

Graduating a V.C.; Benson on Super Circuits

# Radio Digest

EVERY WEEK

# Illustrated

TEN CENTS

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

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SATURDAY, JULY 28, 1923

No. 3

## PROMISE "SILENT" CODE



### FAMOUS PEGGY HOPKINS JOYCE AND "VANITIES OF 1923" ON AIR

Station WOR, Newark, Broadcasts Earl Carroll's Production—Joe Cook Invents "Visual" Radio

NEWARK, N. J.—A special Radio matinee was given by the internationally famous Peggy Hopkins Joyce and the others stars of her latest and greatest success, Earl Carroll's "Vanities of 1923," at Station WOR, L. Bamberger & Co, here recently. The performance ran a full hour and a half.

The program was made up of selections from the sensational revue and several "surprise numbers," especially

written for the occasion.

Joe Cook, principal comedian, who admitted that he is "The World's Greatest Inventor," told how he happened to perfect the Radiophone and introduced his very latest Radio device by which he enables the listeners in to "see" the show. He was especially anxious to give the Radiophans a view of "Pretty Peggy," her \$20,000 Chin-chilla gown and Mr. Carroll's much talked of beauty chorus.

### AUSTRALIA HEARS AMERICAN "BUGS"

SIGNALS, CLEAR AND SHARP, CROSS PACIFIC

News of Receipt Causes Flurry Among Operators on West Coast

SAN FRANCISCO.—The first successful spanning of the Pacific Ocean on schedule has been demonstrated according to reports that American amateur Radio signals have been heard in Australia.

This news in the form of a cablegram from H. K. Love of the Wireless Institute of Australia caused a flurry of excitement among operators in California and other western states many of whom made enviable records in the transatlantic tests of last year.

Reception of amateur signals have been reported from time to time by operators on ships off the coast of Australia and China, one of these vessels having been at anchor in a Chinese port. Never until recently has there been any organized effort to transmit signals across the Pacific Ocean on a definitely arranged schedule.

#### Australians Suggest Test

The tests were made at the suggestion of Australian amateurs, who, hearing of American DX records, desired to demonstrate that they were able to receive signals from western members of the American Radio Relay League. America was to send, Australia to listen.

Although no long distance records were broken, it is significant that American signals were heard clearly and consistently and complete information from the receiving end may show that some amateurs east of the Rockies may have got their signals over unawares.

### U. S. ARMY DEVELOPING EQUIPMENT

Frees Air for Broadcasts

Squier's Sine Wave Alphabet and Bruce Relay to Be Used

By Evans E. Plummer

CHICAGO.—Interference to broadcasting by code stations may soon be eliminated by the development of "silent" Radio telegraphy, Major Joseph O. Mauborgne, signal officer of the Sixth Army Corps area with headquarters here, announced in an interview before his departure to Washington, D. C. The silent telegraphy development is the occasion of the Major's call to Washington, where he has been placed in charge of the U. S. Army Radio laboratory of the Bureau of Standards.

#### Ear Can't Hear Code

The principle behind the "silent" system is that of sending the code signals on a wave frequency below that of sounds audible to the human ear. Thus it will be possible for as many code stations as desire to send at the same time as broadcasting is being done, without the code being heard by the broadcast listeners in. In fact no one will be able to hear the code signals, as these will be sent at a frequency below that possible for the human ear to hear, and it is planned to make use of special relays and tape or page printers in the reception of messages under the new system. The human ear mechanism at its best cannot register sounds with vibration  
(Turn to page 2)



Carol Dempster (left above), well-known star of the silver sheet, has had her innings of broadcasting as well. Picture below (not Miss Dempster) was snapped to illustrate a new heach alih for keeping the hathing suit dry Lower Photo © U. & U.



# INTEREST IN PARTS OFFER STILL RISES

## NUMBER OF INQUIRIES CONTINUES TO GROW

New List of Accessories Printed Here Shows Why Radio Fans Are Attracted

**SPECIAL REWARD OFFER**  
**Coupon Number 9**

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer below.

**Save Me—I Am Valuable**

Interest continues to grow in the Radio Digest's special offer. The number of series submitted by readers desiring parts for the construction of sets, constantly increases.

There is no limit to the number of series you may send to this office but be sure that your coupon numbers run in order. They need not begin with number one but they must be consecutive.

You may send as many coupons as you want. Choose the parts you want and send the list with the coupons and the money.

The parts will be sent to you as soon as we receive your letter.

### Rules to Remember

One point must be emphasized to those contemplating taking advantage of the special offer; that is, that the coupons turned in for any item must be numbered consecutively, as for example, 1, 2, 3, 4 or 5, 6, 7. The number of coupons necessary and the cash remittance, of course, depend on the item sought by the reader. There is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary. The eight classes of items follow:

### Class A Articles

For two consecutively numbered coupons and thirty cents (\$0.30) any one of the following articles will be sent: 1 Carter Imp Jack and Plug; 1 Carter 15-Ohm Resistance Unit; 1 Schindler .00025 mfd. Build-up Mica Condenser; 1 Schindler .0005 mfd. Build-up Mica Condenser; 1 Schindler .001 mfd. Build-up Mica Condenser; 1 Schindler .002 mfd. Build-up Mica Condenser; 1 Schindler .0025 mfd. Build-up Mica Condenser; 1 Martin-Copeland Sta Put Plug; Walnut Standard Tube Socket; Walnut UV-199 Socket; Ray-O-Vac Dry Battery, 1½ volts; Dubilier Micadons Type 601 (.0001, .00025, .0005, .001, .002, .0025, .003 or .004 mfd.); Premier Grid Condenser (.00025 or .0005 mfd.); Premier Variable Resistance; 1 Carter 25-ohm Resistance Unit; Standard Socket Adapter for Delta Midget Tube; Electrad Grid Leak (1, 1.5 and 2 megohms, with clips); Ameco 3-inch Dial; Ameco Inductance Switch; Freshman Micon Condensers, (.00005, .00025, .00035, .0005, .001, .0015, .002, .0025 or .003 mfd.); Teleradio V. T. Socket; B-Metal Mounted Crystal; Aerovox Lightning Switch; Aerovox Series Parallel Switch; Aerovox Contact Lever; Na-Ald Small Space Socket; Se-Ar-De Vernier Adjuster.

### Class B Articles

For four consecutively numbered coupons and sixty cents (\$0.60) any one of the following articles will be sent: 1 Carter .04 mfd. Special Fixed Condenser; 1 Carter Jack Switch; 1 Carter Hold-Tite Jack, One Spring Open Circuit; 1 Carter Hold-Tite Jack, Two Spring Closed Circuit; 1 Carter Hold-Tite Jack, Three Spring Filament Control; 1 Carter Hold-Tite Jack, Four Spring Closed Circuit; 1 Carter Hold-Tite Jack, Five Spring Filament Control; 1 Puddin Variable Grid Leak with .00025 mfd. Condenser; 1 Federal Universal Phone Plug; 1 Federal Open Circuit Jack; 1 Federal Closed Circuit Jack; 1 Federal Double Circuit Jack; 1 Martin-Copeland Sbur Grip Plug; 1 Martin-Copeland WD-11 Socket; 1 Martin-Copeland WD-11 Adapter; 1 Martin-Copeland UV-199 Socket; 1 Martin-Copeland UV-199 Adapter; 1 Martin-Copeland Pull Switch; 1 Martin-Copeland 5-point Inductance Switch; 1 Martin-Copeland Variable Grid Leak; 1 Martin-Copeland SPST Knife Switch; 1 Martin-Copeland SPDT Knife Switch; 1 Martin-Copeland DPST Knife Switch; 1 Martin-Copeland DPDT Knife Switch; Walnut Variable Grid Leak; Walnut Inductance Switch; Dubilier Micadons Type 600 (.0001, .00025, .0005, .001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 610 (.001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 691 (.006 mfd.); Dubilier By-Laws Condenser (.1, .25, or 5 mfd.); Premier Universal Tube Socket; Premier Radio Dial (3/16, 1/4, or 5/16 in. black or white face); Premier Universal Radio Jack, Open Circuit; Premier Universal Radio Jack, Two-Circuit Three Spring; Premier Universal Radio Jack, Two-Circuit Four Spring; Premier Universal Radio Jack, Filament Control, Three Spring; Premier Switch Lever and 10 Points; Turney Spider Web Coil (SW-10 with .038 mihnerly inductance, SW-15 with .066 MH., or SW-20 with .300 MH.); Ameco 6-Ohm Rheostat; Freshman Fix-O Grid Leak and Condenser; Freshman Variable Resistance Leak (with or without condenser); Freshman Micon Condensers (.006 or .005 mfd.); Teleradio 6-Ohm Rheostat; Teleradio 30-Ohm Rheostat; Teleradio Lightning Arrester; B-Metal Crystal Tube Detector Type A; B-Metal Adjustable Detector Type D; Aerovox Rheostat; Se-Ar-De Vacuum Tube Socket.

### Class C Articles

For six consecutively numbered coupons and ninety cents (\$0.90) any one of the following articles will be sent: 1 Carter 6-Ohm Vernier Control Rheostat; 1 Carter "Tu-Way" Plug; 1 Federal Panel Mount Socket; 1 Federal 6-Ohm Rheostat; 1 Federal 3-Ohm (Power) Rheostat; 1 Amperite Automatic Filament Control (with mounting); 1 Martin-Copeland Marco Rheostat; 1 Martin-Copeland Series Parallel Switch; 1 Martin-Copeland DPDT Panel Switch; 1 Martin-Copeland 7-Point Inductance Switch; 1 Martin-Copeland 9-Point Inductance Switch; 1 Martin-Copeland 11-Point Inductance Switch; Walnut Variable Grid Leak with .00025 mfd. Condenser; Walnut Variable Condenser (3-plate .00006 mfd.); Ray-O-Vac Dry Battery, 2 cells 1½ volts; Dubilier Ducon; Dubilier Micadon Type 600 (.006 mfd.); Dubilier Micadon Type 610 (.01 or .02 mfd.); Dubilier

By-Pass Condenser (1 mfd.), Premier Universal Radio Jack, Filament Control Five Spring; CRL Variable Grid Leak, without condenser; Premier No. 250 Variable Resistance, panel mounting; Thordason Vernier Rheostat; Ritter Loop Aerial; Martin Copeland Variable Grid Leak; Ameco Multiple Point Inductance Switch; Ameco 20-Ohm Rheostat; Ameco 50-Ohm Rheostat; Freshman Antenna; Freshman Moon Condenser, .01 mfd.; Teleradio Variable Condensers, (3-plate or 11-plate); Set "Read EM" Binding Posts (9); B-Metal Crystal Tube Detector Type B; Illinois Cushion Resilient Socket; Aerovox Antenna Plug; Aerovox Potentiometer; Aerovox Crystal Detector; Se-Ar-De Adjustable Vernier Condenser.

### Class D Articles

For eight consecutive coupons and one dollar and twenty cents (\$1.20) any one of the following articles will be sent: 1 Carter 20-Ohm Vernier Control Rheostat; 1 Schindler Radio Frequency Transformer; 1 Martin-Copeland 13-Point Inductance Switch; 1 Martin-Copeland 15-Point Inductance Switch; 1 Martin-Copeland 19-Point Inductance Switch; Walnut Variable Condenser (5-Plate .0001 mfd.); Ray-O-Vac No. 4151 B Battery, 2½ volts; Ray-O-Vac Dry Battery, 3 cells 4½ volts; Electrad Variom, with mica condenser; Dubilier By-Pass Condenser (2 mfd.); CRL Variable Grid Leak with Condenser; Resistor (Type A or 2A); Thordason Variable Condenser, .00025 mfd.; Ameco 300-Ohm Potentiometer; Freshman Micon Condenser, .015 mfd.; Teleradio Variable Condenser, 23-plate; Aerovox Crystal Detector and Condenser, mounted; Se-Ar-De Variable Grid Leak, with condenser mounting.

### Class E Articles

For ten consecutively numbered coupons and one dollar and fifty cents (\$1.50) any one of the following articles will be sent: 1 Carter 6-Ohm Automatic Control Rheostat; 1 Carter 20 Ohm Automatic Control Rheostat; 1 Demcal 3-Plate Variable Condenser; Walnut Variable Condenser (13-Plate .00025 mfd.); Ray-O-Vac Dry Battery, 4 cells 1½ volts; Dubilier Variodion (.0004 or .0005 mfd.); Resistor (Type B); Delta Midget Tube and Socket; Thordason Variable Condenser, .005 mfd.; Freshman Micon Condenser, .02 mfd.; B-Metal Crystal Tube Detector Type C; Aerovox 3-Gang Socket; Aerovox Double Slide Tuning Coil; Na-Ald 3-Plate Vernier Condenser, with dial.

### Class F Articles

For twelve consecutively numbered coupons and one dollar and eighty cents (\$1.80) the following will be sent: 1 Acme Pot-Rheo (potentiometer and rheostat); Walnut Variable Condenser (23-Plate .0005 mfd.); Ray-O-Vac No. 2151 B Battery, 2½ volts; Dubilier By-Pass Condenser (3 mfd.); Premier Variable Condenser without dial (.00039 mfd.); Thordason Variable Condenser, .001 mfd.; Ameco Compensating Grid Condenser; Freshman Micon Condenser, 0.25 mfd.; Teleradio Variable Condenser, 43-plate; Se-Ar-De 3-Plate Condenser.

### Class G Articles

For fourteen consecutively numbered coupons and two dollars and forty cents (\$2.40) any one of the following articles will be sent: 1 Federal 7-Plate Variable Condenser; 1 Federal 11-Plate Variable Condenser; 1 Federal 21-Plate Variable Condenser; 1 Federal Anticapacity Switch; 1 Demcal Variable Condenser, 11-Plate; Walnut Variable Condenser (43-Plate .001 mfd.); Dubilier Variodion (.001 mfd.); Dubilier By-Pass Condenser (4 mfd.); Premier Variable Condenser with dial (.00078 mfd.); Premier Heghog A. F. Transformer, 4 to 1 Ratio; Thordason A. F. Transformer, 3.5 to 1 Ratio; Thordason Variable Condenser, with vernier, knob and dial (.0005 mfd.); Thordason Variable Condenser, with vernier, knob and dial (.00025 mfd.); Ritter Grand Crystal Set; Ameco Double H. C. Coil Mounting; Na-Ald 13-Plate Precision Condenser, with dial (.000297 mfd.); Na-Ald 23-Plate Precision Condenser, with dial (.000523 mfd.); Se-Ar-De 9-Plate Condenser; Se-Ar-De 17-Plate Condenser.

dial (.0005 mfd.); Thordason Variable Condenser, with vernier, knob and dial (.00025 mfd.); Ritter Grand Crystal Set; Ameco Double H. C. Coil Mounting; Na-Ald 13-Plate Precision Condenser, with dial (.000297 mfd.); Na-Ald 23-Plate Precision Condenser, with dial (.000523 mfd.); Se-Ar-De 9-Plate Condenser; Se-Ar-De 17-Plate Condenser.

### Class H Articles

For sixteen consecutively numbered coupons and three dollars (\$3.00) any one of the following articles will be sent: 1 Federal Audio Frequency Transformer No. 228 W; 1 Demcal 23-Plate Variable Condenser; 1 Acme Audio Frequency Transformer; 1 Acme Radio Frequency Transformer (R-2, R-3, or R-4); Walnut Variable Condenser (13-Plate vernier); Walnut Variable Condenser (23-Plate vernier); Ray-O-Vac No. 2301 "B" Battery, 45 volts; Ray-O-Vac Dry Battery, 6 cells 1½ volts; Dubilier Duratran (B. F. transformer); Premier Micrometer Variocoupler with dial; Premier Variable Condenser with dial (.0015 mfd.); Premier Variable Condenser with vernier (.0004 mfd.); Premier Heghog A. F. Transformer, 10 to 1 Ratio; Premier Heghog A. F. Transformer, Tube Socket Type, 4 to 1 Ratio; Turney Spider Web Coil Mount, Type B; Thordason A. F. Transformer, 6 to 1 Ratio; Thordason Variable Condenser, with vernier, knob and dial (.001 mfd.); T. B. H. Radio Heat Set, 2,000 ohms; Tulip Loud Speaker, 15-inch, white; Teleradio Vernier Condenser, 23-plate; Teleradio 2,000-Ohm Head Set; Na-Ald Tuning R. F. Transformer, one stage; Na-Ald 43-Plate Precision Condenser, with dial (.001 mfd.); Se-Ar-De 35-Plate Condenser.

## Synchronizes Airmen from Two Stations

### Fan Tunes in Same Piece at Same Time from Two Plants

SCHENECTADY, N. Y.—With nearly 600 broadcasting stations in the air, many of them at the same time, it is not unusual for an operator to pick up two or three stations at the same time. Then begins the delicate task of tuning out all but the desired station, a task frequently impossible and always trying to the temper.

It is most unusual, however, for a fan to secure dual reception and discover that both stations are playing the same tune in the same key and tempo.

This occurred recently. A Providence, R. I., Radiophan recently wrote WGY, local station of the General Electric Company that he had heard the Radio Four sing "Dixie" from WGY at the same time that WEAN, station of the Shepard Company in Providence, was sending out a phonograph record of "Dixie," a banjo solo with piano accompaniment.

## PROMISES "SILENT" CODE

(Continued from page 1)

frequencies of sixteen or less per second. With this fact as a basis of the plan, the telegraphy will be done on these low frequencies, which will in turn be impressed on a carrier wave of any Radio frequency. The first experiments will in all likelihood, according to Major Mauborgne, be done using carrier waves with frequencies of from 600 to 857 kilocycles per second (500 to 350 meters wave length).

Using one carrier wave it will also be possible to modulate this by several different "silent" code bearing frequencies. Thus one station's equipment could be used to handle a number of different messages simultaneously. This system is known as the "multiplex" and sending several messages at once by multiplex is known as multiplexing.

### Will Help Crowded Ether

The successful establishment of the system of multiplex silent telegraphy will mean the opening for Radiophone broadcasting use of every practical wave band now set aside for the use of Radio telegraphy only. Conversely, it will also mean that wave lengths now reserved and used for broadcasting only, will be open to use by Radio telegraph stations.

The latter significance is of much more importance inasmuch as thousands of telegraph stations are crowding one another in the limited range of useful wave frequency bands. This added advantage of the silent system will undoubtedly cause it to be very popular and applied to use quickly, once developed and proven, at the commercial stations.

### To Use Squier Sine Wave Alphabet

The new code signal system invented and recently introduced by Major General George O. Squier, chief signal officer of the U. S. Army, known as the sine wave alphabet, and by means of which it is possible to send at a terrific rate of speed, will be applied to the silent system Major Mauborgne will develop. The sine wave system has already been successfully applied to cable work, permitting an increase in cable speed of 150 per cent.

The Squier sine wave alphabet, explained previously in Radio Digest, is based on the height or amplitude of the sine wave transmitting the signal. For dots the amplitude of the emitted sine wave is less than for dashes. Word and letter spaces, ordinarily consuming much valuable time, can be done away with by Major General Squier's sine system.

### Employ Automatic Receiving Printer

As was explained above, the silent telegraphy will also be silent so far as an operator with a headset is concerned, so that it will be necessary to use an automatic receiver and printer. Relays and printers for this work can receive at from five to ten times as fast as it is possible for an operator to "read." There is also a great decrease in the number of errors with the elimination of the human element.

William B. Bruce, Jr., Springfield, Ohio, well known for his inventions in the submarine cable field, is responsible for the invention of an alternating current operated relay which, Major Mauborgne says, will very likely be employed to operate the printer of the automatic receiver. The Bruce relay will take the sine wave alphabet and is really a very remarkable application of the use of the triode tube, so familiar to Radiophans for its rectifying and amplifying powers in the Radio receiving set. Mr. Bruce will have charge of the experimental work in developing the relay purely as a relay. Its application to the silent sine wave telegraphy will be developed in Major Mauborgne's laboratory.

### Perfecting Static Eliminator

Associated with Major Mauborgne at Washington will be Dr. Louis Cohen, civilian consulting engineer of the U. S. Signal Corps. The two have done much Radio research together, one of their inventions being the static eliminating device already described twice previously in Radio Digest. The experimental work on the static eliminator will be continued at Washington. Although proven to be practical and a desirable addition to receiving sets where atmospheric conditions are especially bothersome, the device is still undergoing refinements and simplification so that the novice can handle it without difficulty.

Plans for marketing the static eliminator, Major Mauborgne says, are not yet definitely completed.

Lieutenant Colonel Alfred T. Clifton, formerly signal officer of the Second Army Corps area, headquarters at Boston, will succeed Major Mauborgne as signal officer of the Sixth Army Corps area, headquarters Chicago.

## Two Broadcasting Stations Recently Opened in Chile

WASHINGTON, D. C.—Reports recently received from Chili state that two new broadcasting stations have been opened in this South American country. One station is located at Santiago de Chile and more recently one was installed in Vina del Mar by an ambitious amateur who sends out regular programs. Both of these stations do not start until the Buenos Aires stations have closed down for the night, there being a difference of one hour in time between the coast and the interior.

Ex-President Wilson has a supersensitive Radio receiving set installed in his home in Washington, D. C.

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## Looking Ahead

How to Make a Good Single Tube Super—will take up most of Part II of Thomas W. Benson's Chapter next week, concluding his discussion on super-regeneration. He will also analyze the principles of the Flewelling circuit.

A Discussion of the Mutual Conductance, Amplification Constants and Output Impedance Values of Vacuum Tubes—and their effects on efficiency of tube operation, is the topic to be handled by H. J. Marx in the issue of August 4. A simplification of the technical terms and formulas will be made for the benefit of fans anxious to learn the theory of tube operation in Radio circuits.

Away up North with Capt. McMillan—Next issue of the Digest will contain cooling pictures of the Captain and his Radio-equipped ship, the Bowdoin. The famous explorer will endeavor to find out all about static while hovering on the roof of the earth.

R. D. Diagram 91—a Different Development of the Ultra Reinartz—will appear next week. The hook-up uses the same tuning unit as was described several months past in the Ultra Reinartz series.

Conclusion of John B. Brady's Patent Survey—Part IV, the end of Mr. Brady's interesting survey of the Radio patent tangle, will be contained in the issue of August 4.

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# RADIO DEVICE AIDS DEAF, TESTS SHOW

## MICROPHONE AND VACUUM TUBES HELP EAR DRUM

Chicago Experimenter Reports Success in Treating Latent Muscles with Speech Amplifier

CHICAGO.—Great success in applying Radio to teaching the deaf to use their vocal chords and even in the reduction of deafness has rewarded the work of B. K. Ford, 8 South Austin Boulevard, this city. The apparatus used in the experiments consists of a microphone connected to a vacuum tube speech amplifier, the output of which is run into an ordinary Radio headset. A milliammeter in the plate circuit of the last tube of the speech amplifier tells how much current is used to make a deaf subject hear.

Once the correct amplification for the subject is established the problem becomes simple. Some deaf persons require great amplification while others require very little. The milliammeter therefore allows grading of the subjects so that classes of the same degree of deafness can be taught by the same apparatus at one time.

### No Lip Reading Allowed

No lip expressions are used by this method in teaching the deaf to speak. The back of the instructor is even turned to the patient so that he cannot be led to read the former's lips. Much patience and care are necessary to induce the deaf patient to learn the sounds that make words.

Henry Heinz, 2027 Bingham street, twenty-one years old, Chicago, was deafened by scarlet fever at the age of six. Four hours of constantly increased amplification were necessary before Mr. Heinz evinced reaction to sound. He is now able to distinguish piano, vocal and violin tones and is being taught to use his voice.

Harry Allen, 2132 Milwaukee avenue, Chicago, fifteen years old, after four hours' work was taught to say, "Hello," "Yes" and "No," and to count from one to ten. The counting was not consecutive; the boy learned the numerals and their value not merely their order.

### Decreased Power Strengthens Hearing

By gradually decreasing the power of the amplifier the deaf subjects soon are enabled to hear much better. The process really is based on the strengthening of the latent muscles of the delicate ear mechanism. The experiments are a revelation in the teaching of the deaf. Normal hearing may be restored in rare cases. Practically every subject treated thus far has shown improvement.

Mr. Ford does not declare that the procedure is a panacea for the deaf nor does he assure improvement in every instance. There are deaf persons whose aural mechanism is hopelessly underdeveloped or crippled.

The value of the method in teaching the deaf to speak and in further educating them is attracting the attention of many.

BELLEVILLE, ONT.—A deaf and dumb boy first heard sound over a Radio set recently during an experiment at the convention of American instructors of the deaf in session at the Ontario school. The lad, using sign language, told delegates he heard voices of singers at a broadcasting station.

NASHVILLE, TENN.—Piano music over a receiving set brought a revelation of hearing facilities recently to Berinth Hudgins, life-long deaf mute, of Trezevant, Tenn., near here, when he applied a receiver to his ear and listened in on a concert. A smile brought the first indication from Hudgins that he could hear.

### Weekly Bible Class Increasing

FORT WORTH, Texas.—The Saturday evening WBAP Bible Class, conducted by Mrs. W. F. Barnum, leader of the Barnum Bible Class of First Methodist Church, is increasing weekly. The enrollment is now over 1,000, the largest Sunday school in the Southwest.

## "HAVE ONE ON ME"—RADIO TREAT AT SEA

NEW YORK.—The first box of cigars ever delivered by means of Radio was sent recently by L. M. Boomer to General T. Coleman du Pont, a passenger on board the Leviathan at sea. It inaugurated the Radio smokers' service instituted by the firm operating the cigar department on board the new vessel.

## PLANE BREMEN-BOUND MAKES PHONE RECORD

LONDON.—A Daimler air express, flying from here to Berlin, recently, conversed with the London air station while approaching Bremen, more than 400 miles distant. The distance is a new record for plane-to-ground phone transmission. The plane used a 400-watt transmitter and was piloted by Captain W. R. Hinchcliffe.

## "OGN" OF WJZ EXPLAINS "BOTTLE"



"OGN" of Station WJZ, New York City, explains to Miss Rose Bower, WJZ listener in, how a five-kilowatt transmitting vacuum tube or "bottle" works. From the expression on her face one can tell that Miss Bower knows less about it now since "OGN" has explained. "OGN" is no other than Raymond F. Guy, well-known announcer at the big metropolitan station. © K. & H.

## SING TABOO SONGS IN FIREMEN'S CONCERT

Program Attracts Wives, Sweeties to Laddies' Stations

BOSTON.—A surprise program broadcast recently from Station WNAC here direct from the Mason street fire headquarters, proved a treat for listening in firemen and other Radiophans all over New

England. An all-star program of theatrical talent from the various theaters sang a large number of popular songs that have been tabooed by Radio lately. Special permission had been secured from the American Society of Composers, Authors and Publishers for this occasion. There were also short talks by Fire Commissioner Glynn and Chief Taber.

At several fire stations in surrounding towns, where the Radio sets have loud speaker equipment, there was quite a gathering of wives and sweethearts of the fire laddies to hear the concert.

# 14 MORE WEEKS OF STANDARD WAVES

## WASHINGTON HEEDS CALL FOR SERIES OF SIGNALS

Bureau of Standards to Broadcast Adjustment During August, September and October

WASHINGTON, D. C.—The popularity of the standard wave frequency signals transmitted by the Bureau of Standards station, WWV, during the last six months is such that the series will be continued in August, September, and October, it has been announced here. The accuracy of the waves is more than three-tenths of one per cent. They are thus ideal for checking wavemeters and adjusting transmitting and receiving apparatus.

The power of the transmitter at WWV enables the station to be heard anywhere east of the Mississippi River, provided sensitive receiving apparatus is used. The schedule follows:

### Schedule of Transmissions

The time used is Eastern Standard. The hours for transmissions August 15, September 13, and September 28 are similar. Different time periods are used, however, in the October 7 transmissions—

10:55 to 11:11 p. m., Aug. 15 and Sept. 13, 705 meters; Sept. 28, 600 meters. 11:15 to 11:26 p. m., Aug. 15 and Sept. 13, 600 meters; Sept. 28, 428 meters. 11:30 to 11:41 p. m.; Aug. 15 and Sept. 13, 450 meters; Sept. 28, 333 meters. 11:45 to 11:56 p. m.; Aug. 15 and Sept. 13, 352 meters; Sept. 28, 273 meters. 12 to 12:11 a. m.; Aug. 16 and Sept. 14, 300 meters; Sept. 29, 231 meters. 12:15 to 12:28 a. m.; Aug. 16 and Sept. 14, 240 meters; Sept. 29, 200 meters. 12:30 to 12:41 a. m.; Aug. 16 and Sept. 14, 200 meters; Sept. 29, 176 meters.

On October 7, the schedule is: 1:55 to 2:11 a. m., 222 meters; 2:15 to 2:26 a. m., 200 meters; 2:30 to 2:41 a. m., 187 meters; 2:45 to 2:56 a. m., 176 meters; 3 to 3:11 a. m., 167 meters; 3:15 to 3:26 a. m., 158 meters; 3:30 to 3:41 a. m., 150 meters.

### Details of System

For each transmission of a standard wave frequency a general call is given by voice first then it is repeated in code. Next the standard frequency signals are given. These consist of the station's call, WWV (--- --- .--- .---), repeated with very long dashes intervening and are transmitted by undamped continuous waves. After the standard signals, special announcements are made.

The general call and the announcements are made with the same frequency as the standard signals between but it is recommended that only the standard signals be used for measurement purposes by those listening in.

## U. S. OFFERS CRYSTAL DETECTOR TEST DATA

Bureau of Standards Information Aid to Manufacturers

WASHINGTON, D. C.—The results of tests of Radio receiving sets by the Bureau of Standards are given in a series of letter circulars of which the first (No. 90) was issued some time ago. This paper dealt with tests of electron tube sets. The second circular of this series (No. 93), ready for distribution, gives the results of tests on crystal detector sets.

It is believed that the methods followed and the examples given in these reports will be of assistance to manufacturers in the development of methods of testing, besides aiding them to describe properly and to improve their products.

The receiving sets are referred to by arbitrary reference numbers rather than by manufacturer's name, type and model numbers. These circulars are available only in mimeographed form and the supply is limited but copies may be obtained by those directly concerned with the testing of receiving sets by addressing the United States Bureau of Standards.

## THE ANTENNA BROTHERS

Spir L. and Lew P.

A Word to the Wise, Etc.





# SURVEYS INDUSTRY'S TANGLE OF PATENTS

## "Cooperative Competition" Leaves Maze of Stumbling Blocks for Independent Manufacturer

By John B. Brady

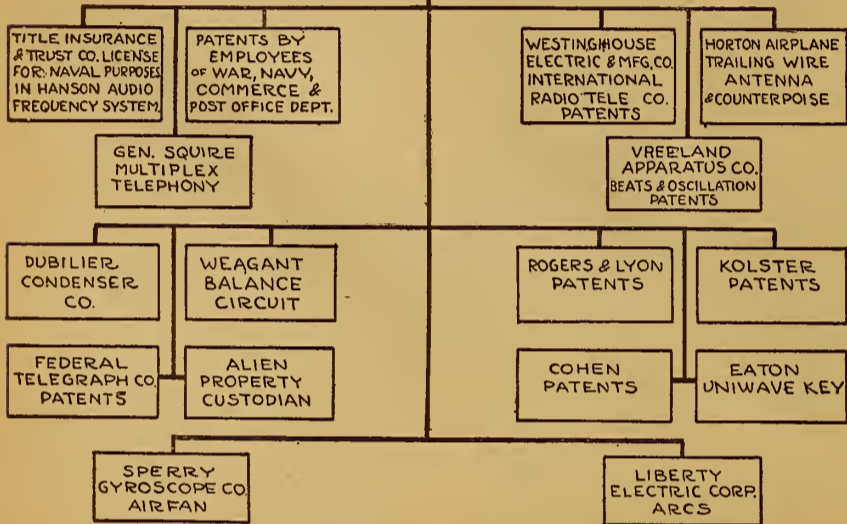
(Editor's Note.—Mr. Brady, a patent attorney of Radio repute, has achieved a remarkable survey of the network of patents, locking and interlocking the Radio industry in a veritable Gordian knot. His serial treatise on the patent situation started July 14 issue.)

### PART III

ON THE signing of the Armistice, however, this, condition no longer continued and the patent monopoly heretofore existing returned with all of its legal aspect and effect. The cir-

not practical and convenient for the Radio Corporation without the infringement of the heterodyne patents and the Armstrong patent of the Westinghouse Electric & Manufacturing Co., while on the other hand the Radio Corporation's combine of patents offered serious difficulties in the way of tube patents for the commercial operations of the Westinghouse Company, and with this problem existing the great combine of patents became established, including the Westinghouse Electric & Man-

UNITED STATES GOVERNMENT WASHINGTON D.C.



Radio Patent Organization Chart

stances were such that no one of the companies working in the art were in a position to sell Radio apparatus without infringing some patents controlled by a competitor. The Westinghouse Electric and Manufacturing Company in gaining a foothold in the commercial Radio field, secured rights under the patents of the International Radio Telegraph Company, including the Fessenden patents, and then under the inventions of Pupin and Armstrong, including the famous Armstrong regenerative circuit.

They had secured certain rights under Hutin and LeBlanc multiplex wire telephony patents, also certain rights by negotiation with the government under the patents of the Federal Telegraph Company, The Atlantic Communication Company, and the invention of Lieutenant Eaton, U. S. N., covering the uniwave arc signaling key.

### Form Radio Corporation

The Radio Corporation was formed, including the patent holdings of the General Electric Company, the Marconi Company, the American Telephone & Telegraph Co., and Western Electric Company, with certain reciprocal license rights designating the fields of operation for each of the several companies, and the heretofore deadlocked patent situation then somewhat relieved. Continuous wave reception was

manufacturing Co. as a part of the Radio Corporation as represented by the chart given last week.

### To Decide if Combine Is Legal

Whether such a combine of patents is in violation of the Sherman Anti-Trust Law, in unlawful and unfair restricting of trade, was the subject matter of a bill for investigation introduced in the House of Representatives by Congressman Fred A. Britten of Illinois. This question is being investigated by the Federal Trade Commission at Washington under a resolution offered by Congressman White of Maine just before Congress adjourned its last session.

The Wireless Specialty Apparatus Company during the war had manufactured for the government certain constructions of



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mica condensers alleged by the Dubilier Condenser Company to be infringements of their patents. Suit was initiated by the Dubilier Company but settlement arrived upon early in the proceedings, wherein the Wireless Specialty Apparatus Company secured certain rights under the patents of the Dubilier Condenser Company.

### Wireless Specialty Invited in

Professor Pickard, associated with the Wireless Specialty Apparatus Company, had been an early and creditable worker in the Radio art and had secured many patents upon the crystal detector. A mutual agreement was reached between the Wireless Specialty Apparatus Company with its associated company, the Tropical Wireless Company, suppliers of Radio apparatus for steamers of the United Fruit Company, and the Radio Corporation, designating the fields of operation of the several companies wherein the Specialty Company became substantially a part of the Radio Corporation. The Radio Corporation finally purchased the Vreeland oscillator patents containing claims which appeared to offer difficulties in operation of thermionic tube oscillators.

(TO BE CONCLUDED)

## PRIZES TO TEMPT RADARIO WRITERS

### Cincinnati Publisher Offers \$100 for Three Best Air-Borne Plots

CINCINNATI, O.—A Cincinnati magazine published in the interests of writers, "The Writer's Digest," announces a prize contest in which \$100 will be given for the three best Radarios. The prizes are: First, \$50; second, \$30, and third, \$20.

The three winning Radarios will be broadcast from Station WLW, Crosley Radio Manufacturing company, here. The contest, open to all, will close September 15, 1923.

Judges in the contest are James Knapp Reeve, writer; Howard T. Dimick, author of several books on photoplay writing, and Fred Smith, studio director of Station WLW.

The Radario, a new dramatic form, offers an interesting field to writers. The contest is intended to impress on them the significance of the new form and to familiarize them with its technique.

## Will Broadcast Lectures Along Educational Lines

DAYTON, O.—Listeners in within a radius of 300 miles of Dayton were able to hear the first program broadcast recently from the new \$3,000 station, WABD, located at Parker high school, this city.

According to G. A. Morris, principal of the school, programs to be broadcast from the station will be along educational lines.



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## Reviews of Books

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

**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, \$2.00.

**An Introduction to Radio.** A real book for the amateur. This treatise comes in two volumes. 96 pages in each volume, fully illustrated with flexible leather covers. Price two volumes, \$1.

**Experimental Wireless Stations.** By P. E. Edelman. Simple directions are given in this book for making Radio equipment for the transmission of messages over long distances. Price, \$3.

**Radio Telephony.** By Alfred N. Goldsmith, Ph. D. This book is intended for Radio engineers, operators and experimenters. Students and other who desire to be clearly informed concerning Radio need this book. It is written in a clear style, fully illustrated with wiring diagrams and photographs of Radio apparatus. Price, \$2.50.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payment for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.

### Alabama Hams Quizzed

BIRMINGHAM, ALA.—Theodore G. Deller, superintendent of Radio for the fifth district was recently in Birmingham and inspecting all Radio stations in Birmingham and vicinity.

While here Mr. Deller addressed the Birmingham Wireless Association, concerning both broadcast listeners and amateur operators, explaining the position of the government in its relation to amateurs and broadcasting stations.

## How to Make a Flewelling Receiver

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for the construction of a Flewelling Receiving Unit and two step amplifier.

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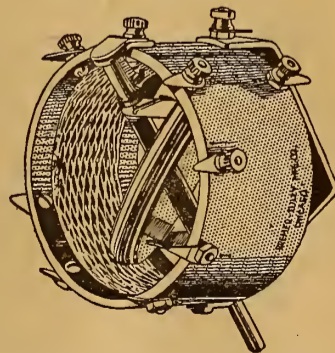
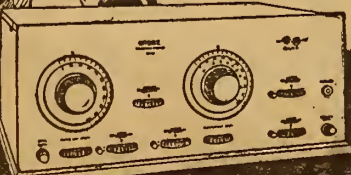
**Point No. 6** This Receiver may be set up in a moment, and successfully operated anywhere—by anyone.

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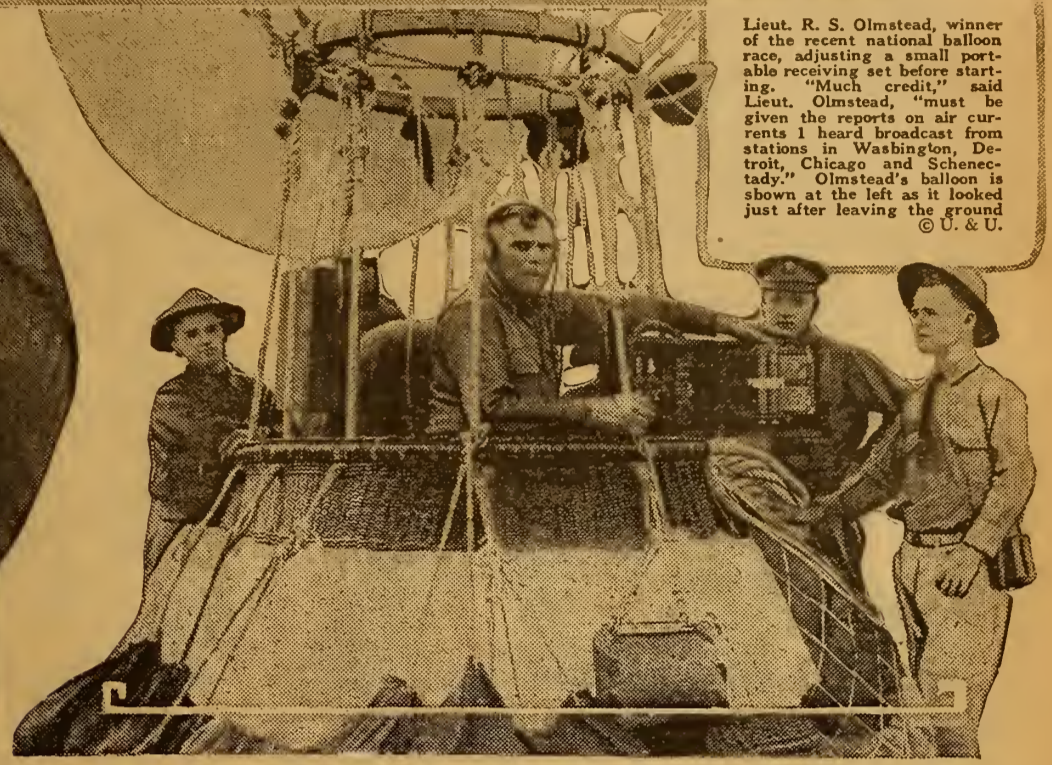
does away with tapped coils and switches on REINARTZ CIRCUITS

and improves range clearness and selectivity wonderfully. Covers new broadcasting wave lengths. Also a wonder-worker in practically all the older circuits, including reflex. Price, from your dealer or postpaid, \$5.00. Hookup diagrams free.

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# BALLOONIST WITH RADIO WINS RACE



Lieut. R. S. Olmstead, winner of the recent national balloon race, adjusting a small portable receiving set before starting. "Much credit," said Lieut. Olmstead, "must be given the reports on air currents I heard broadcast from stations in Washington, Detroit, Chicago and Schenectady." Olmstead's balloon is shown at the left as it looked just after leaving the ground © U. & U.

Five of the fourteen entrants in the recent national balloon race were equipped with lightweight, two tube, portable receiving sets for the purpose of receiving special weather reports giving the air currents at the various altitudes. These were broadcast by stations in Chicago, Detroit, Schenectady and Washington under the supervision of Prof. C. F. Marvin, chief of the U. S. weather bureau, endorsing the value of the Radio reports. Last year Major Oscar Westover, winner of the National Balloon Derby, carried a set in his balloon and also gave particular credit to Radio in helping him to win. Another interesting sidelight on balloon Radio is the report of Ralph Upson, pilot of a second balloon equipped with a set. "One of the outstanding happenings in the use of Radio in the balloon race," said Upson, "was that at altitudes of 3,000 feet and above we observed absolutely no static whatever, although we could see lightning at various points on the horizon." Upson is no Radio newcomer, having experimented considerably with the popular pastime, and is thoroughly competent to judge the presence or absence of static noises

## TALKS TO WIFE WHILE DELIVERING LECTURE

Spouse, Listening In, Gets Personal Remarks in Sermon

BIRMINGHAM, ALA.—By the aid of Radio Rev. Alfred J. Dickinson, Jr., recently delivered a sermon here especially intended for his wife, which the wife heard without the invisible audience being wise. The audience didn't know the wife was listening in several hundred miles away at Tupelo, Miss.

Rev. J. R. Hobbs, pastor of the First Baptist church here, is in Europe, and Rev. Dickinson is filling the pulpit temporarily. When informed that a sermon of his would be broadcast by Station WSY, the Alabama Power Company here, the minister wired his wife to listen in. Mrs. Dickinson wrote her husband she heard every word spoken during the services.

After delivering the sermon the Rev. Dickinson admitted that all through the sermon he talked to his wife at their Tupelo home, but so carefully was his personal remarks to his wife interwoven with the words of his sermon that his congregation did not detect it, and his sermon was pronounced one of the strongest and most forceful ever delivered from a pulpit in Birmingham. "I had an inspiration while speaking, from my wife at our Mississippi home," the minister said.

## Roller Skaters Roll 'Round Rink to Radio

"Aerial Hats" Pick Up Cincinnati Broadcast Music

CINCINNATI, O.—The engineers of Station WLW, Crosley Manufacturing Company here, recently took a receiving set and an amplifying horn to the Hill Top Rink and installed it to test out the possibilities of using broadcast music to roller skate. This is probably the first time roller skating has been done to Radio music.

One of the novelties of this skating and dancing carnival, was the Radio hats which the principal skaters used. They were equipped with a little aerial, and apparatus of the crystal variety was used to pick up the broadcast concert from WLW while the skaters were enabled to keep perfect roller time to the music.

The experiment was so successful that it will be used by the ice skaters at the Cincinnati Zoo, where a carnival is given twice a day.

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

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	6:00-7:00	6:00-7:00	6:00-7:00	6:00-7:00	6:00-7:00	6:00-7:00	6:45-7:45
CFCN, Calgary, Alta.	440	10:00-11:00						
CKAC, Montreal, Que.	430		6:00-9:00		6:00-9:00		6:00-9:00	3:00-4:30
KDKA, E. Pittsburgh, Pa.	326	5:00-9:00	5:00-9:00	5:00-9:00	5:00-9:00	5:00-9:00	5:00-9:00	6:30-7:30
KFAP, Denver, Colo.	360	9:00-10:00	9:00-10:00					
KFDB, San Francisco, Calif.	509	9:00-9:30	9:00-9:30	9:00-9:30	9:00-9:30	9:00-9:30	9:00-9:30	9:00-9:30
KFI, Los Angeles, Calif.	469	8:45-1:00	8:45-1:00	8:45-2:00	8:45-1:00	8:45-2:00	8:45-2:00	10:00-1:00
KGW, Portland, Ore.	492	9:30-2:00	12:00-1:00	10:00-11:00	12:00-1:00	9:00-2:00	12:00-1:00	9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	10:00-12:00
KPO, San Francisco, Calif.	423	10:00-12:00	10:00-12:00					
KSD, St. Louis, Mo.	548	8:00-10:00	8:00-10:00	8:00-10:00		8:00-10:00	8:00-10:00	
KYW, Chicago, Ill.	345		7:00-9:00	7:00-9:00	7:00-9:00	7:00-9:00	7:00-9:00	6:00-7:00
NAA, Radio, Va.	435	5:45-7:20	6:05-7:20	6:25-8:40	5:45-7:40			
PWX, Havana, Cuba	400			8:00-10:30			8:00-10:30	
WBAP, Fort Worth, Texas	476	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:00-7:20	3:30-4:30
WBZ, Springfield, Mass.	337	6:30-8:00	6:30-8:00	6:30-8:00	6:30-8:00	6:30-8:00	6:30-8:00	7:00-8:00
WCX, Detroit, Mich.	517	7:00-10:00	7:00-12:00	7:00-10:00	7:00-10:00	7:00-10:00		4:00-5:00
WDAF, Kansas City, Mo.	411	6:00-1:00	6:00-1:00	6:00-1:00	6:00-1:00	6:00-1:00	6:00-1:00	11:45-1:00
WDAJ, College Park, Ga.	258	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	390		10:00-2:00		10:00-2:00		10:00-2:00	9:00-12:00
WDAR, Philadelphia, Pa.	395	5:30-6:00	5:30-8:00	5:30-9:00	5:30-6:00	6:00-1:00	5:30-6:00	
WEAF, New York, N. Y.	492		5:30-6:00	5:30-8:00	5:30-8:00	5:30-6:00	5:30-8:00	
WFAA, Dallas, Tex.	476	8:30-9:30	8:30-12:00	8:30-9:30	8:30-12:00	8:30-9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	395	5:00-5:30	5:00-7:00	5:00-9:30	5:00-7:00	5:00-5:30		5:30-6:00
WGI, Medford, Mass.	360		6:30-8:00	6:30-8:00	6:30-8:00	6:30-8:00	6:30-8:00	6:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	12:00-1:00	9:30-10:30	9:30-10:30	9:30-10:30	7:30-8:00
WGR, Buffalo, N. Y.	319	6:00-8:00		6:00-8:00		6:00-8:00		
WGY, Schenectady, N. Y.	380	6:45-9:00	6:45-9:00		6:45-9:00	6:45-11:00		5:30-6:30
WHA, Madison, Wis.	360	7:30-8:30		7:30-8:30		7:30-8:30		
WHAS, Louisville, Ky.	400		7:30-9:00	7:30-9:00	7:30-9:00	7:30-9:00		
WHAZ, Troy, N. Y.	380	8:00-9:30						
WHB, Kansas City, Mo.	411		8:00-10:00		8:00-10:00			8:00-10:00
WHK, Cleveland, O.	360	5:00-5:30	5:00-5:30	7:00-8:55	5:00-5:30	5:00-5:30	5:00-5:30	7:00-8:55
WIP, Philadelphia, Pa.	509	4:00-5:30	5:00-10:00	5:00-5:30	5:00-8:00	5:00-5:30	6:00-10:00	
WJAX, Cleveland, O.	390		6:30-8:30		7:15-9:30			
WJY, New York, N. Y.	405		5:30-9:30		5:30-9:30	5:30-9:30		
WJZ, New York, N. Y.	455	5:30-9:30	5:30-9:30	5:30-9:30	5:30-9:30	5:30-9:30	5:30-9:30	6:30-8:30
WKAQ, San Juan, P. R.	360		6:30-8:00				6:30-8:00	
WLAG, Minneapolis, Minn.	417	6:30-10:30	6:30-10:30		5:30-10:30	6:30-10:30	6:30-10:30	7:30-8:30
WLW, Cincinnati, O.	309	7:00-9:00	9:00-11:00	7:00-9:00	9:00-11:00			
WMAQ, Chicago, Ill.	448		7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00		
WMC, Memphis, Tenn.	500	8:00-9:30	8:00-12:00		8:00-9:30	8:00-12:00	8:00-9:30	
WOAI, San Antonio, Texas	385		9:30-10:30		7:30-8:30			9:30-10:30
WOAW, Omaha, Neb.	526	9:00-10:00	9:00-10:00		9:00-10:00	9:00-10:00	9:00-10:00	9:30-10:00
WOC, Davenport, Ia.	484	7:00-8:30		10:00-11:00	7:00-8:30	7:00-8:30	9:30-10:30	7:00-9:00
WOO, Philadelphia, Pa.	509	6:00-9:00			6:00-9:00			
WOR, Newark, N. J.	405	7:00-10:00	5:15-6:30	7:00-10:00	5:15-6:30	5:15-6:30	7:00-10:00	
WOS, Jefferson City, Mo.	441	8:00-9:30		8:00-9:30		8:00-9:30		
WSAI, Cincinnati, O.	309		7:00-9:00		7:00-9:00		9:00-11:00	
WSB, Atlanta, Ga.	429	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	7:30-9:00
WSY, Birmingham, Ala.	360	8:00-8:45		8:00-8:45		8:00-8:45		7:30-8:30
WWJ, Detroit, Mich.	517	6:00-7:30	6:00-7:30	6:00-7:30	6:00-7:30	6:00-7:30		4:30-5:30

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

## WMAK, Lockport, N. Y. Cuts Program During Remodeling

LOCKPORT, N. Y.—Station WMAK of this city has discontinued broadcasting during July and August excepting weather and crop reports, which will be given at 11 a. m. Eastern Standard time. The station will be remodeled and the transmitter will be altered. It is planned to operate as a Class B Station in September.

## Bagpipes Give Scotch Treat

TACOMA, WASH.—An atmosphere of heather hills and bonnie lassies was broadcast from KGB recently when a trio from Tacoma Bagpipe Band played for Ledger Radiophans. Only three members of the originally announced sextette were able to play. Their numbers were "The Gordon Highlanders' March," "Sterlingshire Militia" and "The March Past of the Cameron Highlanders."

## Daily "Time Ticks" Set Watches Right

New WBAP Service Proves Popular with Fans

FORT WORTH, Texas.—Time ticks sent out each morning, except Sunday, by WBAP, Star-Telegram, are proving very popular with Radiophans of the Southwest. The ticks are absolutely correct, being transmitted direct from Washington by wire to WBAP. Many jewelers use the time ticks to set their standard clocks.

The first tick begins at 10:55 (Central time) and continues for five minutes. Each tick is transmitted as a dot, omitting the twenty-ninth second of each minute, and the last five seconds of the first four minutes.

The last ten seconds of the last minute before 11 o'clock are omitted and then a dash is sent at exactly 11 o'clock when the time ball falls in the National Observatory at Washington.

## RADIO TAKES PLACE IN "WELCOME-HOME"

Auto Set Greets Los Angeles Chief on Return to City

LOS ANGELES.—Radio has taken its place as part of the local reception committee to welcome new arrivals, guests and visitors, when recently it was given an important part in welcoming Louis D. Oaks, chief of police, upon his return to this city.

The Radio reception was extended over Station KHJ, the Los Angeles Times. Through arrangements and the courtesy of Major Frank Creswell, of the Western Radio Research Laboratories of this city, which placed a Radio-equipped automobile at the station entrance as Chief Oaks came through the station, he was greeted by Captain of Detectives George K. Home, who broadcast his welcome from The Times Building.

While awaiting the arrival of the train at the station the friends, citizens and representatives of the city, organizations and associations which made up the welcome, were entertained with concert selections, news events of the day and other features from the broadcasting plant.

## Hawaii Hears Michigan "Bugs"

DETROIT.—Three men in Port Huron, Mich., have installed an amateur Radio broadcasting station which has been heard in Hawaii. Its call signal is 8AB.



# WANT TO LISTEN TO EUROPE STATIONS?

## OLD WORLD BECKONS WITH ELEVEN PLANTS

Six British Phone Broadcasters, Three French, One Belgian and One Dutch Operate Daily

Do you think your set will reach to Europe? If so the following information will be of use to you. At present there are eleven phone broadcasters on the continent and the British isles, ranging in wave length transmitted from 353 to 3,100 meters. Better buy some big duo-lateral coils before you start on the European DX hunt but, then, the hunt will be worth it!

Let's take them in turn. Now there's Great Britain for example. Six stations fill the air every evening. If we assume the evening hour to be 7:30 p. m. over there, the time expressed as Eastern Standard would be 2:30 in the afternoon or in Mountain time, 12:30 p. m. The plants and the wave lengths used in Great Britain are: 2L, London, 369 meters; 5IT, Birmingham, 420 meters; 2ZY, Manchester, 385 meters; 5NO, Newcastle, 400 meters; 5WA, Cardiff, 353 meters; 5SC, Glasgow, 415 meters.

### Across the Channel

How about crossing the channel and tuning in France? Well there's FL, the Eiffel Tower, Paris, on 2,600 meters. If you use Eastern Standard time, you can hear him on the following schedule:

7:06 a. m., weather reports, ten minutes; 2:11 p. m., weather reports and concert, thirty minutes; 6:01 p. m., weather reports, ten minutes.

Then down on 1,780 meters there are the Radiola concerts in Paris every day, the schedule is: 1:00 p. m. (Eastern Standard time) news; 1:06 to 1:51 p. m., concert; 4:36 p. m., news; 4:51 to 5:51 p. m., concert.

Then still in Paris the station of L'Ecole Supérieure des Postes, Telegraphes et Telephones can be heard Tuesdays and Thursdays from 3:36 to 5:51 p. m., Eastern Standard time. The plant is also on the air Saturdays, 12:21 to 3:21 p. m.

Lyons, France, puts 1,500 good watts and phonograph records on the air daily except Sunday from 6:36 to 7:06 a. m. The wave length of Lyons, 3,100 meters, is the highest of any phone broadcaster in Europe.

### Holland and Belgium at It Too

The little country you heard so much about in the world war, Belgium, also does its bit. Brussels, BAV, 1,300 meters, has 1,000 watts in its antenna. Its operating schedule is Tuesday and Thursday, 12:43 p. m., Eastern Standard time.

Then Belgium's equally famous neighbor, Holland, has a station at the Hague. The wave length is 1,050 meters. If you can reach the Hague, Station PCGG, you will hear him as follows: Sunday, 10:40 a. m. to 1:20 p. m. (Eastern Standard time), concert; Monday and Thursday, 4:20 to 5:20 p. m., concert. The Monday concerts are sometimes given on 1,300 meters, notice being given the previous Sunday (so you'll have to hear him both times.)

The time difference makes quite a peculiar situation. Concerts broadcast there in the evening are heard here in the early afternoon, while early morning European broadcasts (if there were any) would be heard here the evening before. But don't let the difference in time worry you. Just listen in regularly at the hours given above. Europe hears our big stations but the European broadcasting plants have been heard very few times in this country. Let's put them on our string of DX scalps.

# FLEWELLING ANSWERS TO QUERIES

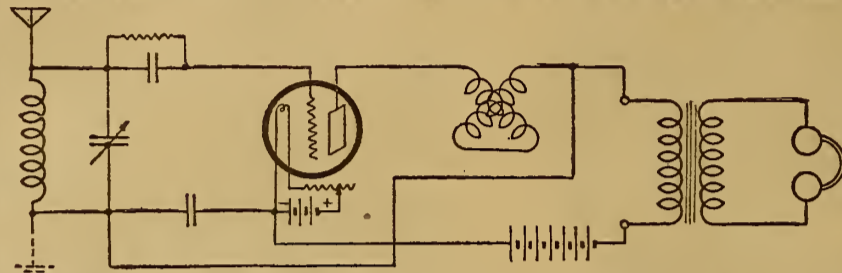
By E. T. Flewelling

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

### Getting Rid of Body Capacity

Question. I am able to report very successful results with the Flewelling circuit so far as reception is concerned but find that hand capacity effects are terrific. Is there no way by which this trouble may be overcome?

Answer. Hand capacity effects with any Radio set seem to depend almost entirely



on the design of the apparatus used. It is the writer's opinion that the time has come when some manufacturers will awaken to the fact that we are still using approximately the designs and ideas in our Radio apparatus of today that were prevalent 15 to 20 years ago. One of the greatest offenders from most any angle is the interleaving plate condenser which is in such common use. One may say that this type of condenser is responsible for ninety per cent of our Radio sets failing to give us maximum results. This is because of hand capacity troubles and poor electrical efficiency. It is a great puzzle to the writer why so many of these condensers are in use when it is so easy to purchase a condenser of a type that will practically spell the elimination of hand capacity effects. One answer to this may be that the public finds it difficult to obtain a condenser of this type—one built mechanically good. Were our apparatus properly designed we would not be bothered in any way by hand capacity effects. This means that there would be no need to shield our sets, with the accompanying bother and trouble that this work entails. However, radio is traveling very fast indeed; it will be only a short time before very radical improvements will be offered by the manufacturers of sets and parts.

However, if we must use the interleaving plate condenser we are still able to eliminate hand capacity effects from the Flewelling circuit. Incidentally, it may be well to bear in mind that the more sensitive a Radio set the greater will be the hand capacity effects, dependent of course to an extent on the layout and design of the apparatus and set. If you

will take any type of Flewelling set in working condition, remove the phones and in their place connect the primary of any audio frequency transformer and connect the phones with the secondary posts of the transformer you will find that, with no other change, the capacity effects have been eliminated for all practical purposes. This helps to overcome even the trouble which is caused by the interleaving plate condensers.

I say connect the primary in place of the phones and the phones with the secondary of the audio transformer. Please remember that conditions have been noticed where the reverse gave better results;

that is, the secondary of the transformer was connected in the circuit and the phones were connected with the primary of the transformer. Note also that the use of a .001 mfd. stopping condenser may be used here in the usual manner depending on your own set. Sometimes it is better to leave it out. The transformer connection is shown in the accompanying diagram. It is often very handy but the writer prefers to use on his own set such apparatus by means of which the hand capacity effects are eliminated without the use of the audio transformer and the incidental expense, space in the set, and the like that its use means.

## Rural Sections Look to WSY for Sunday Sermons

BIRMINGHAM, Ala.—One of the popular features of Station WSY, the Alabama Power Company, is the broadcasting of sermons and special church music. Small towns and rural sections, as well as the cities of Alabama, look for these sermons and musical programs with much regularity, from Birmingham's well known ministers of the various denominations.

## Tells Kiddies by Air How to Swim

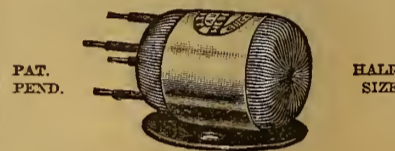
### 'Y' Instructor's Directions Broadcast to Pool

CINCINNATI, O.—Stanley Brauning recently completed his series of swimming lessons from Station WLW, Crosley Manufacturing Company here, by giving a practical demonstration of the use of Radio in teaching children how to enjoy the natorial art. The children were in the pool at the workhouse and Mr. Brauning, swimming director of the Y.M.C.A., got the children to line up in the pool. By means of a Radio receiving set and an amplifying horn, he told them from WLW studio just what to do. This is the first time on record that swimming lessons have been given by Radio. The test was successful in every way.

## All Lightships to Have Sets

DETROIT.—George H. Putman, local commissioner for lighthouses, states that all lightships and lighthouses in the near future will be equipped with apparatus. He has been particularly interested in the effort of WWJ, the Detroit News, along these lines.

## PREMIER "HEGEHOG" AUDIO FREQUENCY TRANSFORMER



PAT. PEND. HALF SIZE  
MAXIMUM VOLUME  
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100 PER CENT SHIELDED  
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Western Electric.....	12.00	7.95	Tungar 2 Amp.....	18.00	14.95
M. & K., 6000 Ohms.....	16.00	6.50	Mica Diaphragms.....	2.00	1.25
Rico, 3000 Ohms.....	6.50	3.95	RHEOSTATS		
Dictagraph, 3000 Ohms.....	8.00	6.50	Cutler Hammer.....	1.00	.85
Ambassador, 3000 Ohms.....	8.00	3.98	With Vernier.....	1.50	1.25
Nathaniel Baldwin, Original.....	12.00	8.75	C. H. Potentiometer.....	1.50	1.25
Nathaniel Baldwin, Single, with Carb.....	6.00	4.45	Klossner Vernier.....	1.50	1.20
Brandes Genuine.....	8.00	6.75	SETS		
VARIOCOUPERS & VARIOMETERS			Aerola Jr. (Westinghouse).....	18.00	5.95
Queens.....	5.00	1.95	Cutting & Washington 3-Tube Type 11.....	125.00	55.00
Fisher.....	5.00	1.95	Tuska Regenerative.....	35.00	22.50
Raven.....	5.00	1.95	Crosley Regenerative.....	19.00	
Tuska with Dial.....	6.00	2.95	Crosley 2-Step Amplifier.....	17.00	
Pathe.....	6.00	2.95	2-Step Amplifier, Assembled.....	11.95	
Columbia.....	6.50	3.95	General Radio 1-Step Amplifier.....	8.00	6.95
Workrite.....	6.00	2.95	LOUD SPEAKERS		
Eagle Bakelite.....	8.50	4.95	Magnavox Type R3.....	35.00	24.95
Fisher, Large.....	6.50	2.95	Atlas.....	25.00	17.50
Pearlco Bakelite.....	6.50	4.45	Western Electric.....	56.00	Special
VARIABLE CONDENSERS (Moulded Ends)			Music Master.....	30.00	24.95
3 Plate.....	2.00	1.25	Wooden Horn.....	8.50	5.75
11 Plate.....	3.50	1.75	Aluminum Horn.....	10.00	4.95
17 Plate.....	4.00	1.95	TUBES		
23 Plate.....	4.00	1.95	UV-199, UV-201-A, WD-12, WD-11.....	5.75	
43 Plate.....	5.00	2.25	All Genuine.....	7.95	
11 Plate Vernier.....	6.00	3.25	VT-2 Western Electric.....	3.75	
17 Plate Vernier.....	6.90	3.25	De Forest DV-6.....	4.50	
23 Plate Vernier.....	6.60	3.50	UV-200.....	4.50	
43 Plate Vernier.....	7.50	3.95	De Forest DV-6A.....	4.75	
TRANSFORMERS			COMPLETE PARTS FOR		
All American.....	3.95		Flewelling Circuit.....	13.95	
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ADVANCE PROGRAMS

(Continued from page 7)

WMAQ (Central, Daylight Saving, 448), 7:00-8:00 P. M., Talk, Rockwell Stephens; Talk, "Circus Days," J. E. Cole; Talk, "China and the Chinese," W. R. Gillee; 8:00-10:00 P. M., Concert, LaSalle Orchestra; Dawn Hulbert, soprano; Jaroslav Gons, cellist.

Agnes Adie; "Air de Ballet," Orchestra; "Spanish Serenade," Jacques Stern; "The Magic of Your Eyes," Agnes Adie; Selection from "You're in Love," Orchestra. KDKA (Eastern, 326), 7:20 P. M., Concert, "Egmont," Don Quixote, Suite in Four Parts, "Midsummer Night's Dream," "Swanee River," "Stars and Stripes," Westinghouse Band, T. J. Vastine, director; "Song of Russia," "By the Window," "Fair as a Sun," "The Wanderer," "Serenata," "Bird of the Wilderness," H. M. Freeman, tenor.

Friday, July 27

CFOA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "The Merry Wives of Windsor," Star Orchestra; "Were You to Call," Sydney Walsh, tenor; "Ave Maria," Ed. Hollist; "Beautiful Spring," Orchestra; "A Little Coon's Prayer," Sydney Walsh; "Sommeli," Mannie Roth; "A Ball Scene," Orchestra; "My World," Sydney Walsh; "Serenade," Orchestra. KDKA (Eastern, 326), 7:20 P. M., Concert, "A Fairy Tale," "Distant Greeting," "Melody," Herbert Sawyer, viola; Bert Mustin, the Fun Maker.

KGW (Pacific, 492), 3:30-4:00 P. M., Talk, "Food Preservation," Jesse D. McComb; 4:00-5:15 P. M., Mrs. Percy B. Kelly, singer; 8:15-9:00 P. M., Dance program, George Olsen's Orchestra; 10:00-11:00 P. M., Dance program, George Olsen's Orchestra; 11:00-12:00 P. M., Hoot Owls. KHJ (Pacific, 393), 8:00-10:00 P. M., De Luxe program, Charles de la Platte, bass; Lecture, Dr. Eugene Francis Storck. KSD (Central, 546), 8:00 P. M., Opera, "Gypsy Love," Municipal Theater.

Saturday, July 28

CFOA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "The Merry Wives of Windsor," Star Orchestra; "Were You to Call," Sydney Walsh, tenor; "Ave Maria," Ed. Hollist; "Beautiful Spring," Orchestra; "A Little Coon's Prayer," Sydney Walsh; "Sommeli," Mannie Roth; "A Ball Scene," Orchestra; "My World," Sydney Walsh; "Serenade," Orchestra. KDKA (Eastern, 326), 7:20 P. M., Concert, "A Fairy Tale," "Distant Greeting," "Melody," Herbert Sawyer, viola; Bert Mustin, the Fun Maker.

WMAQ (Central, Daylight Saving, 448), 8:00-10:00 P. M., Concert, LaSalle Orchestra; Talk, "Law Not War," Dr. Norman Barr. WOC (Central, 484), 8:30 P. M., Educational talk, C. Hall; 8:45 P. M., Chimes concert; 6:30 P. M., Sandman; 9:30-10:30 P. M., Dance program, P. S. C. Orchestra. WJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 7:00 P. M., News Orchestra; Musical program, pupils of Gray Fowler's and Bassillos A. Kyros.

Sunday, July 29

WMAQ (Central, Daylight Saving, 448), 8:00-10:00 P. M., Concert, LaSalle Orchestra; Talk, "Law Not War," Dr. Norman Barr. WOC (Central, 484), 8:30 P. M., Educational talk, C. Hall; 8:45 P. M., Chimes concert; 6:30 P. M., Sandman; 9:30-10:30 P. M., Dance program, P. S. C. Orchestra. WJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 7:00 P. M., News Orchestra; Musical program, pupils of Gray Fowler's and Bassillos A. Kyros.

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WMAQ (Central, Daylight Saving, 448), 8:00-10:00 P. M., Concert, LaSalle Orchestra; Talk, "Law Not War," Dr. Norman Barr. WOC (Central, 484), 8:30 P. M., Educational talk, C. Hall; 8:45 P. M., Chimes concert; 6:30 P. M., Sandman; 9:30-10:30 P. M., Dance program, P. S. C. Orchestra. WJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 7:00 P. M., News Orchestra; Musical program, pupils of Gray Fowler's and Bassillos A. Kyros.

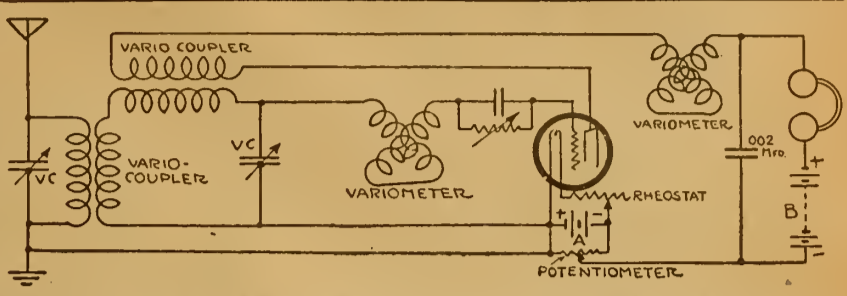
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Tuesday, July 31

WMAQ (Central, Daylight Saving, 448), 8:00-10:00 P. M., Concert, LaSalle Orchestra; Talk, "Law Not War," Dr. Norman Barr. WOC (Central, 484), 8:30 P. M., Educational talk, C. Hall; 8:45 P. M., Chimes concert; 6:30 P. M., Sandman; 9:30-10:30 P. M., Dance program, P. S. C. Orchestra. WJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 7:00 P. M., News Orchestra; Musical program, pupils of Gray Fowler's and Bassillos A. Kyros.

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SELECTIVE DOUBLE REGENERATOR



A great many hook-ups are presented to the fan; unless he uses care and studies much in making a circuit, he will be disappointed with results. The diagram shows another circuit; it is not entirely new; however, if the fan who makes this exercises good judgment in the selection of apparatus, he will be surprised at the results. The set is very selective.

Ground Connections

For the best results the ground connection should be made to some conducting area on about the same level as the receiver. A steam or hot water heating system give a good ground. Avoid a long ground wire, as this gives height and lack of selectivity without compensating additional signal strength. This is an important point when the receiver is installed in an upper floor of a building such as an apartment. In this latter case the piping system of the building will furnish a good ground. Never run a separate wire down to the ground floor. The wires from antenna and ground where they approach the receiver should be separated as much as possible and the receiver should be placed as near as possible to the point where the antenna wire enters the building.

Ampere Hours of Batteries

Storage battery capacities are rated by their manufacturers in ampere hours. Thus, theoretically, a 60-ampere-hour cell will supply 6 amperes of current for about 10 hours, three amperes for about 20 hours, or one ampere for about 60 hours. In practice, however, as the discharge rate is increased the capacity of a single charge is reduced, and a 60-ampere-hour battery would deliver 10 amperes for approximately only five hours instead of six.

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Two-stage amplifying unit for use with the Melco-400, also regularly costing \$35, now only \$17.50

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Advertisement for World Radio Batteries: 'DON'T PASS THIS-BUY World Radio Batteries SAVE YOU 50% WRITTEN 2YR GUAR SPECIAL 2-Volt Storage Battery for WD-11 and WD-12 Tubes. Will give \$5 200 HOURS on single charge... \$5 World-Radio-Batteries Are unconditionally guaranteed Because you deal direct with a manufacturer who is responsible for the performance and quality of the Battery. 6 Volts-60 Amps., \$10.00 6 Volts-100 Amps., \$14.50 6 Volts-80 Amps., \$12.50 6 Volts-120 Amps., \$16.00 Full Rating Guaranteed MAIL YOUR ORDER TODAY. WE SHIP EXPRESS C. O. D. SUBJECT TO INSPECTION, OR WILL ALLOW 5% FOR CASH WITH ORDER. ALL ORDERS SHIPPED SAME DAY AS RECEIVED. WORLD BATTERY COMPANY, 60 E. Roosevelt Rd., Dept. L, Chicago, Ill.'

Advertisement for Money Earning Opportunity: 'HERE is your chance to cash in on your spare time. A special offer is being made to you for the summer. YOU can easily earn some real money, or your choice of Radio parts needed for your receiving set. WORK is pleasant and profitable. Just call on your friends, enrolling their names on our large family roll of readers. WRITE at once for our proposition which is yours for the asking. Address Circulation Manager, Radio Digest 123 W. Madison St., Chicago'



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## Understand Your Set

To Know the Why of a Set Is Gratifying

ONE OF the foundation stones of this republic of ours is the broad principle that all men are created equal. It requires, however, but a few years of living to convince one that this principle, if it is to be accepted as true, must be subjected to several limitations. Similarly, it may be said that Radio broadcasting is intended for everybody, intended but not realized yet.

Now the thousands of Radiophans who listen with keen enjoyment nightly to the programs of their favorite stations may be surprised when they are told that the amount of pleasure they receive from their sets could be increased many times if only they would make the slight effort to understand something of the principles underlying the operation of their sets. Even a very slight knowledge of the whys and wherefores of tuning, for example, will place the possessor in a position superior to that of one who knows merely enough to turn the dials until he happens upon some station that he wants to hear.

## Period of Poor Reception Passed

Stations Will Now Come in with Increasing Ease

GOOD news for Radiophans is the announcement by scientists that the period of poorest reception has just passed, and that from now on distant stations will come in with increasing ease and frequency.

The cycle of audibility, as scientific men designate the ability to receive Radio signals at different periods of the year, begins to drop during the month of March rather rapidly and reaches its lowest point during the middle of June. After June 15 reception begins to improve, until maximum audibility is reached in winter.

Reception of long distance stations during the remainder of the summer will be possible about twenty-five days each month. Toward the middle of October fans may figure on getting back to highest efficiency in tuning in the elusive far-away broadcasts.

Due to the use of better equipment and short aerials, very little interference has been noted by fans even during the period of lowest audibility, and Radio reception has been almost as good as during the winter. The broadcasting stations have suffered far more from the summer weather than have the owners of receiving sets. Most of the local stations have had to shut down occasionally because of heavy charges of electricity from the air getting into the transmitting tubes.

## Sets for Outdoor Use

Improvements Make Summer Radio Possible

TWO ELEMENTS of Radio receiving sets which have been perfected during the last year or two have gone far to help in making it convenient and satisfactory to use Radio receiving sets outdoors. The first of these is the dry battery tube, that is, electron tube detectors and amplifiers which require only a small dry battery rather than a heavy storage battery to light the filaments. The second improvement is the development of more satisfactory loud speakers which furnish a considerable volume of sound without undesirable distortion. Thus it is possible now with small portable receiving sets which can be purchased or which can be fairly easily assembled, to receive satisfactory Radio broadcasting while camping, boating or motoring. It is a noteworthy fact that exploring parties now take Radio receiving sets with them for the dual purpose of furnishing amusement during the evening hours at camp and for receiving time signals with which to check their chronometers.

It must be recognized that Radio transmission conditions are not as good in the summer as in the winter. Transmission range is decreased so that it is not possible to hear the distant station which can be received in the winter. The presence of atmospheric disturbances or static often makes it difficult to hear weak signals; reliance must be placed on stations which are near and powerful enough to produce loud sounds from the receiving set. Fortunately it is not necessary to rely entirely on distant stations since there is now more than 500 licensed broadcasting stations in the United States.

## RADIO INDI-GEST



### Introducing Mike and Izzy

Friends and readers of Indi-Gest, meet Mike (left) and Izzy (right), trained antenna raiser chimpanzees, for the great nameless Walla Walla station of this Radio-knut column. Inasmuch as our contributors failed to contribute enough printable and sad jokes to fill the column this week, we were asked by Mike and Izzy if we would give them a little free publicity. As was remarked in an issue previously, they are very intelligent, both having been fired from the Harvard zoo on the same day, less than three feet apart.

After seeing the above picture they said indignantly, in chorus, "Why, you've made monkeys outa us!"

Another cute thing they do (see picture), is hang on the frame of their picture. Asked why they did this, Mike replied, "The matter has been called to my attention that you print your paper Indi-Gest on a rotary press and print over 100,000 copies, so I didn't want to fly off the roller." Izzy had a much more simple explanation. (He is very simple.) He answered, "I just had a temporary ether wave put in my tail, and I didn't want to change the wave length."

To prove their excellent education, listen in on the following conversation:

Mike: "Who invented Radio anyhow?"  
Izzy: "Macaroni, but not anyhow. He just invented it anyway."  
Mike: "Why, oh why did he do it?"  
Izzy: "Because he had a corner on the spaghetti tubing market and wanted to round it off."

(Curtain.)

All of which goes to prove they don't know anything.

## A-B-C Lessons for Indigest Beginners

Chapter VI—Such as Spark Amateurs, Etc.

BY GOSH

**F** IS for the filament,  
A very useful toy,  
And when it's awfully white and hot,  
The things you hear—Oh joy!

## They're Priceless and Not Mailable

Dear Indi: Please send me a special prize for NOT constructing the Stebbins Sooper. I won't try it for three reasons: (1) being a model young man, I don't want a Degenerative set; (2) I don't like soup; (3) I haven't got the parts. H. M. R.

(P. S.)—Where can I buy the parts?

## Good Enough for Indi-Gestion

Dear Indi: Here's my contribution; hope I make the Column. Shoot this on your Chef:

RADIO BANQUET MENU  
ENTREES  
Socket Salad, Flewelling Dressing  
Aerial Sauce with Browned Galena  
DRINK  
Drops from Grid-Leak, (99%)  
MEAL  
Boiled Variometers  
Mashed Condensers  
Fried Name Plates  
Burned "B" Batteries  
Hot Solder with Paste  
DESSERT  
Iced Binding Posts  
TO ORDER  
Hot Filaments on Toast  
Potato Cord Chips

O. S. CILLATOR.

Resting here is John  
McCutcheon East  
Who made a high dive  
From his antenna mast.

## They Don't Grow Bananas in Alaska

Dear Indi: Please refer this missive to your R. E. I set up my Stebbins Degenerative set and had to erect an aerial. I hooked one end of the wire to the house and the other to a banana tree. (I live in Alaska.) The first music to come through was "Yes, we have no bananas today." Howcom? RITA M.

## Looking Ahead

Awards in the Name Contest Next Week—Indi-Gest next issue will carry full, complete and total returns and awards in the Walla Walla broadcasting station call contest. The beautiful, brass, round, beveled edge switch point must be awarded as much of the lacquer is coming off. Who will obtain this super excellent accessory? Buy Indi-Gest next week from your most inconvenient newsdealer, 10c.

## A Glimpse into the Future



## Condensed

By DIELECTRIC

Adjust your headsets and then slip off into a sound sleep. "Sound" it will be. You may never have learned to speak French, Japanese or Russian during your waking moments, but just allow the subconscious mind to lay hold of addresses in these strange tongues and when you come to, your family will be amazed to find a linguist in their midst. Code is learned in a very short time, we are told, if we will only follow this course. Would it teach silent periods?

After reading Mr. Brady's articles in this paper on the present patent tangle, as applied to Radio, you will be convinced that the commercial phase needs some adjustment to prevent complete control by a single group. Not so much publicity has been given to this particular feature of late and it is well that some facts be brought to our attention. It is quite proper to refer to the difficulties met in the automobile industry and their subsequent solution. Much that applied there has equal concern with this newer industry; possibly may be corrected in the same manner.

We may find a great many uses for our receiving sets to yield saving of labor. It is reported that a Frenchman has invented an alarm clock which serves its evil purpose when a certain wave length leaves Eiffel tower. Why not have Radio open the drafts on your heater next winter in the early morning hours, so that the house will be warm when you wish to get dressed? Use it to put out the lights at night when Arlington warns your daughter's caller to be up and going! A Radio razor (safety) would be a valuable asset.

Station WRAD has indeed made a record of which it may be proud. Only a ten-watt station, yet it has been heard in thirteen states and in Canada. It is located at Marion, Kansas. It is one thing to be picked up at a great distance on rare occasions and quite another to be consistently heard in far states. A record of equal interest is that made by a station in California which was picked up through interference six thousand miles away, and only one-half kilowatt used. This latter may lead to important discoveries.

There are those who still contend that the broadcasting of church services has a tendency not for the best. They should not lose sight of the many instances where, except for Radio, there would be no chance to hear preaching. A new recruit to the ranks of listeners in to religious meetings is that lumberjack who is getting a loud speaker for the benefit of his fellows in camp. He had lived eleven years without hearing a single church service.

The matter of Radio broadcasting in Italy seems to be taking a turn for the better. Although much has been said of the desirability of having the Italian government look with favor on a plan to foster broadcasting stations, nothing came of it until the progressive Premier took charge of the case himself. It is hard to conceive of the nation which gave birth to Marconi holding back in anything pertaining to this great branch of scientific discovery.

Rules applying to the use of Radio during war time have been formulated and published. The Commission of Jurists at the Hague having this decision to make apparently covered every phase of the subject and produced regulations which it would be difficult to misinterpret. Rules of conduct by nations at war have been ignored, as all of us recall, but Radio has not reached the stage where it may operate without nearly everybody listening in, consequently the chances of avoiding detection when violating these rules are very slim. Efforts to perfect secret transmission will no doubt increase. There is much to learn in this broad field.



# First Steps for Beginners in Radio

## Chapter XI, Part I—Super Regeneration

By Thomas W. Benson, A. M. I. R. E.

**BEGINNERS** will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiotelephony. The articles yet to appear are:

- Chapter XI, Part II—Super Regeneration.
- Chapter XII—Reflex Circuit Operation.
- Chapter XIII—About Headsets and Loud Speakers.
- Chapter XIV—Batteries Used in Radiophony.

THE mere mention of the word super-regeneration gives rise to ideas and dreams of the Master Set that will eventually be evolved from the maze of circuits now in use and make possible the reception from every station on the face of the old world. And although it promised much, the three tube set as originally described by Armstrong seems to have fallen down when taken in hand by the amateur and even by the more experienced men in Radio. This is no reflection on the efficiency of the circuit, but simply means that much work must be done before the more complicated circuits are made simple enough for the average man to handle.

### Theory of Super-Regeneration.

The theory of super-regeneration is so simple that it is strange it was not thought of long ago. Since the first days of regenerative receivers it was noticed that when the coupling between the tickler and the grid was made too close the set howled. This was due to the plate current feeding back into the grid, the added negative charge on the grid further varying the plate current, which again reacted on the grid more forcibly. In this manner the currents built up to such a strength that the tube went into self-oscillation and

modified circuit that can be readily assembled by the experimenter. The contents for the various parts are given in the illustration. It will be seen that the first tube is in a regenerative circuit, the plate being coupled to the grid circuit by a tickler coil.

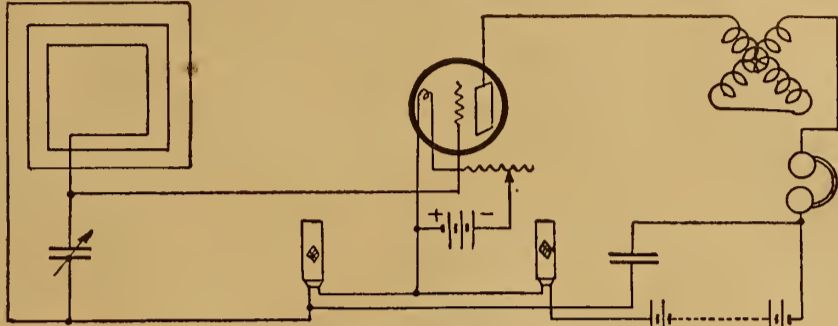


Figure 47—The one tube flivver that has given good results

The second tube is connected to form an oscillator, the plate being closely coupled to the grid with a condenser in the grid circuit to control the amount of energy reaching the grid and thus the intensity of the oscillations. The grid of the second tube is connected through a filter to the grid of the first tube. This filter keeps the received currents from reaching the grid of the oscillator tube.

The action can be described in this manner: When the tubes are lighted a high whistling note is heard in the receivers. This is due to the oscillations in the second tube taking place at audible frequency. On adjusting the variable condenser across the primary coil of the first tube a series of harmonic notes will be heard, due to the beat action between the oscillatory currents in both tubes.

we must make a compromise. It is logical that the longer the building-up process is allowed to go on the louder will be the signals, but since the checking point will then be further apart, they occur at an audible frequency. When we check them at a fre-

The circuit originally demonstrated by Armstrong employed one stage of audio frequency amplification, which introduced further difficulties. Realizing that the audio frequency amplifier would amplify the audible controlling current, it is necessary to filter this out before it reaches the amplifier, or it will reach an annoying volume.

We can then sum up super-regeneration as simply a regenerative circuit which is prevented from oscillating during one-half the cycle of the oscillation in a second tube and permitted to build up during the other half of the cycle. Therefore, any regenerative circuit that is subject to a checking potential on its grid at or near the highest range of audibility will function as a super-regenerator.

### The One-Tube Flivver.

By combining the source of audio frequency, or, as it is often termed, the variation frequency, in the same circuit with the tuning inductance we have the one tube flivver super-regenerator that is making good. This circuit is shown in Figure 47 and consists of a tuned plate regenerative circuit using a loop aerial with honeycomb inductances connected in the plate and grid circuits. The coil in the grid circuit is a 1,250-turn coil, that in the plate being a 1,500-turn coil. The condenser across the B battery and coils serves to bypass the higher Radio frequency currents in the cir-

(Continued on page 14)

### Use of Power Tubes.

For the best results, it is necessary to use power tubes with high voltages on the plate, although the regular amplifying tubes can be used with some loss in signal strength. There is no doubt that this circuit does give excellent results when properly adjusted, but it takes infinite patience and many hours of testing before one gets the hang of making all the adjustments necessary to get results. The writer has worked for hours over such a circuit, pulled it apart in disgust and hooked it up again, determined to make it work before any results worthy of note were obtained.

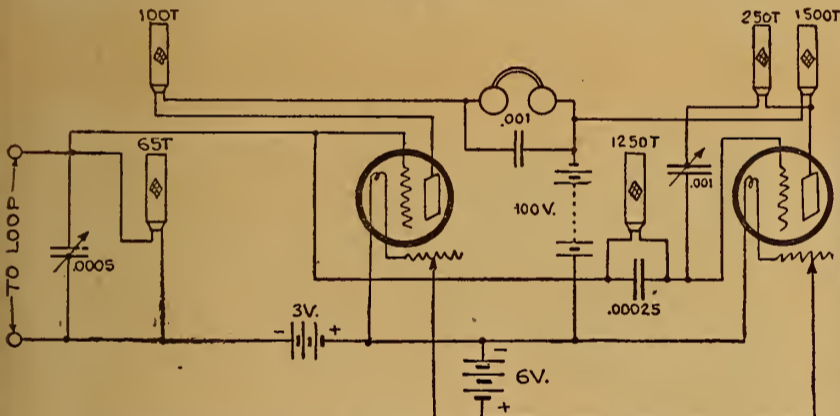


Figure 46—A super circuit using honeycomb coils, showing how one tube functions to control regeneration in other tube

howled or screamed. The intensity of this howling was many times that of any signal coming in on the set. And everyone would say, "Gee, if the stuff would only come in like that." And why not?

Since this building up of the currents in the tube is gradual, or step by step, taking only a very small interval of time, it is conceivable that we could permit the tube to build up the currents to a high value and then check the process and let the building up begin all over again. Were this checking to take place at a rate above audibility, the resultant sounds would be unbroken. And this is just what Armstrong did to produce the super-regenerative circuit.

### Operation of the Circuit.

The operation of the circuit will be clear by considering Figure 46, which shows a

Now, when a signal is received and the circuits properly adjusted, the first tube will tend to regenerate and build up to a howl, but before the tube can start to howl the oscillations in the second tube make the grid too negative and the tube stops oscillating for an instant, when the current from the oscillating tube changes its polarity the first tube starts to build up again and is again checked. In this manner extremely loud signals can be obtained. But

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# Control Unit for Dry Cell Tubes

## Dry Cell with Rheostat Mounted on One Base

When the experimenter desires to keep his instruments separate, that is, not all sharing the same panel, but each instrument having an individual base and panel,

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**T**HERE are many little kinks worked out at home that would aid your fellow Radio worker if only he knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in obtaining such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,  
Radio Digest  
123 W. Madison St., Chicago

the following is a convenient assembly of the parts involved directly or indirectly with the filament-lighting circuit:

A base is made from 3/4-inch board, 6 inches long and 4 inches wide. A board 3/8 inch in thickness, 7 inches long and 4 inches wide will serve for a panel. These boards are finished smoothly with sandpaper. The panel is attached to the base with two screws, and holes are drilled for the rheostat and binding posts in the approximate positions shown in the sketch; screw holes are drilled in the base for semi-permanent mounting.

A cup for holding the dry cell in place is made from the lower end of a cylindrical cardboard box (such as a mailing tube, with bottom), which is screwed to the base, allowing sufficient space on the latter, next to the panel, to mount the tube-socket. The panel, base and cup are painted with a flat-black paint; when the paint is dry, shellac is applied.

The rheostat, grid condenser and leak, and the "antenna" and "plate" binding posts are mounted on the panel; the cup and tube socket are on the base. Connections are made as follows: From antenna binding post to GL and condenser, thence to grid terminal on socket; from one terminal of rheostat to one filament terminal on socket; from other terminal of rheostat to dry cell, thence to remaining filament terminal on socket; from plate terminal on socket to plate binding post on panel.—George Frederick, Washington, D. C.

### Insulation Tube

A good insulation tube for Radio work can be made very cheaply by wrapping empire cloth around a cardboard tube. Shellac the cloth and when it becomes sticky, wrap it around the tube and smooth out the wrinkles with a cloth. This is very suitable for a CW transmitter inductance tube. A tube about 8 inches long and 5 inches in diameter can be made for about twenty cents.—Tecumseh Woodland Baltimore, Md.

### Loose Coupler Used with WD-11

The accompanying sketch shows design data and diagram of connections for an outfit which I have been using with great success. This hook-up is the result of my attempt to develop a WD-11 outfit which would give the maximum control with a minimum of instruments.

The primary of the loose coupler is made with 175 turns of No. 23 enameled wire with 195 turns of No. 22 sec wound in the opposite direction on the secondary. The diameter of the primary is 4 1/2 inches and the length of the coil is 6 1/2 inches. The diameter of the secondary is 3 3/4 inches and the length is 6 1/2 inches.

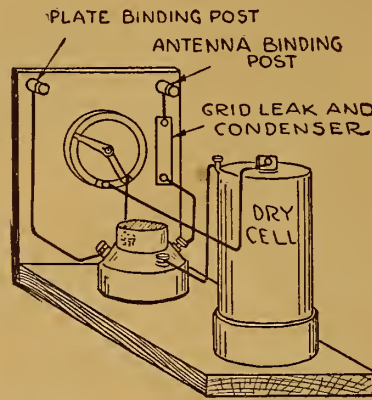
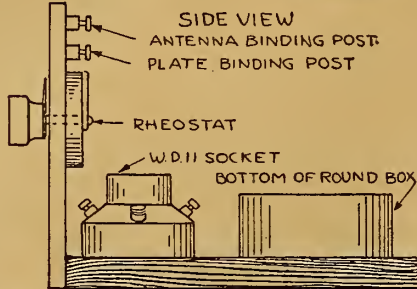
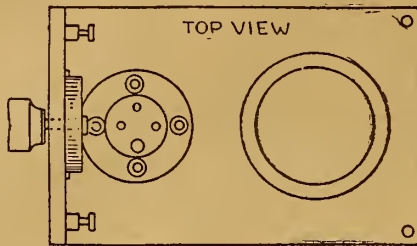
### TWO SUPERSENSITIVE CIRCUITS

(Both Copyrighted)

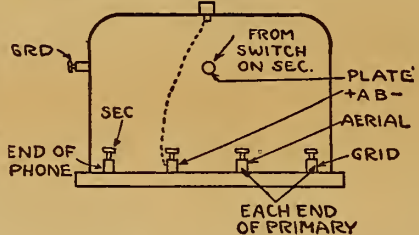
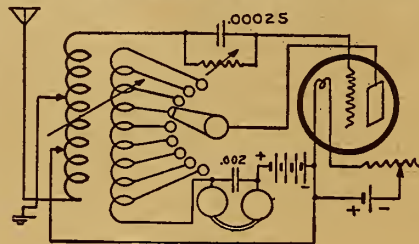
My Highly Improved Reinartz brings in all important stations on both coasts and Mexican border, loud, clear and without distortion. We dance to music from Atlanta received on one loud Baldwin unit. Build one of these wonderful sets from my blueprints and specifications, price 50c, or with a perfect and complete double wound spiderweb coil, \$3.00 by mail. No other windings used. Photo of my set on a glass panel with every order.

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## ALL PARTS NECESSARY IN UNIT



I am located about 1 1/2 miles from the broadcasting station WAAK (100 watts) and about 1 mile in the same direction from broadcasting station WCAY (250



watts). I had the good fortune one evening to pick up both stations at once and with the hook-up mentioned I could tune out either at will. I can also pick up DX within a thousand miles. Occasionally I have picked up NAA time signals without using loading coils.—Wm. Luetge, Milwaukee, Wis.

### Shielding Panels

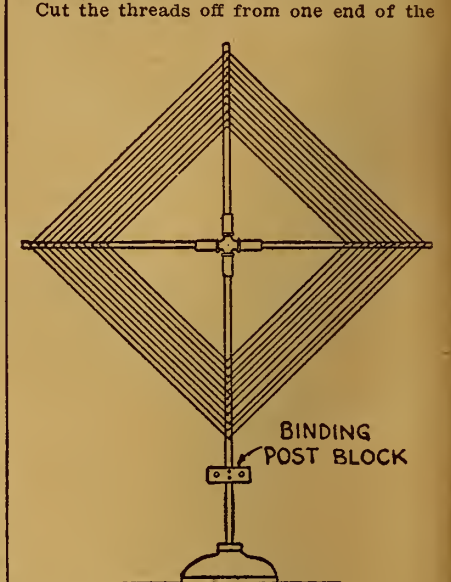
In making and operating a Radio set, I found the following plan to be of great help. After trying tinfoil, which did not give satisfactory results, either in operation or appearance, I painted the back of the panel with aluminum paint. I used an extra large brass washer to insure better connection between the paint and the binding post.

In painting the panel I place the front flat on the table, so that the paint will not run into the holes for the shafts of the instruments. As an added precaution, I use blotter washers for the shafts and glue them to the panel.

One of the good features is that the entire surface can be covered with the aluminum paint. Another advantage of the aluminum paint is the lower cost as compared with aluminum plates. I found that practically all body capacity was eliminated.—Frank Gavitt, Wichita, Kans.

## Long Distance Received with Homemade Loop

A loop of good appearance can easily be made of the following materials: 1 polished brass 1/2-inch cross, 4 polished brass 3-inch nipples, 2 or 4 1/2-inch dowel rods, according to the size of the loop to be made, 1 piece of bakelite for a binding post block, 1 desk lamp base, small wood screws, stain and varnish.



nipples and turn the other ends into the cross. Cut the dowel rods to the size required and insert them into the nipples. The wire spacing should be marked on the rods and small brass wood screws may be used for attaching the wires, or holes may be drilled to receive them.

My present loop measures 18 inches diagonally and has 11 turns of 10-28 litz wire. With a .001 mfd. variable condenser I am receiving stations within a 1,500-mile radius.—Peter S. Schott, Perth Amboy, N. J.

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# Condenser Dial Markings for Wave Lengths

## Types of Condensers and Their Values

By H. J. Marx

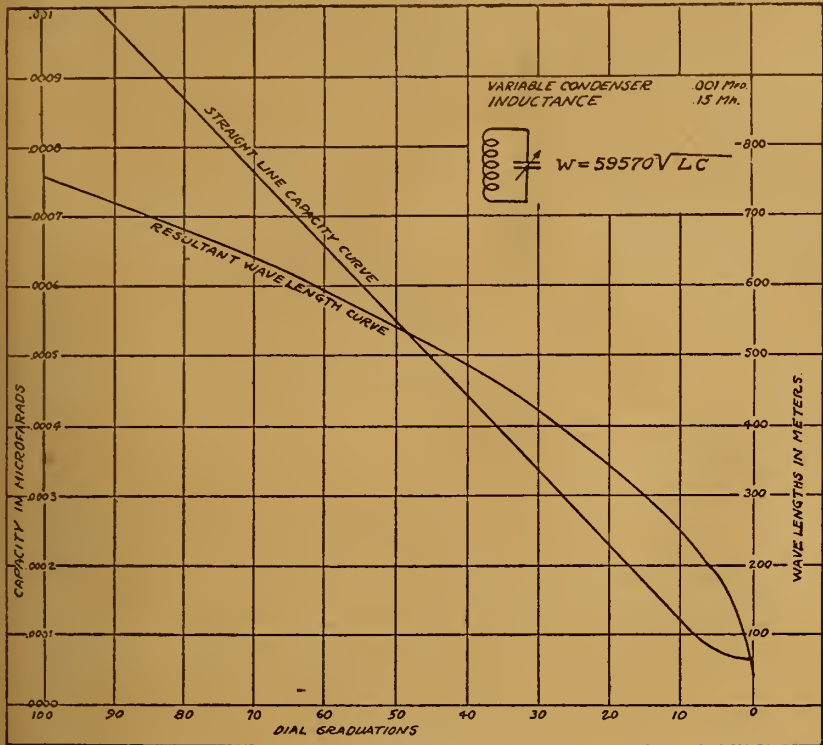


Figure 1

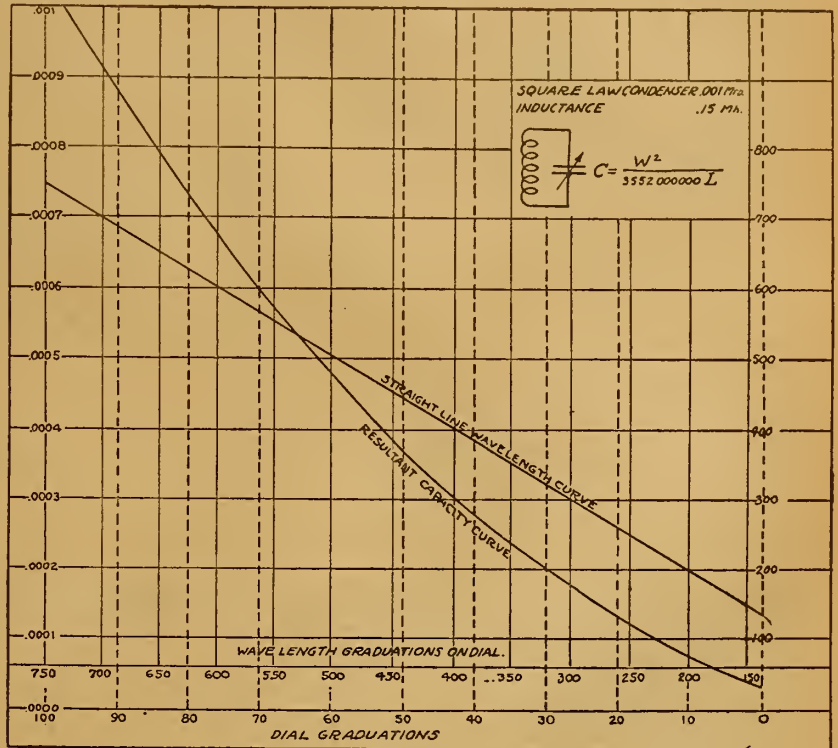


Figure 2

IT IS not unusual to receive a letter from some fan who wonders why the dials are not graduated in wave lengths. His idea is not unreasonable, and the time is not far off when sets will have wave length graduated dials instead of just the usual zero to one hundred or the angular degree graduations. There are, however, a number of factors which effect this, of which the fan usually does not know; it is these factors that will be discussed in this article.

First, we need not define wave length, but it is generally known that wave length is dependent upon the inductance and capacity of the circuit. Expressed in a formula, we have:

$$W = 59570 \sqrt{LC}$$

where W = wave length in meters.  
L = inductance in milhenries.  
C = capacity in microfarads.

### Antenna or Primary Circuit

The antenna circuit includes the aerial and ground, with its capacity and inductance in addition to the tuning units. The antenna inductance and capacity are not necessarily fixed values. Both vary to a limited extent, depending on a number of conditions; then, again, one fan has an aerial 100 feet long and 40 feet high, while another has one 60 feet long and 50 feet high. It is, therefore, impossible to graduate a dial for wave lengths in the primary circuit. If, however, a loop aerial is used and its inductance determined, the dial of the usual tuning condenser can be graduated for wave lengths, but this condition is parallel to what is taken up under secondary circuits, and will be more fully discussed under that heading. All circuits operating without an aerial, usually a fixed or variable inductance incorporated in the circuit, can also be handled the same way.

### Secondary Tuning Circuit

In the secondary circuit there would be little trouble in having the dials graduated for wave length. The main condition imposed would be the necessity of a fixed inductance value. Naturally, if the inductance is variable, every change in the inductance would alter the condenser setting

for the same wave length. This fixed inductance value is not unusual; for example, the rotor of a variocoupler has no taps, therefore, the inductance value is fixed. Similarly, the loop aerial, unless tapped, has a fixed inductance value.



Figure 3

Where a double or even triple honeycomb coil circuit is used, the secondary circuit is tuned by means of the variable condenser shunted across the secondary honeycomb coil.

If, then, the inductance value is fixed,



## YELLOW TIP MICROMETER ADJUSTING CRYSTAL DETECTOR

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the tuning control being centered in the variable condenser, it is the dial on this apparatus that can be used to indicate the wave length for its different positions. This naturally emphasizes the importance of accuracy and workmanship in its construction.

### Variable Condenser

Up to this time there has been but limited development in condenser design. The present type of rotating plate condensers is seldom very accurate. Though spacing

may be fairly uniform when manufactured, handling soon changes positions of plates. Many of the plates are stamped out with rough edges. Unless the metal is carefully treated, temperature changes will produce warping of the plates. The plates may not be spaced, but there is no uniform capacity change. Gradually development and improvements in design will help eliminate these uncertain factors. The other types of construction, if efficient, are usually too

(Continued on page 14)

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Operates with any of the dry cell tubes as well as with standard 6 volt tubes. Cabinet will hold three No. 6 dry cells and 22 volt "B" Battery.

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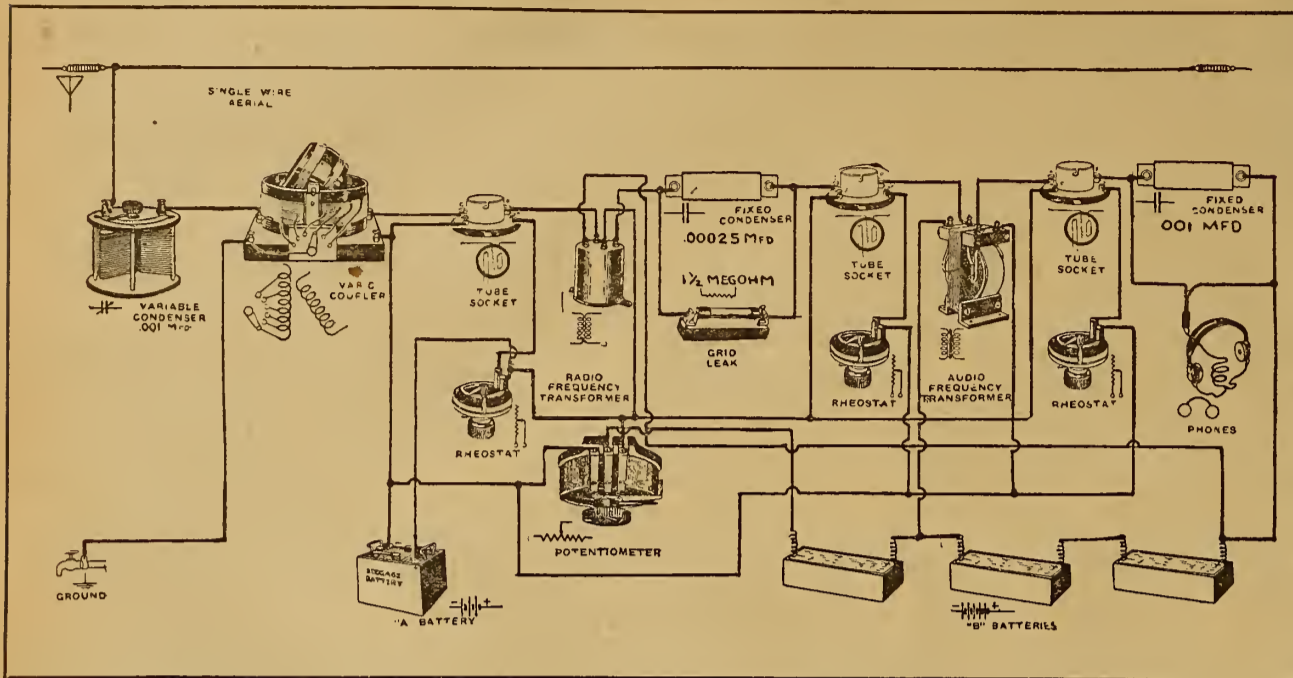
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# ONE STAGE R. F., DETECTOR AND ONE STAGE A. F.



ONE stage of Radio frequency amplification, detector, and one stage of audio frequency amplification is the second of the simplex diagrams. As can be readily seen by examining the diagram, this circuit consists of a variocoupler, used as a simple tuning arrangement with a variable condenser of .001 mfd. capacity in the aerial lead. No regeneration is used. The variocoupler tunes the aerial circuit and then passes it on through the Radio frequency amplifier tube, a UV-201. The plate circuit of

this stage consists of a Radio frequency transformer, 67 1/2 volt B battery, and potentiometer. The potentiometer is very necessary if good results are to be obtained. The detector circuit is the usual conventional arrangement employing a fixed condenser of .00025 mfd. capacity and grid leak of 1 1/2 megohms resistance in the grid lead. A soft tube is used as a detector, preferably a UV-200. The plate circuit of the detector is completed with the primary of an audio frequency trans-

former and B battery of 22 1/2 volts. The single stage of audio frequency amplification employed is of the usual type, consisting of a UV-201 and B battery of the same strength as that of the Radio frequency amplifier. This arrangement may be used with any receiver where Radio frequency amplification may be advantageously employed and the usual results of such amplification obtained. Tuning is effected with the variocoupler, variable condenser, rheostats and potentiometer in the order listed.

more apparent when the other classes are analyzed.

### The Straight Line Condenser.

The illustration, Figure 1, shows the straight line graph by plotting the capacity against the usual dial graduations. The markings on the dial are taken as zero to one hundred; some dials are graduated to 180; that would mean merely that the divisions on the bottom of the graph would cover 180 points in the same distance that the 100 are covered. Naturally, 180 degrees of rotation are assumed. Using the formula for wave length, the different wave lengths are calculated, assuming a 50-turn honeycomb coil (.15 milhenries) is used as the inductance. The illustration shows the resultant wave length curve. Since the curve is not a straight line, the dial graduations would be irregular.

For example, from graduations 42 to 100 the wave length would run from 500 to 750 meters, or a total of 250 meters range. But the lower part of the scale, 0 to 42, would cover a wave length range from 0 to 500. In other words, the lower half of the graduations, would cover over twice the range that the upper half does.

In order to remedy this difficulty, the third class of condensers, called the square law type, were developed. They are used mostly in wavemeter work and for laboratory testing.

### The Square Law Condenser.

The wave length formula can be changed around to read:

$$C = \frac{W^2}{3552000000 L}$$

using the same unit values as before.

This indicates that in a circuit with a fixed inductance value the capacity varies as the square of the wave length, divided by the product of a constant and the fixed inductance.

In Figure 2 the wave length is first plotted as a straight line, the necessary capacity values are calculated and the curve drawn in. The condenser is so designed that the plate areas required for the various dial settings check up with capacities as called for on the graph. The dial range in wave lengths would then run from about 150 to 750 meters. Naturally any change in the maximum capacity of the condenser or the inductance of the coil alters these dial values.

At the base of Figure 2 the wave length values at the different points of the dial graduations are marked in steps of 50 meters. This can be carried further and kept handy with a set, so that the dial graduations can readily be interpreted in terms of wave length.

The illustration Figure 3 shows the form of plate used in one of the square law type of condensers at present on the market.

With the new tubes just on the market, it is suggested that tube sockets be mounted on a cushion base to minimize vibration.

## FIRST STEPS IN RADIO

(Continued from page 11)

cut and to increase the wave length of the coils so a longer period is obtained between checking points. The two coils need not be put in inductive relation to each other, the feedback being obtained through the capacity of the plate and grid, as described under tuned plate regenerative receivers.

The action of this circuit is identical to that using two tubes, but one tube functions as both oscillator and detector.

### Oscillation in the Circuit.

When the tube is lighted the circuit begins to oscillate at a frequency determined by the values of the honeycomb coils and the capacity across them. This current will have a frequency between twenty and thirty thousand cycles per second, which is near the upper limit of audibility and a high pitched whistle will be heard in the receivers constantly. If annoying, the pitch of the whistle can be varied by changing the capacity across the battery and coils. If the whistle is pushed above audibility, the signal strength will be reduced, as mentioned previously because the tube is not allowed to build up as long. The grid circuit containing the loop aerial and condenser are tuned to the wave length to be received, and when the signals are heard the set is made to regenerate by adjusting the plate variometer. We find, however, that the regeneration can be carried to a point where the set will operate a loud

speaker nicely because the oscillations from the honeycomb coils only permit regeneration to occur during one-half the cycle, and thus the tube is not permitted to howl or squeal.

This little set is ideal for the man limited to one tube and desiring to work with a loop aerial. For the benefit of those who would care to build a set of this type, full details of construction will be given in the next chapter as well as the theory of operation of the Flewelling circuit, showing that the operation therein is very similar if not identical to that in the Armstrong super sets.

(TO BE CONTINUED)

## DIAL MARKINGS FOR W. L.

(Continued from page 13)

high priced, so for the present only the rotating plate type will be considered.

This type can be divided into three different classes, namely:

The semi-circular plate construction.

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The straight-line capacity type.

The square-law type.

The average variable condenser that appears on the market falls in the first class. The second type are not so numerous, and as a rule are much larger in size, due to the contour and size of the plates. Of the third class, there are very few on the market.

The capacity curve of the condensers of the first class, based on the dial graduations, is very irregular; no two are alike. It is very difficult to graduate a dial in wave lengths because of the irregularity of such graduations. This will become

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# Questions and Answers

### Interference

(3603) KB, Wilkes-Barre, Pa.  
I have a two-stage regenerative set which is the same as that used by my neighbors. When I am tuned in and they tune in it tunes me off and causes noise. Our aerials are about 20 feet apart; mine is about 5 feet lower than theirs. They have two wires about 125 feet long; mine is one wire, 160 feet long.

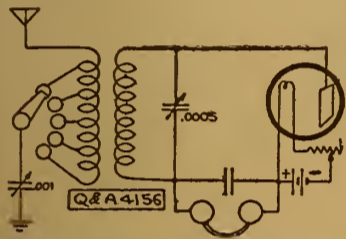
Will raising my wire have any effect?  
A.—Noting difficulties occasioned by interference of regenerative circuit in proximity we are advising that two methods are suggested for overcoming the annoyance. Ask your neighbor to construct a single wire antenna which will in no way decrease the efficiency of his circuit but rather make it more selective, and construct your own of the same type at right angles and as far away as possible. This method should eliminate all conflicting operation.

If this plan is not possible it will be necessary for each of you to add Radio frequency amplification to your sets. The employment of one stage will prevent re-radiation from the receiver which is the cause of interference cited.

### Diode Tube Circuit

(4156) JTL, Mt. Vernon, S. D.  
Will you please publish a diagram of a hook-up consisting of a variocoupler and variable condenser for tuning in, using the two-element Diode tube?

How far will this tube receive broad-



casts and what will the wave lengths include, using a standard variocoupler? Will it be as sensitive as a crystal?

A.—A circuit employing the Diode tube accompanies this article. This will have a wave length from 200 to about 500 meters and a receiving range of about 150 miles, winter reception. It will be more sensitive than a crystal detector.

### Super Heterodyne

(2858) HEP, Providence, R. I.  
I have noted your article and diagram R. D. 73 on the Super Heterodyne on page 14 of the February 24 issue, but it is not plain enough for me, and I desire further information. Would you be so kind as to answer the following questions:

Should the inductance L2, which is shown in an upper and lower section, be wound one over the other or in two separate coils of 18 turns each, side by side? If two separate coils are used, is there a variable inductive relation to each other? You do not mention the inductances which are shunted by condensers C4 and C5. Of what are these composed and what is the size of each? Should they have a variable inductive relation?

Is it necessary to use separate A and B batteries, as shown, or can one A battery be used for the whole circuit, even if using separate B batteries?

Will this circuit function with the WD-11 tubes or DeForest 1 1/2 V tubes?

Should the two tubes composing the heterodyne (the first two on the left) be hard or soft tubes?

Does this super heterodyne require 4

stages of Radio frequency as shown or can it be operated on a lesser number, such as 2 or 3 stages?

Is this circuit as shown good for all wave lengths up to 20,000, and if so, would inductances mentioned in the second question remain the same for all waves?

A.—Inductance L2 consists of two sepa-

in signals appreciably louder? If so, how long pipe would be necessary?

What advantages does a north and south aerial have over one running east and west, or vice versa? Would a combination of both be superior to either one alone?

How can you cut out interference on a

The Question and Answer department is purely a service department and the publishers would like to have your assistance in helping to keep it up to the highest standard, therefore when asking questions please make out your query on a separate piece of paper and written on one side only. Do not mix your questions with other material, write that on a separate piece of paper. Each one must go to a different department. Then, too, we have so many who fail to put their name and address on each sheet. Please remember this when you write your letters, and also to enclose a stamped self-addressed envelope. Unsigned letters are not answered.

rate coils wound on the same tube but not over each other. The two coils are wound side by side with taps taken from the center, as per diagram.

Inductance shunted by condensers C4 and C5 may consist either of honeycomb coils or a variocoupler, and are variable in inductance relation.

One A battery may be used, but separate B batteries are advisable.

It is doubtful if 1 1/2-volt tubes will function as effectively as 6-volt tubes. Would advise 6-volt tubes for results desired.

Two tubes composing the heterodyne should be hard.

The circuit may be used with less stages of Radio frequency than designated, although volume will not be great with less than four.

By substituting the proper size inductances in the tuning controls this circuit will accomplish 20,000 meters wave length. Inductances mentioned will remain constant.

### Reinartz Reception.

(2892) HCN, Rapid City, S. Dak.

I built a Reinartz set according to one of your hook-ups, and have received 155 stations in four weeks, but would like to ask a few questions on this hook-up.

Can you use Radio frequency on a Reinartz? Is it advisable? Will it cure the kick-back which bothers neighboring receivers?

I am not using a phone condenser. What advantage would it give me?

I have no amplification, but get some stations so loud can lay phones on table and hear words ten feet away. My ground wire is very long, about 35 feet. Would shortening it by burying copper plates or driving pipe into the ground help to bring

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proper skill in tuning. There is nothing we could suggest to increase its selectivity.

Twenty-two and one-half volts on the plate is sufficient. There would be no advantage in connecting two 6-volt A batteries in parallel, as suggested.

A Homecharger is effective in charging B batteries.

### Static and Tube Noises

(3574) LCT, Jones, Ala.  
I would like to ask you a few questions as to a "Flewelling" set which I am installing.

How may I keep down static tube noises and body capacity?

How may I increase the clearness and range of my set?

A.—Answering your inquiry with reference to disturbances encountered in the operation of the Flewelling circuit, we advise that tube noises should be eliminated by careful tuning, and body capacity effect by shielding the back of the panel with tin foil and a grounding shield. By skillful adjustment of the grid leak the signals should be clear. The circuit has a consistent range of one thousand miles which probably will not be materially increased by any method.

Static interference is not peculiar to any circuit; it is difficult to combat. However, with a selective circuit, of which the Flewelling is a type, it should be at a minimum. A short one wire antenna is advised for the circuit in question.

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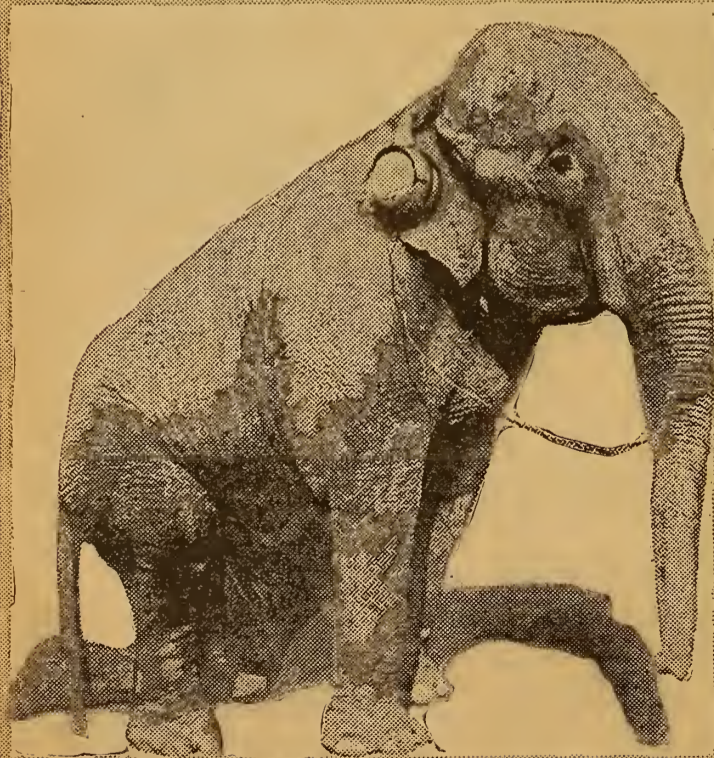
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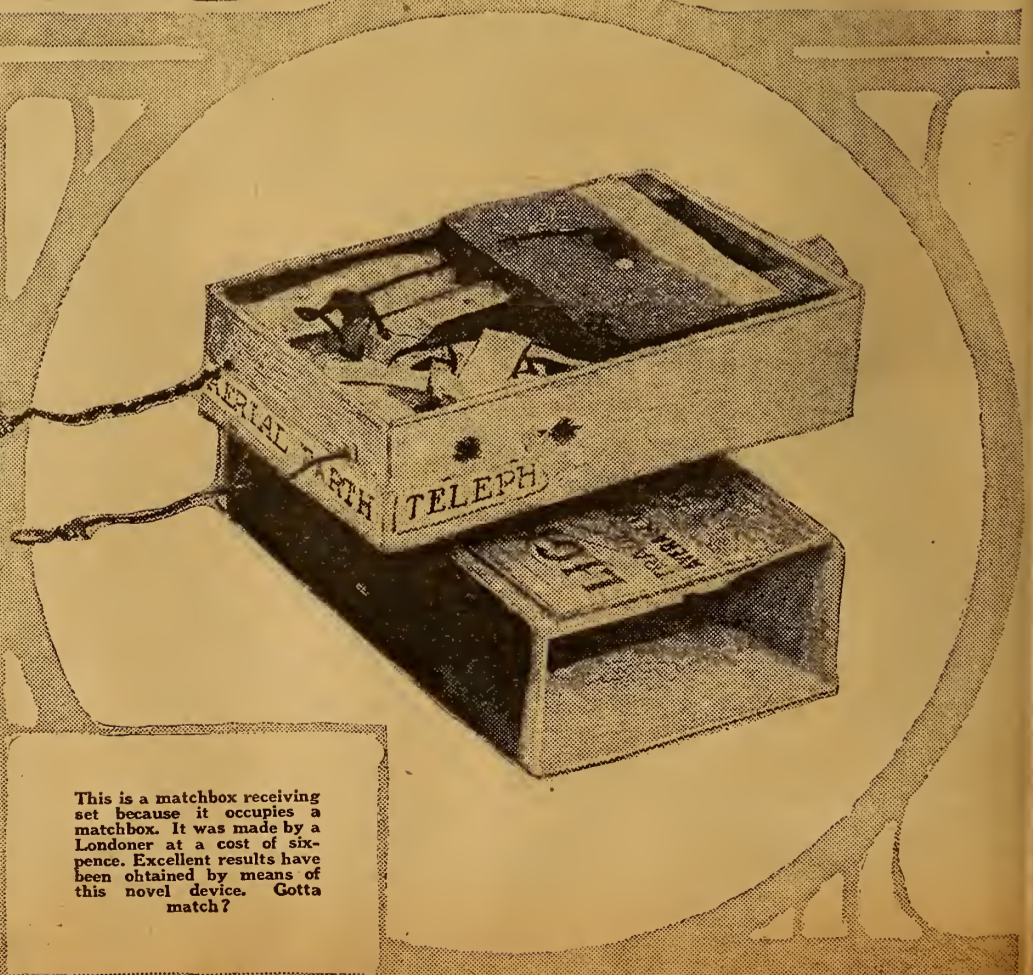




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