. 100 mi. White & Boyer Co. Daily ex Sun, 1-2 pm, music. Tues, 7:45-10 pm, music. Eastern.

WJK, Toledo, O. 300 mi. Serric Radio Equipment Co. Daily ex Sun, 3-4 pm, concert. Mon, Wed, Fri, 7:30-9 pm, concert, lecture, etc. Sun, 7:30-9 pm, church service, concert. Eastern.

WJL, New York, N. Y. De Forest Radio Telephone & Telegraph Co.

WJZ, Newark, N. J. 485 also. 1,500 mi. Westinghouse Elec. Co. Daily ex Sun, 15 minutes hourly from 9 am to 6 pm; 12-12:30 pm; 7-10:15 pm. Miscellaneous program of highly varied nature. Sun, 3-10:15 pm, music. Eastern.

WKAA, Cedar Rapids, Ia. 200, 485 also. 200 mi. H. F. Paar. Daily ex Sun, 12:45 pm, reports; 5:30, reports, agriograms; 6-7, music. Thurs, 11-12 pm, music. Sun, 5 pm, church service. Central.

WKAC, Lincoln, Neb. 400 mi. Star Pub. Co. Tues, Fri, 8-9:30 pm, concert, entertainment. Central.

WKAD, East Providence, R. I. Charles Looff.

WKAF, Wichita Falls, Tex. W. S. Radio Supply Co.

WKAG, Louisville, Ky. Edwin T. Bruce.

WKAH, West Palm Beach, Fla. Planet Radio Co.

WKAI, Fargo, N. D. 150 mi. Fargo Plumbing & Heating Co. Daily ex Sun, 5-5:45 pm, concert, sports. Central.

WKAK, Okemah, Okla. Okfuskee County News.

WKAL, Orange, Tex. Gray & Gray.

WKAM, Hastings, Neb. Daily Tribune.

WKAN, Montgomery, Ala. 200 mi. Alabama Radio Mfg. Co. Daily ex Sun, 3:30 pm, 8:30, music, news. Eastern.

WKAP, Granston, R. I. Wilcox Flint.

WKAQ, San Juan, Porto Rico. Radio Corp. of Porto Rico.

WKAR, East Lansing, Mich. Mich. Agrl. College.

WKAS, Springfield, Mo. 100 mi. L. E. Lines Music Co. Daily ex Sun, 6:30-7 pm, sports. Mon, Fri, Sat, 8-9:15 pm, music. Central.

WKAT, Frankfort, Ind. Morning Times.

WKAW, Laconia, N. H. Laconia Radio Club.

WKAW, Beloit, Wis. 100 mi. L. M. Turner. Daily 12-12:15 pm, 7-7:30, concert. Central.

WKAX, Bridgeport, Conn. 75 mi. A. Macfarlane.

WKAY, Fairbairn, Minn. 485 also. 500 mi. Breaux College.

WKAZ, Wilkes-Barre, Pa. 100 mi. Landau's Music Co. No definite schedule. Sat, 8-12 pm, dance music. Sun, 11 am, 8 pm, church service. Eastern.

WKC, Baltimore, Md. 500 mi. Jos. M. Zamolski Co. Tues, Thurs, Sat, 7:30-9:30 pm. Eastern, daylight saving.

WKN, Memphis, Tenn. Reichman-Crosby Co.

WKY, Oklahoma City, Okla. 485 also. 500 mi. Oklahoma Radio Shop. (Daily Oklahoman.) Daily, 12 m, weather; 7-7:30 pm, sports, specials; 8:30-9:30, concert; 9, weather, news. Sun, 3:30-4:30 pm, concert. Central.

WLB, Springfield, O. U. S. Army.

WLAB, Carrollton, Mo. George F. Grossman.

WLAC, Raleigh, N. C. N. C. State College.

WLAD, Hastings, Nebr. 150 mi. Arvanette Radio Supply Co. Program not established.

WLAF, Lincoln, Neb. Johnson Radio Co.

WLAI, Minneapolis, Minn. 1,000 mi. Cutting & Wash. Radio Corp. Daily ex Sun, 9:30-10 am, music, market reports; 1:30-3 pm, music, farm news, styles; 3:30-4:45, markets, music; 6-7:30, farm news, children's hour. Thurs, Fri, Sat, 8-9:30 pm, concert. Sun, 4:30-5:30 pm, church services. Central.

WLAL, Waco, Tex. 485 also. 1,000 mi. Waco Elec. Supply Co. Daily ex Sun, 10:30, 2:30 pm, music, reports. Tues, Thurs, Sat, 7:45-8:45 pm, music. Sun, 3 pm, church service.

WLAK, Bellows Falls, Vt. Vermont Farm Machine Co.

WLAL, Tulsa Radio Co. Tulsa, Okla.

WLAM, Springfield, O. 100 mi. Morrow Radio Co. Mon, Wed, Fri, 8-9:30 pm, dance music. Central.

WLAN, Houston, Tex. Futuna Hdw. Co.

WLAO, Scranton, Pa. 100 mi. 485 also. R. C. Ehrhardt and J. H. Jones. Mon, Wed, Fri, 7:15 pm, bedtime stories, reports, 8-9:45 pm, music. Sun, 7:30 pm, music; 8:30, church services; 9:15, music. Eastern.

WLAP, Louisville, Ky. W. V. Jordan.

WLAR, Kalamazoo, Mich. 100 mi. A. E. Schilling. Daily, 10-12 pm, music. Central.

WLAS, Marshalltown, Ia. 50 mi. Meikel Music Co. No definite schedule.

WLAT, Burlington, Ia. Chas. G. Bosch Co.

WLAW, Burlington, Vt. 200 mi. Elec. Shop, Inc. Daily ex Sun, 8-9 pm, music, entertainment. Central.

WLAW, New York, N. Y. New York Police Dept. Broadcasting Station. (Putnam Elec. Co.)

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

WLAY, Fairbanks, Alaska. Northern Commercial Co.

WLBA, Warren, O. Hutten 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, reports, Tues, Thurs, 8:30-11:15 pm, concert. Sun, 2-4 pm, 8:30-11:15 pm, concert. Sun, 2-4 pm, 8:30-11:15 pm, concert. Sun, 2-4 pm, 8:30-11:15 pm, concert. Sun, 2-4 pm, 8:30-11:15 pm, concert.

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

WMA, Anderson, Ind. 25 mi. Arrow Radio Lab. Mon, Wed, Fri, 7:30-8:30 pm, concert, news, etc. Central.

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

WMAF, Dartmouth, Mass. Round Hills Radio Corp.

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

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

WMAJ, Kansas City, Mo. 485 also. 600 mi. Daily Drivers Telegram. Daily ex Sun, 8:45 am, 9:15, 10:15, 11:15, 11:45 pm, 2:30, weather, markets. Central.

WMAK, Lockport, N. Y. Norton Lumber.

WMAL, Trenton, N. J. 100 mi. Trenton Hdw. Co. Mon, Thurs, 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.

WMAQ, Easton, Pa. Utility Battery Service.

WMAZ, Chicago, Ill. 1,500 mi. Chicago Daily News. Daily, 7:30-7:50 pm, 9:30-10, Central.

(Continued on page 9)

In Two Parts—

THE BROADCASTING station directory is the most complete and authentic list of radiophone plants. Letters are being sent various stations every day for information. No other paper or source provides the data given here. The idea is original and a service which RADIO DIGEST has maintained from the start. Every public service broadcasting station is to be found now, not only in the location index, but in the schedule list. The latter, however is divided, one-half appearing this week, and the other half to appear next week. It is believed the improvement will be greeted as welcome by many readers. The station schedules, given here, are listed alphabetically by call letters. Following the call is given the city and state, the wave length (PROVIDING a wave length other than 360 meters, is used), the miles range of the station, the owner of the station, the schedule of operating hours, and the kind of time used. The state, city and call list appears with the first half of the station schedules every other week and is merely an index. One wishing to find the calls of the stations in his vicinity, will find this index useful. Two successive issues of RADIO DIGEST will give one the most complete and accurate list of broadcasting stations obtainable.

STATION SCHEDULES

(Continued from page 8)

WMAR, Waterloo, Ia. Waterloo Elec. Supply Co.
WMAF, Auburn, Ala. Ala. Polytechnic Inst.
WMAW, Walpole, N. D. 50 mi. Walpole Elec. Co.
WMAU, Shreveport, La. La. State Fair Assn.
WMAX, Ann Arbor, Mich. K. & K. Radio Supply

Sun, 8-9 pm, church service. Central.
WTAW, College Station, Tex. Agricultural and Mechanical College of Tex.
WTG, Manhattan, Kan. 485 only. 75 mi. Kan. State Agril. College.
WTK, Paris, Tex. 300 mi. Paris Radio Elec. Co.
WTP, Bay City, Mich. 75 mi. Ra-Do Corp.

KENNEDY RECEIVER

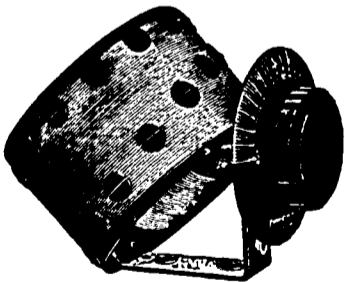
(Continued from page 6)

Primary tap switch, left-hand lever on the third contact point as shown.
Multiple switch thrown to the parallel side. If this switch is thrown in series, the primary tap switch will have to be turned to about the fifth contact point.

RADIO PANELS

Cut exactly to size and shipped the same day your order is received—1/4 in. thick, \$0.01 1/2 per sq. in.
We Pay Postage—Try Us.
RADIO INSTRUMENT & PANEL CO.
26 North Desplaines Street Chicago, Illinois

FOR PRACTICAL PEOPLE PREMIER "MICROMETER" VARIOCOUPLER



You Will Appreciate THE BAKELITE BUTTONS All soldering is done on twenty Bakelite Buttons.
A SUPER-EFFICIENT VARIOCOUPLER—has 180-degree orientation and with 20 Antenna taps permitting sharp and more sensitive tuning.

PRICES AND SPECIFICATIONS

Price—Less dial, switch levers and buttons 1/4-in. shaft \$4.50
Same with Premier dial, but less lever and buttons 5.00
Complete with Premier dial, 20 contact buttons and two switch levers 6.50

The primary is in tune and the dial should be left in this position.

Final Adjustments

The final adjustments necessary to complete the tuning of the receiver are as follows:
(a) Adjust the coupling dial until the loudest signals again are heard.
(b) Readjust the filament rheostat until maximum signal strength is obtained without distortion.

Amplifier Adjustments

The amplifier should be adjusted one stage at a time. First, plug in at the first step, then turn the control knob for this stage to the right until maximum signal strength is obtained.

GOVERNMENT STORAGE BATTERIES

Absolutely new Signal Corps Aero-plans Edison 3 cell type BB-4, \$4.50; Willard 4 cell type SYR-13, \$4.25; Willard 2 volt 40 A.H. for Aeriolta tubes, \$4.75; Edison 6 volt, \$7.75; Edison single cells (2 1/2 x 1 1/2 x 8 inches), \$1.75; Edison elements, 8c per pair. Quality Radio Shop, Richmond, Indiana.

Columbus Dispatch Column Keeps One Ahead of Rivals

COLUMBUS, O.—The Columbus Dispatch is paying more attention to the new thing in American life, Radiophony, than all newspapers in this vicinity.

An Important real estate deal was put through a few days ago with the aid of Radio. The owner was absent on his yacht at some unknown point, but Radio located him and his verbal approval was obtained.

Headquarters for Radio Supplies and Equipment
Radio Department
COMMONWEALTH EDISON ELECTRIC SHOPS
72 West Adams Street Chicago, Ill.

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Hearing Strange Tongues

Long Distance Reception Picks Up Various Languages
ONE morning the editor was called on the local telephone to give the name of WOAI's owner. The inquirer was a bit confused for he had heard the night before the Star-Spangled Banner played and sung in Spanish. The Cuba station has been heard in many parts of the country. Newark has been heard in London. France will soon be heard in New York and before the world realizes it, the broadcasting fan will be much concerned in tuning out the Chinese language than stations that are interfering in his native tongue. For those broadcast fans who have sensitive sets, the programs sent out in the future from the new Cuban station will be of great interest inasmuch as the words will be entirely in Spanish, making the location of the station certain, even though the call letters PWX are not caught.

Mine Disasters Diverted

Transmitter Taken Into Mine for Tests
AS LONG as the earth contains minerals needed by mankind, men will go digging after them, and just so long will there be the possibility of mine disasters. No matter how elaborate a mine telephone system may be, an explosion of gas, or a fall of rock, could render it partly or wholly inoperative. Since this is so, it would seem as if Radio might provide a means of maintaining communication under any conditions that may arise. Experiments were recently conducted in England at the Baggeridge colliery and some interesting results were obtained.

Efforts were made to transmit messages from a depth of 700 yards to the surface. A three-tube set was used for receiving. The aerial was erected by stringing a wire from a steel hoisting gear 100 feet high to a girder of a railway bridge. The ground wire was clamped to the lower part of a railway rail. The transmitter and its aerial were first installed in the steel cage or elevator in the mine shaft, but considerable screening effect was experienced. Tests were made at various distances down the shaft and reception was found to be clearer when transmission was made at the lower points.

The transmitter was taken into the workings where its ground was a cable laid on the floor and the aerial, a wire strung between props. The signals were received at the mouth of the mine. Thus Radio registers another score in its onward march for supremacy.

Aid to Meteorology

Farthest North Station Center of Activity

LAST winter, an American engineer, Hagbard D. I. Leherold, spent several months on a barren rock 400 miles north of Iceland in the Arctic ocean. He was the leader of a meteorological expedition backed by the Bergen Geophysical Institute. His observations were believed so important to the rest of the world that an observatory was established by the Norwegian government at Jan Mayn. This new observatory has a Radio station so that weather observations can be broadcasted as fast as noted. Scientists believe that this farthest north station will be the beginning of a new epoch in the history of science. They give credit to Radio in a large measure.

Meteorology is fast becoming an international study, for the storms and weather of one country soon affect the situation in another. Today the immense area covering the whole of Europe, northern Africa and the Near East, as well as the United States and Canada, is combed with great care by weather observers, and their reports are received at central points, abstracted and broadcasted by Radio daily from Washington, Paris and a few substations. Thus it has become possible for meteorologists to obtain within twelve hours of the taking of the observations, a representative meteorological situation over the greater part of the northern hemisphere, extending from the Pacific coast of America in the West to Russia in the East, and from Egypt in the South to 400 miles beyond Iceland in the North.

Condensed

By DIELECTRIC

A friend of mine recently stepped into a large store in one of the Eastern states and inquired about the super-regenerative receiving set. He was told by the clerk that no one seemed to know very much about it; in fact, he seemed to think that Mr. Armstrong himself was not sure just how it worked. Your smiling at this doesn't mean a thing to Mr. Armstrong, of course, but it should awaken managers of Radio departments to the damages of uninformed clerks. About every paper published in the interests of Radio has carried one or more articles explaining this receiving set and what is required to properly manipulate it. There is very, very much about this fascinating subject with which I am entirely unenlightened, but then I'm not a salesman.

This may not be the pleasantest time to fix one's attention on the Canadian Northwest, if we happen to be living a little near the equator, however, there's something worth gossiping about and this is the place to do it. Surveyors in the MacKenzie river district are busy mapping it out and Radio is a valuable aid to them in their work. It is an aid in this way, that they secure the standard government time by tuning in a broadcasting station, then knowing the local time they can figure their location with very little error. To many of us fans the time signals are rather a source of amusement; the very signals that mean so much to ships at sea and lonely Canadian surveyors.

Speaking of the sounds which come at certain times in the day from our Arlington station, it is interesting to note that jewelers may listen to them and set the watches in their stores to the very second. When you are listening in late at night to the "owls," you may get the impression that time is a very small item, but correct time is a very large factor in every man's life. With a Radio set it is possible for anyone to keep his clocks striking more or less in unison. The Radio-timed jeweler is the one to patronize.

The Japs are said to have installed the most elaborate Radio equipment to be found on any ship afloat on the Kamoi, a fuel ship in the Imperial Japanese navy. One of the features which impressed me most was the Radio telephone exchange, which permits any officer aboard to communicate with other vessels from one of several stations located in various parts of this ship. The exchange operator can put an officers in complete control of transmitter and receiver when the red light flashing in front of him indicates a receiver has been taken from a phone hook. Rather ingenious isn't it? Don't overlook the fact that much of the equipment (if not all) bears the name of an American manufacturer!

Weddings may now take place in the comfortable setting of a modern broadcasting room sans crowds of gaping critics, sans disgruntled friends not favored with printed invitations and sans a good many other things. It is reported that a wedding was recently broadcast where even the osculatorial ceremony was distinctly heard by the vast number of unseen guests. Martyrs to science! There have been many such; but who will serve to show the incredulous that Radio can faithfully reproduce to a multitude of listeners in the culinary disputes, sometimes arising, between married couples? Please stand by for the weather announcement: "Stormy ————!!!"

Some fine day automobiles will be equipped with sending sets, which will broadcast the name and residence location of their owners, controlled by some automatic device to repeat the information at certain intervals, and all you do when leaving the car unoccupied is to turn on the controls and go away contented. How can this be done without transmitting antenna readily detachable by any deft sleuth? Well—I don't know, but neither did I know the manner in which other apparently impossible things were to be worked out, though they have been. Better confine my attention to gossip? All right, brother fans, however, you will see some miraculous accomplishments in our realm of science within the next generation. I simply want to start someone guessing.

Senator Marconi somewhere made the prophetic statement that in time we would be utilizing electricity generated by the sun. He doesn't know how this could be done; yet is confident that it will be. Giving expression to visions of marvelous things yet to become verities, men of his type are strengthening incredulity in some, while prodding others into feverish activity along the line of experimentation. The fact is, as you know, a great many wonderful discoveries have been the result of accident. Tinker with your sets and some day you may become accidentally famous.

Just a short time ago, on an ocean liner approaching these shores, an opera singer was conscious of the fact that at the speed the vessel was then making she would be too late to fulfill her engagement with one of our leading orchestras. Two of the outstanding achievements of inventive minds were immediately sought to relieve the situation; one, Radio, and the other, an aeroplane. This message from far at sea via Radio was calling for the aid of a flying boat to get the prima donna to her destination on time. These incidents become commonplace in time, though this is said to be the first occurrence of its kind.

As proof of the efficiency of many of the broadcasting stations just look at the increasing number of class B stations. A license to operate on 400 meters in this class carries with it, not only certain obligations pertaining to the transmitter, but valuable guarantees to the receiver.

RADIO INDI-GEST

And a Broad-Cast to Their Eyes

Ethyl—Why do they call the burlesque show chorus "Radio Girls"?

Methyl—They make use of guys, switches and stays, have leads and circuits, get tuned up and have phony conversations.

When Winter Comes

Dear Sirs:

I see by your magazine that an ingenious person can earn a dollar with a worthy workshop kink. It is a very good idea and promotes a feeling of self-reliability. Here is my kink, and I hope you will accept it. It is a bit humorous and yet practical.



Recently while I was listening to a program being sent out from a nearby station, the head band on my 'phone broke. Remembering that I had an old pair of earmuffs around, I looked for them. Having found them, I proceeded to attach them to my 'phones. They gave me very good service that night, even though they did look strange and I must say they also looked comical.—Fredric M. Deller.

Ask the Editor—He Can Tell You

A few questions that are asked of the Radio editor, and what he replied:

Q.—How is it that my reception is very weak unless I keep my finger glued on the ground post?
A.—Never glue connections; use solder.

Q.—If the effective resistance of alternating amplitude in proper phase relation is impressed infinitely on free oscillations, will regeneration function to maximum reception?
A.—Radio Waves yells for help!

Q.—I have the latest two-stage amplifier, but can not get out of town. What shall I do?
A.—Board an interurban.

Q.—I have tried for two hours to get signs with my super-army; didn't even get static.
A.—Didn't you even get tired?

Q.—My hot-wire ammeter smokes occasionally. What about it?
A.—Just so it does not start drinking, you are within the law.

Q.—What is a good layout for a set?
A.—Referred to our poultry editor.

Q.—How far can I receive on a watch case outfit?
A.—From two feet to two miles.

Q.—If I wind a flag pole full with No. 30 wire, will I receive Europe?
A.—Better leave Europe where it is for the present.

Q.—How does it come I receive squeals and grunts entirely?
A.—You must be directional to the Cincy zoo or the Chicago stockyards.—Indianapolis News.

Why Dig a Garden Now-a-Days?

A newly invented angle worm consists of brass rods placed in the earth several feet apart, with a live wire attached to the visible ends. The current running



through the earth annoys angle worms so much that they come to the surface, where they are available for bait and chicken food. One man suggests running broadcast jazz through the wires, which would make the worms "shimmy" to the surface in a hurry.—Chicago Daily News.

So Has the Dictionary

Mrs. Oral—Mrs. Noisy says she does not like her husband's Radio outfit.

Mrs. Verbal—No. It always has the last word.

Use of the Radio Receiving Set in the Home

Part XII—Maintenance

By H. M. Towne

THERE are always certain inspections, repairs and replacements necessary to Radio receiving sets which can be classed as maintenance. A Radio receiver, particularly the more elaborate vacuum tube sets, will not operate indefinitely without attention, any more than an automobile. The crystal detector sets are so relatively simple as to require but very little attention aside from the possible renewal of the crystal or periodically breaking the crystal and remount-

is the universal means of checking B batteries, it is by no means an infallible method.

Very often a battery may be deteriorated to a point where one or two of the small individual cells have high internal resistance and will be bad enough to cause unsteady voltage on the plate of the vacuum tubes, but the same battery might register fairly constant voltage on a voltmeter. This is because very rapid fluctuations of voltage will always affect

when the battery is supplying current to several vacuum tubes. The charging of storage batteries should be done periodically in order to keep the battery in good condition. If the Radio set is not in use, it is better for the battery to be discharged slowly and charged again, this being done every month. This will prevent sulphating of the battery plates, which is one of the most destructive agents to storage batteries.

Charging of batteries has come to be quite a promising business since the advent of popular Radio, and almost every community has its battery shop which will call for, charge and deliver the storage batteries used with Radio sets. For the single tube sets, this method of caring for the charging is not too expensive, but when considered for the four or five-tube sets, it is too expensive and troublesome.

Battery Charging Devices

Battery charging equipments available on the market will charge the average battery over-night, the current being supplied from the house lighting circuit. These battery charging equipments are made in two popular types. They are both rectifiers which convert the alternating current from the lighting circuit to a low voltage direct current to be delivered to the battery. The two popular types are the vacuum tube or kenotron type of rectifier, and the mechanical vibrating rectifier.

The vacuum tube rectifier operates much the same as the plain detector tube, but the rectifier bulb has only two elements, filament and plate. The filament is heated to incandescence and will emit electrons. A low voltage tap from an auto-transformer supplies alternating current voltage to the plate. When the positive wave of the cycle is on the plate, a current flows, but when the negative wave is on the plate, no current will flow.

The storage battery is connected in the plate circuit and will be charged during one-half of each cycle of the alternating current supply. This is frequently termed half-wave rectification. The diagram for such a rectifier is shown in Figure 39. It will be seen that the filament of the rectifier tube is heated by alternating current tapped from the auto-transformer. The battery must always be inserted in

the plate circuit with the correct polarity relation. The positive side of the battery should always be on the plate side of the tube.

The diagram of a mechanical type of rectifier for charging batteries is shown in Figure 40. The alternating current supply is stepped down to low voltage through a transformer. This low voltage alternating current is supplied to a magnet whose field actuates a vibrating armature. The armature is designed and balanced to vibrate best at one particular frequency, which is the rated frequency of the rectifier. The vibrating armature carries a contact which, when the armature is toward the electro-magnet, engages a similar but stationary contact. These contacts close every time the armature is toward the actuating magnet.

The storage battery is connected in a circuit which is closed by these contacts and whenever the contacts are together, current will be passed through the battery. The contacts are closed only on one side of the alternating current cycle so that the current passing through the battery is always of one direction. The vibrations of the armature must be exactly in synchronism with the alternating current frequency. A second electro-magnet coil on the same core as the first is shunted directly across the battery. The interlacing of the direct current flux

(Continued on page 12)

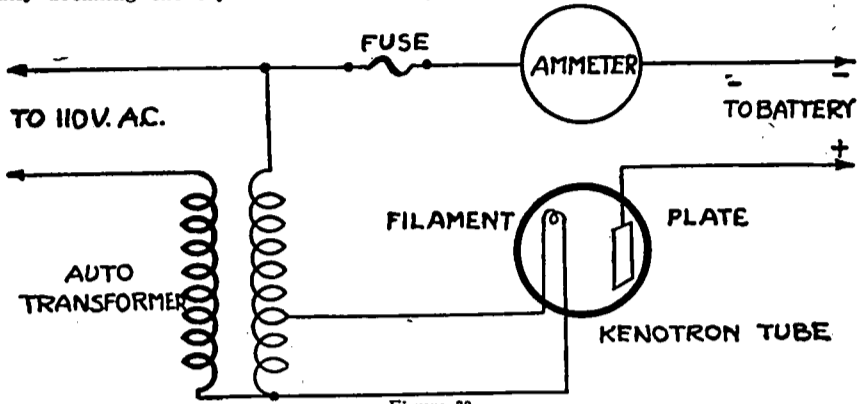


Figure 39

ing it so as to present a new and clean surface for the contact point to touch upon.

Antenna and Ground System

The antenna and ground system, if properly installed, should not require any appreciable attention. In a lot of cases, however, receiving antennae are hurriedly erected, using a limb of a tree for a support, and unless provision is made for the swaying of the tree, during high winds, the antenna wire will be subject to some severe whipping during storms and high winds. In such cases, the antenna should be given a casual inspection after storms and slack taken up if it has been stretched.

The lightning arrester or protective device should be given periodic inspection, preferably at the beginning of the lightning season. Along with this is the importance of a good ground connection. The ground wire is in some cases exposed and subject to the meddling of youngsters or to perhaps more natural means of injury. A broken ground wire may not always be evidenced by the operation of the receiving set, as most any receiver will give good signals without ground connection, provided the adjustment of the tuning inductor compensates for the small capacitance to ground. For this reason, an occasional inspection of the ground wire is recommended and particularly the lightning ground wire and its earth connection, making sure that the entire discharge path from antenna to earth is intact.

The B Batteries

Probably the most frequent chance for attention with vacuum tube sets is with the B batteries. These have a limited life which may vary from two to ten months, depending upon the grade of battery and its care and usage. The B battery deterioration is first evidenced by noises which will somewhat resemble the familiar static discharges, and occasionally accompanied by sizzling or frying sounds. The connections to the batteries should be inspected to insure no loose con-

nections and the vacuum tube sockets should be inspected to insure that the base prongs on the vacuum tubes are making positive contact with the spring contacts in the sockets.

Tube Socket and Prongs

It is well to remove occasionally the vacuum tubes, both detector and amplifiers, and bend up the spring contacts so that more spring pressure will be exerted against the tube prongs when the tubes are in place. Also, brighten up the ends of the tube prongs with a fine file or emery paper. These two precautions should be taken before discarding B batteries, since a poor contact will cause very much the same troubles as deteriorated B batteries. While the voltmeter

the plate current through the Radio receivers, but the fluctuations may be too rapid to show up on the voltmeter, that is, the voltmeter registers the average value and does not respond quickly enough to show small but rapid fluctuations.

Contacts on Instruments

All contacts of a sliding or adjustable nature such as rheostats, potentiometers, tap switches, etc., should be kept relatively tight so that the movable element exerts a certain constant pressure on the stationary elements. Poor contacts from this source are the frequent cause of unsteady and noisy operation.

It is much better to keep the contacts tightly engaged and use a little light oil on them to prevent stiffness in motion. The oil should be applied with the finger, using just a drop of oil and it should be rubbed lightly over the contact surfaces.

A cloth should then be rubbed over the surfaces to remove any excess of oil. Just a fine invisible film of oil will enable smooth operation and will still not interfere with contact, providing the pressure is good.

Transformer Troubles

Amplifying transformers occasionally give trouble by open circuiting in one of the windings. The wire used in these transformers is usually very fine to minimize the space factor, and this very fine wire is subject to oxidation or chemical action which may gradually eat through the wire. This is more liable to happen where the leads are soldered to the fine wire, resulting from chemical action caused by the soldering flux and subsequent oxidation. An excess of flux when soldering the fine wire is generally responsible.

This same condition is experienced quite frequently in the step-down coil or transformer which is integral to some designs of loud speakers. The primary winding of these coils consists of a large number of turns of fine wire, which may open circuit similarly to the amplifying transformers. These open circuited windings will be first evidenced by noises of

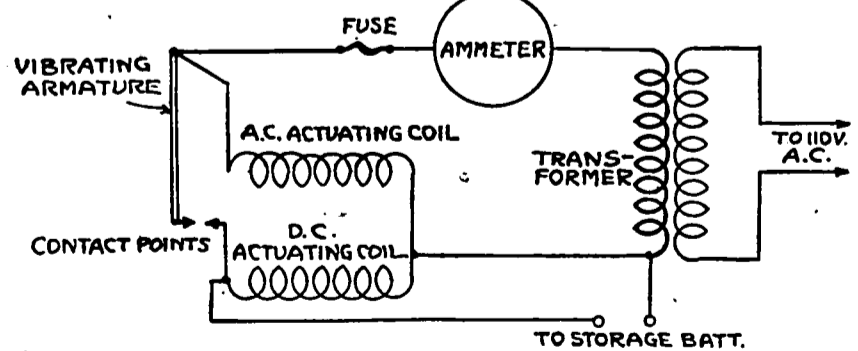
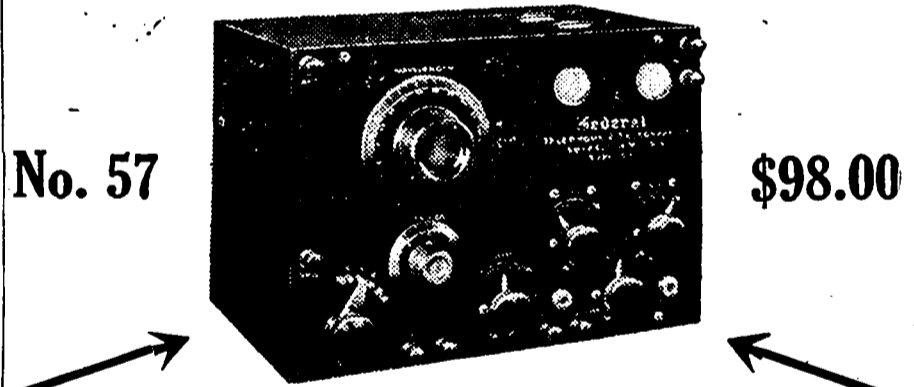


Figure 40

MAKE THIS A RADIO CHRISTMAS



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Freak Hook-Up for Regenerative Set

Variocoupler and One Variometer in Hook-up

Just what makes the performance of this freak hook-up particularly satisfactory for long distance work, will have to be left to more prying minds than my

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.

own. But however freakish it may be, I have received WSB, WHB, WOC, WJZ, WAAC, WEAB, WDAF, WBAA, and a dozen others with but one tube, although the enclosed diagram shows an amplifier attached.

All that is required for this set is a variocoupler, a variometer, a 21-plate variable condenser, a two plate vernier condenser which can be made from parts of a grid condenser, a rheostat with vernier attachment and a one tube outfit. The verniers are absolutely necessary because of the critical tuning, for though it takes time to get a perfect adjustment especially on long distance broadcasting station, the operator will feel rewarded in the end for his work.

Coils C1 and C2, in the diagram, are the stator and rotor of the variocoupler. C3 is the stator of the variometer and C4 is the rotor. It will be noted that the coils of the variometer have been disconnected and it is now used as another variocoupler. It will also be seen that there are two taps taken from C3. This is done for finer adjustments and efficient operation. One is taken from the end of the stator's winding and the other from the center of the winding where the two halves of the stator coil are joined.

The remainder of the hook-up, I believe, explains itself. An audio frequency step will add somewhat to its range and the strength of the signals, but is not necessary if a good antenna is used. I have not yet tried a step of Radio frequency with this set, but would like to hear from anyone who does experiment with it. I will be glad to hear from anyone who finds certain rearrangements of the instruments in this hook-up will increase the efficiency.—J. H. Varnum, Detroit, Mich.

Old Records Make Set Parts

Neat hard-rubber plates and handles for use in Radio sets can be successfully made from cracked and broken phonograph records. Heat the composition with a blow torch, roll the material into balls of soft rubber and mold them into any shape desired. Place the rubber mass between two hot metal plates. Thin rubber sheets result when the rubber and plates are run through an ordinary laundry wringer. A high polish can be put on the handles and plates by using a fine emery cloth and oil.

USE OF RADIO SET

(Continued from page 11)

and the alternating flux from these magnet coils is exerted on the armature to enable perfect synchronism with the alternating current supply.

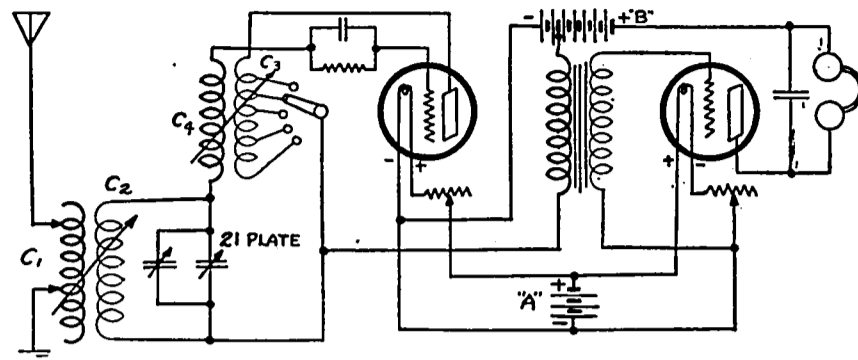
The storage battery may be inserted in any polarity without danger, as reversed polarity simply means that the opposite half of the alternating current wave will be used for charging. The vibrating element starts automatically when the battery and alternating current circuits are closed.

Use of Ammeters

Ammeters in series with the battery circuit enable the charging current to be read. This should be kept relatively low, and the period of charging relatively long. A long, light charge is better for a battery than a short, heavy charge. Most of the rectifiers on the market have charging ratings of from two to eight amperes. The battery should be kept well charged when the convenience of a charger is had. An over-night charge once every two weeks will keep the battery in good condition and permit use of the set for several hours every day without noticeable fall of battery voltage.

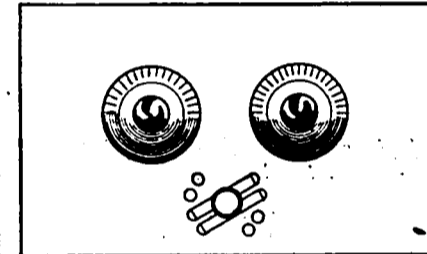
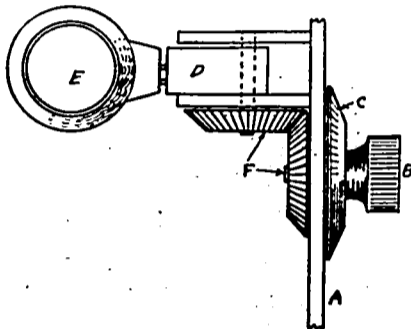
(The End.)

CONNECTIONS FOR UNUSUAL SET



Mounting for Honeycomb Coils

The illustrations show a new and unusual mounting for honeycomb coils. With this mounting there is no coils on the outside of the panel. The panel is shown



at A, which may be 6 or 8 inches high and B is the knob with C the 3-inch dial. Two miter gears F are used to swing the coil which has its mounting in the usual manner at D and E represents the coil.

There are various combinations for the

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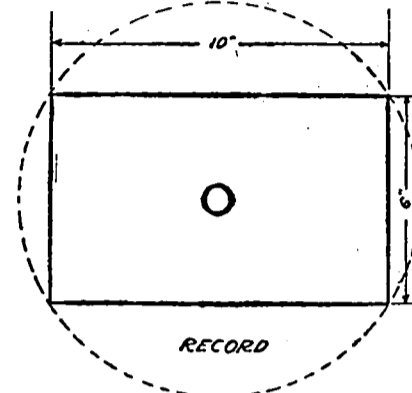
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ANTENNA HI-VOLTAGE +
GROUND HI-VOLTAGE -
OUTPUT LO-VOLTAGE +
INPUT LO-VOLTAGE -
TICKLER MODULATION

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FROM 8C TO 5C EACH
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Receiving Set Panels Made of Disc Records

In constructing a Radio receiving set I desired a good dielectric panel. The regular materials were too expensive for use and I conceived the idea of using some worn out disk phonograph records. The ones I had were large in size and with music on one side. A 6 by 10-inch panel can be cut from a 12-inch record.

Any sized record may be used, but the smaller the record the smaller the panel. The material can be easily cut with a



hot knife and holes made with a heated ice pick. The hole in the center can be used for a switch or rheostat shaft.—E. Hoffman, Terre Haute, Ind.

A good aerial and a fair receiver will do as good work, or a poor aerial and a good receiver, but a good aerial and a good receiver is the best combination.

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Reinartz Circuit for Use with Panel Sets

Hook-Up with Two Stages of Audio Frequency Amplification

By H. J. Marx

THE POPULARITY of the Reinartz tuning units has been such that every presentation of it in a new form merits the attention of the Radio-phan. Its application to panel form and the addition of a two-step audio frequency amplifier panel is given in this article. In addition the winding of the spider web coil is detailed.

A detailed list of apparatus is given. The vacuum tubes can all be hard tubes. The transformers are of the usual commercial type, with a ratio of about four to one. If a ten to one is used, it should be for the first amplifier stage only. Three tap switches are needed for the primary, secondary and tickler circuits. The six-stop contacts are small projecting knobs similar to the contact points that prevent the lever from sliding off the contact points.

Tinned copper wire, No. 14, is used for the connections inside of the cabinet. The No. 25 S. C. C. wire is used for winding the spider web coil. The dials are for the two variable condensers. The panel sizes can be altered to suit the ideas of the constructor. The panel thickness need not be over 1/8 inch. The bakelite frame is for winding the spider web, but fiber or any other good insulating material can be substituted. The plan for laying out the spider web frame is given with dimensions. The cabinet construction is left to the judgment of the maker.

Winding the Spider Web Coil

In winding the coil, the wire should be laced in and out of the tongues of the frame—with an even tension throughout. The taps should not be taken all at the same point, but should be taken in steps—each one on the tongue following the one where the preceding tap is taken off. The turns are counted from each tap point. In this way about two complete extra turns are accumulated. In taking off a tap a one-inch loop is twisted in the wire and the turns are continued, afterwards the cotton covering can be removed from the taps in preparation for soldering leads.

The first and tickler winding consists of 60 turns, with a tap every fifteen turns. Counting the start and finish, this will give five connection points.

It should be noticed that the primary and secondary are all one length of winding spaced with fifteen extra turns connecting the two sets of taps.

The primary consists of ten turns, with a tap for every turn—contacting the starting lead, there will be eleven connection points. After the last tap, fifteen extra turns are wound on before the next tap is made. This tap is the first connection for the secondary tap switch.

The secondary winding consists of twenty-eight turns, tapped after every seven turns. Counting the first tap this will give five connection points.

Soldering Tap Leads

In soldering the connections to the con-

tact points it is advisable to first tin the tapped connections. This will make it easier to get a good soldered joint and a perfect electrical connection. Poor and careless workmanship will do more towards destroying the efficiency of a receiving set than any other factor. After the winding has been completed the projecting tongues can be trimmed off, leaving an eight-inch projection above the last turn.

The mounting of the spider web in the cabinet is left to the ingenuity of the amateur. It can either be mounted vertical or laid at the bottom of the cabinet. If the horizontal mounting in the base is used, the taps should all be taken off on one side. If the vertical mounting is decided on the taps should be located in each case on the side where the tap switch is mounted on the panel.

The secondary condenser should be on

binding posts are connected to the positive side of the filament storage battery. Likewise the two A— posts are connected to the negative side. The B— and B+ binding posts in the detector panel are for connection to a 40-volt plate battery.

The top binding post on the right-hand side of the detector panel is connected to the corresponding one on the left-hand side of the amplifier panel. Likewise the two binding posts directly below in each panel are strapped together. Phones or a loud speaker are connected to the two binding posts on the right-hand side of the amplifier panel.

Naturally, if only the detector panel is used, the phones are connected to the two posts on the right-hand side. The batteries are connected as before, but under these conditions it would be best to substitute a soft (detector) tube and use only a 22½-volt plate battery.

antenna circuit. This will increase the number of turns required and will increase the induced current in the secondary circuit. In addition it will give more accurate tuning control of the primary circuit. If the aerial is very short it may be necessary to add a variable condenser, shunted between the antenna and ground building posts.

Amplifying Buzzer Tone

When making detector adjustment tests, ordinary magnetic buzzers are generally used. Although quite convenient, the faint tone emitted is not as desirable a signal as could be wished for.

The tone can be raised by simply placing tightly-folded strips of paper between the magnet core and armature and between the armature and contact spring. The requisite thickness of paper may be determined by experiment.

Instead of the paper, rubber bands may be used, if they are wound tightly around the buzzer in such a manner as to occupy the same positions as the paper.

In further adjusting the buzzer for a higher tone, the contact screw must also be regulated.—J. M. C.

Radio Used as Barometer

Many experienced Radio enthusiasts are able to predict with a fair degree of accuracy the advent of cloudy or rainy weather. When the "static" is particularly heavy, as evidenced by loud sounds and crashes in the telephone receivers, it is a fairly certain sign that bad weather is close at hand. This may be observed on small crystal sets as well as on more elaborate ones. Beginners who have never had experience with static probably had an opportunity to get well acquainted with it this summer.—J. M. C.

Correction

Referring to the diagram shown on page 13 of the November 18th issue, the leads on the two right hand contacts of the multiple switch No. 2 were interchanged in the original illustration—which would short circuit the antenna to the ground.

How to Mount the Crystal

A novel way to mount the detector crystal in the cup is here given. Procure a little mercury and stir into it some fine lead filings, enough so that the mixture becomes a very thick paste. Place it in the detector cup and place the crystal in it. In a few minutes the mixture will harden and hold the mineral firmly.

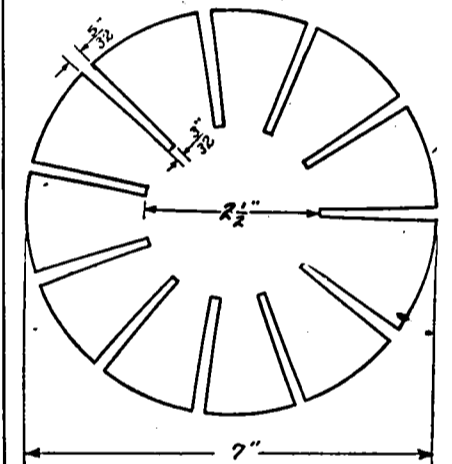
With this simple method, there is no heat applied to the crystal to destroy its rectifying properties, and unless one learns how to mix the low melting point alloys the mineral will be ruined even with some of the very soft solders.

LIST OF APPARATUS

- Three Vacuum Tubes
- Three Tube Sockets
- Three Rheostats
- Two A. F. Transformers
- Two Phone Condensers .001 mfd.
- One Variable Condenser .0005 mfd.
- One Variable Condenser .00025 mfd.
- One Grid Condenser .0005 mfd.
- One Grid Leak 1 megohm
- Three Lever Switches

- Twenty-One Contact Points
- Six Stop Contacts
- Fourteen Binding Posts
- No. 14 Tinned Copper Wire
- No. 25 S. C. C. Wire
- Two Dials 3-inch
- Two Panels 7 inches by 9 inches
- Bakelite Frame 1/16 by 7 inches square
- Two Cabinets
- Miscellaneous Screws, etc.

the left side of the panel and the plate condenser to the right of it. In assembling instruments it is well to keep in mind that the arrangement should be such



as to reduce the lengths of the tap leads and other wiring to a minimum.

Connecting the Two Panels

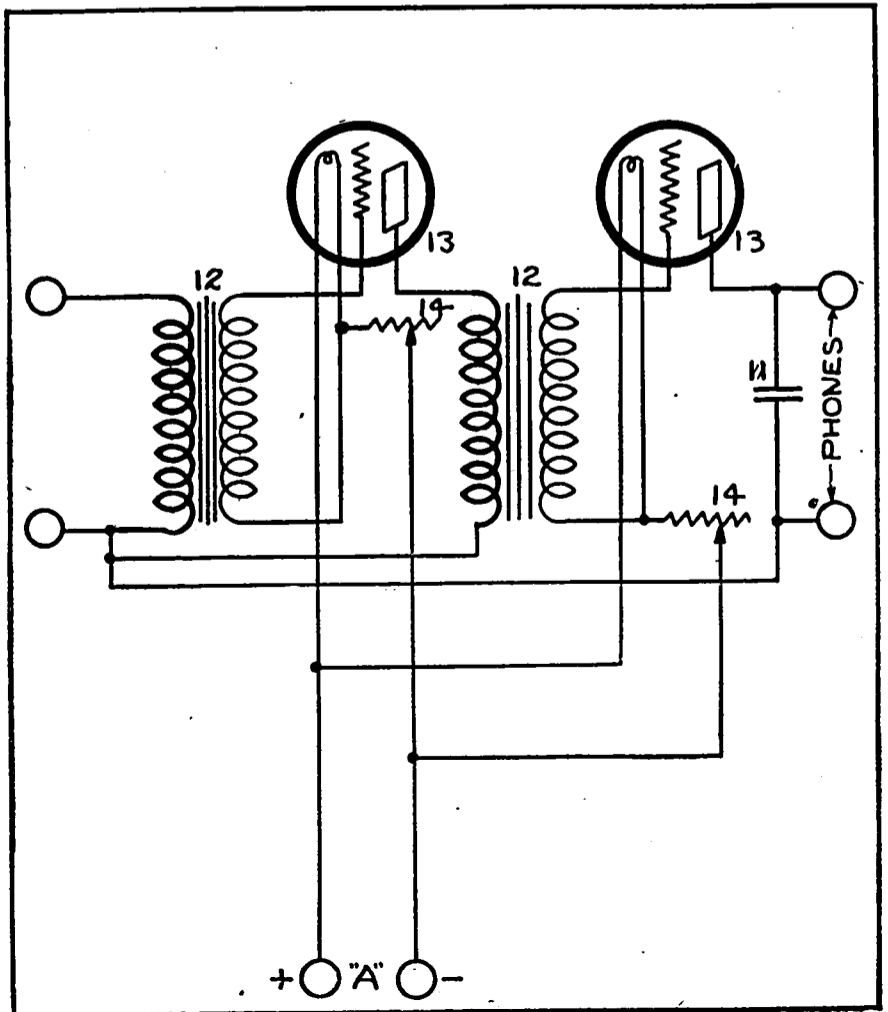
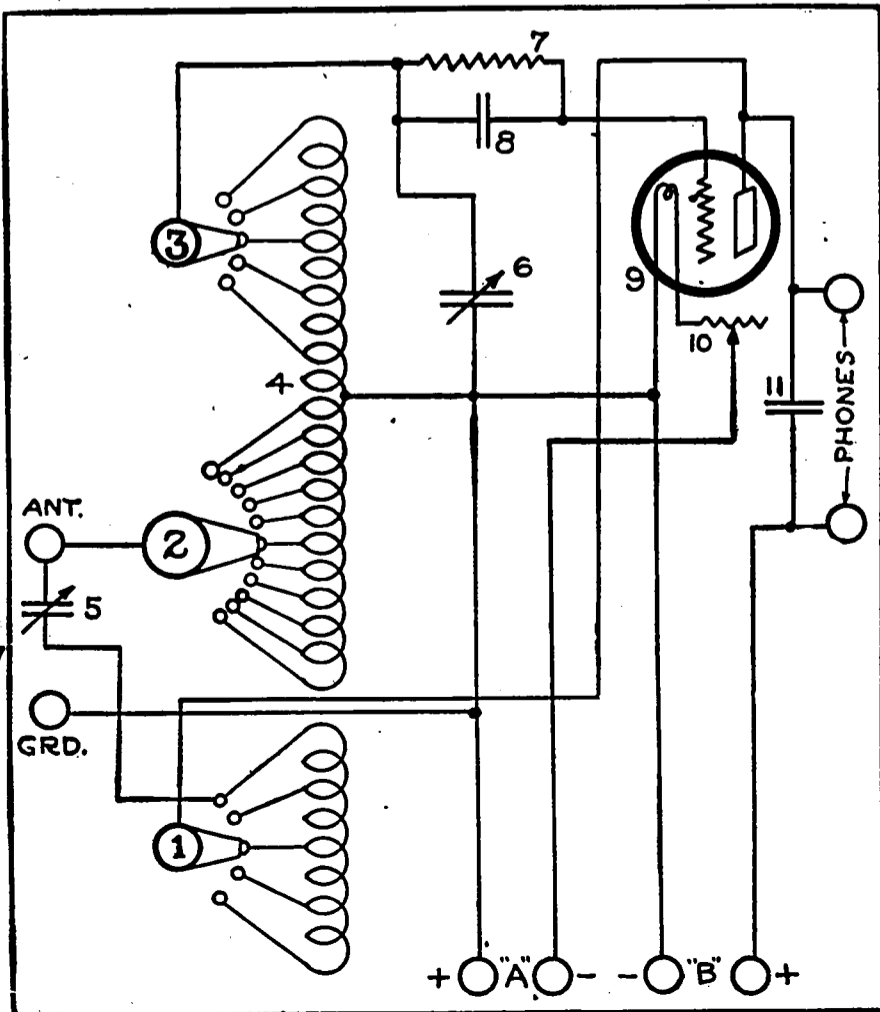
When the both panels are used, the A+

Tuning the Set

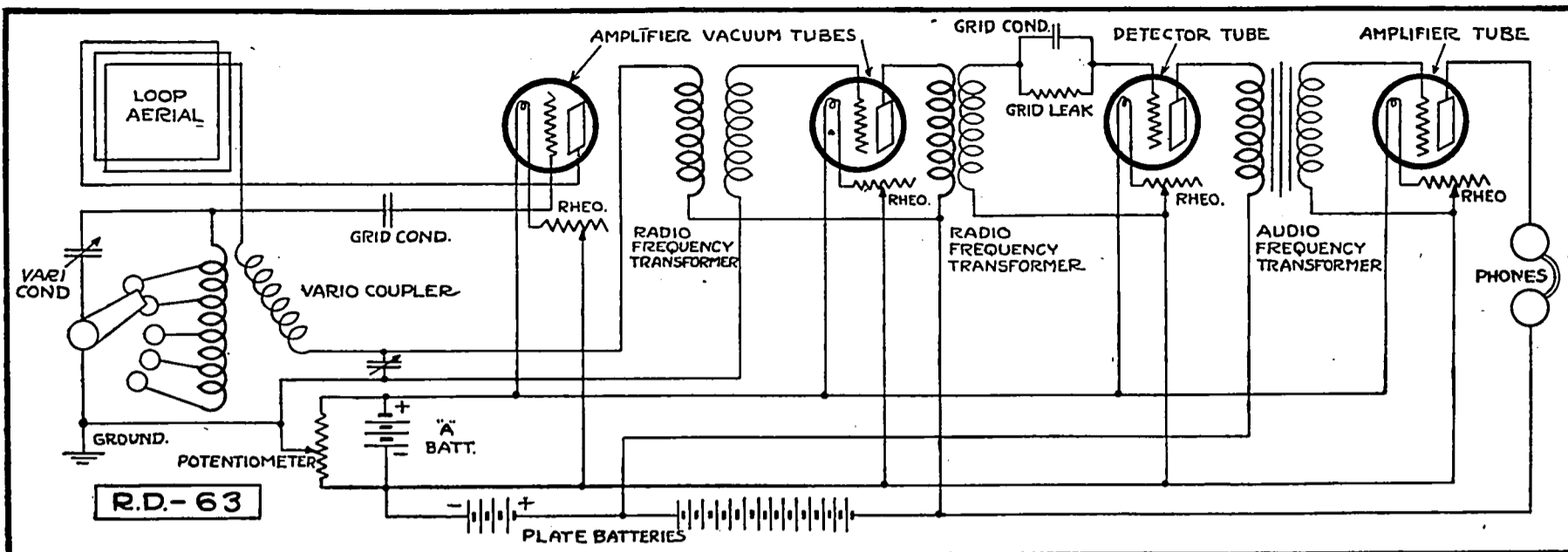
The two condensers are set at zero, that is with the plates all the way out. Tap switch (1) is placed on its top contact point. Primary switch (2) is set above the center contact while secondary switch (3) is also set about the center contact. The rheostats (10 and 14) are then adjusted to point below where the hissing or howling starts. The primary and secondary switches (2 and 3) are then varied until reception is heard the loudest. Secondary condenser (6) is then adjusted for improvement in reception. The tickler tap switch (1) and condenser (5) are then worked in conjunction for the full benefit of regeneration, but care must be taken not to pass the point of distortion. Slight adjustments can now be made on all controls, including the rheostats, for improvement in reception.

One point that the novice should bear in mind is the fact that best reception is not usually found with the rheostats turned on for full filament voltage, unless the batteries are running down. Another fact is that adding too much plate voltage will cause the signals to mush up.

If the wave length of the antenna system is high and only one or two turns of the primary are necessary for reception, it will be advisable to place a variable condenser (43-plate) in series in the



PRACTICAL REGENERATIVE LOOP SET



This hook-up, to be used with a ground connection in conjunction with a loop aerial, will prove interesting to the Radiophan who is unable to erect an outdoor aerial. The peculiarity in the design is that the loop aerial is placed in series in the plate circuit. In addition, the rotor of the variocoupler is used for regeneration on the plate of the first tube. Thus a double regenerative effect is obtained. Naturally due to the sensitivity of the double regenerative action, the directional effects of the loop will be very critical. The primary of the variocoupler should be one with plenty of turns in order to

give sufficient inductance, so that the wavelength with the variable condenser, which should be of .001 microfarads capacity, will be in the neighborhood of five hundred meters. The primary condenser could be of the vernier type, in order to facilitate close tuning. The grid condenser of the first tube should have a capacity of about .00025 mfd. The grid leak and condenser unit on the detector tube should be .5 megohm and .00025 mfd., respectively. The grid potential of the first and second tubes is controlled by the 40-ohm potentiometer which is connected across the 6-volt filament storage battery. Two Radio frequency transformers are

used for the two stages of R. F. amplification. The plate batteries consist of a 22 1/2-volt and 45-volt unit connected in series. The one side of the primaries of the two R. F. transformers and the plate circuit of the last tube are all connected to the positive terminal of the 45-volt battery, thus obtaining a total of 67 1/2-volts on their plate circuits. The primary of the audio frequency transformer is connected in between the two units thus placing a 22 1/2-volt potential on the plate of the detector tube. Separate rheostats are used on all four tubes. The detector tube, naturally, is a soft tube, while the other three are hard amplifying tubes. The variable conden-

ser between the plate and grid circuits need not have a maximum capacity of more than .00025 mfd. In tuning, the coupling between the primary and plate circuits should be set at zero. Then the primary circuit is adjusted by means of the top switch and variable condenser. Then the plate circuit is tuned in by means of the coupling, the plate condenser and the direction of the loop. The maximum directional effect of the loop should be realized before the coupling and capacity are adjusted. The adjustment of the potentiometer and rheostats are the final steps in tuning. This circuit will be found very effective for long distance loop reception.

The Reader's View

Butte, Montana, Heard From

As the columns of your publication will serve best in reply to the numerous requests from the operators of transmitting stations located in our United States and a portion of our neighboring dominion on the north, but applying more stress on the Ninth district of which I am located in about the center, I must say as regards modulation, distance, class of music and other entertainment, together with information of more or less value to thinking people, I wish it to be well understood that their efforts are not in vain, and that every word or signal finds its way to the most remote corner of my house.

The only kick I have is directed against certain stations who jam the other with no object in view other than that of advertising their goods and taking advantage of the most popular hour, 8 to 9 P. M.

At times I wonder if I should complain? Give a calf enough rope and it will hang itself every time.—Francis L. Stentz, Butte, Montana.

Transcontinental Reception

Using a home-made receiving set consisting of a variometer regenerative set with detector and one step amplifier, I have been getting several of the eastern broadcasting stations quite regularly.

In most cases long distance reception is caused, as many say, by some freak atmospheric condition. However, I don't think that these "freak" conditions play any part in my case. When I tune in on some long distance station I generally (not always) hear it till the end of the program. This happens not just once but the next night as well.

I am located about 100 miles south of Portland, Oregon, and have heard during the last two weeks, KLZ, KFAF, and DD5, Denver, Colorado, WBAP, WHB, WCAS, and WSB.

WSB is about 2,800 miles from here, but even so, I heard their programs on the nights of September 28, 29, and 30, for a period of about forty-five minutes each night.

WBAP of Fort Worth, Texas, is also heard quite regularly.

KLZ of Denver is the loudest station I have heard east of the Rockies, although the voice of KFAF is more easily understood.

Further east, WCAS and WBAP are the best, as far as clarity and modulation are concerned.

The voice of the announcer at WSB is not near as easily understood as that of WBAP even though WSB is much louder. I hope to hear more of the eastern stations as winter comes on and our good (?) friend static disappears.—Kenneth C. Stone, Halsey, Oregon, Radio Station 7FH.

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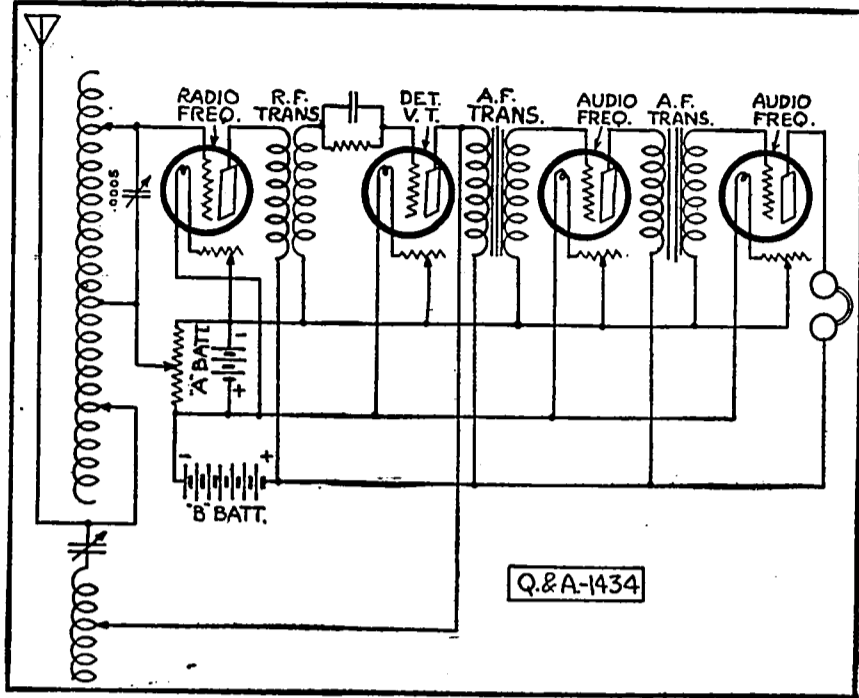
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Questions and Answers

(1434) CM & E Co., Calloway, Nebr.
 (1434, CM & E Co., Calloway, Nebr.)
 Will you please furnish me with a hook-up of a Reinartz tuner equipped with one stage of Radio frequency and two stages audio frequency amplification?

poise? If so, will you please give specifications?
 A.—We have carefully noted sketch of wiring diagram. Answers to your inquiries are as follows:



Q.&A-1434

A.—Numbered Q. & A. 1434 on this page is given the diagram of circuit of Reinartz Tuner with one stage of Radio and two stages of audio frequency amplification.

Interference

(1188) CLS, Jackson, Mississippi
 I am using a two-step, single-coil, regenerative receiver and do all my tuning with a 45-plate condenser with vernier and the tickler coil. The set works fine and when the static is not too bad I hear WWJ at Detroit, and WHB, KSD, WOS, WOC, WSB, WLAJ and WEAY, practically every night.

I am troubled very much from interference and it seems as though some nights I can't separate the stations from one another. What good receiving I do is on the 400-meter stations or while just one or two of the 360-meter stations are operating. Ordinarily the set tunes sharply and a two or three degree turn on the condenser will always tune a station and its carrier wave out completely.

Will you please tell what changes or additions I can make on this set to make it more selective? The nearest station to me is Atlanta, Ga., or about 375 miles and the other stations are from 450 to 800 miles.

A.—Noting your letter and the difficulties you are experiencing along the line of interference, we can only say that such is a very common lot and it is difficult to avoid where stations in close proximity are broadcasting on the same wave length. The most practical way to eliminate interference with the type of receiving set you describe is to have vernier adjustments on all controls.

We feel that you have every reason in spite of annoyance to be congratulated upon your record of long distance reception and believe that with the use of adjustments advised you will be able to overcome your difficulties to a great extent.

Can't Get Pacific Coast

(1178) FWL, Virginia, Minnesota
 I am using the R. C. of A. hook-up with a few minor changes. (Drawing enclosed.)
 1. Please give the proper procedure of tuning this circuit.

2. Antenna inductance consists of 100 turns of No. 24 wire on 3 1/2-inch tube tapped at every 10 turns. Why aren't honeycombs suitable for this? I have tried different values, but have been unable to make them oscillate.

3. Why can't I get the Pacific coast stations? Do you think a few more stages of Radio would help? Also, why can't I get more stations in the daytime? I've only been able to get CJGG and WBAD. Seems to me WHAP should come in.

4. I am using a 150-foot single No. 14 wire aerial, 35 feet high. Would I obtain greater signal strength using stranded wire?

5. What audibility value has regeneration? Suppose I use a variometer in my plate circuit. Would it be equivalent to one stage of audio frequency? I am using none at present.

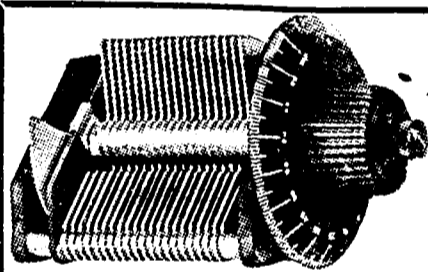
6. Once before you stated that stepped down alternating current could be used on the exciting coil of a Magnavox if the current were rectified. Would an electrolytic rectifier be suitable? How many jars should I use?

7. I haven't a very good ground, as there are no water or gas pipes in my location. Would you recommend a counter-

tuning will be to tune audio frequency to loudest signals and then radio frequency. At best this is a difficult set to operate.

2. By using proper size honeycomb coil you should have no difficulty in making them oscillate.

3. Pacific Coast stations are very difficult of reception because of intercepting mountains. Daylight reception is not always favorable because of interference and because of the effect of the sun's rays which ground the waves.

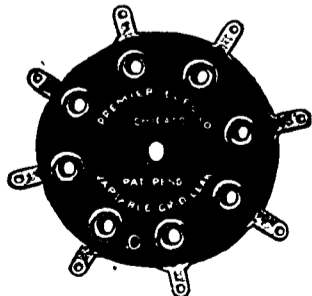


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4. Stranded wire would be advisable for antenna, and elevating it more would help for long distance reception.

5. Regeneration has greater value than two stages of audio frequency amplification. A variometer in the plate circuit of the detector tube will satisfy.

6. Would not advise the use of electrolytic rectifier as it will cause a disagreeable hum due to the fact that rectifiers are not one hundred per cent efficient in their rectification.

7. Would not advise use of counterpoise for receiving. Would rather advise the use of large metal plates buried in the earth, or better still in a well or cistern, being sure that they are well soldered to lead-in wire.

Ground in Well

(1175), AM, Prairie du Chien, Wis.

1. Is it possible to light the filament of an audion detector with alternating current? If so, how?

2. If I increase the height of my aerial, will it make broadcasting louder?

3. Does a driven well about 40 feet deep make a good ground if well connected?

4. Should the lightning ground be separate from receiving ground?

5. I have a short wave, regenerative set, 100-600 meters. Could I place a loading coil in the circuit to receive spark and air stations of higher wave length?

6. Can body capacity be done away with? If so, how?

A.—1. It is possible to light filament with alternating current, but not advisable as the alternating current hum will drown out signals.

2. Elevating aerial will somewhat increase the sound of receiving, but more noticeable the range of receiving set.

3. A ground in a well will be very satisfactory.

4. It does not matter materially whether or not the lightning ground is separate from receiving ground.

5. A regenerative set is not designed for the kind of work suggested and it would not be advisable to make the addition of loading coil to receive spark stations.

6. Body capacity can be eliminated by shielding panel. An article on this subject appears on page thirteen of June 24th issue of RADIO DIGEST.

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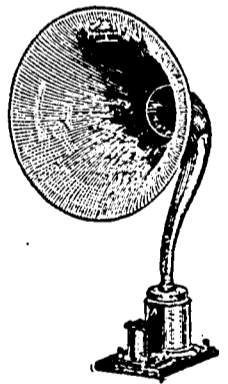
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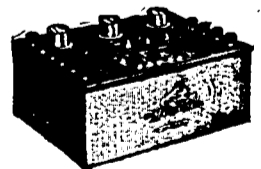


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Edouard Cotreuil as Don Basilio, the music master, in "Barber of Seville." Cotreuil is a distinguished French basso. Moffett Photo

Too much cannot be said of the ability of Anna Ludmila (upper left) the nineteen-year-old premiere danseuse of the Chicago Opera Company. Daguerre Photo

Here is Irene Pavloska again, this time as Mercedes in "Carmen." "Carmen" was the second opera to be broadcasted by station KYW this season. Moffett Photo

Ina Bourskaya as the designing princess Amneris in the first act of "Aida." This was the first Chicago Opera of the season. Moffett Photo

Edith Mason as Madame Butterfly in the opera of that name. It was in this role that the popular American soprano achieved her sensational debut last year with the Chicago Opera. Hutchinson Photo